City of Sacramento
Supplement to Annual Continuing Disclosure Reports
Fiscal Years 2015/16, 2016/17, & 2017/18

Issue	Sacramento Public Financing Authority 2015 Lease Revenue Bonds (Golden 1 Center) (Federally Taxable)
Par	$ 272,870,000
Issued	September 24, 2015
CUSIP Numbers	78605QAD9 78605QAE7 78605QAF4 78605QAG2 78605QAH0 78605QAJ6

This filing supplements the following continuing disclosure filings:

- **FY16 continuing disclosure filing – EMMA submission ID ES799649**
- **FY17 continuing disclosure filing – EMMA submission ID ES869771**
- **FY18 continuing disclosure filing – EMMA submission ID ES966430**

<u>Content of Annual Report.</u>

The City's Annual Report shall contain or incorporate by reference the following:

A. The actuarial valuation report for the Miscellaneous Employees Plan and Safety Employees Plan most recently provided to the City by CalPERS as of the date the City files the Annual Report and the actuarial valuation report for SCERS most recently provided to the City by SCERS as of the date the City files the Annual Report.

Exhibit A1 – CalPERS Actuarial Valuation Report – Miscellaneous as of June 30, 2015
Exhibit A2 – CalPERS Actuarial Valuation Report – Miscellaneous as of June 30, 2016
Exhibit A3 – CalPERS Actuarial Valuation Report – Miscellaneous as of June 30, 2017
Exhibit B1 – CalPERS Actuarial Valuation Report – Safety as of June 30, 2015
Exhibit B2 – CalPERS Actuarial Valuation Report – Safety as of June 30, 2016
Exhibit B3 – CalPERS Actuarial Valuation Report – Safety as of June 30, 2017

Exhibit A1

California Public Employees' Retirement System
Actuarial Office
P.O. Box 942701
Sacramento, CA 94229-2701
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www.calpers.ca.gov

August 2016

MISCELLANEOUS PLAN OF THE CITY OF SACRAMENTO (CalPERS ID: 7903930500)
Annual Valuation Report as of June 30, 2015

Dear Employer,

As an attachment to this letter, you will find a copy of the June 30, 2015 actuarial valuation report of your pension plan. Your 2015 actuarial valuation report contains important actuarial information about your pension plan at CalPERS. Your CalPERS staff actuary, whose signature appears in the "Actuarial Certification" section on page 1, is available to discuss the report with you after August 31, 2016.

Future Contributions

The exhibit below displays the minimum employer contributions for Fiscal Year 2017-18 and projected contributions for Fiscal Year 2018-19, before any cost sharing. The projected contributions for Fiscal Year 2018-19 are based on the most recent information available, including an estimate of the investment return for Fiscal Year 2015-16, namely 0.0 percent. For a projection of employer contributions beyond Fiscal Year 2018-19, please refer to the "Projected Employer Contributions" in the "Highlights and Executive Summary" section. This 5-year projection of future employer contributions supersedes any previous projections we have provided. The "Risk Analysis" section of the valuation report also contains estimated employer contributions in future years under a variety of investment return scenarios.

Fiscal Year	Employer Normal Cost Rate	Employer Payment of Unfunded Liability	Employee PEPRA Rate
2017-18	7.803%	$16,565,701	6.00%
2018-19 (projected)	7.8%	$19,828,711	N/A

Member contributions other than cost sharing (whether paid by the employer or the employee) are in addition to the above. **The employer contributions in this report do not reflect any cost sharing arrangement you may have with your employees.**

The estimates for Fiscal Year 2018-19 also assume that there are no future contract amendments and no liability gains or losses (such as larger than expected pay increases, more retirements than expected, etc.). This is a very important assumption because these gains and losses do occur and can have a significant impact on required contributions. These gains and losses cannot be predicted in advance so the projected employer contributions are just estimates. The actual required employer contributions for Fiscal Year 2018-19 will be provided in next year's report.

Changes since the Prior Year's Valuation

Beginning with Fiscal Year 2017-18 CalPERS will collect employer contributions toward the plan's unfunded liability as dollar amounts instead of the prior method of a contribution rate. This change will address potential funding issues that could arise from a declining payroll or reduction in the number of active members in the plan. Funding the unfunded liability as a percentage of payroll could lead to the underfunding of the plans. Although employers will be invoiced at the beginning of the fiscal year for their unfunded liability payment the plan's normal cost contribution will continue to be collected as a percentage of payroll.

The CalPERS Board of Administration adopted a Risk Mitigation Policy which is designed to reduce funding risk over time. The policy establishes a mechanism whereby CalPERS investment performance that significantly outperforms the discount rate triggers adjustments to the discount rate, expected investment return and strategic asset allocation targets. A minimum excess investment return of 4% above the existing discount rate is necessary to cause a funding risk mitigation event. The policy has no impact on the current year valuation results but is expected to have an impact in future years. More details on the Risk Mitigation Policy can be found on our website.

Besides the above noted changes, there may also be changes specific to the plan such as contract amendments and funding changes.

Further descriptions of general changes are included in the "Highlights and Executive Summary" section and in Appendix A, "Actuarial Methods and Assumptions." The effects of the changes on the required contributions are included in the "Reconciliation of Required Employer Contributions" section.

We understand that you might have a number of questions about these results. While we are very interested in discussing these results with your agency, in the interest of allowing us to give every public agency their results, we ask that you wait until after August 31 to contact us with actuarial questions. If you have other questions, you may call the Customer Contact Center at (888)-CalPERS or (**888-225-7377**).

Sincerely,

ALAN MILLIGAN
Chief Actuary

ACTUARIAL VALUATION

as of June 30, 2015

for the MISCELLANEOUS PLAN of the CITY OF SACRAMENTO

(CalPERS ID: 7903930500)
(Rate Plan ID: 1209)

REQUIRED CONTRIBUTIONS FOR FISCAL YEAR July 1, 2017 – June 30, 2018

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ACTUARIAL CERTIFICATION

To the best of our knowledge, this report is complete and accurate and contains sufficient information to disclose, fully and fairly, the funded condition of the MISCELLANEOUS PLAN OF THE CITY OF SACRAMENTO. This valuation is based on the member and financial data as of June 30, 2015 provided by the various CalPERS databases and the benefits under this plan with CalPERS as of the date this report was produced. It is our opinion that the valuation has been performed in accordance with generally accepted actuarial principles, in accordance with standards of practice prescribed by the Actuarial Standards Board, and that the assumptions and methods are internally consistent and reasonable for this plan, as prescribed by the CalPERS Board of Administration according to provisions set forth in the California Public Employees' Retirement Law.

The undersigned is an actuary for CalPERS, who is a member of the American Academy of Actuaries and the Society of Actuaries and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

MAY SHUANG YU, ASA, MAAA
Senior Pension Actuary, CalPERS

HIGHLIGHTS AND EXECUTIVE SUMMARY

- **INTRODUCTION**
- **PURPOSE OF THE REPORT**
- **REQUIRED CONTRIBUTIONS**
- **PLAN'S FUNDED STATUS**
- **PROJECTED EMPLOYER CONTRIBUTIONS**
- **COST**
- **CHANGES SINCE THE PRIOR YEAR'S VALUATION**
- **SUBSEQUENT EVENTS**

Introduction

This report presents the results of the June 30, 2015 actuarial valuation of the MISCELLANEOUS PLAN OF THE CITY OF SACRAMENTO of the California Public Employees' Retirement System (CalPERS). This actuarial valuation sets the required employer contributions for Fiscal Year 2017-18.

The CalPERS Board of Administration adopted a Risk Mitigation Policy which is designed to reduce funding risk over time. The policy establishes a mechanism whereby CalPERS investment performance that significantly outperforms the discount rate triggers adjustments to the discount rate, expected investment return and strategic asset allocation targets. A minimum excess investment return of 4% above the existing discount rate is necessary to cause a funding risk mitigation event. The Risk Mitigation Policy does not have an impact on the current year actuarial valuation. More details on the Risk Mitigation Policy can be found on our website.

Purpose of the Report

The actuarial valuation was prepared by the CalPERS Actuarial Office using data as of June 30, 2015. The purpose of the report is to:

- Set forth the assets and accrued liabilities of this plan as of June 30, 2015;
- Determine the required employer contributions for the fiscal year July 1, 2017 through June 30, 2018;
- Provide actuarial information as of June 30, 2015 to the CalPERS Board of Administration and other interested parties.

The pension funding information presented in this report should not be used in financial reports subject to Governmental Accounting Standards Board (GASB) Statement No. 68 for an Agent Employer Defined Benefit Pension Plan. A separate accounting valuation report for such purposes is available from CalPERS and details for ordering are available on our website.

The use of this report for any other purposes may be inappropriate. In particular, this report does not contain information applicable to alternative benefit costs. The employer should contact their actuary before disseminating any portion of this report for any reason that is not explicitly described above.

California Actuarial Advisory Panel Recommendations

This report includes all the basic disclosure elements as described in the *Model Disclosure Elements for Actuarial Valuation Reports* recommended in 2011 by the California Actuarial Advisory Panel (CAAP), with the exception of including the original base amounts of the various components of the unfunded liability in the Schedule of Amortization Bases shown on page 15.

Additionally, this report includes the following "Enhanced Risk Disclosures" also recommended by the CAAP in the Model Disclosure Elements document:

- A "Deterministic Stress Test," projecting future results under different investment income scenarios
- A "Sensitivity Analysis," showing the impact on current valuation results using a 1 percent plus or minus change in the discount rate.

Required Contributions

		Fiscal Year
Required Employer Contribution		**2017-18**
Employer Normal Cost Rate		**7.803%**
Plus Either		
1) Monthly Employer Dollar UAL Payment	**$**	**1,380,475**
Or		
2) Annual UAL Prepayment Option	**$**	**15,977,381**
Required PEPRA Member Contribution Rate		**6.00%**

*The total minimum required employer contribution is the **sum** of the Plan's Employer Normal Cost Rate (expressed as a percentage of payroll) **plus** the Employer Unfunded Accrued Liability (UAL) Contribution Amount (billed monthly in dollars). Only the UAL portion of the employer contribution can be prepaid (which must be received in full no later than July 31). Plan Normal Cost contributions will be made as part of the payroll reporting process. If there is contractual cost sharing or other change, this amount will change. §20572 of the Public Employees' Retirement Law assesses interest at an annual rate of 10 percent if a contracting agency fails to remit the required contributions when due. For additional detail regarding the determination of the required contribution for PEPRA members, see Appendix D. Required member contributions for Classic members can be found in Appendix B.*

		Fiscal Year 2016-17		Fiscal Year 2017-18
Normal Cost Contribution as a Percentage of Payroll				
Total Normal Cost		14.675%		14.525%
Employee Contribution[1]		6.824%		6.722%
Employer Normal Cost		7.851%		7.803%
Projected Annual Payroll for Contribution Year	$	167,037,878	$	176,536,898
Estimated Employer Contributions Based On Projected Payroll				
Total Normal Cost	$	24,512,809	$	25,641,985
Employee Contribution[1]		11,398,665		11,866,810
Employer Normal Cost		13,114,144		13,775,175
Unfunded Liability Contribution		14,407,710		16,565,701
Estimated Total Employer Contribution[2]	$	27,521,854	$	30,340,876

[1] For classic members, this is the percentage specified in the Public Employees Retirement Law, net of any reduction from the use of a modified formula or other factors. For PEPRA members, the member contribution rate is based on 50 percent of the normal cost. A development of PEPRA member contribution rates can be found in Appendix D. Employee cost sharing is not shown in this report.

[2] As a percentage of projected payroll the UAL contribution for Fiscal Year 2017-18 is 9.384 percent for an estimated total employer contribution rate of 17.187 percent. As determined in the June 30, 2014 valuation, the Fiscal Year 2016-17 UAL contribution is 8.625 percent for a total employer contribution rate of 16.476 percent.

Plan's Funded Status

	June 30, 2014	June 30, 2015
1. Present Value of Projected Benefits	$ 1,177,474,929	$ 1,249,680,018
2. Entry Age Normal Accrued Liability	1,004,412,173	1,067,754,811
3. Market Value of Assets (MVA)	$ 795,788,802	$ 812,201,601
4. Unfunded Accrued Liability (UAL) [(2) – (3)]	$ 208,623,371	$ 255,553,210
5. Funded Ratio [(3) / (2)]	79.2%	76.1%

Projected Employer Contributions

The estimated employer contribution for Fiscal Year 2018-19 is based on a projection of the most recent information we have available, including an estimated 0.0 percent investment return for Fiscal Year 2015-16.

The table below shows projected employer contributions (before cost sharing) for the next five fiscal years, assuming CalPERS earns 0.0 percent for Fiscal Year 2015-16 and 7.50 percent every fiscal year thereafter, and assuming that all other actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur during the projection period. The projected normal cost percentages do not reflect that the normal cost will decline over time as new employees are hired into PEPRA or other lower cost benefit tiers.

	Required Contribution	**Projected Future Employer Contributions**				
Fiscal Year	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
Normal Cost %	7.803%	7.8%	7.8%	7.8%	7.8%	7.8%
UAL $	16,565,701	19,828,711	23,272,587	25,338,739	27,926,851	29,877,225

For projected contributions under alternate investment return scenarios, please see the "Analysis of Future Investment Return Scenarios" in the "Risk Analysis" section.

Cost

Actuarial Cost Estimates in General

What will this pension plan cost? Unfortunately, there is no simple answer. There are two major reasons for the complexity of the answer. First, actuarial calculations, including the ones in this report, are based on a number of assumptions about the future. These assumptions can be divided into two categories.

- Demographic assumptions include the percentage of employees that will terminate, die, become disabled, and retire in each future year.
- Economic assumptions include future salary increases for each active employee, and the assumption with the greatest impact: future asset returns at CalPERS for each year into the future until the last dollar is paid to current members of the plan.

While CalPERS has set these assumptions to reflect our best estimate of the real future of the plan, it must be understood that these assumptions are very long-term predictors and will surely not be realized in any one year. For example, while the asset earnings at CalPERS have averaged more than the assumed return of 7.5 percent for the past twenty year period ending June 30, 2015, returns for each fiscal year ranged from negative -24 percent to +21.7 percent.

Second, the very nature of actuarial funding produces the answer to the question of plan cost as the sum of two separate pieces.

- The Normal Cost (i.e., the annual cost associated with one year of service accrual) expressed as a percentage of total active payroll.
- The Past Service Cost or Accrued Liability (i.e., the current value of the benefit for all credited past service of current members) which is expressed as a lump sum dollar amount.

The cost is the sum of a percent of future pay and a lump sum dollar amount. In prior years CalPERS converted Past Service Cost to a percent of payroll and expressed the total required employer contribution as a single rate. Going forward the Past Service Cost will no longer be converted to a percent of payroll and this cost will be invoiced to the employer as a monthly dollar contribution amount with the option to prepay the annual amount at the beginning of the fiscal year. The normal cost will continue to be expressed as a percentage of active payroll with employer and employee contributions payable as part of the payroll reporting process.

Changes since the Prior Year's Valuation

Benefits

The standard actuarial practice at CalPERS is to recognize mandated legislative benefit changes in the first annual valuation following the effective date of the legislation. Voluntary benefit changes by plan amendment are generally included in the first valuation that is prepared after the amendment becomes effective, even if the valuation date is prior to the effective date of the amendment.

This valuation generally reflects plan changes by amendments effective before the date of the report. Please refer to the "Plan's Major Benefit Options" and Appendix B for a summary of the plan provisions used in this valuation. The effect of any mandated benefit changes or plan amendments on the unfunded liability is shown in the "(Gain)/Loss Analysis" and the effect on the employer contribution is shown in the "Reconciliation of Required Employer Contributions." It should be noted that no change in liability or contribution is shown for any plan changes which were already included in the prior year's valuation.

Actuarial Methods and Assumptions

Beginning with Fiscal Year 2017-18 CalPERS will collect employer contributions toward the plan's unfunded liability as dollar amounts instead of the prior method of a contribution rate. This change will address potential funding issues that could arise from a declining payroll or reduction in the number of active members in the plan. Funding the unfunded liability as a percentage of payroll could lead to the underfunding of the plans. Although employers will be invoiced at the beginning of the fiscal year for their unfunded liability payment the plan's normal cost contribution will continue to be collected as a percentage of payroll.

Subsequent Events

Risk Mitigation

The CalPERS Board of Administration adopted a Risk Mitigation Policy which is designed to reduce funding risk over time. The policy establishes a mechanism whereby CalPERS investment performance that significantly outperforms the discount rate triggers adjustments to the discount rate, expected investment return and strategic asset allocation targets. A minimum excess investment return of 4% above the existing discount rate is necessary to cause a funding risk mitigation event. More details on the Risk Mitigation Policy can be found on our website.

ASSETS

- **RECONCILIATION OF THE MARKET VALUE OF ASSETS**
- **ASSET ALLOCATION**
- **CALPERS HISTORY OF INVESTMENT RETURNS**

Reconciliation of the Market Value of Assets

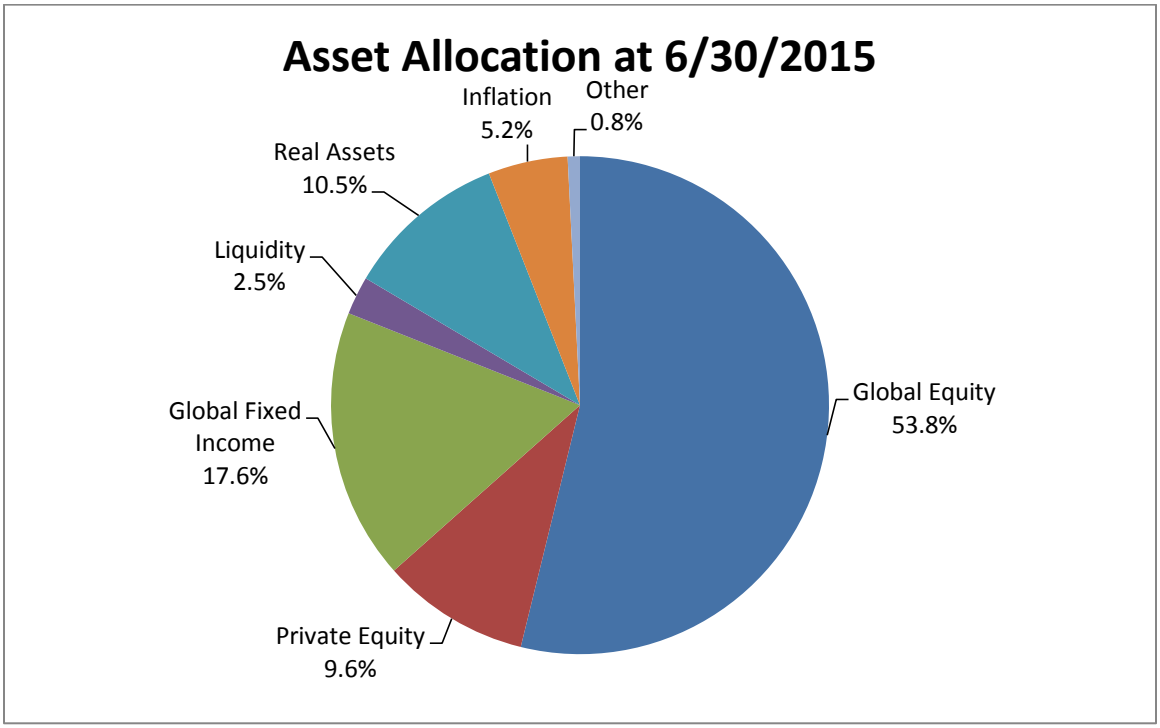
1.	Market Value of Assets as of 6/30/14 including Receivables	$	795,788,802
2.	Change in Receivables for Service Buybacks as of 6/30/14		(370,629)
3.	Employer Contributions		22,826,829
4.	Employee Contributions		10,813,795
5.	Benefit Payments to Retirees and Beneficiaries		(33,188,889)
6.	Refunds		(1,201,420)
7.	Lump Sum Payments		0
8.	Transfers and Miscellaneous Adjustments		331,922
9.	Investment Return		17,201,191
10.	Market Value of Assets as of 6/30/15 including Receivables	$	812,201,601

Asset Allocation

CalPERS adheres to an Asset Allocation Strategy which establishes asset class allocation policy targets and ranges, and manages those asset class allocations within their policy ranges. CalPERS Investment Belief No. 6 recognizes that strategic asset allocation is the dominant determinant of portfolio risk and return. On February 19, 2014, the CalPERS Board of Administration adopted changes to the current asset allocation as shown in the Policy Target Allocation below expressed as a percentage of total assets. The asset allocation has an expected long term blended rate of return of 7.5 percent.

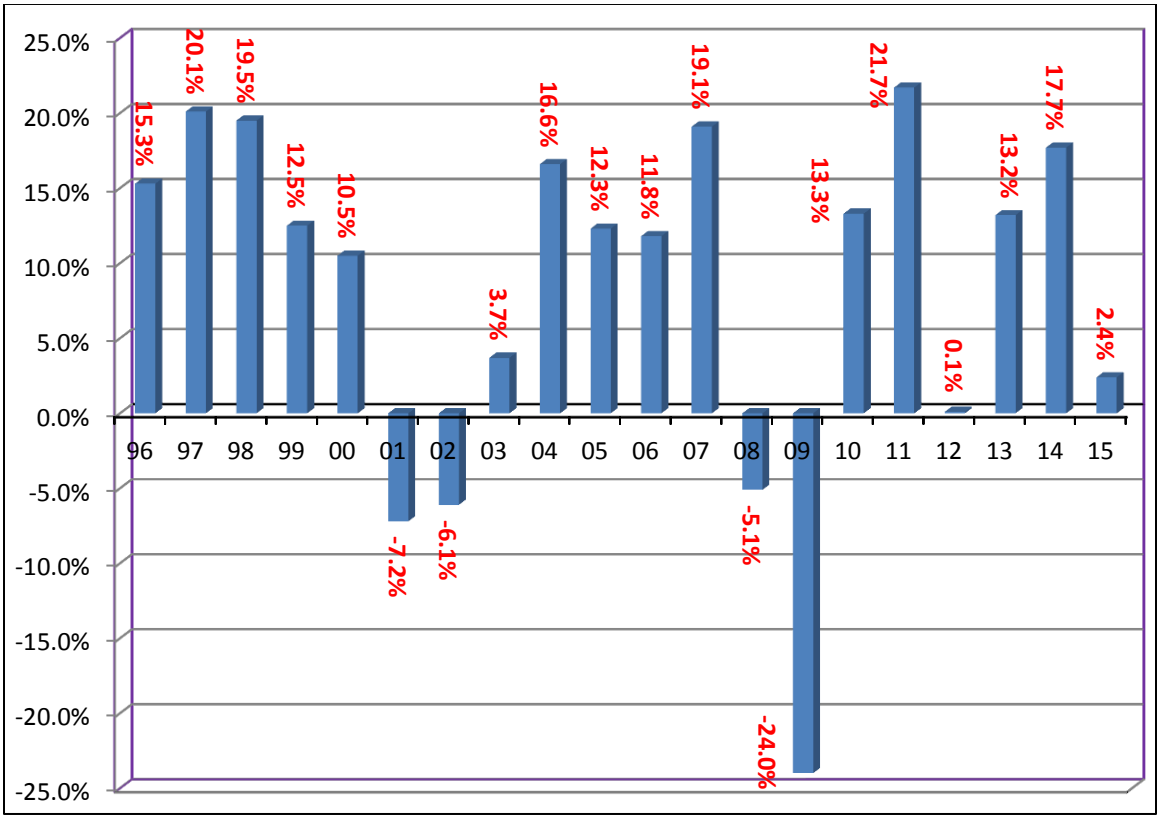
The asset allocation and market value of assets shown below reflect the values of the Public Employees' Retirement Fund (PERF) in its entirety as of June 30, 2015. The assets for CITY OF SACRAMENTO MISCELLANEOUS PLAN are part of the PERF and are invested accordingly.

(A) Asset Class	(B) Market Value ($ Billion)	(C) Policy Target Allocation
Global Equity	162.5	51.0%
Private Equity	29.0	10.0%
Global Fixed Income	53.1	20.0%
Liquidity	7.5	1.0%
Real Assets	31.8	12.0%
Inflation Sensitive Assets	15.6	6.0%
Other	2.4	0.0%
Total Fund	**$301.9**	**100.0%**



CalPERS History of Investment Returns

The following is a chart with the 20-year historical annual returns of the Public Employees Retirement Fund for each fiscal year ending on June 30. Beginning in 2002, the figures are reported as gross of fees.



The table below shows historical geometric mean annual returns of the Public Employees Retirement Fund for various time periods ending on June 30, 2015, (figures are reported as gross of fees). The geometric mean rate of return is the average rate per period compounded over multiple periods. It should be recognized that in any given year the rate of return is volatile. Although the expected rate of return on the recently adopted new asset allocation is 7.5 percent, the portfolio has an expected volatility of 11.76 percent per year. The volatility is a measure of the risk of the portfolio expressed in the standard deviation of the fund's total return distribution, expressed as a percentage. Consequently, when looking at investment returns, it is more instructive to look at returns over longer time horizons.

History of CalPERS Geometric Mean Rates of Return and Volatilities					
	1 year	**5 year**	**10 year**	**20 year**	**30 year**
Geometric Return	2.4%	10.7%	6.1%	7.7%	9.1%
Volatility	–	9.4%	14.0%	11.8%	10.5%

LIABILITIES AND CONTRIBUTIONS

- **DEVELOPMENT OF ACCRUED AND UNFUNDED LIABILITIES**
- **(GAIN) / LOSS ANALYSIS 06/30/14 - 06/30/15**
- **SCHEDULE OF AMORTIZATION BASES**
- **30-YEAR AMORTIZATION SCHEDULES AND ALTERNATIVES**
- **RECONCILIATION OF REQUIRED EMPLOYER CONTRIBUTIONS**
- **EMPLOYER CONTRIBUTION HISTORY**
- **FUNDING HISTORY**

Development of Accrued and Unfunded Liabilities

		June 30, 2014	June 30, 2015
1. Present Value of Projected Benefits			
a) Active Members	$	670,764,708	685,312,653
b) Transferred Members		77,156,548	81,254,972
c) Terminated Members		26,542,385	26,424,316
d) Members and Beneficiaries Receiving Payments		403,011,288	456,688,077
e) Total	$	1,177,474,929	1,249,680,018
2. Present Value of Future Employer Normal Costs	$	89,114,737	94,312,818
3. Present Value of Future Employee Contributions	$	83,948,019	87,612,389
4. Entry Age Normal Accrued Liability			
a) Active Members [(1a) - (2) - (3)]	$	497,701,952	503,387,446
b) Transferred Members (1b)		77,156,548	81,254,972
c) Terminated Members (1c)		26,542,385	26,424,316
d) Members and Beneficiaries Receiving Payments (1d)		403,011,288	456,688,077
e) Total	$	1,004,412,173	1,067,754,811
5. Market Value of Assets (MVA)	$	795,788,802	812,201,601
6. Unfunded Accrued Liability (UAL) [(4e) - (5)]	$	208,623,371	255,553,210
7. Funded Ratio [(5) / (4e)]		79.2%	76.1%

(Gain)/Loss Analysis 6/30/14 – 6/30/15

To calculate the cost requirements of the plan, assumptions are made about future events that affect the amount and timing of benefits to be paid and assets to be accumulated. Each year, actual experience is compared to the expected experience based on the actuarial assumptions. This results in actuarial gains or losses, as shown below.

1. Total (Gain)/Loss for the Year		
a) Unfunded Accrued Liability (UAL) as of 6/30/14	$	208,623,371
b) Expected Payment on the UAL during 2014/2015		10,339,690
c) Interest through 6/30/15 [.075 x (1a) - ((1.075)^{½} - 1) x (1b)]		15,266,024
d) Expected UAL before all other changes [(1a) - (1b) + (1c)]		213,549,705
e) Change due to plan changes		0
f) Change due to assumption change		0
g) Expected UAL after all other changes [(1d) + (1e) + (1f)]		213,549,705
h) Actual UAL as of 6/30/15		255,553,210
i) Total (Gain)/Loss for 2014/2015 [(1h) - (1g)]	$	42,003,505
2. Contribution (Gain)/Loss for the Year		
a) Expected Contribution (Employer and Employee)	$	33,446,938
b) Interest on Expected Contributions		1,231,585
c) Actual Contributions		33,640,624
d) Interest on Actual Contributions		1,238,717
e) Expected Contributions with Interest [(2a) + (2b)]		34,678,523
f) Actual Contributions with Interest [(2c) + (2d)]		34,879,341
g) Contribution (Gain)/Loss [(2e) - (2f)]	$	(200,818)
3. Asset (Gain)/Loss for the Year		
a) Market Value of Assets as of 6/30/14	$	795,788,802
b) Prior Fiscal Year Receivables		(2,634,849)
c) Current Fiscal Year Receivables		2,264,220
d) Contributions Received		33,640,624
e) Benefits and Refunds Paid		(34,390,309)
f) Transfers and Miscellaneous Adjustments		331,922
g) Expected Int. [.075 x (3a + 3b) + ((1.075)^{½} - 1) x ((3d) + (3e) + (3f))]		59,471,164
h) Expected Assets as of 6/30/15 [(3a) + (3b) + (3c) + (3d) + (3e) + (3f) + (3g)]		854,471,574
i) Market Value of Assets as of 6/30/15		812,201,601
j) Asset (Gain)/Loss [(3h) **-** (3i)]	$	42,269,973
4. Liability (Gain)/Loss for the Year		
a) Total (Gain)/Loss (1i)	$	42,003,505
b) Contribution (Gain)/Loss (2g)		(200,818)
c) Asset (Gain)/Loss (3j)		42,269,973
d) Liability (Gain)/Loss [(4a) - (4b) - (4c)]	$	(65,650)

Schedule of Amortization Bases

There is a two-year lag between the valuation date and the start of the contribution fiscal year.

- The assets, liabilities, and funded status of the plan are measured as of the valuation date: June 30, 2015.
- The required employer contributions determined by the valuation are for the fiscal year beginning two years after the valuation date: Fiscal Year 2017-18.

This two-year lag is necessary due to the amount of time needed to extract and test the membership and financial data, and the need to provide public agencies with their required employer contribution well in advance of the start of the fiscal year.

The Unfunded Accrued Liability (UAL) is used to determine the employer contribution and therefore must be rolled forward two years from the valuation date to the first day of the fiscal year for which the contribution is being determined. The UAL is rolled forward each year by subtracting the expected payment on the UAL for the fiscal year and adjusting for interest. The expected payment on the UAL for a fiscal year is equal to the Expected Employer Contribution for the fiscal year minus the Expected Normal Cost for the year. The Employer Contribution for the first fiscal year is determined by the actuarial valuation two years ago and the contribution for the second year is from the actuarial valuation one year ago. The Normal Cost Rate for each of the two fiscal years is assumed to be the same as the rate determined by the current valuation. All expected dollar amounts are determined by multiplying the rate by the expected payroll for the applicable fiscal year, based on payroll as of the valuation date.

Reason for Base	Date Established	Amortization Period	Balance 6/30/15	Expected Payment 2015-16	Balance 6/30/16	Expected Payment 2016-17	Balance 6/30/17	Scheduled Payment for 2017-18
BENEFIT CHANGE	06/30/05	9	$2,638,412	$305,174	$2,519,882	$314,329	$2,382,970	$323,759
ASSUMPTION CHANGE	06/30/07	8	$19,914,863	$2,484,170	$18,832,835	$2,558,695	$17,592,386	$2,635,456
ARNETT CASE	06/30/07	8	$159,091	$19,845	$150,447	$20,440	$140,538	$21,053
ASSETS CHANGE	06/30/07	8	$(134,007)	$(16,716)	$(126,726)	$(17,217)	$(118,379)	$(17,734)
METHOD CHANGE	06/30/07	9	$(1,453,443)	$(168,113)	$(1,388,148)	$(173,157)	$(1,312,726)	$(178,352)
BENEFIT CHANGE	06/30/08	12	$(315,547)	$(30,403)	$(307,690)	$(31,315)	$(298,299)	$(32,255)
ASSUMPTION CHANGE	06/30/09	14	$14,470,317	$1,267,482	$14,241,438	$1,305,506	$13,955,968	$1,344,671
SPECIAL (GAIN)/LOSS	06/30/09	24	$21,200,884	$1,371,248	$21,369,210	$1,412,386	$21,507,508	$1,454,757
SPECIAL (GAIN)/LOSS	06/30/10	25	$113,985	$7,224	$115,044	$7,441	$115,957	$7,664
ASSUMPTION CHANGE	06/30/11	16	$18,369,942	$1,485,114	$18,207,889	$1,529,667	$17,987,488	$1,575,557
SPECIAL (GAIN)/LOSS	06/30/11	26	$(3,393,801)	$(211,027)	$(3,429,539)	$(217,358)	$(3,461,393)	$(223,879)
PAYMENT (GAIN)/LOSS	06/30/12	27	$1,738,750	$106,193	$1,759,053	$109,378	$1,777,576	$112,660
(GAIN)/LOSS	06/30/12	27	$82,431,323	$5,034,416	$83,393,879	$5,185,448	$84,272,033	$5,341,012
SAFCA FRESH START B	06/30/13	28	$(245,658)	$(3,455)	$(260,500)	$(7,118)	$(272,658)	$(10,997)
SAFCA FRESH START A	06/30/13	19	$(249,264)	$(18,255)	$(249,031)	$(18,803)	$(248,212)	$(19,367)
(GAIN)/LOSS	06/30/13	28	$96,319,847	$1,354,742	$102,139,209	$2,790,769	$106,906,119	$4,311,737
ASSUMPTION CHANGE	06/30/14	19	$38,707,232	$(301,641)	$41,923,023	$798,537	$44,239,309	$1,644,985
(GAIN)/LOSS	06/30/14	29	$(76,723,219)	$(8,958)	$(82,468,173)	$(1,159,918)	$(87,450,658)	$(2,389,431)
(GAIN)/LOSS	06/30/15	30	$42,003,503	$580,284	$44,552,114	$632,205	$47,238,038	$664,405
TOTAL			**$255,553,210**	**$13,257,324**	**$260,974,216**	**$15,039,915**	**$264,953,565**	**$16,565,701**

30-Year Amortization Schedule and Alternatives

The amortization schedule on the previous page shows the minimum contributions required according to CalPERS amortization policy. There has been considerable interest from many agencies in paying off these unfunded accrued liabilities sooner and the possible savings in doing so. As a result, we have provided alternate amortization schedules to help analyze the current amortization schedule and illustrate the advantages of accelerating unfunded liability payments.

Shown on the following page are future year amortization payments based on 1) the current amortization schedule reflecting the individual bases and remaining periods shown on the previous page, and 2) alternate "fresh start" amortization schedules using two sample periods that would both result in interest savings relative to the current amortization schedule. Note that the payments under each alternate scenario increase by 3 percent for each year into the future. The schedules do not attempt to reflect any experience after June 30, 2015 that may deviate from the actuarial assumptions. Therefore, future amortization payments displayed in the Current Amortization Schedule may not match projected amortization payments shown in connection with Projected Employer Contributions provided elsewhere in this report.

The Current Amortization Schedule typically contains individual bases that are both positive and negative. Positive bases result from plan changes, assumption changes or plan experience that result in increases to unfunded liability. Negative bases result from plan changes, assumption changes or plan experience that result in decreases to unfunded liability. The combination of positive and negative bases within an amortization schedule can result in unusual or problematic circumstances in future years such as:

- A positive total unfunded liability with a negative total payment,
- A negative total unfunded liability with a positive total payment, or
- Total payments that completely amortize the unfunded liability over a very short period of time

In any year where one of the above scenarios occurs, the actuary will consider corrective action such as replacing the existing unfunded liability bases with a single "fresh start" base and amortizing it over a reasonable period.

The Current Amortization Schedule on the following page may appear to show that, based on the current amortization bases, one of the above scenarios will occur at some point in the future. It is impossible to know today whether such a scenario will in fact arise since there will be additional bases added to the amortization schedule in each future year. Should such a scenario arise in any future year, the actuary will take appropriate action based on guidelines in the CalPERS amortization policy. For purposes of this display, total payments include any negative payments. Therefore, the amount of estimated savings may be understated to the extent that negative payments appear in the current schedule.

30-Year Amortization Schedule and Alternatives

	Current Amortization Schedule		Alternate Schedules			
			20 Year Amortization		15 Year Amortization	
Date	**Balance**	**Payment**	**Balance**	**Payment**	**Balance**	**Payment**
6/30/2017	264,953,565	16,565,701	264,953,565	20,005,432	264,953,565	24,288,170
6/30/2018	267,649,396	18,840,211	264,083,009	20,605,595	259,642,572	25,016,815
6/30/2019	268,189,157	21,236,278	262,524,898	21,223,763	253,177,778	25,767,320
6/30/2020	266,285,102	22,192,642	260,209,000	21,860,476	245,449,986	26,540,339
6/30/2021	263,246,667	23,606,211	257,059,251	22,516,290	236,341,125	27,336,550
6/30/2022	258,514,725	24,314,400	252,993,308	23,191,779	225,723,572	28,156,646
6/30/2023	252,693,620	25,043,830	247,922,058	23,887,532	213,459,408	29,001,345
6/30/2024	245,679,648	25,795,147	241,749,092	24,604,158	199,399,629	29,871,386
6/30/2025	237,360,642	23,226,280	234,370,139	25,342,283	183,383,289	30,767,527
6/30/2026	231,081,173	23,733,344	225,672,461	26,102,552	165,236,584	31,690,553
6/30/2027	223,805,006	24,445,344	215,534,194	26,885,628	144,771,863	32,641,270
6/30/2028	215,244,908	25,178,704	203,823,646	27,692,197	121,786,564	33,620,508
6/30/2029	205,282,440	25,980,055	190,398,539	28,522,963	96,062,072	34,629,123
6/30/2030	193,741,931	26,759,455	175,105,192	29,378,652	67,362,488	35,667,997
6/30/2031	180,527,783	25,528,302	157,777,647	30,260,011	35,433,309	36,738,037
6/30/2032	167,599,061	25,012,734	138,236,723	31,167,812		
6/30/2033	154,235,235	21,914,952	116,289,002	32,102,846		
6/30/2034	143,080,972	21,212,944	91,725,738	33,065,931		
6/30/2035	131,817,994	20,449,094	64,321,681	34,057,909		
6/30/2036	120,502,274	19,654,282	33,833,816	35,079,647		
6/30/2037	109,161,951	20,243,911				
6/30/2038	96,359,764	20,851,226				
6/30/2039	81,967,735	21,476,764				
6/30/2040	65,847,734	22,121,068				
6/30/2041	47,850,701	16,913,302				
6/30/2042	33,903,417	16,904,525				
6/30/2043	18,919,189	15,946,493				
6/30/2044	3,804,453	2,304,284				
6/30/2045	1,700,654	306,798				
6/30/2046	1,510,108	1,565,713				
Totals		**599,323,994**		**537,553,456**		**451,733,586**
Estimated Savings				**61,770,538**		**147,590,408**

Reconciliation of Required Employer Contributions

Normal Cost (% of Payroll)

1. For Period 7/1/16 – 6/30/17	
a) Employer Normal Cost	7.851%
b) Employee Contribution	6.824%
c) Total Normal Cost	14.675%
2. Effect of changes since the prior year annual valuation	
a) Effect of changes in demographics results	(0.150%)
b) Effect of plan changes	0.000%
c) Effect of changes in assumptions	0.000%
d) Net effect of the changes above [sum of (a) through (c)]	(0.150%)
3. For Period 7/1/17 – 6/30/18	
a) Employer Normal Cost	7.803%
b) Employee Contribution	6.722%
c) Total Normal Cost	14.525%
Employer Normal Cost Change [(3a) – (1a)]	(0.048%)
Employee Contribution Change [(3b) – (1b)]	(0.102%)

Unfunded Liability Contribution ($)

1. For Period 7/1/16 – 6/30/17	14,407,710
2. Effect of changes since the prior year annual valuation	
a) Effect of changes in demographics and financial results	664,405
b) Effect of plan changes	0
c) Effect of changes in assumptions	0
d) Effect of progression of amortization payments	1,493,586
e) Effect of changes due to Fresh Start	0
f) Effect of elimination of amortization base	0
g) Net effect of the changes above [sum of (a) through (f)]	2,157,991
3. For Period 7/1/17 – 6/30/18 [(1)+(2g)]	16,565,701

The amounts shown for the period 7/1/16 – 6/30/17 may be different if a prepayment of unfunded actuarial liability is made or a plan change became effective after the prior year's actuarial valuation was performed.

Employer Contribution History

The table below provides a recent history of the required employer contributions for the plan, as determined by the annual actuarial valuation. It does not account for prepayments or benefit changes made during a fiscal year.

		Required By Valuation	
Fiscal Year	**Employer Normal Cost**	**Unfunded Rate**	**Unfunded Liability Payment ($)**
2012 - 13	7.433%	5.411%	N/A
2013 - 14	7.676%	5.969%	N/A
2014 - 15	7.582%	6.837%	N/A
2015 - 16	7.810%	7.859%	N/A
2016 - 17	7.851%	8.625%	N/A
2017 - 18	7.803%	N/A	16,565,701

Funding History

The table below shows the recent history of the actuarial accrued liability, the market value of assets, the funded ratio and the annual covered payroll.

Valuation Date	Accrued Liability	Market Value of Assets (MVA)	Unfunded Liability	Funded Ratio	Annual Covered Payroll
06/30/10	$ 750,920,883	$ 477,184,231	$ 273,736,652	63.5%	$ 171,328,547
06/30/11	819,168,698	589,536,663	229,632,035	72.0%	164,638,959
06/30/12	860,874,899	596,115,272	264,759,627	69.2%	151,456,486
06/30/13	914,353,322	677,151,274	237,202,048	74.1%	151,487,681
06/30/14	1,004,412,173	795,788,802	208,623,371	79.2%	152,863,321
06/30/15	1,067,754,811	812,201,601	255,553,210	76.1%	161,556,270

RISK ANALYSIS

- **ANALYSIS OF FUTURE INVESTMENT RETURN SCENARIOS**
- **ANALYSIS OF DISCOUNT RATE SENSITIVITY**
- **VOLATILITY RATIOS**
- **HYPOTHETICAL TERMINATION LIABILITY**

Analysis of Future Investment Return Scenarios

The investment return for Fiscal Year 2015-16 was not known at the time this report was produced. The investment return in Fiscal Year 2015-16 as of April 30, 2016 is 0.0 percent before administrative expenses. For purposes of projecting future employer contributions, we are assuming a 0.0 percent investment return for Fiscal Year 2015-16.

The investment return realized during a fiscal year first affects the required contribution for the fiscal year two years later. For example, the investment return for Fiscal Year 2015-16 will first be reflected in the June 30, 2016 actuarial valuation that will be used to set the employer contribution for Fiscal Year 2018-19. The Fiscal Year 2016-17 investment return will first be reflected in the June 30, 2017 actuarial valuation that will be used to set the employer contribution for Fiscal Year 2019-20 and so forth.

As part of this report, a sensitivity analysis was performed to determine the effects of various investment returns during fiscal years 2016-17, 2017-18 and 2018-19 on the 2019-20, 2020-21 and 2021-22 employer contributions. Once again, the projections assume that all other actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur.

Five different investment return scenarios were selected.

- The first scenario is a -3.8 percent return for each of the 2016-17, 2017-18, and 2018-19 fiscal years. Based on the current investment allocation, this is what one would expect if the markets were to give us about a 5th percentile return from July 1, 2016 through June 30, 2019.
- The second scenario is a 2.8 percent return for each of the 2016-17, 2017-18, and 2018-19 fiscal years. Based on the current investment allocation, this is what one would expect if the markets were to give us about a 25th percentile return from July 1, 2016 through June 30, 2019.
- The third scenario is a 7.5 percent return for each of the 2016-17, 2017-18, and 2018-19 fiscal years. Based on the current investment allocation, this is what one would expect if the markets were to give us about a 49th percentile return from July 1, 2016 through June 30, 2019.
- The fourth scenario is a 12.0 percent return for each of the 2016-17, 2017-18, and 2018-19 fiscal years. Based on the current investment allocation, this is what one would expect if the markets were to give us about a 75th percentile return from July 1, 2016 through June 30, 2019.
- Finally, the last scenario is an 18.9 percent return for each of the 2016-17, 2017-18, and 2018-19 fiscal years. Based on the current investment allocation, this is what one would expect if the markets were to give us about a 95th percentile return from July 1, 2016 through June 30, 2019.

The table below shows the estimated projected contributions and the estimated increases for the plan under the five different scenarios.

2016-19 Investment Return Scenario	Fiscal Year			Estimated Change Between 2018-19 and 2021-22
	2019-20	2020-21	2021-22	
(3.8%)				
Normal Cost	7.8%	7.8%	7.8%	0.0%
UAL Contribution	$24,766,867	$29,862,112	$37,061,695	$17,232,984
2.8%				
Normal Cost	7.8%	7.8%	7.8%	0.0%
UAL Contribution	$23,894,081	$27,261,090	$31,892,468	$12,063,757
7.5%				
Normal Cost	7.8%	7.8%	7.8%	0.0%
UAL Contribution	$23,272,587	$25,338,739	$27,926,851	$8,098,140
12.0%				
Normal Cost	8.0%	8.2%	8.4%	0.6%
UAL Contribution	$22,706,889	$23,640,998	$24,408,528	$4,579,817
18.9%				
Normal Cost	8.4%	8.9%	9.5%	1.7%
UAL Contribution	$21,865,357	$21,113,224	$19,084,996	$(743,715)

For the last two scenarios in the table above the results incorporate the impact of CalPERS Risk Mitigation Policy. A 12.0% return would result in a reduction of the discount rate by 0.05% and a return of 18.9% would reduce the discount rate by 0.15%. Reducing the discount rate increases both the plan's accrued liability and normal cost. While the projections reflect estimated changes to the normal cost due to lower discount rates, they do not reflect the possible increase in the PEPRA member contribution rate in such scenarios. More details about the Risk Mitigation policy can be found on our website.

The projected normal cost percentages do not reflect that the normal cost will decline over time as new employees are hired into PEPRA or other lower cost benefit tiers.

Analysis of Discount Rate Sensitivity

The following analysis looks at the Fiscal Year 2017-18 total normal cost rates and liabilities under two different discount rate scenarios. Shown below are the total normal cost rates assuming discount rates that are 1 percent lower and 1 percent higher than the current valuation discount rate. This analysis shows the potential plan impacts if the PERF were to realize investment returns of 6.50 percent or 8.50 percent over the long-term.

This type of analysis gives the reader a sense of the long-term risk to required contributions.

Sensitivity Analysis			
As of June 30, 2015	**6.50% Discount Rate (-1%)**	**7.50% Discount Rate (assumed rate)**	**8.50% Discount Rate (+1%)**
Plan's Total Normal Cost	18.306%	14.525%	11.688%
Accrued Liability	$1,225,497,863	$1,067,754,811	$938,504,389
Unfunded Accrued Liability	$413,296,262	$255,553,210	$126,302,788

Volatility Ratios

The actuarial calculations supplied in this communication are based on a number of assumptions about long-term demographic and economic behavior. Unless these assumptions (terminations, deaths, disabilities, retirements, salary growth, and investment return) are exactly realized each year, there will be differences on a year-to-year basis. The year-to-year differences between actual experience and the assumptions are called actuarial gains and losses and serve to lower or raise required employer contributions from one year to the next. Therefore, employer contributions will inevitably fluctuate, especially due to the ups and downs of investment returns.

Asset Volatility Ratio (AVR)

Plans that have higher asset-to-payroll ratios experience more volatile employer contributions (as a percentage of payroll) due to investment return. For example, a plan with an asset-to-payroll ratio of 8 may experience twice the contribution volatility due to investment return volatility than a plan with an asset-to-payroll ratio of 4. Shown below is the asset volatility ratio, a measure of the plan's current volatility. It should be noted that this ratio is a measure of the current situation. It increases over time but generally tends to stabilize as the plan matures.

Liability Volatility Ratio (LVR)

Plans that have higher liability-to-payroll ratios experience more volatile employer contributions (as a percentage of payroll) due to investment return and changes in liability. For example, a plan with a liability-to-payroll ratio of 8 is expected to have twice the contribution volatility of a plan with a liability-to-payroll ratio of 4. The liability volatility ratio is also included in the table below. It should be noted that this ratio indicates a longer-term potential for contribution volatility. The asset volatility ratio, described above, will tend to move closer to the liability volatility ratio as the plan matures.

Contribution Volatility		As of June 30, 2015
1. Market Value of Assets without Receivables	$	809,937,381
2. Payroll		161,556,270
3. Asset Volatility Ratio (AVR) [(1) / (2)]		5.0
4. Accrued Liability	$	1,067,754,811
5. Liability Volatility Ratio (LVR) [(4) / (2)]		6.6

Hypothetical Termination Liability

The hypothetical termination liability is an estimate of the financial position of the plan had the contract with CalPERS been terminated as of June 30, 2015. The plan liability on a termination basis is calculated differently compared to the plan's ongoing funding liability. For this hypothetical termination liability calculation, both compensation and service are frozen as of the valuation date and no future pay increases or service accruals are assumed.

A more conservative investment policy and asset allocation strategy was adopted by the CalPERS Board for the Terminated Agency Pool. The Terminated Agency Pool has limited funding sources since no future employer contributions will be made. Therefore, expected benefit payments are secured by risk-free assets and benefit security for members is increased while limiting the funding risk. However, this asset allocation has a lower expected rate of return than the PERF and consequently, a lower discount rate assumption. The lower discount rate for the Terminated Agency Pool results in higher liabilities for terminated plans.

The effective termination discount rate will depend on actual market rates of return for risk-free securities on the date of termination. As market discount rates are variable the table below shows a range for the hypothetical termination liability based on the lowest and highest interest rates observed during an approximate 2-year period centered around the valuation date.

Market Value of Assets (MVA)	Hypothetical Termination Liability[1,2] @ 2.00%	Funded Status	Unfunded Termination Liability @ 2.00%	Hypothetical Termination Liability[1,2] @ 3.25%	Funded Status	Unfunded Termination Liability @ 3.25%
$812,201,601	$2,173,460,458	37.4%	$1,361,258,857	$1,776,868,303	45.7%	$964,666,702

[1] The hypothetical liabilities calculated above include a 7 percent mortality contingency load in accordance with Board policy. Other actuarial assumptions, such as wage and inflation assumptions, can be found in Appendix A.

[2] The current discount rate assumption used for termination valuations is a weighted average of the 10-year and 30-year U.S. Treasury yields where the weights are based on matching asset and liability durations as of the termination date. The discount rates used in the table are based on 20-year Treasury bonds, rounded to the nearest quarter percentage point, which is a good proxy for most plans. The 20-year Treasury yield was 2.75 percent on June 30, 2015.

In order to terminate the plan, you must first contact our Retirement Services Contract Unit to initiate a Resolution of Intent to Terminate. The completed Resolution will allow the plan actuary to give you a preliminary termination valuation with a more up-to-date estimate of the plan liabilities. CalPERS advises you to consult with the plan actuary before beginning this process.

PLAN'S MAJOR BENEFIT PROVISIONS

Plan's Major Benefit Options

Shown below is a summary of the major optional benefits for which your agency has contracted. A description of principal standard and optional plan provisions is in the following section of this Appendix.

	Contract Package						
Benefit Provision	Active Misc	Active Misc	Active Misc	Active Misc	Inactive Misc	Receiving Misc	
Benefit Formula	2.0% @ 55	2.0% @ 55	2.0% @ 55	2.0% @ 62	2.0% @ 55		
Social Security Coverage	Yes	Yes	No	Yes	No		
Full/Modified	Modified	Modified	Full	Full	Full		
Employee Contribution Rate	7.00%	7.00%	7.00%	6.00%			
Final Average Compensation Period	One Year	One Year	One Year	Three Year	One Year		
Sick Leave Credit	Yes	Yes	Yes	Yes	Yes		
Non-Industrial Disability	Standard	Standard	Standard	Standard	Standard		
Industrial Disability	Yes	Yes	Yes	Yes	Yes		
Pre-Retirement Death Benefits							
Optional Settlement 2W	No	No	No	No	No		
1959 Survivor Benefit Level	No	No	No	No	No		
Special	No	No	No	No	No		
Alternate (firefighters)	No	No	No	No	No		
Post-Retirement Death Benefits							
Lump Sum	$500	$500	$500	$500	$500	$500	
Survivor Allowance (PRSA)	Yes	Yes	Yes	Yes	Yes	Yes	
COLA	2%	2%	2%	2%	2%	2%	

APPENDICES

- **APPENDIX A – ACTUARIAL METHODS AND ASSUMPTIONS**
- **APPENDIX B – PRINCIPAL PLAN PROVISIONS**
- **APPENDIX C – PARTICIPANT DATA**
- **APPENDIX D – DEVELOPMENT OF PEPRA MEMBER CONTRIBUTION RATES**
- **APPENDIX E – GLOSSARY OF ACTUARIAL TERMS**

APPENDIX A

ACTUARIAL METHODS AND ASSUMPTIONS

- **ACTUARIAL DATA**
- **ACTUARIAL METHODS**
- **ACTUARIAL ASSUMPTIONS**
- **MISCELLANEOUS**

Actuarial Data

As stated in the Actuarial Certification, the data which serves as the basis of this valuation has been obtained from the various CalPERS databases. We have reviewed the valuation data and believe that it is reasonable and appropriate in aggregate. We are unaware of any potential data issues that would have a material effect on the results of this valuation, except that data does not always contain the latest salary information for former members now in reciprocal systems and does not recognize the potential for unusually large salary deviation in certain cases such as elected officials. Therefore, salary information in these cases may not be accurate. These situations are relatively infrequent, however, and when they do occur, they generally do not have a material impact on the required employer contributions.

Actuarial Methods

Actuarial Cost Method

The actuarial cost method used is the Entry Age Normal Cost Method. Under this method, projected benefits are determined for all members and the associated liabilities are spread in a manner that produces level annual cost as a percentage of pay in each year from the member's age of hire (entry age) to their assumed retirement age on the valuation date. The cost allocated to the current fiscal year is called the normal cost.

The actuarial accrued liability for active members is then calculated as the portion of the total cost of the plan allocated to prior years. The actuarial accrued liability for members currently receiving benefits and for members entitled to deferred benefits is equal to the present value of the benefits expected to be paid. No normal costs are applicable for these participants.

Amortization of Unfunded Actuarial Accrued Liability

The excess of the total actuarial accrued liability over the market value of plan assets is called the unfunded actuarial accrued liability (UAL). Funding requirements are determined by adding the normal cost and an amortization payment toward the unfunded liability. Commencing with the June 30, 2013 valuation, all new gains or losses are tracked and amortized over a fixed 30-year period with a 5 year ramp up at the beginning and a 5 year ramp down at the end of the amortization period. All changes in liability due to plan amendments (other than golden handshakes) are amortized over a 20-year period with no ramp. Changes in actuarial assumptions, or changes in actuarial methodology are amortized over a 20-year period with a 5 year ramp up at the beginning and a 5 year ramp down at the end of the amortization period. Changes in unfunded accrued liability due to a Golden Handshake will be amortized over a period of 5 years.

<u>Exceptions for Inconsistencies:</u>

An exception to the amortization rules above is used whenever their application results in inconsistencies. In these cases, a "fresh start" approach is used. This means that the current unfunded actuarial liability is projected and amortized over a set number of years. For example, a fresh start is needed in the following situations:

1) When a positive payment would be required on a negative unfunded actuarial liability (or conversely a negative payment on a positive unfunded actuarial liability); or
2) When there are excess assets, rather than an unfunded liability. In this situation, a 30-year fresh start is used.

It should be noted that the actuary may determine that a fresh start is necessary under other circumstances. In all cases of a fresh start, the period is set by the actuary at what is deemed appropriate; however, the period will not be greater than 30 years.

Exceptions for Inactive Plans:

The following exceptions apply to plans classified as Inactive. These plans have no active members and no expectation to have active members in the future.

- Amortization of unfunded liability is on a "level dollar" basis rather than a "level percent of pay" basis
- Actuarial judgment will be used to shorten amortization periods for Inactive plans with existing periods that are deemed too long given the duration of the liability. In many cases, a Fresh Start approach with a 20 year closed period will be used. However, the specific demographics of the plan will be used to determine if periods shorter or longer than 20 years may be more appropriate.

Asset Valuation Method

It is the policy of the CalPERS Board of Administration to use professionally accepted amortization methods to eliminate a surplus or an unfunded accrued liability in a manner that maintains benefit security for the members of the System while minimizing substantial variations in required employer contributions. On April 17, 2013, the CalPERS Board of Administration approved a recommendation to change the CalPERS amortization and rate smoothing policies. Beginning with the June 30, 2013 valuations that set the employer contribution for Fiscal Year 2015-16, CalPERS employs a policy that amortizes all gains and losses over a fixed 30-year period. The increase or decrease in the rate is then spread directly over a 5-year period. This method is referred to as "direct rate smoothing." CalPERS no longer uses an actuarial value of assets and only uses the market value of assets. The direct rate smoothing method is equivalent to a method using a 5 year asset smoothing period with no actuarial value of asset corridor and a 25-year amortization period for gains and losses.

PEPRA Normal Cost Rate Methodology

Per Government Code Section 7522.30(b) the "normal cost rate" shall mean the annual actuarially determined normal cost for the plan of retirement benefits provided to the new member and shall be established based on actuarial assumptions used to determine the liabilities and costs as part of the annual actuarial valuation. The plan of retirement benefits shall include any elements that would impact the actuarial determination of the normal cost, including, but not limited to, the retirement formula, eligibility and vesting criteria, ancillary benefit provisions, and any automatic cost-of-living adjustments as determined by the public retirement system.

Each non-pooled plan is considered to be stable with a sufficiently large demographic of actives. It is preferable to determine normal cost using a large active population ongoing so that this rate remains relatively stable. The total PEPRA normal cost will be calculated using all active members within a non-pooled plan. Accordingly, plans will be funded equally between employer and employee based on the demographics of the employees of that employer. As each non-pooled plan builds up to either 100+ active PEPRA members or half of their active population is under the PEPRA formula, the total PEPRA normal cost will be based on the active PEPRA population in the plan.

Actuarial Assumptions

In 2014, CalPERS completed a 2-year asset liability management study incorporating actuarial assumptions and strategic asset allocation. On February 19, 2014, the CalPERS Board of Administration adopted relatively modest changes to the current asset allocation that will reduce the expected volatility of returns. The adopted asset allocation is expected to have a long-term blended return that continues to support a discount rate assumption of 7.5 percent. The Board also approved several changes to the demographic assumptions that more closely align with actual experience. The most significant of these is mortality improvement to acknowledge the greater life expectancies we are seeing in our membership and expected continued improvements. The new actuarial assumptions were first used in the June 30, 2014 valuation to set the Fiscal Year 2016-17 contribution for public agency employers. The increase in liability due to new actuarial assumptions is amortized over a 20-year period with a 5-year ramp-up/ramp-down in accordance with Board policy. These new actuarial assumptions are set forth in this section.

For more details and additional rationale for the selection of the actuarial assumptions, please refer to the CalPERS Experience Study and Review of Actuarial Assumptions report from January 2014 that can be found on the CalPERS website under: "Forms and Publications". Click on "View All" and search for Experience Study.

All actuarial assumptions (except the discount rates used for the hypothetical termination liability) represent an estimate of future experience rather than observations of the estimates inherent in market data.

Economic Assumptions

Discount Rate

7.5 percent compounded annually (net of expenses). This assumption is used for all plans.

Termination Liability Discount Rate

The current discount rate assumption used for termination valuations is a weighted average of the 10-year and 30-year U.S. Treasury yields where the weights are based on matching asset and liability durations as of the termination date.

The hypothetical termination liabilities in this report are calculated using an observed range of market interest rates. This range is based on the lowest and highest 20-year Treasury bond observed during an approximate 2-year period centered around the valuation date. The 20-year Treasury bond has a similar duration to most plan liabilities and serves as a good proxy for the termination discount rate. The 20-year Treasury yield was 2.75 percent on June 30, 2015.

Salary Growth

Annual increases vary by category, entry age, and duration of service. A sample of assumed increases are shown below.

Public Agency Miscellaneous

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.1220	0.1160	0.1020
1	0.0990	0.0940	0.0830
2	0.0860	0.0810	0.0710
3	0.0770	0.0720	0.0630
4	0.0700	0.0650	0.0570
5	0.0640	0.0600	0.0520
10	0.0460	0.0430	0.0390
15	0.0420	0.0400	0.0360
20	0.0390	0.0380	0.0340
25	0.0370	0.0360	0.0330
30	0.0350	0.0340	0.0320

Public Agency Fire

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.2000	0.1980	0.1680
1	0.1490	0.1460	0.1250
2	0.1200	0.1160	0.0990
3	0.0980	0.0940	0.0810
4	0.0820	0.0780	0.0670
5	0.0690	0.0640	0.0550
10	0.0470	0.0460	0.0420
15	0.0440	0.0420	0.0390
20	0.0420	0.0390	0.0360
25	0.0400	0.0370	0.0340
30	0.0380	0.0360	0.0340

Public Agency Police

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.1500	0.1470	0.1310
1	0.1160	0.1120	0.1010
2	0.0950	0.0920	0.0830
3	0.0810	0.0780	0.0700
4	0.0700	0.0670	0.0600
5	0.0610	0.0580	0.0520
10	0.0450	0.0430	0.0370
15	0.0450	0.0430	0.0370
20	0.0450	0.0430	0.0370
25	0.0450	0.0430	0.0370
30	0.0450	0.0430	0.0370

Salary Growth (continued)

Public Agency County Peace Officers

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.1770	0.1670	0.1500
1	0.1340	0.1260	0.1140
2	0.1080	0.1030	0.0940
3	0.0900	0.0860	0.0790
4	0.0760	0.0730	0.0670
5	0.0650	0.0620	0.0580
10	0.0470	0.0450	0.0410
15	0.0460	0.0450	0.0390
20	0.0460	0.0450	0.0380
25	0.0460	0.0450	0.0380
30	0.0460	0.0440	0.0380

Schools

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.0900	0.0880	0.0820
1	0.0780	0.0750	0.0700
2	0.0700	0.0680	0.0630
3	0.0650	0.0630	0.0580
4	0.0610	0.0590	0.0540
5	0.0580	0.0560	0.0510
10	0.0460	0.0450	0.0410
15	0.0420	0.0410	0.0380
20	0.0390	0.0380	0.0350
25	0.0370	0.0350	0.0330
30	0.0350	0.0330	0.0310

- The Miscellaneous salary scale is used for Local Prosecutors.
- The Police salary scale is used for Other Safety, Local Sheriff, and School Police.

Overall Payroll Growth

3.00 percent compounded annually (used in projecting the payroll over which the unfunded liability is amortized). This assumption is used for all plans.

Inflation

2.75 percent compounded annually. This assumption is used for all plans.

Non-valued Potential Additional Liabilities

The potential liability loss for a cost-of-living increase exceeding the 2.75 percent inflation assumption, and any potential liability loss from future member service purchases are not reflected in the valuation.

Miscellaneous Loading Factors

Credit for Unused Sick Leave

Total years of service is increased by 1 percent for those plans that have accepted the provision providing Credit for Unused Sick Leave.

Conversion of Employer Paid Member Contributions (EPMC)

Total years of service is increased by the Employee Contribution Rate for those plans with the provision providing for the Conversion of Employer Paid Member Contributions (EPMC) during the final compensation period.

Norris Decision (Best Factors)

Employees hired prior to July 1, 1982 have projected benefit amounts increased in order to reflect the use of "Best Factors" in the calculation of optional benefit forms. This is due to a 1983 Supreme Court decision, known as the Norris decision, which required males and females to be treated equally in the determination of benefit amounts. Consequently, anyone already employed at that time is given the best possible conversion factor when optional benefits are determined. No loading is necessary for employees hired after July 1, 1982.

Termination Liability

The termination liabilities include a 7 percent contingency load. This load is for unforeseen improvements in mortality.

Demographic Assumptions

Pre-Retirement Mortality

Non-industrial death rates vary by age and gender. Industrial death rates vary by age. See sample rates in table below. The non-industrial death rates are used for all plans. The industrial death rates are used for safety plans (except for Local Prosecutor safety members where the corresponding miscellaneous plan does not have the Industrial Death Benefit).

	Non-Industrial Death (Not Job-Related)		**Industrial Death (Job-Related)**
Age	Male	Female	Male and Female
20	0.00031	0.00020	0.00003
25	0.00040	0.00023	0.00007
30	0.00049	0.00025	0.00010
35	0.00057	0.00035	0.00012
40	0.00075	0.00050	0.00013
45	0.00106	0.00071	0.00014
50	0.00155	0.00100	0.00015
55	0.00228	0.00138	0.00016
60	0.00308	0.00182	0.00017
65	0.00400	0.00257	0.00018
70	0.00524	0.00367	0.00019
75	0.00713	0.00526	0.00020
80	0.00990	0.00814	0.00021

Miscellaneous plans usually have industrial death rates set to zero unless the agency has specifically contracted for industrial death benefits. If so, each non-industrial death rate shown above will be split into two components; 99 percent will become the non-industrial death rate and 1 percent will become the industrial death rate.

Post-Retirement Mortality

Rates vary by age, type of retirement, and gender. See sample rates in table below. These rates are used for all plans.

	Healthy Recipients		Non-Industrially Disabled (Not Job-Related)		Industrially Disabled (Job-Related)	
Age	Male	Female	Male	Female	Male	Female
50	0.00501	0.00466	0.01680	0.01158	0.00501	0.00466
55	0.00599	0.00416	0.01973	0.01149	0.00599	0.00416
60	0.00710	0.00436	0.02289	0.01235	0.00754	0.00518
65	0.00829	0.00588	0.02451	0.01607	0.01122	0.00838
70	0.01305	0.00993	0.02875	0.02211	0.01635	0.01395
75	0.02205	0.01722	0.03990	0.03037	0.02834	0.02319
80	0.03899	0.02902	0.06083	0.04725	0.04899	0.03910
85	0.06969	0.05243	0.09731	0.07762	0.07679	0.06251
90	0.12974	0.09887	0.14804	0.12890	0.12974	0.09887
95	0.22444	0.18489	0.22444	0.21746	0.22444	0.18489
100	0.32536	0.30017	0.32536	0.30017	0.32536	0.30017
105	0.58527	0.56093	0.58527	0.56093	0.58527	0.56093
110	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000

The post-retirement mortality rates above include 20 years of projected on-going mortality improvement using Scale BB published by the Society of Actuaries.

Marital Status

For active members, a percentage who are married upon retirement is assumed according to member category as shown in the following table.

Member Category	Percent Married
Miscellaneous Member	85%
Local Police	90%
Local Fire	90%
Other Local Safety	90%
School Police	90%

Age of Spouse

It is assumed that female spouses are 3 years younger than male spouses. This assumption is used for all plans.

Terminated Members

It is assumed that terminated members refund immediately if non-vested. Terminated members who are vested are assumed to follow the same service retirement pattern as active members but with a load to reflect the expected higher rates of retirement, especially at lower ages. The following table shows the load factors that are applied to the service retirement assumption for active members to obtain the service retirement pattern for separated vested members:

Age	Load Factor Miscellaneous	Load Factor Safety
50	190%	310%
51	110%	190%
52	110%	105%
53 through 54	100%	105%
55	100%	140%
56 and above	100% (no change)	100% (no change)

Termination with Refund

Rates vary by entry age and service for miscellaneous plans. Rates vary by service for safety plans. See sample rates in tables below.

Public Agency Miscellaneous

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40	Entry Age 45
0	0.1742	0.1674	0.1606	0.1537	0.1468	0.1400
1	0.1545	0.1477	0.1409	0.1339	0.1271	0.1203
2	0.1348	0.1280	0.1212	0.1142	0.1074	0.1006
3	0.1151	0.1083	0.1015	0.0945	0.0877	0.0809
4	0.0954	0.0886	0.0818	0.0748	0.0680	0.0612
5	0.0212	0.0193	0.0174	0.0155	0.0136	0.0116
10	0.0138	0.0121	0.0104	0.0088	0.0071	0.0055
15	0.0060	0.0051	0.0042	0.0032	0.0023	0.0014
20	0.0037	0.0029	0.0021	0.0013	0.0005	0.0001
25	0.0017	0.0011	0.0005	0.0001	0.0001	0.0001
30	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001
35	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Public Agency Safety

Duration of Service	Fire	Police	County Peace Officer
0	0.0710	0.1013	0.0997
1	0.0554	0.0636	0.0782
2	0.0398	0.0271	0.0566
3	0.0242	0.0258	0.0437
4	0.0218	0.0245	0.0414
5	0.0029	0.0086	0.0145
10	0.0009	0.0053	0.0089
15	0.0006	0.0027	0.0045
20	0.0005	0.0017	0.0020
25	0.0003	0.0012	0.0009
30	0.0003	0.0009	0.0006
35	0.0003	0.0009	0.0006

The police termination and refund rates are also used for Public Agency Local Prosecutors, Other Safety, Local Sheriff, and School Police.

Schools

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40	Entry Age 45
0	0.1730	0.1627	0.1525	0.1422	0.1319	0.1217
1	0.1585	0.1482	0.1379	0.1277	0.1174	0.1071
2	0.1440	0.1336	0.1234	0.1131	0.1028	0.0926
3	0.1295	0.1192	0.1089	0.0987	0.0884	0.0781
4	0.1149	0.1046	0.0944	0.0841	0.0738	0.0636
5	0.0278	0.0249	0.0221	0.0192	0.0164	0.0135
10	0.0172	0.0147	0.0122	0.0098	0.0074	0.0049
15	0.0115	0.0094	0.0074	0.0053	0.0032	0.0011
20	0.0073	0.0055	0.0038	0.0020	0.0002	0.0002
25	0.0037	0.0023	0.0010	0.0002	0.0002	0.0002
30	0.0015	0.0003	0.0002	0.0002	0.0002	0.0002
35	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002

Termination with Vested Benefits

Rates vary by entry age and service for miscellaneous plans. Rates vary by service for safety plans. See sample rates in tables below.

Public Agency Miscellaneous

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40
5	0.0656	0.0597	0.0537	0.0477	0.0418
10	0.0530	0.0466	0.0403	0.0339	0.0000
15	0.0443	0.0373	0.0305	0.0000	0.0000
20	0.0333	0.0261	0.0000	0.0000	0.0000
25	0.0212	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000	0.0000
35	0.0000	0.0000	0.0000	0.0000	0.0000

Public Agency Safety

Duration of Service	Fire	Police	County Peace Officer
5	0.0162	0.0163	0.0265
10	0.0061	0.0126	0.0204
15	0.0058	0.0082	0.0130
20	0.0053	0.0065	0.0074
25	0.0047	0.0058	0.0043
30	0.0045	0.0056	0.0030
35	0.0000	0.0000	0.0000

- When a member is eligible to retire, the termination with vested benefits probability is set to zero.
- After termination with vested benefits, a miscellaneous member is assumed to retire at age 59 and a safety member at age 54.
- The Police termination with vested benefits rates are also used for Public Agency Local Prosecutors, Other Safety, Local Sheriff, and School Police.

Schools

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40
5	0.0816	0.0733	0.0649	0.0566	0.0482
10	0.0629	0.0540	0.0450	0.0359	0.0000
15	0.0537	0.0440	0.0344	0.0000	0.0000
20	0.0420	0.0317	0.0000	0.0000	0.0000
25	0.0291	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000	0.0000
35	0.0000	0.0000	0.0000	0.0000	0.0000

Non-Industrial (Not Job-Related) Disability

Rates vary by age and gender for miscellaneous plans. Rates vary by age and category for safety plans.

	Miscellaneous		Fire	Police	County Peace Officer	Schools	
Age	Male	Female	Male and Female	Male and Female	Male and Female	Male	Female
20	0.0002	0.0001	0.0001	0.0001	0.0001	0.0003	0.0003
25	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
30	0.0002	0.0002	0.0001	0.0002	0.0001	0.0001	0.0002
35	0.0005	0.0008	0.0001	0.0003	0.0004	0.0005	0.0004
40	0.0012	0.0016	0.0001	0.0004	0.0007	0.0015	0.0010
45	0.0019	0.0022	0.0002	0.0005	0.0013	0.0030	0.0019
50	0.0021	0.0023	0.0005	0.0008	0.0018	0.0039	0.0024
55	0.0022	0.0018	0.0010	0.0013	0.0010	0.0036	0.0021
60	0.0022	0.0014	0.0015	0.0020	0.0006	0.0031	0.0014

- The miscellaneous non-industrial disability rates are used for Local Prosecutors.
- The police non-industrial disability rates are also used for Other Safety, Local Sheriff, and School Police.

Industrial (Job-Related) Disability

Rates vary by age and category.

Age	Fire	Police	County Peace Officer
20	0.0001	0.0000	0.0004
25	0.0003	0.0017	0.0013
30	0.0007	0.0048	0.0025
35	0.0016	0.0079	0.0037
40	0.0030	0.0110	0.0051
45	0.0053	0.0141	0.0067
50	0.0277	0.0185	0.0092
55	0.0409	0.0479	0.0151
60	0.0583	0.0602	0.0174

- The police industrial disability rates are also used for Local Sheriff and Other Safety.
- Fifty percent of the police industrial disability rates are used for School Police.
- One percent of the police industrial disability rates are used for Local Prosecutors.
- Normally, rates are zero for miscellaneous plans unless the agency has specifically contracted for industrial disability benefits. If so, each miscellaneous non-industrial disability rate will be split into two components: 50 percent will become the non-industrial disability rate and 50 percent will become the industrial disability rate.

Service Retirement

Retirement rates vary by age, service, and formula, except for the safety ½ @ 55 and 2% @ 55 formulas, where retirement rates vary by age only.

Service Retirement

Public Agency Miscellaneous 1.5% @ 65

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.008	0.011	0.013	0.015	0.017	0.019
51	0.007	0.010	0.012	0.013	0.015	0.017
52	0.010	0.014	0.017	0.019	0.021	0.024
53	0.008	0.012	0.015	0.017	0.019	0.022
54	0.012	0.016	0.019	0.022	0.025	0.028
55	0.018	0.025	0.031	0.035	0.038	0.043
56	0.015	0.021	0.025	0.029	0.032	0.036
57	0.020	0.028	0.033	0.038	0.043	0.048
58	0.024	0.033	0.040	0.046	0.052	0.058
59	0.028	0.039	0.048	0.054	0.060	0.067
60	0.049	0.069	0.083	0.094	0.105	0.118
61	0.062	0.087	0.106	0.120	0.133	0.150
62	0.104	0.146	0.177	0.200	0.223	0.251
63	0.099	0.139	0.169	0.191	0.213	0.239
64	0.097	0.136	0.165	0.186	0.209	0.233
65	0.140	0.197	0.240	0.271	0.302	0.339
66	0.092	0.130	0.157	0.177	0.198	0.222
67	0.129	0.181	0.220	0.249	0.277	0.311
68	0.092	0.129	0.156	0.177	0.197	0.221
69	0.092	0.130	0.158	0.178	0.199	0.224
70	0.103	0.144	0.175	0.198	0.221	0.248

Public Agency Miscellaneous 2% @ 60

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.010	0.013	0.015	0.018	0.019	0.021
51	0.009	0.011	0.014	0.016	0.017	0.019
52	0.011	0.014	0.017	0.020	0.022	0.024
53	0.010	0.012	0.015	0.017	0.020	0.021
54	0.015	0.019	0.023	0.025	0.029	0.031
55	0.022	0.029	0.035	0.040	0.045	0.049
56	0.018	0.024	0.028	0.033	0.036	0.040
57	0.024	0.032	0.038	0.043	0.049	0.053
58	0.027	0.036	0.043	0.049	0.055	0.061
59	0.033	0.044	0.054	0.061	0.068	0.076
60	0.056	0.077	0.092	0.105	0.117	0.130
61	0.071	0.097	0.118	0.134	0.149	0.166
62	0.117	0.164	0.198	0.224	0.250	0.280
63	0.122	0.171	0.207	0.234	0.261	0.292
64	0.114	0.159	0.193	0.218	0.244	0.271
65	0.150	0.209	0.255	0.287	0.321	0.358
66	0.114	0.158	0.192	0.217	0.243	0.270
67	0.141	0.196	0.238	0.270	0.301	0.337
68	0.103	0.143	0.174	0.196	0.219	0.245
69	0.109	0.153	0.185	0.209	0.234	0.261
70	0.117	0.162	0.197	0.222	0.248	0.277

Service Retirement

Public Agency Miscellaneous 2% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.014	0.018	0.021	0.025	0.027	0.031
51	0.012	0.014	0.017	0.020	0.021	0.025
52	0.013	0.017	0.019	0.023	0.025	0.028
53	0.015	0.020	0.023	0.027	0.030	0.034
54	0.026	0.033	0.038	0.045	0.051	0.059
55	0.048	0.061	0.074	0.088	0.100	0.117
56	0.042	0.053	0.063	0.075	0.085	0.100
57	0.044	0.056	0.067	0.081	0.091	0.107
58	0.049	0.062	0.074	0.089	0.100	0.118
59	0.057	0.072	0.086	0.103	0.118	0.138
60	0.067	0.086	0.103	0.123	0.139	0.164
61	0.081	0.103	0.124	0.148	0.168	0.199
62	0.116	0.147	0.178	0.214	0.243	0.288
63	0.114	0.144	0.174	0.208	0.237	0.281
64	0.108	0.138	0.166	0.199	0.227	0.268
65	0.155	0.197	0.238	0.285	0.325	0.386
66	0.132	0.168	0.203	0.243	0.276	0.328
67	0.122	0.155	0.189	0.225	0.256	0.304
68	0.111	0.141	0.170	0.204	0.232	0.274
69	0.114	0.144	0.174	0.209	0.238	0.282
70	0.130	0.165	0.200	0.240	0.272	0.323

Public Agency Miscellaneous 2.5% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.004	0.009	0.019	0.029	0.049	0.094
51	0.004	0.009	0.019	0.029	0.049	0.094
52	0.004	0.009	0.020	0.030	0.050	0.095
53	0.008	0.014	0.025	0.036	0.058	0.104
54	0.024	0.034	0.050	0.066	0.091	0.142
55	0.066	0.088	0.115	0.142	0.179	0.241
56	0.042	0.057	0.078	0.098	0.128	0.184
57	0.041	0.057	0.077	0.097	0.128	0.183
58	0.045	0.061	0.083	0.104	0.136	0.192
59	0.055	0.074	0.098	0.123	0.157	0.216
60	0.066	0.088	0.115	0.142	0.179	0.241
61	0.072	0.095	0.124	0.153	0.191	0.255
62	0.099	0.130	0.166	0.202	0.248	0.319
63	0.092	0.121	0.155	0.189	0.233	0.302
64	0.091	0.119	0.153	0.187	0.231	0.299
65	0.122	0.160	0.202	0.245	0.297	0.374
66	0.138	0.179	0.226	0.272	0.329	0.411
67	0.114	0.149	0.189	0.229	0.279	0.354
68	0.100	0.131	0.168	0.204	0.250	0.322
69	0.114	0.149	0.189	0.229	0.279	0.354
70	0.127	0.165	0.209	0.253	0.306	0.385

Service Retirement

Public Agency Miscellaneous 2.7% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.004	0.009	0.014	0.035	0.055	0.095
51	0.002	0.006	0.011	0.030	0.050	0.090
52	0.006	0.012	0.017	0.038	0.059	0.099
53	0.010	0.017	0.024	0.046	0.068	0.110
54	0.032	0.044	0.057	0.085	0.113	0.160
55	0.076	0.101	0.125	0.165	0.205	0.265
56	0.055	0.074	0.093	0.127	0.160	0.214
57	0.050	0.068	0.086	0.118	0.151	0.204
58	0.055	0.074	0.093	0.127	0.161	0.215
59	0.061	0.082	0.102	0.138	0.174	0.229
60	0.069	0.093	0.116	0.154	0.192	0.250
61	0.086	0.113	0.141	0.183	0.225	0.288
62	0.105	0.138	0.171	0.218	0.266	0.334
63	0.103	0.135	0.167	0.215	0.262	0.329
64	0.109	0.143	0.177	0.226	0.275	0.344
65	0.134	0.174	0.215	0.270	0.326	0.401
66	0.147	0.191	0.235	0.294	0.354	0.433
67	0.121	0.158	0.196	0.248	0.300	0.372
68	0.113	0.147	0.182	0.232	0.282	0.352
69	0.117	0.153	0.189	0.240	0.291	0.362
70	0.141	0.183	0.226	0.283	0.341	0.418

Public Agency Miscellaneous 3% @ 60

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.012	0.018	0.024	0.039	0.040	0.091
51	0.009	0.014	0.019	0.034	0.034	0.084
52	0.014	0.020	0.026	0.043	0.044	0.096
53	0.016	0.023	0.031	0.048	0.050	0.102
54	0.026	0.036	0.045	0.065	0.070	0.125
55	0.043	0.057	0.072	0.096	0.105	0.165
56	0.042	0.056	0.070	0.094	0.103	0.162
57	0.049	0.065	0.082	0.108	0.119	0.180
58	0.057	0.076	0.094	0.122	0.136	0.199
59	0.076	0.100	0.123	0.157	0.175	0.244
60	0.114	0.148	0.182	0.226	0.255	0.334
61	0.095	0.123	0.152	0.190	0.214	0.288
62	0.133	0.172	0.211	0.260	0.294	0.378
63	0.129	0.166	0.204	0.252	0.285	0.368
64	0.143	0.185	0.226	0.278	0.315	0.401
65	0.202	0.260	0.318	0.386	0.439	0.542
66	0.177	0.228	0.279	0.340	0.386	0.482
67	0.151	0.194	0.238	0.292	0.331	0.420
68	0.139	0.179	0.220	0.270	0.306	0.391
69	0.190	0.245	0.299	0.364	0.414	0.513
70	0.140	0.182	0.223	0.274	0.310	0.396

Service Retirement

Public Agency Miscellaneous 2% @ 62

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.000	0.000	0.000	0.000	0.000	0.000
51	0.000	0.000	0.000	0.000	0.000	0.000
52	0.010	0.013	0.016	0.019	0.022	0.024
53	0.013	0.017	0.020	0.024	0.027	0.031
54	0.021	0.027	0.033	0.039	0.045	0.050
55	0.044	0.056	0.068	0.080	0.092	0.104
56	0.030	0.039	0.047	0.055	0.063	0.072
57	0.036	0.046	0.056	0.066	0.076	0.086
58	0.046	0.059	0.072	0.085	0.097	0.110
59	0.058	0.074	0.089	0.105	0.121	0.137
60	0.062	0.078	0.095	0.112	0.129	0.146
61	0.062	0.079	0.096	0.113	0.129	0.146
62	0.097	0.123	0.150	0.176	0.202	0.229
63	0.089	0.113	0.137	0.162	0.186	0.210
64	0.094	0.120	0.145	0.171	0.197	0.222
65	0.129	0.164	0.199	0.234	0.269	0.304
66	0.105	0.133	0.162	0.190	0.219	0.247
67	0.105	0.133	0.162	0.190	0.219	0.247
68	0.105	0.133	0.162	0.190	0.219	0.247
69	0.105	0.133	0.162	0.190	0.219	0.247
70	0.125	0.160	0.194	0.228	0.262	0.296

Service Retirement

Public Agency Fire ½ @ 55 and 2% @ 55

Age	Rate	Age	Rate
50	0.0159	56	0.1108
51	0.0000	57	0.0000
52	0.0344	58	0.0950
53	0.0199	59	0.0441
54	0.0413	60	1.00000
55	0.0751		

Public Agency Police ½ @ 55 and 2% @ 55

Age	Rate	Age	Rate
50	0.0255	56	0.0692
51	0.0000	57	0.0511
52	0.0164	58	0.0724
53	0.0272	59	0.0704
54	0.0095	60	1.0000
55	0.1667		

Service Retirement

Public Agency Police 2% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.005	0.005	0.005	0.005	0.017	0.089
51	0.005	0.005	0.005	0.005	0.017	0.087
52	0.018	0.018	0.018	0.018	0.042	0.132
53	0.044	0.044	0.044	0.044	0.090	0.217
54	0.065	0.065	0.065	0.065	0.126	0.283
55	0.086	0.086	0.086	0.086	0.166	0.354
56	0.067	0.067	0.067	0.067	0.130	0.289
57	0.066	0.066	0.066	0.066	0.129	0.288
58	0.066	0.066	0.066	0.066	0.129	0.288
59	0.139	0.139	0.139	0.139	0.176	0.312
60	0.123	0.123	0.123	0.123	0.153	0.278
61	0.110	0.110	0.110	0.110	0.138	0.256
62	0.130	0.130	0.130	0.130	0.162	0.291
63	0.130	0.130	0.130	0.130	0.162	0.291
64	0.130	0.130	0.130	0.130	0.162	0.291
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.009	0.009	0.009	0.009	0.013	0.020
51	0.013	0.013	0.013	0.013	0.020	0.029
52	0.018	0.018	0.018	0.018	0.028	0.042
53	0.052	0.052	0.052	0.052	0.079	0.119
54	0.067	0.067	0.067	0.067	0.103	0.154
55	0.089	0.089	0.089	0.089	0.136	0.204
56	0.083	0.083	0.083	0.083	0.127	0.190
57	0.082	0.082	0.082	0.082	0.126	0.189
58	0.088	0.088	0.088	0.088	0.136	0.204
59	0.074	0.074	0.074	0.074	0.113	0.170
60	0.100	0.100	0.100	0.100	0.154	0.230
61	0.072	0.072	0.072	0.072	0.110	0.165
62	0.099	0.099	0.099	0.099	0.152	0.228
63	0.114	0.114	0.114	0.114	0.175	0.262
64	0.114	0.114	0.114	0.114	0.175	0.262
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 3% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.004	0.004	0.004	0.004	0.015	0.086
51	0.014	0.014	0.014	0.014	0.034	0.114
52	0.026	0.026	0.026	0.026	0.060	0.154
53	0.038	0.038	0.038	0.038	0.083	0.188
54	0.071	0.071	0.071	0.071	0.151	0.292
55	0.061	0.061	0.061	0.061	0.131	0.261
56	0.072	0.072	0.072	0.072	0.153	0.295
57	0.065	0.065	0.065	0.065	0.140	0.273
58	0.066	0.066	0.066	0.066	0.142	0.277
59	0.118	0.118	0.118	0.118	0.247	0.437
60	0.065	0.065	0.065	0.065	0.138	0.272
61	0.084	0.084	0.084	0.084	0.178	0.332
62	0.108	0.108	0.108	0.108	0.226	0.405
63	0.084	0.084	0.084	0.084	0.178	0.332
64	0.084	0.084	0.084	0.084	0.178	0.332
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 3% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.001	0.001	0.001	0.006	0.016	0.069
51	0.002	0.002	0.002	0.006	0.018	0.071
52	0.012	0.012	0.012	0.021	0.040	0.098
53	0.032	0.032	0.032	0.049	0.085	0.149
54	0.057	0.057	0.057	0.087	0.144	0.217
55	0.073	0.073	0.073	0.109	0.179	0.259
56	0.064	0.064	0.064	0.097	0.161	0.238
57	0.063	0.063	0.063	0.095	0.157	0.233
58	0.065	0.065	0.065	0.099	0.163	0.241
59	0.088	0.088	0.088	0.131	0.213	0.299
60	0.105	0.105	0.105	0.155	0.251	0.344
61	0.118	0.118	0.118	0.175	0.282	0.380
62	0.087	0.087	0.087	0.128	0.210	0.295
63	0.067	0.067	0.067	0.100	0.165	0.243
64	0.067	0.067	0.067	0.100	0.165	0.243
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 3% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.050	0.050	0.050	0.099	0.240	0.314
51	0.034	0.034	0.034	0.072	0.198	0.260
52	0.033	0.033	0.033	0.071	0.198	0.259
53	0.039	0.039	0.039	0.080	0.212	0.277
54	0.045	0.045	0.045	0.092	0.229	0.300
55	0.052	0.052	0.052	0.105	0.248	0.323
56	0.042	0.042	0.042	0.087	0.221	0.289
57	0.043	0.043	0.043	0.088	0.223	0.292
58	0.054	0.054	0.054	0.109	0.255	0.333
59	0.054	0.054	0.054	0.108	0.253	0.330
60	0.060	0.060	0.060	0.121	0.272	0.355
61	0.048	0.048	0.048	0.098	0.238	0.311
62	0.061	0.061	0.061	0.122	0.274	0.357
63	0.057	0.057	0.057	0.115	0.263	0.343
64	0.069	0.069	0.069	0.137	0.296	0.385
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 3% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.020	0.020	0.020	0.040	0.130	0.192
51	0.008	0.008	0.008	0.023	0.107	0.164
52	0.023	0.023	0.023	0.043	0.136	0.198
53	0.023	0.023	0.023	0.043	0.135	0.198
54	0.027	0.027	0.027	0.048	0.143	0.207
55	0.043	0.043	0.043	0.070	0.174	0.244
56	0.053	0.053	0.053	0.085	0.196	0.269
57	0.054	0.054	0.054	0.086	0.197	0.271
58	0.052	0.052	0.052	0.084	0.193	0.268
59	0.075	0.075	0.075	0.116	0.239	0.321
60	0.065	0.065	0.065	0.102	0.219	0.298
61	0.076	0.076	0.076	0.117	0.241	0.324
62	0.068	0.068	0.068	0.106	0.224	0.304
63	0.027	0.027	0.027	0.049	0.143	0.208
64	0.094	0.094	0.094	0.143	0.277	0.366
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 2% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.011	0.011	0.011	0.011	0.020	0.036
51	0.009	0.009	0.009	0.009	0.016	0.028
52	0.018	0.018	0.018	0.018	0.034	0.060
53	0.037	0.037	0.037	0.037	0.067	0.119
54	0.049	0.049	0.049	0.049	0.089	0.159
55	0.063	0.063	0.063	0.063	0.115	0.205
56	0.045	0.045	0.045	0.045	0.082	0.146
57	0.064	0.064	0.064	0.064	0.117	0.209
58	0.047	0.047	0.047	0.047	0.086	0.154
59	0.105	0.105	0.105	0.105	0.130	0.191
60	0.105	0.105	0.105	0.105	0.129	0.188
61	0.105	0.105	0.105	0.105	0.129	0.188
62	0.105	0.105	0.105	0.105	0.129	0.188
63	0.105	0.105	0.105	0.105	0.129	0.188
64	0.105	0.105	0.105	0.105	0.129	0.188
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.005	0.005	0.005	0.005	0.008	0.012
51	0.006	0.006	0.006	0.006	0.009	0.013
52	0.012	0.012	0.012	0.012	0.019	0.028
53	0.033	0.033	0.033	0.033	0.050	0.075
54	0.045	0.045	0.045	0.045	0.069	0.103
55	0.061	0.061	0.061	0.061	0.094	0.140
56	0.055	0.055	0.055	0.055	0.084	0.126
57	0.081	0.081	0.081	0.081	0.125	0.187
58	0.059	0.059	0.059	0.059	0.091	0.137
59	0.055	0.055	0.055	0.055	0.084	0.126
60	0.085	0.085	0.085	0.085	0.131	0.196
61	0.085	0.085	0.085	0.085	0.131	0.196
62	0.085	0.085	0.085	0.085	0.131	0.196
63	0.085	0.085	0.085	0.085	0.131	0.196
64	0.085	0.085	0.085	0.085	0.131	0.196
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 2.5% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.014	0.014	0.014	0.014	0.025	0.045
51	0.012	0.012	0.012	0.012	0.021	0.038
52	0.025	0.025	0.025	0.025	0.046	0.081
53	0.047	0.047	0.047	0.047	0.086	0.154
54	0.063	0.063	0.063	0.063	0.115	0.205
55	0.076	0.076	0.076	0.076	0.140	0.249
56	0.054	0.054	0.054	0.054	0.099	0.177
57	0.071	0.071	0.071	0.071	0.130	0.232
58	0.057	0.057	0.057	0.057	0.103	0.184
59	0.126	0.126	0.126	0.126	0.156	0.229
60	0.126	0.126	0.126	0.126	0.155	0.226
61	0.126	0.126	0.126	0.126	0.155	0.226
62	0.126	0.126	0.126	0.126	0.155	0.226
63	0.126	0.126	0.126	0.126	0.155	0.226
64	0.126	0.126	0.126	0.126	0.155	0.226
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2.5% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.007	0.007	0.007	0.007	0.010	0.015
51	0.008	0.008	0.008	0.008	0.012	0.018
52	0.016	0.016	0.016	0.016	0.025	0.038
53	0.042	0.042	0.042	0.042	0.064	0.096
54	0.057	0.057	0.057	0.057	0.088	0.132
55	0.074	0.074	0.074	0.074	0.114	0.170
56	0.066	0.066	0.066	0.066	0.102	0.153
57	0.090	0.090	0.090	0.090	0.139	0.208
58	0.071	0.071	0.071	0.071	0.110	0.164
59	0.066	0.066	0.066	0.066	0.101	0.151
60	0.102	0.102	0.102	0.102	0.157	0.235
61	0.102	0.102	0.102	0.102	0.157	0.236
62	0.102	0.102	0.102	0.102	0.157	0.236
63	0.102	0.102	0.102	0.102	0.157	0.236
64	0.102	0.102	0.102	0.102	0.157	0.236
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 2.7% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.0138	0.0138	0.0138	0.0138	0.0253	0.0451
51	0.0123	0.0123	0.0123	0.0123	0.0226	0.0402
52	0.0249	0.0249	0.0249	0.0249	0.0456	0.0812
53	0.0497	0.0497	0.0497	0.0497	0.0909	0.1621
54	0.0662	0.0662	0.0662	0.0662	0.1211	0.2160
55	0.0854	0.0854	0.0854	0.0854	0.1563	0.2785
56	0.0606	0.0606	0.0606	0.0606	0.1108	0.1975
57	0.0711	0.0711	0.0711	0.0711	0.1300	0.2318
58	0.0628	0.0628	0.0628	0.0628	0.1149	0.2049
59	0.1396	0.1396	0.1396	0.1396	0.1735	0.2544
60	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
61	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
62	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
63	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
64	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2.7% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.0065	0.0065	0.0065	0.0065	0.0101	0.0151
51	0.0081	0.0081	0.0081	0.0081	0.0125	0.0187
52	0.0164	0.0164	0.0164	0.0164	0.0254	0.0380
53	0.0442	0.0442	0.0442	0.0442	0.0680	0.1018
54	0.0606	0.0606	0.0606	0.0606	0.0934	0.1397
55	0.0825	0.0825	0.0825	0.0825	0.1269	0.1900
56	0.0740	0.0740	0.0740	0.0740	0.1140	0.1706
57	0.0901	0.0901	0.0901	0.0901	0.1387	0.2077
58	0.0790	0.0790	0.0790	0.0790	0.1217	0.1821
59	0.0729	0.0729	0.0729	0.0729	0.1123	0.1681
60	0.1135	0.1135	0.1135	0.1135	0.1747	0.2615
61	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
62	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
63	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
64	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Service Retirement

Schools 2% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.005	0.009	0.013	0.015	0.016	0.018
51	0.005	0.010	0.014	0.017	0.019	0.021
52	0.006	0.012	0.017	0.020	0.022	0.025
53	0.007	0.014	0.019	0.023	0.026	0.029
54	0.012	0.024	0.033	0.039	0.044	0.049
55	0.024	0.048	0.067	0.079	0.088	0.099
56	0.020	0.039	0.055	0.065	0.072	0.081
57	0.021	0.042	0.059	0.070	0.078	0.087
58	0.025	0.050	0.070	0.083	0.092	0.103
59	0.029	0.057	0.080	0.095	0.105	0.118
60	0.037	0.073	0.102	0.121	0.134	0.150
61	0.046	0.090	0.126	0.149	0.166	0.186
62	0.076	0.151	0.212	0.250	0.278	0.311
63	0.069	0.136	0.191	0.225	0.251	0.281
64	0.067	0.133	0.185	0.219	0.244	0.273
65	0.091	0.180	0.251	0.297	0.331	0.370
66	0.072	0.143	0.200	0.237	0.264	0.295
67	0.067	0.132	0.185	0.218	0.243	0.272
68	0.060	0.118	0.165	0.195	0.217	0.243
69	0.067	0.133	0.187	0.220	0.246	0.275
70	0.066	0.131	0.183	0.216	0.241	0.270

Miscellaneous

Internal Revenue Code Section 415

The limitations on benefits imposed by Internal Revenue Code Section 415 are taken into account in this valuation. Each year the impact of any changes in this limitation since the prior valuation is included and amortized as part of the actuarial gain or loss base. This results in lower contributions for those employers contributing to the Replacement Benefit Fund and protects CalPERS from prefunding expected benefits in excess of limits imposed by federal tax law.

Internal Revenue Code Section 401(a)(17)

The limitations on compensation imposed by Internal Revenue Code Section 401(a)(17) are taken into account in this valuation. Each year, the impact of any changes in the compensation limitation since the prior valuation is included and amortized as part of the actuarial gain or loss base. The compensation limit for classic members for the 2015 calendar year is $265,000.

APPENDIX B

PRINCIPAL PLAN PROVISIONS

The following is a description of the principal plan provisions used in calculating costs and liabilities. We have indicated whether a plan provision is standard or optional. Standard benefits are applicable to all members while optional benefits vary among employers. Optional benefits that apply to a single period of time, such as Golden Handshakes, have not been included. Many of the statements in this summary are general in nature, and are intended to provide an easily understood summary of the Public Employees' Retirement Law. The law itself governs in all situations.

Service Retirement

Eligibility

A classic CalPERS member or PEPRA Safety member becomes eligible for Service Retirement upon attainment of age 50 with at least 5 years of credited service (total service across all CalPERS employers, and with certain other retirement systems with which CalPERS has reciprocity agreements). For employees hired into a plan with the 1.5 percent at 65 formula, eligibility for service retirement is age 55 with at least 5 years of service. PEPRA miscellaneous members become eligible for service retirement upon attainment of age 52 with at least 5 years of service.

Benefit

The service retirement benefit is a monthly allowance equal to the product of the *benefit factor*, *years of service*, and *final compensation.*

- The *benefit factor* depends on the benefit formula specified in your agency's contract. The table below shows the factors for each of the available formulas. Factors vary by the member's age at retirement. Listed are the factors for retirement at whole year ages:

Miscellaneous Plan Formulas

Retirement Age	1.5% at 65	2% at 60	2% at 55	2.5% at 55	2.7% at 55	3% at 60	PEPRA 2% at 62
50	0.5000%	1.092%	1.426%	2.000%	2.000%	2.000%	N/A
51	0.5667%	1.156%	1.522%	2.100%	2.140%	2.100%	N/A
52	0.6334%	1.224%	1.628%	2.200%	2.280%	2.200%	1.000%
53	0.7000%	1.296%	1.742%	2.300%	2.420%	2.300%	1.100%
54	0.7667%	1.376%	1.866%	2.400%	2.560%	2.400%	1.200%
55	0.8334%	1.460%	2.000%	2.500%	2.700%	2.500%	1.300%
56	0.9000%	1.552%	2.052%	2.500%	2.700%	2.600%	1.400%
57	0.9667%	1.650%	2.104%	2.500%	2.700%	2.700%	1.500%
58	1.0334%	1.758%	2.156%	2.500%	2.700%	2.800%	1.600%
59	1.1000%	1.874%	2.210%	2.500%	2.700%	2.900%	1.700%
60	1.1667%	2.000%	2.262%	2.500%	2.700%	3.000%	1.800%
61	1.2334%	2.134%	2.314%	2.500%	2.700%	3.000%	1.900%
62	1.3000%	2.272%	2.366%	2.500%	2.700%	3.000%	2.000%
63	1.3667%	2.418%	2.418%	2.500%	2.700%	3.000%	2.100%
64	1.4334%	2.418%	2.418%	2.500%	2.700%	3.000%	2.200%
65	1.5000%	2.418%	2.418%	2.500%	2.700%	3.000%	2.300%
66	1.5000%	2.418%	2.418%	2.500%	2.700%	3.000%	2.400%
67 & up	1.5000%	2.418%	2.418%	2.500%	2.700%	3.000%	2.500%

Safety Plan Formulas

Retirement Age	½ at 55 *	2% at 55	2% at 50	3% at 55	3% at 50
50	1.783%	1.426%	2.000%	2.400%	3.000%
51	1.903%	1.522%	2.140%	2.520%	3.000%
52	2.035%	1.628%	2.280%	2.640%	3.000%
53	2.178%	1.742%	2.420%	2.760%	3.000%
54	2.333%	1.866%	2.560%	2.880%	3.000%
55 & Up	2.500%	2.000%	2.700%	3.000%	3.000%

* For this formula, the benefit factor also varies by entry age. The factors shown are for members with an entry age of 35 or greater. If entry age is less than 35, then the age 55 benefit factor is 50 percent divided by the difference between age 55 and entry age. The benefit factor for ages prior to age 55 is the same proportion of the age 55 benefit factor as in the above table.

PEPRA Safety Plan Formulas

Retirement Age	2% at 57	2.5% at 57	2.7% at 57
50	1.426%	2.000%	2.000%
51	1.508%	2.071%	2.100%
52	1.590%	2.143%	2.200%
53	1.672%	2.214%	2.300%
54	1.754%	2.286%	2.400%
55	1.836%	2.357%	2.500%
56	1.918%	2.429%	2.600%
57 & Up	2.000%	2.500%	2.700%

- The *years of service* is the amount credited by CalPERS to a member while he or she is employed in this group (or for other periods that are recognized under the employer's contract with CalPERS). For a member who has earned service with multiple CalPERS employers, the benefit from each employer is calculated separately according to each employer's contract, and then added together for the total allowance. An agency may contract for an optional benefit where any unused sick leave accumulated at the time of retirement will be converted to credited service at a rate of 0.004 years of service for each day of sick leave.

- The *final compensation* is the monthly average of the member's highest 36 or 12 consecutive months' full-time equivalent monthly pay (no matter which CalPERS employer paid this compensation). The standard benefit is 36 months. Employers had the option of providing a final compensation equal to the highest 12 consecutive months for classic plans only. Final compensation must be defined by the highest 36 consecutive months' pay under the 1.5% at 65 formula. PEPRA members have a cap on the annual salary that can be used to calculate final compensation for all new members based on the Social Security contribution and benefit base. For employees that participate in Social Security this cap is $117,020 for 2015 and for those employees that do not participate in Social Security the cap for 2015 is $140,424. Adjustments to the caps are permitted annually based on changes to the CPI for all urban consumers.

- Employees must be covered by Social Security with the 1.5% at 65 formula. Social Security is optional for all other benefit formulas. For employees covered by Social Security, the modified formula is the standard benefit. Under this type of formula, the final compensation is offset by $133.33 (or by one third if the final compensation is less than $400). Employers may contract for the full benefit with Social Security that will eliminate the offset applicable to the final compensation. For employees not covered by Social Security, the full benefit is paid with

no offsets. Auxiliary organizations of the CSUC system may elect reduced contribution rates, in which case the offset is $317 if members are not covered by Social Security or $513 if members are covered by Social Security.

- The miscellaneous and PEPRA safety service retirement benefit is not capped. The classic service retirement benefit is capped at 90 percent of final compensation.

Vested Deferred Retirement

Eligibility for Deferred Status

A CalPERS member becomes eligible for a deferred vested retirement benefit when he or she leaves employment, keeps his or her contribution account balance on deposit with CalPERS, **and** has earned at least 5 years of credited service (total service across all CalPERS employers, and with certain other retirement systems with which CalPERS has reciprocity agreements).

Eligibility to Start Receiving Benefits

The CalPERS classic members and PEPRA safety members become eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for deferred status and upon attainment of age 50 (55 for employees hired into a 1.5% @ 65 plan). PEPRA miscellaneous members become eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for deferred status and upon attainment of age 52.

Benefit

The vested deferred retirement benefit is the same as the service retirement benefit, where the benefit factor is based on the member's age at allowance commencement. For members who have earned service with multiple CalPERS employers, the benefit from each employer is calculated separately according to each employer's contract, and then added together for the total allowance.

Non-Industrial (Non-Job Related) Disability Retirement

Eligibility

A CalPERS member is eligible for Non-Industrial Disability Retirement if he or she becomes *disabled* and has at least 5 years of credited service (total service across all CalPERS employers, and with certain other retirement systems with which CalPERS has reciprocity agreements). There is no special age requirement. *Disabled* means the member is unable to perform his or her job because of an illness or injury, which is expected to be permanent or to last indefinitely. The illness or injury does not have to be job related. A CalPERS member must be actively employed by any CalPERS employer at the time of disability in order to be eligible for this benefit.

Standard Benefit

The standard Non-Industrial Disability Retirement benefit is a monthly allowance equal to 1.8 percent of final compensation, multiplied by *service*, which is determined as follows:

- *Service* is CalPERS credited service, for members with less than 10 years of service or greater than 18.518 years of service; or

- *Service* is CalPERS credited service plus the additional number of years that the member would have worked until age 60, for members with at least 10 years but not more than 18.518 years of service. The maximum benefit in this case is 33 1/3 percent of final compensation.

Improved Benefit

Employers have the option of providing the improved Non-Industrial Disability Retirement benefit. This benefit provides a monthly allowance equal to 30 percent of final compensation for the first 5 years of service, plus 1 percent for each additional year of service to a maximum of 50 percent of final compensation.

Members who are eligible for a larger service retirement benefit may choose to receive that benefit in lieu of a disability benefit. Members eligible to retire, and who have attained the normal retirement age determined by their service retirement benefit formula, will receive the same dollar amount for disability retirement as that payable for service retirement. For members who have earned service with multiple CalPERS employers, the benefit attributed to each employer is the total disability allowance multiplied by the ratio of service with a particular employer to the total CalPERS service.

Industrial (Job Related) Disability Retirement

All safety members have this benefit. For miscellaneous members, employers have the option of providing this benefit. An employer may choose to provide the increased benefit option or the improved benefit option.

Eligibility

An employee is eligible for Industrial Disability Retirement if he or she becomes disabled while working, where disabled means the member is unable to perform the duties of the job because of a work-related illness or injury, which is expected to be permanent or to last indefinitely. A CalPERS member who has left active employment within this group is not eligible for this benefit, except to the extent described below.

Standard Benefit

The standard Industrial Disability Retirement benefit is a monthly allowance equal to 50 percent of final compensation.

Increased Benefit (75 percent of Final Compensation)

The increased Industrial Disability Retirement benefit is a monthly allowance equal to 75 percent final compensation for total disability.

Improved Benefit (50 percent to 90 percent of Final Compensation)

The improved Industrial Disability Retirement benefit is a monthly allowance equal to the Workman's Compensation Appeals Board permanent disability rate percentage (if 50 percent or greater, with a maximum of 90 percent) times the final compensation.

For a CalPERS member not actively employed in this group who became disabled while employed by some other CalPERS employer, the benefit is a return of accumulated member contributions with respect to employment in this group. With the standard or increased benefit, a member may also choose to receive the annuitization of the accumulated member contributions.

If a member is eligible for service retirement and if the service retirement benefit is more than the industrial disability retirement benefit, the member may choose to receive the larger benefit.

Post-Retirement Death Benefit

Standard Lump Sum Payment

Upon the death of a retiree, a one-time lump sum payment of $500 will be made to the retiree's designated survivor(s), or to the retiree's estate.

Improved Lump Sum Payment

Employers have the option of providing an improved lump sum death benefit of $600, $2,000, $3,000, $4,000 or $5,000.

Form of Payment for Retirement Allowance

Standard Form of Payment

Generally, the retirement allowance is paid to the retiree in the form of an annuity for as long as he or she is alive. The retiree may choose to provide for a portion of his or her allowance to be paid to any designated beneficiary after the retiree's death. CalPERS provides for a variety of such benefit options, which the retiree pays for by taking a reduction in his or her retirement allowance. Such reduction takes into account the amount to be provided to the beneficiary and the probable duration of payments (based on the ages of the member and beneficiary) made subsequent to the member's death.

Improved Form of Payment (Post-Retirement Survivor Allowance)

Employers have the option to contract for the post-retirement survivor allowance.

For retirement allowances with respect to service subject to the modified formula, 25 percent of the retirement allowance will automatically be continued to certain statutory beneficiaries upon the death of the retiree, without a reduction in the retiree's allowance. For retirement allowances with respect to service subject to the full or supplemental formula, 50 percent of the retirement allowance will automatically be continued to certain statutory beneficiaries upon the death of the retiree, without a reduction in the retiree's allowance. This additional benefit is referred to as post-retirement survivor allowance (PRSA) or simply as survivor continuance.

In other words, 25 percent or 50 percent of the allowance, the continuance portion, is paid to the retiree for as long as he or she is alive, and that same amount is continued to the retiree's spouse (or if no eligible spouse, to unmarried child(ren) until they attain age 18; or, if no eligible child(ren), to a qualifying dependent parent) for the rest of his or her lifetime. This benefit will not be discontinued in the event the spouse remarries.

The remaining 75 percent or 50 percent of the retirement allowance, which may be referred to as the option portion of the benefit, is paid to the retiree as an annuity for as long as he or she is alive. Or, the retiree may choose to provide for some of this option portion to be paid to any designated beneficiary after the retiree's death. Benefit options applicable to the option portion are the same as those offered with the standard form. The reduction is calculated in the same manner but is applied only to the option portion.

Pre-Retirement Death Benefits

Basic Death Benefit

This is a standard benefit.

Eligibility

An employee's beneficiary (or estate) may receive the basic death benefit if the member dies while actively employed. A CalPERS member must be actively employed with the CalPERS employer providing this benefit to be eligible for this benefit. A member's survivor who is eligible for any other pre-retirement death benefit may choose to receive that death benefit instead of this basic death benefit.

Benefit

The basic death benefit is a lump sum in the amount of the member's accumulated contributions, where interest is currently credited at 7.5 percent per year, plus a lump sum in the amount of one month's salary for each completed year of current service, up to a maximum of six months' salary. For purposes of this benefit, one month's salary is defined as the member's average monthly full-time rate of compensation during the 12 months preceding death.

1957 Survivor Benefit

This is a standard benefit.

Eligibility

An employee's *eligible survivor(s)* may receive the 1957 Survivor benefit if the member dies while actively employed, has attained at least age 50 for classic and safety PEPRA members and age 52 for miscellaneous PEPRA members, and has at least 5 years of credited service (total service across all CalPERS employers and with certain other retirement systems with which CalPERS has reciprocity agreements). A CalPERS member must be actively employed with the CalPERS employer providing this benefit to be eligible for this benefit. An eligible survivor means the surviving spouse to whom the member was married at least one year before death or, if there is no eligible spouse, to the member's unmarried child(ren) under age 18. A member's survivor who is eligible for any other pre-retirement death benefit may choose to receive that death benefit instead of this 1957 Survivor benefit.

Benefit

The 1957 Survivor benefit is a monthly allowance equal to one-half of the unmodified service retirement benefit that the member would have been entitled to receive if the member had retired on the date of his or her death. If the benefit is payable to the spouse, the benefit is discontinued upon the death of the spouse. If the benefit is payable to dependent child(ren), the benefit will be discontinued upon death or attainment of age 18, unless the child(ren) is disabled. The total amount paid will be at least equal to the basic death benefit.

Optional Settlement 2W Death Benefit

This is an optional benefit.

Eligibility

An employee's *eligible survivor* may receive the Optional Settlement 2W Death benefit if the member dies while actively employed, has attained at least age 50 for classic and safety PEPRA members and age 52 for miscellaneous PEPRA members, and has at least 5 years of credited service (total service across all CalPERS employers and with certain other retirement systems with which CalPERS has reciprocity agreements). A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. An *eligible survivor* means the surviving spouse to whom the member was married at least one year before death. A member's survivor who is eligible for any other pre-retirement death benefit may choose to receive that death benefit instead of this Optional Settlement 2W Death benefit.

Benefit

The Optional Settlement 2W Death benefit is a monthly allowance equal to the service retirement benefit that the member would have received had the member retired on the date of his or her death and elected Optional Settlement 2W. (A retiree who elects Optional Settlement 2W receives an allowance that has been reduced so that it will continue to be paid after his or her death to a surviving beneficiary.) The allowance is payable as long as the surviving spouse lives, at which time it is continued to any unmarried child(ren) under age 18, if applicable. The total amount paid will be at least equal to the basic death benefit.

Special Death Benefit

This is a standard benefit for safety members. An employer may elect to provide this benefit for miscellaneous members.

Eligibility

An employee's *eligible survivor(s)* may receive the special death benefit if the member dies while actively employed and the death is job-related. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. An *eligible survivor* means the surviving spouse to whom the member was married prior to the onset of the injury or illness that resulted in death. If there is no eligible spouse, an eligible survivor means the member's unmarried child(ren) under age 22. An eligible survivor who chooses to receive this benefit will not receive any other death benefit.

Benefit

The special death benefit is a monthly allowance equal to 50 percent of final compensation, and will be increased whenever the compensation paid to active employees is increased but ceasing to increase when the member would have attained age 50. The allowance is payable to the surviving spouse until death at which time the allowance is continued to any unmarried child(ren) under age 22. There is a guarantee that the total amount paid will at least equal the basic death benefit.

If the member's death is the result of an accident or injury caused by external violence or physical force incurred in the performance of the member's duty, and there are *eligible* surviving child(ren) (*eligible* means unmarried child(ren) under age 22) in addition to an eligible spouse, then an **additional monthly allowance** is paid equal to the following:

- if 1 eligible child: 12.5 percent of final compensation
- if 2 eligible children: 20.0 percent of final compensation
- if 3 or more eligible children: 25.0 percent of final compensation

Alternate Death Benefit for Local Fire Members

This is an optional benefit available only to local fire members.

Eligibility

An employee's *eligible survivor(s)* may receive the alternate death benefit in lieu of the basic death benefit or the 1957 Survivor benefit if the member dies while actively employed and has at least 20 years of total CalPERS service. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. An *eligible survivor* means the surviving spouse to whom the member was married prior to the onset of the injury or illness that resulted in death. If there is no eligible spouse, an eligible survivor means the member's unmarried child(ren) under age 18.

Benefit

The Alternate Death benefit is a monthly allowance equal to the service retirement benefit that the member would have received had the member retired on the date of his or her death and elected Optional Settlement 2W. (A retiree who elects Optional Settlement 2W receives an allowance that has been reduced so that it will continue to be paid after his or her death to a surviving beneficiary.) If the member has not yet attained age 50, the benefit is equal to that which would be payable if the member had retired at age 50, based on service credited at the time of death. The allowance is payable as long as the surviving spouse lives, at which time it is continued to any unmarried child(ren) under age 18, if applicable. The total amount paid will be at least equal to the basic death benefit.

Cost-of-Living Adjustments (COLA)

Standard Benefit

Retirement and survivor allowances are adjusted each year in May for cost of living, beginning the second calendar year after the year of retirement. The standard cost-of-living adjustment (COLA) is 2 percent. Annual adjustments are calculated by first determining the lesser of 1) 2 percent compounded from the end of the year of retirement or 2) actual rate of inflation. The resulting increase is divided by the total increase provided in prior years. For any particular year, the COLA adjustment may be less than 2 percent (when the rate of inflation is low), may be greater than the rate of inflation (when the rate of inflation is low after several years of high inflation) or may even be greater than 2 percent (when inflation is high after several years of low inflation).

Improved Benefit

Employers have the option of providing a COLA of 3 percent, 4 percent, or 5 percent, determined in the same manner as described above for the standard 2 percent COLA. An improved COLA is not available with the 1.5% at 65 formula.

Purchasing Power Protection Allowance (PPPA)

Retirement and survivor allowances are protected against inflation by PPPA. PPPA benefits are cost-of-living adjustments that are intended to maintain an individual's allowance at 80 percent of the initial allowance at retirement adjusted for inflation since retirement. The PPPA benefit will be coordinated with other cost-of-living adjustments provided under the plan.

Employee Contributions

Each employee contributes toward his or her retirement based upon the retirement formula. The standard employee contribution is as described below.

- The percent contributed below the monthly compensation breakpoint is 0 percent.
- The monthly compensation breakpoint is $0 for full and supplemental formula members and $133.33 for employees covered by the modified formula.
- The percent contributed above the monthly compensation breakpoint depends upon the benefit formula, as shown in the table below.

Benefit Formula	Percent Contributed above the Breakpoint
Miscellaneous, 1.5% at 65	2%
Miscellaneous, 2% at 60	7%
Miscellaneous, 2% at 55	7%
Miscellaneous, 2.5% at 55	8%
Miscellaneous, 2.7% at 55	8%
Miscellaneous, 3% at 60	8%
Miscellaneous, 2% at 62	50% of the Total Normal Cost
Miscellaneous, 1.5% at 65	50% of the Total Normal Cost
Safety, 1/2 at 55	Varies by entry age
Safety, 2% at 55	7%
Safety, 2% at 50	9%
Safety, 3% at 55	9%
Safety, 3% at 50	9%
Safety, 2% at 57	50% of the Total Normal Cost
Safety, 2.5% at 57	50% of the Total Normal Cost
Safety, 2.7% at 57	50% of the Total Normal Cost

The employer may choose to "pick-up" these contributions for classic members (Employer Paid Member Contributions or EPMC). EPMC is prohibited for new PEPRA members.

An employer may also include Employee Cost Sharing in the contract, where employees agree to share the cost of the employer contribution. These contributions are paid in addition to the member contribution.

Auxiliary organizations of the CSUC system may elect reduced contribution rates, in which case the offset is $317 and the contribution rate is 6 percent if members are not covered by Social Security. If members are covered by Social Security, the offset is $513 and the contribution rate is 5 percent.

Refund of Employee Contributions

If the member's service with the employer ends, and if the member does not satisfy the eligibility conditions for any of the retirement benefits above, the member may elect to receive a refund of his or her employee contributions, which are credited with 6 percent interest compounded annually.

1959 Survivor Benefit

This is a pre-retirement death benefit available only to members not covered by Social Security. Any agency joining CalPERS subsequent to 1993 is required to provide this benefit if the members are not covered by Social Security. The benefit is optional for agencies joining CalPERS prior to 1994. Levels 1, 2 and 3 are now closed. Any new agency or any agency wishing to add this benefit or increase the current level may only choose the 4th or Indexed Level.

This benefit is not included in the results presented in this valuation. More information on this benefit is available on the CalPERS website at www.calpers.ca.gov.

APPENDIX C

PARTICIPANT DATA

- **SUMMARY OF VALUATION DATA**
- **ACTIVE MEMBERS**
- **TRANSFERRED AND TERMINATED MEMBERS**
- **RETIRED MEMBERS AND BENEFICIARIES**

Summary of Valuation Data

	June 30, 2014	June 30, 2015
1. **Active Members**		
a) Counts	2,450	2,585
b) Average Attained Age	45.75	45.20
c) Average Entry Age to Rate Plan	33.14	33.35
d) Average Years of Service	12.61	11.85
e) Average Annual Covered Pay	$ 62,393	$ 62,498
f) Annual Covered Payroll	152,863,321	161,556,270
g) Projected Annual Payroll for Contribution Year	167,037,878	176,536,898
h) Present Value of Future Payroll	1,225,515,563	1,303,371,353
2. **Transferred Members**		
a) Counts	2,305	2,290
b) Average Attained Age	44.30	44.52
c) Average Years of Service	2.12	2.15
d) Average Annual Covered Pay	$ 83,489	$ 86,993
3. **Terminated Members**		
a) Counts	1,770	1,781
b) Average Attained Age	42.54	42.92
c) Average Years of Service	2.31	2.24
d) Average Annual Covered Pay	$ 38,319	$ 38,724
4. **Retired Members and Beneficiaries**		
a) Counts	1,928	2,105
b) Average Attained Age	63.65	63.92
c) Average Annual Benefits	$ 16,005	$ 16,720
5. **Active to Retired Ratio** [(1a) / (4a)]	1.27	1.23

Counts of members included in the valuation are counts of the records processed by the valuation. Multiple records may exist for those who have service in more than one valuation group. This does not result in double counting of liabilities.

Average Annual Benefits represents benefit amounts payable by this plan only. Some members may have service with another agency and would therefore have a larger total benefit than would be included as part of the average shown here.

Active Members

Counts of members included in the valuation are counts of the records processed by the valuation. Multiple records may exist for those who have service in more than one valuation group. This does not result in double counting of liabilities.

Distribution of Active Members by Age and Service

	Years of Service at Valuation Date						
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Total**
15-24	98	0	0	0	0	0	98
25-29	214	21	3	0	0	0	238
30-34	121	70	39	3	0	0	233
35-39	113	73	89	25	1	0	301
40-44	89	86	91	47	10	3	326
45-49	66	66	114	73	40	28	387
50-54	56	53	97	67	53	104	430
55-59	27	41	70	53	37	103	331
60-64	14	27	40	31	26	46	184
65 and over	12	12	10	9	8	6	57
All Ages	**810**	**449**	**553**	**308**	**175**	**290**	**2,585**

Distribution of Average Annual Salaries by Age and Service

	Years of Service at Valuation Date						
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Average**
15-24	$26,327	$0	$0	$0	$0	$0	$26,327
25-29	32,867	48,133	62,635	0	0	0	34,589
30-34	46,554	55,933	61,677	76,343	0	0	52,287
35-39	55,934	62,483	70,828	72,524	93,946	0	63,430
40-44	54,048	68,872	72,208	73,125	67,176	52,600	66,167
45-49	58,116	64,280	70,005	81,030	77,405	68,910	69,766
50-54	52,294	65,200	71,413	73,545	75,722	77,142	70,406
55-59	54,994	71,207	67,953	73,147	75,396	77,176	71,833
60-64	46,464	60,869	70,806	73,950	77,520	74,204	69,823
65 and over	58,106	70,421	78,699	56,789	80,774	85,497	70,168
All Ages	**$44,413**	**$63,511**	**$70,075**	**$74,682**	**$76,152**	**$75,812**	**$62,498**

Transferred and Terminated Members

Distribution of Transfers to Other CalPERS Plans by Age and Service

	Years of Service at Valuation Date							
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Total**	**Average Salary**
15-24	5	0	0	0	0	0	5	$39,865
25-29	78	2	0	0	0	0	80	59,085
30-34	267	15	0	0	0	0	282	78,738
35-39	400	22	4	0	0	0	426	90,432
40-44	391	26	10	5	0	0	432	90,672
45-49	384	28	18	6	3	0	439	94,778
50-54	231	35	21	14	4	2	307	92,085
55-59	141	28	11	3	1	0	184	81,041
60-64	76	13	9	2	0	0	100	70,187
65 and over	27	6	1	0	1	0	35	73,745
All Ages	**2000**	**175**	**74**	**30**	**9**	**2**	**2,290**	**86,993**

Distribution of Terminated Participants with Funds on Deposit by Age and Service

	Years of Service at Valuation Date							
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Total**	**Average Salary**
15-24	24	0	0	0	0	0	24	$25,373
25-29	173	1	0	0	0	0	174	28,839
30-34	280	13	3	0	0	0	296	33,027
35-39	268	23	8	1	0	0	300	38,734
40-44	240	29	5	4	0	0	278	42,121
45-49	183	30	8	5	0	0	226	43,555
50-54	149	33	12	9	2	2	207	43,619
55-59	115	28	10	6	1	0	160	43,487
60-64	57	12	2	2	0	0	73	40,202
65 and over	39	2	2	0	0	0	43	34,182
All Ages	**1528**	**171**	**50**	**27**	**3**	**2**	**1,781**	**38,724**

Retired Members and Beneficiaries

Distribution of Retirees and Beneficiaries by Age and Retirement Type*

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 30	0	0	0	0	0	7	7
30-34	0	0	2	0	0	1	3
35-39	0	2	4	0	0	1	7
40-44	0	4	9	0	0	2	15
45-49	0	3	25	0	1	2	31
50-54	119	16	56	2	2	9	204
55-59	317	24	53	2	1	9	406
60-64	441	21	38	3	0	17	520
65-69	395	21	39	1	0	21	477
70-74	191	6	13	1	0	16	227
75-79	111	3	3	1	0	11	129
80-84	38	1	2	0	0	12	53
85 and Over	15	1	2	0	0	8	26
All Ages	**1627**	**102**	**246**	**10**	**4**	**116**	**2,105**

Distribution of Average Annual Amounts for Retirees and Beneficiaries by Age and Retirement Type*

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Average
Under 30	$0	$0	$0	$0	$0	$5,128	$5,128
30-34	0	0	157	0	0	1,068	460
35-39	0	8,403	282	0	0	834	2,681
40-44	0	6,693	6,552	0	0	3,615	6,198
45-49	0	11,791	4,588	0	66	19,710	6,115
50-54	6,835	10,716	7,218	10,097	85	7,877	7,257
55-59	16,178	9,413	14,050	5,831	28	12,085	15,318
60-64	21,049	10,745	18,276	26,064	0	7,401	20,013
65-69	21,248	12,177	24,328	2,786	0	13,443	20,718
70-74	17,602	16,604	24,145	16,126	0	27,841	18,666
75-79	14,349	10,564	20,662	17,153	0	14,524	14,444
80-84	10,727	11,263	20,587	0	0	9,132	10,748
85 and Over	7,319	5,881	17,131	0	0	5,974	7,604
All Ages	**$17,879**	**$10,844**	**$13,897**	**$14,611**	**$66**	**$12,369**	**$16,720**

Retired Members and Beneficiaries (continued)

Distribution of Retirees and Beneficiaries by Years Retired and Retirement Type*

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 5 Yrs	762	27	53	2	0	49	893
5-9	527	19	40	4	1	35	626
10-14	229	31	58	3	1	17	339
15-19	79	16	36	1	0	6	138
20-24	27	6	36	0	1	7	77
25-29	2	3	23	0	0	2	30
30 and Over	1	0	0	0	1	0	2
All Years	**1627**	**102**	**246**	**10**	**4**	**116**	**2,105**

Distribution of Average Annual Amounts for Retirees and Beneficiaries by Years Retired and Retirement Type*

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Average
Under 5 Yrs	$19,668	$13,829	$12,711	$6,184	$0	$16,624	$18,881
5-9	18,383	10,949	13,798	20,016	66	10,828	17,423
10-14	14,547	9,523	13,593	16,964	50	7,402	13,545
15-19	11,656	9,316	13,244	2,786	0	7,392	11,549
20-24	5,354	10,280	16,213	0	119	6,607	10,860
25-29	7,122	6,253	14,964	0	0	12,413	13,400
30 and Over	3,215	0	0	0	28	0	1,622
All Years	**$17,879**	**$10,844**	**$13,897**	**$14,611**	**$66**	**$12,369**	**$16,720**

* Counts of members do not include alternate payees receiving benefits while the member is still working. Therefore, the total counts may not match information on page 25 of the report. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

APPENDIX D

DEVELOPMENT OF PEPRA MEMBER CONTRIBUTION RATES

Development of PEPRA Members Contribution Rates

The table below shows the determination of the Member contribution rates based on 50 percent of the Total Normal Cost for each respective plan on June 30, 2015.

Assembly Bill (AB) 340 created PEPRA that implemented new benefit formulas and a final compensation period as well as new contribution requirements for new employees. In accordance with Section Code 7522.30(b), "new members … shall have an initial contribution rate of at least 50 percent of the normal cost rate." The normal cost for the plan is dependent on the benefit levels, actuarial assumptions and demographics of the plan particularly the entry age into the plan. The PEPRA total normal cost for the plan is calculated assuming the entire active population, including classic members, is subject to the adopted PEPRA formula and applicable compensation limits. Should the total normal cost of the plan change by one percent or more from the base total normal cost established for the plan, the new member rate shall be 50% of the new normal cost rounded up to the next highest quarter percent.

		Basis for Current Rate		**Rates Effective July 1, 2017**			
Rate Plan Identifier	**Plan**	**Total Normal Cost**	**Member Rate**	**Total Normal Cost**	**Change**	**Change Needed**	**Member Rate**
26779	Miscellaneous PEPRA	12.204%	6.000%	12.123%	(0.081%)	No	6.000%

APPENDIX E

GLOSSARY OF ACTUARIAL TERMS

Glossary of Actuarial Terms

Accrued Liability *(also called Actuarial Accrued Liability or Entry Age Normal Accrued Liability)*
The total dollars needed as of the valuation date to fund all benefits earned in the past for *current* members.

Actuarial Assumptions
Assumptions made about certain events that will affect pension costs. Assumptions generally can be broken down into two categories: demographic and economic. Demographic assumptions include such things as mortality, disability and retirement rates. Economic assumptions include discount rate, salary growth and inflation.

Actuarial Methods
Procedures employed by actuaries to achieve certain funding goals of a pension plan. Actuarial methods include funding method, setting the length of time to fund the Accrued Liability and determining the Value of Assets.

Actuarial Valuation
The determination, as of a valuation date of the Normal Cost, Accrued liability, and related actuarial present values for a pension plan. These valuations are performed annually or when an employer is contemplating a change to their plan provisions.

Amortization Bases
Separate payment schedules for different portions of the Unfunded Liability. The total Unfunded Liability of a Risk Pool or non-pooled plan can be segregated by "cause," creating "bases" and each such base will be separately amortized and paid for over a specific period of time. However, all bases are amortized using investment and payroll assumptions from the current valuation. This can be likened to a home having a first mortgage of 24 years remaining payments and a second mortgage that has 10 years remaining payments. Each base or each mortgage note has its own terms (payment period, principal, etc.)

Generally, in an actuarial valuation, the separate bases consist of changes in unfunded liability due to contract amendments, actuarial assumption changes, actuarial methodology changes, and/or gains and losses. Payment periods are determined by Board policy and vary based on the cause of the change.

Amortization Period
The number of years required to pay off an Amortization Base.

Classic Member (under PEPRA)
A classic member is a member who joined CalPERS prior to January, 1, 2013 and who is not defined as a new member under PEPRA. (See definition of new member below)

Discount Rate Assumption
The actuarial assumption that was called "investment return" in earlier CalPERS reports or "actuarial interest rate" in Section 20014 of the California Public Employees' Retirement Law (PERL).

Entry Age
The earliest age at which a plan member begins to accrue benefits under a defined benefit pension plan. In most cases, this is the age of the member on their date of hire.

Entry Age Normal Cost Method
An actuarial cost method designed to fund a member's total plan benefit over the course of his or her career. This method is designed to yield a rate expressed as a level percentage of payroll.
(The assumed retirement age less the entry age is the amount of time required to fund a member's total benefit. Generally, the older a member on the date of hire, the greater the entry age normal cost. This is mainly because there is less time to earn investment income to fund the future benefits.)

Fresh Start

A Fresh Start is when multiple amortization bases are collapsed to one base and amortized together over a new funding period.

Funded Status

A measure of how well funded, or how "on track" a plan or risk pool is with respect to assets versus accrued liabilities. A ratio greater than 100% means the plan or risk pool has more assets than liabilities and a ratio less than 100% means liabilities are greater than assets.

GASB 68

Statement No. 68 of the Governmental Accounting Standards Board. The accounting standard governing a state or local governmental employer's accounting and financial reporting for pensions. GASB 68 replaces GASB 27 effective the first fiscal year beginning after June 15, 2014.

New Member (under PEPRA)

A new member includes an individual who becomes a member of a public retirement system for the first time on or after January 1, 2013, and who was not a member of another public retirement system prior to that date, and who is not subject to reciprocity with another public retirement system.

Normal Cost

The annual cost of service accrual for the upcoming fiscal year for active employees. The normal cost should be viewed as the long term contribution rate.

Pension Actuary

A business professional that is authorized by the Society of Actuaries, and the American Academy of Actuaries to perform the calculations necessary to properly fund a pension plan.

PEPRA

The California Public Employees' Pension Reform Act of 2013

Prepayment Contribution

A payment made by the employer to reduce or eliminate the year's required employer contribution.

Present Value of Benefits (PVB)

The total dollars needed as of the valuation date to fund all benefits earned in the past or expected to be earned in the future for *current* members.

Superfunded

A condition existing when a plan's Actuarial Value of Assets exceeds its Present Value of Benefits. Prior to the passage of PEPRA, when this condition existed on a given valuation date for a given plan, employee contributions for the rate year covered by that valuation could be waived.

Unfunded Liability (UAL)

When a plan or pool's Value of Assets is less than its Accrued Liability, the difference is the plan or pool's Unfunded Liability. If the Unfunded Liability is positive, the plan or pool will have to pay contributions exceeding the Normal Cost.

Exhibit A2

California Public Employees' Retirement System
Actuarial Office
P.O. Box 942701
Sacramento, CA 94229-2701
TTY: (916) 795-3240
(888) 225-7377 phone · (916) 795-2744 fax
www.calpers.ca.gov

July 2017

MISCELLANEOUS PLAN OF THE CITY OF SACRAMENTO (CalPERS ID: 7903930500)
Annual Valuation Report as of June 30, 2016

Dear Employer,

As an attachment to this letter, you will find a copy of the June 30, 2016 actuarial valuation report of your pension plan. Your 2016 actuarial valuation report contains important actuarial information about your pension plan at CalPERS. Your CalPERS staff actuary, whose signature appears in the "Actuarial Certification" section on page 1, is available to discuss the report with you after August 31, 2017.

Required Contributions

The exhibit below displays the minimum required employer contributions and the Employee PEPRA Rate for Fiscal Year 2018-19 along with estimates of the required contributions for Fiscal Years 2019-20 and 2020-21. Member contributions other than cost sharing (whether paid by the employer or the employee) are in addition to the results shown below. **The required employer contributions in this report do not reflect any cost sharing arrangement you may have with your employees.**

Fiscal Year	Employer Normal Cost Rate	Employer Amortization of Unfunded Accrued Liability	Employee PEPRA Rate
2018-19	8.252%	$19,935,890	6.75%
Projected Results			
2019-20	*8.7%*	*$23,899,000*	*TBD*
2020-21	*9.6%*	*$27,140,000*	*TBD*

The actual investment return for Fiscal Year 2016-17 was not known at the time this report was prepared. The projections above assume the investment return for that year would be 7.375 percent. ***If the actual investment return for Fiscal year 2016-17 differs from 7.375 percent, the actual contribution requirements for the projected years will differ from those shown above.***

Moreover, the projected results for Fiscal Years 2019-20 and 2020-21 also assume that there are no future plan changes, no further changes in assumptions other than those recently approved, and no liability gains or losses. Such changes can have a significant impact on required contributions. Since they cannot be predicted in advance, the projected employer results shown above are estimates. The actual required employer contributions for Fiscal year 2019-20 will be provided in next year's report.

For additional details regarding the assumptions and methods used for these projections please refer to the "Projected Employer Contributions" in the "Highlights and Executive Summary" section.

The required contributions shown above include a Normal Cost component expressed as a percentage of payroll and a payment toward Unfunded Accrued Liability expressed as a dollar amount. Actual contributions for Fiscal Year 2018-19 and all future years will be collected on that basis. For illustrative total contribution requirements expressed as percentages of payroll, please see pages 4 and 5 of the report.

The "Risk Analysis" section of the valuation report on page 21 also contains estimated employer contributions in future years under a variety of investment return scenarios.

Changes since the Prior Year's Valuation

On December 21, 2016, the CalPERS Board of Administration lowered the discount rate from 7.50 percent to 7.00 percent using a three year phase-in beginning with the June 30, 2016 actuarial valuations. The minimum employer contributions for Fiscal Year 2018-19 determined in this valuation were calculated using a discount rate of 7.375 percent. The projected employer contributions on Page 5 are calculated assuming that the discount rate will be lowered to 7.25 percent next year and to 7.00 percent the following year as adopted by the Board.

Beginning with Fiscal Year 2017-18 CalPERS began collecting employer contributions toward the plan's unfunded liability as dollar amounts instead of the prior method of a contribution rate. This change addresses potential funding issues that could arise from a declining payroll or reduction in the number of active members in the plan. Funding the unfunded liability as a percentage of payroll could lead to the underfunding of the plans. Due to stakeholder feedback regarding internal needs for total contributions expressed as a percentage of payroll, the reports have been modified to include such results in the contribution projection on page 5. These results are provided for information purposes only. Contributions toward the unfunded liability will continue to be collected as dollar amounts.

The CalPERS Board of Administration adopted a Risk Mitigation Policy which is designed to reduce funding risk over time. This Policy has been temporarily suspended during the period over which the discount rate is being lowered. More details on the Risk Mitigation Policy can be found on our website.

Besides the above noted changes, there may also be changes specific to the plan such as contract amendments and funding changes.

Further descriptions of general changes are included in the "Highlights and Executive Summary" section and in Appendix A, "Actuarial Methods and Assumptions." The effects of the changes on the required contributions are included in the "Reconciliation of Required Employer Contributions" section.

We understand that you might have a number of questions about these results. While we are very interested in discussing these results with your agency, in the interest of allowing us to give every public agency their results, we ask that you wait until after August 31 to contact us with actuarial questions. If you have other questions, you may call the Customer Contact Center at (888)-CalPERS or (**888-225-7377**).

Sincerely,

SCOTT TERANDO
Chief Actuary

ACTUARIAL VALUATION
as of June 30, 2016

for the
MISCELLANEOUS PLAN
of the
CITY OF SACRAMENTO

(CalPERS ID: 7903930500)
(Rate Plan ID: 1209)

REQUIRED CONTRIBUTIONS
FOR FISCAL YEAR
July 1, 2018 – June 30, 2019

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ACTUARIAL CERTIFICATION

To the best of our knowledge, this report is complete and accurate and contains sufficient information to disclose, fully and fairly, the funded condition of the MISCELLANEOUS PLAN OF THE CITY OF SACRAMENTO. This valuation is based on the member and financial data as of June 30, 2016 provided by the various CalPERS databases and the benefits under this plan with CalPERS as of the date this report was produced. It is our opinion that the valuation has been performed in accordance with generally accepted actuarial principles, in accordance with standards of practice prescribed by the Actuarial Standards Board, and that the assumptions and methods are internally consistent and reasonable for this plan, as prescribed by the CalPERS Board of Administration according to provisions set forth in the California Public Employees' Retirement Law.

The undersigned is an actuary for CalPERS, a member of the American Academy of Actuaries and the Society of Actuaries and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

MAY SHUANG YU, ASA, MAAA
Senior Pension Actuary, CalPERS

HIGHLIGHTS AND EXECUTIVE SUMMARY

- **INTRODUCTION**
- **PURPOSE OF THE REPORT**
- **REQUIRED CONTRIBUTIONS**
- **PLAN'S FUNDED STATUS**
- **PROJECTED EMPLOYER CONTRIBUTIONS**
- **COST**
- **CHANGES SINCE THE PRIOR YEAR'S VALUATION**
- **SUBSEQUENT EVENTS**

Introduction

This report presents the results of the June 30, 2016 actuarial valuation of the MISCELLANEOUS PLAN OF THE CITY OF SACRAMENTO of the California Public Employees' Retirement System (CalPERS). This actuarial valuation sets the required employer contributions for Fiscal Year 2018-19.

Purpose of the Report

The actuarial valuation was prepared by the CalPERS Actuarial Office using data as of June 30, 2016. The purpose of the report is to:

- Set forth the assets and accrued liabilities of this plan as of June 30, 2016;
- Determine the required employer contributions for the fiscal year July 1, 2018 through June 30, 2019;
- Provide actuarial information as of June 30, 2016 to the CalPERS Board of Administration and other interested parties.

The pension funding information presented in this report should not be used in financial reports subject to Governmental Accounting Standards Board (GASB) Statement No. 68 for an Agent Employer Defined Benefit Pension Plan. A separate accounting valuation report for such purposes is available from CalPERS and details for ordering are available on our website.

The measurements shown in this actuarial valuation may not be applicable for other purposes. The employer should contact their actuary before disseminating any portion of this report for any reason that is not explicitly described above.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; changes in actuarial policies; and changes in plan provisions or applicable law.

California Actuarial Advisory Panel Recommendations

This report includes all the basic disclosure elements as described in the *Model Disclosure Elements for Actuarial Valuation Reports* recommended in 2011 by the California Actuarial Advisory Panel (CAAP), with the exception of including the original base amounts of the various components of the unfunded liability in the Schedule of Amortization Bases shown on page 15.

Additionally, this report includes the following "Enhanced Risk Disclosures" also recommended by the CAAP in the Model Disclosure Elements document:

- A "Deterministic Stress Test," projecting future results under different investment income scenarios
- A "Sensitivity Analysis," showing the impact on current valuation results using alternative discount rates of 6.0 percent, 7.0 percent and 8.0 percent.

Required Contributions

		Fiscal Year
Required Employer Contribution		**2018-19**
Employer Normal Cost Rate		**8.252%**
Plus Either		
1) Monthly Employer Dollar UAL Payment	**$**	**1,661,324**
Or		
2) Annual UAL Prepayment Option	**$**	**19,239,068**
Required PEPRA Member Contribution Rate		**6.75%**

*The total minimum required employer contribution is the **sum** of the Plan's Employer Normal Cost Rate (expressed as a percentage of payroll) **plus** the Employer Unfunded Accrued Liability (UAL) Contribution Amount (billed monthly in dollars).*

*Only the UAL portion of the employer contribution can be prepaid **(which must be received in full no later than July 31)**. Plan Normal Cost contributions will be made as part of the payroll reporting process. If there is contractual cost sharing or other change, this amount will change.*

§20572 of the Public Employees' Retirement Law assesses interest at an annual rate of 10 percent if a contracting agency fails to remit the required contributions when due.

For additional detail regarding the determination of the required contribution for PEPRA members, see Appendix D. Required member contributions for Classic members can be found in Appendix B.

		Fiscal Year 2017-18		Fiscal Year 2018-19
Normal Cost Contribution as a Percentage of Payroll				
Total Normal Cost		14.525%		14.938%
Employee Contribution[1]		6.722%		6.686%
Employer Normal Cost		7.803%		8.252%
Projected Annual Payroll for Contribution Year	$	176,536,898	$	187,561,931
Estimated Employer Contributions Based On Projected Payroll				
Total Normal Cost	$	25,641,985	$	28,018,001
Employee Contribution[1]		11,866,810		12,540,391
Employer Normal Cost		13,775,175		15,477,610
Unfunded Liability Contribution		16,565,701		19,935,890
% of Projected Payroll (illustrative only)		9.384%		10.629%
Estimated Total Employer Contribution	$	30,340,876	$	35,413,500
% of Projected Payroll (illustrative only)		17.187%		18.881%

[1] For classic members, this is the percentage specified in the Public Employees Retirement Law, net of any reduction from the use of a modified formula or other factors. For PEPRA members, the member contribution rate is based on 50 percent of the normal cost. A development of PEPRA member contribution rates can be found in Appendix D. Employee cost sharing is not shown in this report.

Plan's Funded Status

	June 30, 2015	June 30, 2016
1. Present Value of Projected Benefits	$ 1,249,680,018	$ 1,351,149,137
2. Entry Age Normal Accrued Liability	1,067,754,811	1,151,634,656
3. Market Value of Assets (MVA)	$ 812,201,601	$ 815,858,288
4. Unfunded Accrued Liability (UAL) [(2) – (3)]	$ 255,553,210	$ 335,776,368
5. Funded Ratio [(3) / (2)]	76.1%	70.8%

This measure of funded status is an assessment of the need for future employer contributions based on the selected actuarial cost method used to fund the plan. The UAL is the present value of future employer contributions for service that has already been earned and is in addition to future normal cost contributions for active members. For a measure of funded status that is appropriate for assessing the sufficiency of plan assets to cover estimated termination liabilities, please see "Hypothetical Termination Liability" in the "Risk Analysis" section.

Projected Employer Contributions

The table below shows the required and projected employer contributions (before cost sharing) for the next six fiscal years. Projected results reflect the adopted changes to the discount rate described in Appendix A, "Actuarial Methods and Assumptions." The projections also assume that all actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur during the projection period. The projected normal cost percentages in the projections below do not reflect that the normal cost will decline over time as new employees are hired into PEPRA or other lower cost benefit tiers.

	Required Contribution	**Projected Future Employer Contributions (Assumes 7.375% Return for Fiscal Year 2016-17)**					
Fiscal Year	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**	**2023-24**	**2024-25**
Normal Cost %	8.252%	8.7%	9.6%	9.6%	9.6%	9.6%	9.6%
UAL Payment	19,935,890	23,899,000	27,140,000	31,523,000	35,421,000	38,050,000	40,269,000
*Total as a % of Payroll**	*18.9%*	*21.1%*	*23.2%*	*25.0%*	*26.4%*	*27.1%*	*27.6%*
Projected Payroll	*187,561,931*	*193,188,789*	*198,984,452*	*204,953,986*	*211,102,606*	*217,435,684*	*223,958,755*

*Illustrative only and based on the projected payroll shown.

Changes in the UAL due to actuarial gains or losses as well as changes in actuarial assumptions or methods are amortized using a 5-year ramp up. For more information, please see "Amortization of the Unfunded Actuarial Accrued Liability" under "Actuarial Methods" in Appendix A. This method phases in the impact of unanticipated changes in UAL over a 5-year period and attempts to minimize employer cost volatility from year to year. As a result of this methodology, dramatic changes in the required employer contributions in any one year are less likely. However, required contributions can change gradually and significantly over the next five years. In years where there is a large increase in UAL the relatively small amortization payments during the ramp up period could result in a funded ratio that is projected to decrease initially while the contribution impact of the increase in the UAL is phased in.

Due to the adopted changes in the discount rate for the next two valuations in combination with the 5-year phase-in ramp, the increases in the required contributions are expected to continue for seven years from Fiscal Year 2018-19 through Fiscal Year 2024-25.

For projected contributions under alternate investment return scenarios, please see the "Analysis of Future Investment Return Scenarios" in the "Risk Analysis" section.

Cost

Actuarial Cost Estimates in General

What is the cost of the pension plan?

Contributions to fund the pension plan are comprised of two components:

- The Normal Cost, expressed as a percentage of total active payroll.
- The Amortization of the Unfunded Accrued Liability (UAL), expressed as a dollar amount.

For fiscal years prior to FY 2017-18, the Amortizations of UAL component was expressed as percentage of total active payroll. Starting with FY 2017-18, the Amortization of UAL component will be expressed as a dollar amount and will be invoiced on a monthly basis. There will be an option to prepay this amount during July of each fiscal year.

The Normal Cost component will continue to be expressed as a percentage of active payroll with employer and employee contributions payable as part of the regular payroll reporting process.

The determination of both components requires complex actuarial calculations. The calculations are based on a set of actuarial assumptions which can be divided into two categories:

- Demographic assumptions (which includes mortality rates, retirement rates, employment termination rates, disability rates)
- Economic assumptions (which includes future investment earnings, inflation, salary growth rates)

These assumptions reflect CalPERS best estimate of the future experience of the plan and are long term in nature. We recognize that all the assumptions will not be realized in any given year. For example, the investment earnings at CalPERS have averaged 7.0 percent over the 20 years ending June 30, 2016, yet individual fiscal year returns have ranged from -24 percent to +21.7 percent. In addition, CalPERS reviews all the actuarial assumptions on an ongoing basis by conducting in depth experience studies every four years.

Changes since the Prior Year's Valuation

Benefits

The standard actuarial practice at CalPERS is to recognize mandated legislative benefit changes in the first annual valuation following the effective date of the legislation. Voluntary benefit changes by plan amendment are generally included in the first valuation that is prepared after the amendment becomes effective, even if the valuation date is prior to the effective date of the amendment.

This valuation generally reflects plan changes by amendments effective before the date of the report. Please refer to the "Plan's Major Benefit Options" and Appendix B for a summary of the plan provisions used in this valuation. The effect of any mandated benefit changes or plan amendments on the unfunded liability is shown in the "(Gain)/Loss Analysis" and the effect on the employer contribution is shown in the "Reconciliation of Required Employer Contributions." It should be noted that no change in liability or contribution is shown for any plan changes which were already included in the prior year's valuation.

Actuarial Methods and Assumptions

On December 21, 2016, the CalPERS Board of Administration lowered the discount rate from 7.50 percent to 7.00 percent using a three year phase-in beginning with the June 30, 2016 actuarial valuations. The minimum employer contributions for Fiscal Year 2018-19 determined in this valuation were calculated using a discount rate of 7.375 percent. The projected employer contributions on Page 5 are calculated assuming that the discount rate will be lowered to 7.25 percent next year and 7.00 percent the following year as adopted by the Board. The decision to reduce the discount rate was primarily based on reduced capital market assumptions provided by external investment consultants and CalPERS investment staff. The specific decision adopted by the Board reflected recommendations from CalPERS staff and additional input from employer and employee stakeholder groups. Based on the investment allocation adopted by the Board and capital market assumptions, the reduced discount rate assumption provides a more realistic assumption for the long term investment return of the fund.

Notwithstanding the Board's decision to phase into a 7.0 percent discount rate, subsequent analysis of the expected investment return of CalPERS assets or changes to the investment allocation may result in a change to this three year discount rate schedule. A comprehensive analysis of all actuarial assumptions and methods including the discount rate will be conducted in 2017.

Subsequent Events

The contribution requirements determined in this actuarial valuation report are based on demographic and financial information as of June 30, 2016. Changes in the value of assets subsequent to that date are not reflected. Declines in asset values will increase the required contribution, while investment returns above the assumed rate of return will decrease the actuarial cost of the plan.

This actuarial valuation report reflects statutory changes, regulatory changes and CalPERS Board actions through January 2017. Any subsequent changes or actions are not reflected.

ASSETS

- **RECONCILIATION OF THE MARKET VALUE OF ASSETS**
- **ASSET ALLOCATION**
- **CALPERS HISTORY OF INVESTMENT RETURNS**

Reconciliation of the Market Value of Assets

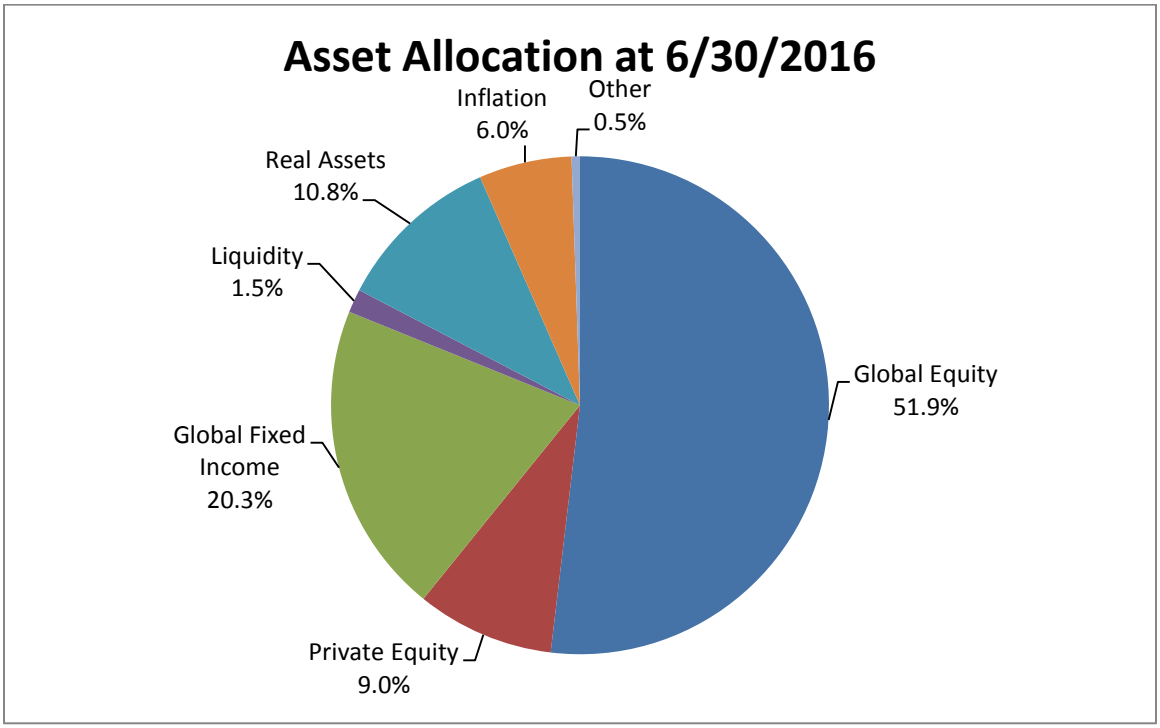
1.	Market Value of Assets as of 6/30/15 including Receivables	$	812,201,601
2.	Change in Receivables for Service Buybacks		(306,972)
3.	Employer Contributions		25,962,718
4.	Employee Contributions		11,630,388
5.	Benefit Payments to Retirees and Beneficiaries		(37,063,102)
6.	Refunds		(917,121)
7.	Lump Sum Payments		0
8.	Transfers and Miscellaneous Adjustments		1,193,147
9.	Net Investment Return		3,157,629
10.	Market Value of Assets as of 6/30/16 including Receivables	$	815,858,288

Asset Allocation

CalPERS adheres to an Asset Allocation Strategy which establishes asset class allocation policy targets and ranges, and manages those asset class allocations within their policy ranges. CalPERS Investment Belief No. 6 recognizes that strategic asset allocation is the dominant determinant of portfolio risk and return. On February 19, 2014, the CalPERS Board of Administration adopted changes to the current asset allocation as shown in the Policy Target Allocation below expressed as a percentage of total assets.

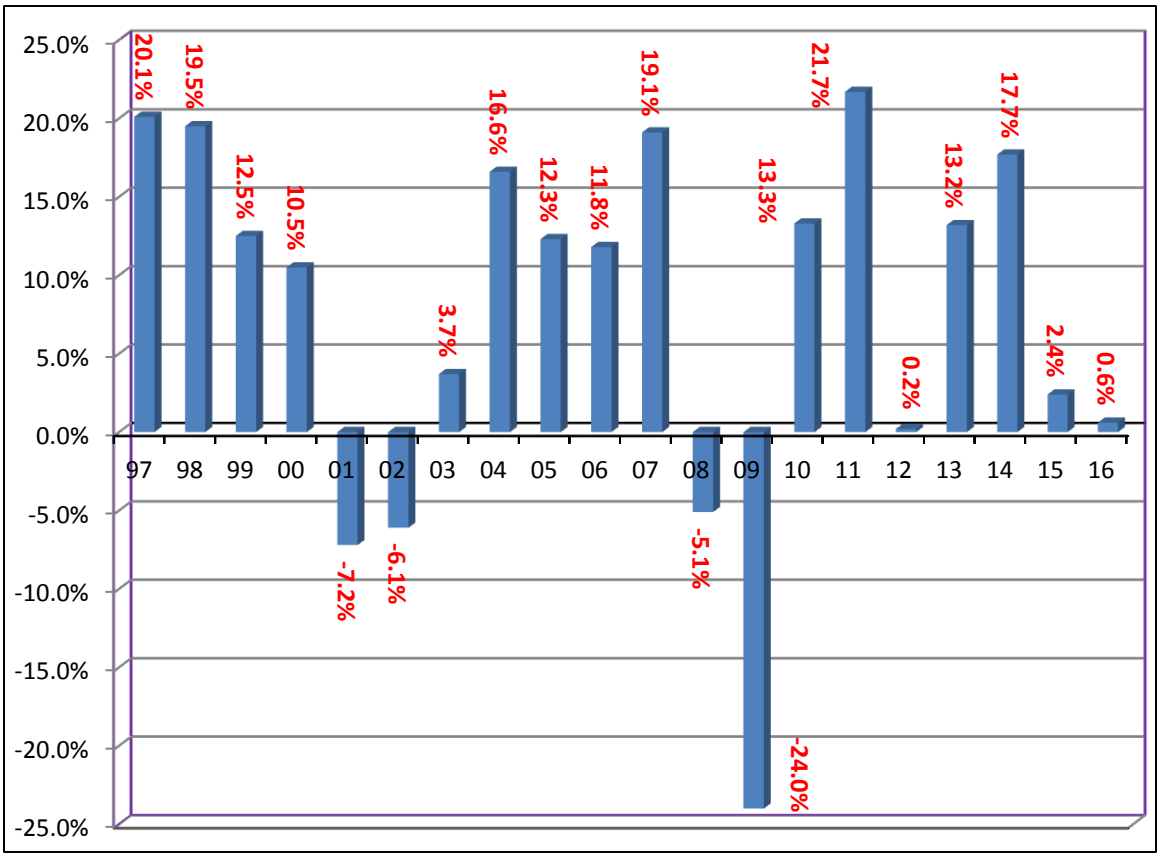
The asset allocation and market value of assets shown below reflect the values of the Public Employees' Retirement Fund (PERF) in its entirety as of June 30, 2016. The assets for CITY OF SACRAMENTO MISCELLANEOUS PLAN are part of the PERF and are invested accordingly.

(A) Asset Class	(B) Market Value ($ Billion)	(C) Policy Target Allocation
Public Equity	153.1	51.0%
Private Equity	26.4	10.0%
Global Fixed Income	59.9	20.0%
Liquidity	4.5	1.0%
Real Assets	31.8	12.0%
Inflation Sensitive Assets	17.8	6.0%
Other	1.6	0.0%
Total Fund	**$295.1**	**100.0%**



CalPERS History of Investment Returns

The following is a chart with the 20-year historical annual returns of the Public Employees Retirement Fund for each fiscal year ending on June 30. Beginning in 2002, the figures are reported as gross of fees.



The table below shows historical geometric mean annual returns of the Public Employees Retirement Fund for various time periods ending on June 30, 2016, (figures are reported as gross of fees). The geometric mean rate of return is the average rate per period compounded over multiple periods. It should be recognized that in any given year the rate of return is volatile. The portfolio has an expected volatility of 11.8 percent per year based on the most recent Asset Liability Modelling study. The volatility is a measure of the risk of the portfolio expressed in the standard deviation of the fund's total return distribution, expressed as a percentage. Consequently, when looking at investment returns, it is more instructive to look at returns over longer time horizons.

History of CalPERS Geometric Mean Rates of Return and Volatilities					
	1 year	**5 year**	**10 year**	**20 year**	**30 year**
Geometric Return	0.6%	6.6%	5.0%	7.0%	8.2%
Volatility	–	8.1%	14.0%	11.8%	10.1%

LIABILITIES AND CONTRIBUTIONS

- **DEVELOPMENT OF ACCRUED AND UNFUNDED LIABILITIES**
- **(GAIN) / LOSS ANALYSIS 06/30/15 - 06/30/16**
- **SCHEDULE OF AMORTIZATION BASES**
- **30-YEAR AMORTIZATION SCHEDULES AND ALTERNATIVES**
- **RECONCILIATION OF REQUIRED EMPLOYER CONTRIBUTIONS**
- **EMPLOYER CONTRIBUTION HISTORY**
- **FUNDING HISTORY**

Development of Accrued and Unfunded Liabilities

		June 30, 2015	June 30, 2016
1. Present Value of Projected Benefits			
a) Active Members	$	685,312,653	736,895,997
b) Transferred Members		81,254,972	89,121,552
c) Terminated Members		26,424,316	26,600,231
d) Members and Beneficiaries Receiving Payments		456,688,077	498,531,357
e) Total	$	1,249,680,018	1,351,149,137
2. Present Value of Future Employer Normal Costs	$	94,312,818	106,837,670
3. Present Value of Future Employee Contributions	$	87,612,389	92,676,811
4. Entry Age Normal Accrued Liability			
a) Active Members [(1a) - (2) - (3)]	$	503,387,446	537,381,516
b) Transferred Members (1b)		81,254,972	89,121,552
c) Terminated Members (1c)		26,424,316	26,600,231
d) Members and Beneficiaries Receiving Payments (1d)		456,688,077	498,531,357
e) Total	$	1,067,754,811	1,151,634,656
5. Market Value of Assets (MVA)	$	812,201,601	815,858,288
6. Unfunded Accrued Liability (UAL) [(4e) - (5)]	$	255,553,210	335,776,368
7. Funded Ratio [(5) / (4e)]		76.1%	70.8%

(Gain)/Loss Analysis 6/30/15 – 6/30/16

To calculate the cost requirements of the plan, assumptions are made about future events that affect the amount and timing of benefits to be paid and assets to be accumulated. Each year, actual experience is compared to the expected experience based on the actuarial assumptions. This results in actuarial gains or losses, as shown below.

1. Total (Gain)/Loss for the Year		
a) Unfunded Accrued Liability (UAL) as of 6/30/15	$	255,553,210
b) Expected Payment on the UAL during 2015-16		13,257,324
c) Interest through 6/30/16 [.075 x (1a) - ((1.075)^{½} - 1) x (1b)]		18,678,329
d) Expected UAL before all other changes [(1a) - (1b) + (1c)]		260,974,215
e) Change due to plan changes		0
f) Change due to assumption change		18,843,804
g) Expected UAL after all other changes [(1d) + (1e) + (1f)]		279,818,019
h) Actual UAL as of 6/30/16		335,776,368
i) Total (Gain)/Loss for 2015-16 [(1h) - (1g)]	$	55,958,349
2. Contribution (Gain)/Loss for the Year		
a) Expected Contribution (Employer and Employee)	$	37,259,286
b) Interest on Expected Contributions		1,371,964
c) Actual Contributions		37,593,106
d) Interest on Actual Contributions		1,384,256
e) Expected Contributions with Interest [(2a) + (2b)]		38,631,250
f) Actual Contributions with Interest [(2c) + (2d)]		38,977,362
g) Contribution (Gain)/Loss [(2e) - (2f)]	$	(346,112)
3. Asset (Gain)/Loss for the Year		
a) Market Value of Assets as of 6/30/15	$	812,201,601
b) Prior Fiscal Year Receivables		(2,264,220)
c) Current Fiscal Year Receivables		1,957,248
d) Contributions Received		37,593,106
e) Benefits and Refunds Paid		(37,980,223)
f) Transfers and Miscellaneous Adjustments		1,193,147
g) Expected Int. [.075 x (3a + 3b) + ((1.075)^{½} - 1) x ((3d) + (3e) + (3f))]		60,774,983
h) Expected Assets as of 6/30/16 [(3a) + (3b) + (3c) + (3d) + (3e) + (3f) + (3g)]		873,475,642
i) Market Value of Assets as of 6/30/16		815,858,288
j) Asset (Gain)/Loss [(3h) **-** (3i)]	$	57,617,354
4. Liability (Gain)/Loss for the Year		
a) Total (Gain)/Loss (1i)	$	55,958,349
b) Contribution (Gain)/Loss (2g)		(346,112)
c) Asset (Gain)/Loss (3j)		57,617,354
d) Liability (Gain)/Loss [(4a) - (4b) - (4c)]	$	(1,312,893)

Schedule of Amortization Bases

There is a two-year lag between the valuation date and the start of the contribution fiscal year.

- The assets, liabilities, and funded status of the plan are measured as of the valuation date: June 30, 2016.
- The required employer contributions determined by the valuation are for the fiscal year beginning two years after the valuation date: Fiscal Year 2018-19.

This two-year lag is necessary due to the amount of time needed to extract and test the membership and financial data, and the need to provide public agencies with their required employer contribution well in advance of the start of the fiscal year.

The Unfunded Accrued Liability (UAL) is used to determine the employer contribution and therefore must be rolled forward two years from the valuation date to the first day of the fiscal year for which the contribution is being determined. The UAL is rolled forward each year by subtracting the expected payment on the UAL for the fiscal year and adjusting for interest. The expected payment on the UAL for a fiscal year is equal to the Expected Employer Contribution for the fiscal year minus the Expected Normal Cost for the year. The Employer Contribution for the first fiscal year is determined by the actuarial valuation two years ago and the contribution for the second year is from the actuarial valuation one year ago. The Normal Cost Rate for each of the two fiscal years is assumed to be the same as the rate determined by the current valuation. All expected dollar amounts are determined by multiplying the rate by the expected payroll for the applicable fiscal year, based on payroll as of the valuation date.

Reason for Base	Date Established	Amortization Period	Balance 6/30/16	Expected Payment 2016-17	Balance 6/30/17	Expected Payment 2017-18	Balance 6/30/18	Scheduled Payment for 2018-19
BENEFIT CHANGE	06/30/05	8	$2,519,882	$314,329	$2,380,010	$323,759	$2,220,050	$331,119
ASSUMPTION CHANGE	06/30/07	7	$18,832,835	$2,558,695	$17,570,388	$2,635,456	$16,135,294	$2,696,661
ARNETT CASE	06/30/07	7	$150,447	$20,440	$140,362	$21,053	$128,898	$21,543
ASSETS CHANGE	06/30/07	7	$(126,726)	$(17,217)	$(118,231)	$(17,734)	$(108,575)	$(18,146)
METHOD CHANGE	06/30/07	8	$(1,388,148)	$(173,157)	$(1,311,095)	$(178,352)	$(1,222,977)	$(182,406)
BENEFIT CHANGE	06/30/08	11	$(307,690)	$(31,315)	$(297,933)	$(32,255)	$(286,482)	$(32,941)
ASSUMPTION CHANGE	06/30/09	13	$14,241,438	$1,305,506	$13,938,954	$1,344,671	$13,573,578	$1,371,989
SPECIAL (GAIN)/LOSS	06/30/09	23	$21,369,210	$1,412,386	$21,481,648	$1,454,757	$21,558,472	$1,477,946
SPECIAL (GAIN)/LOSS	06/30/10	24	$115,044	$7,441	$115,818	$7,664	$116,418	$7,783
ASSUMPTION CHANGE	06/30/11	15	$18,207,889	$1,529,667	$17,965,651	$1,575,557	$17,657,995	$1,606,098
SPECIAL (GAIN)/LOSS	06/30/11	25	$(3,429,539)	$(217,358)	$(3,457,237)	$(223,879)	$(3,480,221)	$(227,271)
PAYMENT (GAIN)/LOSS	06/30/12	26	$1,759,053	$109,378	$1,775,444	$112,660	$1,789,642	$114,323
(GAIN)/LOSS	06/30/12	26	$83,393,879	$5,185,448	$84,170,917	$5,341,012	$84,844,064	$5,419,888
SAFCA FRESH START B	06/30/13	27	$(260,500)	$(7,118)	$(272,336)	$(10,997)	$(281,026)	$(17,585)
SAFCA FRESH START A	06/30/13	18	$(249,031)	$(18,803)	$(247,913)	$(19,367)	$(246,128)	$(19,717)
(GAIN)/LOSS	06/30/13	27	$102,139,209	$2,790,769	$106,780,128	$4,311,737	$110,187,258	$5,835,575
ASSUMPTION CHANGE	06/30/14	18	$41,923,023	$798,537	$44,187,387	$1,644,985	$45,741,642	$2,513,464
(GAIN)/LOSS	06/30/14	28	$(82,468,173)	$(1,159,918)	$(87,348,272)	$(2,389,431)	$(91,314,233)	$(3,635,810)
(GAIN)/LOSS	06/30/15	29	$44,552,114	$632,205	$47,182,730	$664,405	$49,973,987	$1,346,902
ASSUMPTION CHANGE	06/30/16	20	$18,843,804	$(731,932)	$20,991,976	$(753,890)	$23,321,329	$439,577
(GAIN)/LOSS	06/30/16	30	$55,958,348	$475,624	$59,592,425	$0	$63,987,366	$886,898
TOTAL			**$335,776,368**	**$14,783,607**	**$345,220,818**	**$15,811,811**	**$354,296,351**	**$19,935,890**

30-Year Amortization Schedule and Alternatives

The amortization schedule on the previous page shows the minimum contributions required according to CalPERS amortization policy. There has been considerable interest from many agencies in paying off these unfunded accrued liabilities sooner and the possible savings in doing so. As a result, we have provided alternate amortization schedules to help analyze the current amortization schedule and illustrate the advantages of accelerating unfunded liability payments.

Shown on the following page are future year amortization payments based on 1) the current amortization schedule reflecting the individual bases and remaining periods shown on the previous page, and 2) alternate "fresh start" amortization schedules using two sample periods that would both result in interest savings relative to the current amortization schedule. Note that the payments under each alternate scenario increase by 3 percent per year. **The schedules do not reflect the impact of adopted discount rate changes that will become effective beyond June 30, 2016. Therefore, future amortization payments displayed in the Current Amortization Schedule on the following page will not match projected amortization payments shown in connection with Projected Employer Contributions provided elsewhere in this report.**

The Current Amortization Schedule typically contains individual bases that are both positive and negative. Positive bases result from plan changes, assumption changes or plan experience that result in increases to unfunded liability. Negative bases result from plan changes, assumption changes or plan experience that result in decreases to unfunded liability. The combination of positive and negative bases within an amortization schedule can result in unusual or problematic circumstances in future years such as:

- A positive total unfunded liability with a negative total payment,
- A negative total unfunded liability with a positive total payment, or
- Total payments that completely amortize the unfunded liability over a very short period of time

In any year where one of the above scenarios occurs, the actuary will consider corrective action such as replacing the existing unfunded liability bases with a single "fresh start" base and amortizing it over a reasonable period.

The Current Amortization Schedule on the following page may appear to show that, based on the current amortization bases, one of the above scenarios will occur at some point in the future. It is impossible to know today whether such a scenario will in fact arise since there will be additional bases added to the amortization schedule in each future year. Should such a scenario arise in any future year, the actuary will take appropriate action based on guidelines in the CalPERS amortization policy. For purposes of this display, total payments include any negative payments. Therefore, the amount of estimated savings may be understated to the extent that negative payments appear in the current schedule.

30-Year Amortization Schedule and Alternatives

	Current Amortization Schedule*		Alternate Schedules			
			20 Year Amortization		15 Year Amortization	
Date	**Balance**	**Payment**	**Balance**	**Payment**	**Balance**	**Payment**
6/30/2018	354,296,352	19,935,890	354,296,352	26,484,535	354,296,352	32,225,321
6/30/2019	359,767,756	23,711,212	352,981,927	27,279,071	347,033,215	33,192,081
6/30/2020	361,730,617	26,147,369	350,747,250	28,097,443	338,232,646	34,187,843
6/30/2021	361,313,847	29,117,166	347,499,753	28,940,366	327,751,208	35,213,479
6/30/2022	357,788,978	31,483,639	343,139,300	29,808,577	315,433,981	36,269,883
6/30/2023	351,551,965	32,428,146	337,557,606	30,702,835	301,113,691	37,357,980
6/30/2024	343,876,258	33,400,989	330,637,616	31,623,920	284,609,775	38,478,719
6/30/2025	334,626,387	31,082,290	322,252,831	32,572,637	265,727,362	39,633,081
6/30/2026	327,097,020	31,826,373	312,266,589	33,549,817	244,256,201	40,822,073
6/30/2027	318,241,331	32,781,165	300,531,289	34,556,311	219,969,484	42,046,735
6/30/2028	307,743,158	33,764,601	286,887,563	35,593,000	192,622,604	43,308,137
6/30/2029	295,451,693	34,823,136	271,163,374	36,660,790	161,951,802	44,607,381
6/30/2030	281,156,858	35,867,832	253,173,062	37,760,614	127,672,728	45,945,603
6/30/2031	264,725,244	34,929,056	232,716,306	38,893,432	89,478,881	47,323,971
6/30/2032	248,054,575	34,709,647	209,577,017	40,060,235	47,039,946	48,743,690
6/30/2033	230,381,801	31,943,390	183,522,141	41,262,043		
6/30/2034	214,272,108	30,851,844	154,300,383	42,499,904		
6/30/2035	198,105,406	29,666,052	121,640,824	43,774,901		
6/30/2036	181,975,150	28,414,913	85,251,447	45,088,148		
6/30/2037	165,951,742	28,496,564	44,817,542	46,440,792		
6/30/2038	148,661,998	28,557,534				
6/30/2039	130,033,958	29,414,264				
6/30/2040	109,144,341	30,296,690				
6/30/2041	85,799,728	25,409,482				
6/30/2042	65,797,666	25,653,932				
6/30/2043	44,067,150	24,972,277				
6/30/2044	21,440,351	9,888,793				
6/30/2045	12,774,622	6,209,967				
6/30/2046	7,281,863	5,599,125				
6/30/2047	2,016,981	2,090,034				
Totals		**803,473,372**		**711,649,371**		**599,355,977**
Interest Paid		**449,177,020**		**357,353,019**		**245,059,625**
Estimated Savings				**91,824,001**		**204,117,395**

* This schedule does not reflect the impact of adopted discount rate changes that will become effective beyond June 30, 2016. For Projected Employer Contributions, please see Page 5.

Reconciliation of Required Employer Contributions

Normal Cost (% of Payroll)

1. For Period 7/1/17 – 6/30/18	
a) Employer Normal Cost	7.803%
b) Employee Contribution	6.722%
c) Total Normal Cost	14.525%
2. Changes since the prior year annual valuation	
a) Effect of changes in demographics results	(0.001%)
b) Effect of plan changes	0.000%
c) Effect of changes in assumptions	0.414%
d) Net effect of the changes above [sum of (a) through (c)]	0.413%
3. For Period 7/1/18 – 6/30/19	
a) Employer Normal Cost	8.252%
b) Employee Contribution	6.686%
c) Total Normal Cost	14.938%
Employer Normal Cost Change [(3a) – (1a)]	0.449%
Employee Contribution Change [(3b) – (1b)]	(0.036%)

Unfunded Liability Contribution ($)

1. For Period 7/1/17 – 6/30/18	16,565,701
2. Changes since the prior year annual valuation	
a) Effect of (gain)/loss during prior year[1]	886,898
b) Effect of plan changes	0
c) Effect of changes in assumptions[2]	439,577
d) Changes to prior year amortization payments[3]	2,043,714
e) Effect of changes due to Fresh Start	0
f) Effect of elimination of amortization base	0
g) Net effect of the changes above [sum of (a) through (f)]	3,370,189
3. For Period 7/1/18 – 6/30/19 [(1)+(2g)]	19,935,890

[1] The unfunded liability contribution for the (gain)/loss during the year prior to the valuation date is 20 percent of the "full" annual requirement due to the 5-year ramp. Increases to this amount that occur during the ramp period will be included in line d) in future years.

[2] The unfunded liability contribution for the change in assumptions is 20 percent of the "full" annual requirement due to the 5-year ramp. Increases to this amount that occur during the ramp period will be included in line d) in future years.

[3] Includes changes due to 5-year ramp, payroll growth assumption, and re-amortization under new discount rate.

The amounts shown for the period 7/1/17 – 6/30/18 may be different if a prepayment of unfunded actuarial liability is made or a plan change became effective after the prior year's actuarial valuation was performed.

Employer Contribution History

The table below provides a recent history of the required employer contributions for the plan, as determined by the annual actuarial valuation. It does not account for prepayments or benefit changes made during a fiscal year.

		Required By Valuation	
Fiscal Year	**Employer Normal Cost**	**Unfunded Rate**	**Unfunded Liability Payment ($)**
2013 - 14	7.676%	5.969%	N/A
2014 - 15	7.582%	6.837%	N/A
2015 - 16	7.810%	7.859%	N/A
2016 - 17	7.851%	8.625%	N/A
2017 - 18	7.803%	N/A	16,565,701
2018 - 19	8.252%	N/A	19,935,890

Funding History

The table below shows the recent history of the actuarial accrued liability, the market value of assets, the funded ratio and the annual covered payroll.

Valuation Date	Accrued Liability	Market Value of Assets (MVA)	Unfunded Liability	Funded Ratio	Annual Covered Payroll
06/30/11	$ 819,168,698	$ 589,536,663	$ 229,632,035	72.0%	$ 164,638,959
06/30/12	860,874,899	596,115,272	264,759,627	69.2%	151,456,486
06/30/13	914,353,322	677,151,274	237,202,048	74.1%	151,487,681
06/30/14	1,004,412,173	795,788,802	208,623,371	79.2%	152,863,321
06/30/15	1,067,754,811	812,201,601	255,553,210	76.1%	161,556,270
06/30/16	1,151,634,656	815,858,288	335,776,368	70.8%	171,645,737

RISK ANALYSIS

- **ANALYSIS OF FUTURE INVESTMENT RETURN SCENARIOS**
- **ANALYSIS OF DISCOUNT RATE SENSITIVITY**
- **VOLATILITY RATIOS**
- **HYPOTHETICAL TERMINATION LIABILITY**

Analysis of Future Investment Return Scenarios

Analysis was performed to determine the effects of various future investment returns on required employer contributions. The projections below provide a range of results based on five investment return scenarios assumed to occur during the next four fiscal years (2016-17, 2017-18, 2018-19 and 2019-20). The projections also assume that all other actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur.

Each of the five investment return scenarios assumes a return of 7.375 percent for fiscal year 2016-17. For fiscal years 2017-18, 2018-19, and 2019-20 each scenario assumes an alternate fixed annual return. The fixed return assumptions for the five scenarios are -3.0 percent, 3.0 percent, 7.0 percent (7.25 percent for 2017-18), 11.0 percent and 17.0 percent.

The alternate investment returns were chosen based on stochastic analysis of possible future investment returns over the four year period ending June 30, 2020. Using the expected returns and volatility of the asset classes in which the funds are invested, we produced ten thousand stochastic outcomes for this period. We then selected annual returns that approximate the 5th, 25th, 50th, 75th, and 95th percentiles for these outcomes. For example, of all of the 4-year outcomes generated in the stochastic analysis, approximately 25 percent of them had an average annual return of 3.0 percent or less.

Required contributions outside of this range are also possible. In particular, while it is unlikely that investment returns will average less than -3.0 percent or greater than 17.0 percent over this four year period, the possibility of a single investment return less than -3.0 percent or greater than 17.0 percent in any given year is much greater.

Assumed Annual Return From 2017-18 through 2019-20	**Projected Employer Contributions**			
	2019-20	**2020-21**	**2021-22**	**2022-23**
(3.0%)				
Normal Cost	8.7%	9.6%	9.6%	9.6%
UAL Contribution	$23,899,000	$28,505,000	$35,636,000	$43,718,000
3.0%				
Normal Cost	8.7%	9.6%	9.6%	9.6%
UAL Contribution	$23,899,000	$27,706,000	$33,241,000	$38,933,000
Assumed Discount Rate				
Normal Cost	8.7%	9.6%	9.6%	9.6%
UAL Contribution	$23,899,000	$27,140,000	$31,523,000	$35,421,000
11.0%				
Normal Cost	8.7%	9.6%	9.8%	10.0%
UAL Contribution	$23,899,000	$26,640,000	$29,918,000	$32,125,000
17.0%				
Normal Cost	8.7%	9.6%	10.2%	10.9%
UAL Contribution	$23,899,000	$25,841,000	$27,384,000	$26,957,000

Given the temporary suspension of the Risk Mitigation Policy during the period over which the discount rate assumption is being phased down to 7.0 percent, the projections above were performed without reflection of any possible impact of this Policy for Fiscal Years 2019-20 and 2020-21.

The projected normal cost percentages do not reflect that the normal cost will decline over time as new employees are hired into PEPRA or other lower cost benefit tiers.

Analysis of Discount Rate Sensitivity

Shown below are various valuation results as of June 30, 2016 assuming alternate discount rates. Results are shown using the current discount rate of 7.375 percent as well as alternate discount rates of 6.0 percent, 7.0 percent, and 8.0 percent. The alternate rate of 7.0 percent was selected since the Board has adopted this rate as the final discount rate at the end of the three year phase-in of the reduction in this assumption. The rates of 6.0 percent and 8.0 percent were selected since they illustrate the impact of a 1 percent increase or decrease to the 7.0 percent assumption. This analysis shows the potential plan impacts if the PERF were to realize investment returns of 6.0 percent, 7.0 percent, or 8.0 percent over the long-term.

This type of analysis gives the reader a sense of the long-term risk to required contributions. For a measure of funded status that is appropriate for assessing the sufficiency of plan assets to cover estimated termination liabilities, please see "Hypothetical Termination Liability" in the "Risk Analysis" section.

Sensitivity Analysis				
As of June 30, 2016	**Plan's Normal Cost**	**Accrued Liability**	**Unfunded Accrued Liability**	**Funded Status**
7.375% (current discount rate)	14.938%	$1,151,634,656	$335,776,368	70.8%
6.0%	20.629%	$1,393,491,874	$577,633,586	58.5%
7.0%	16.272%	$1,211,058,368	$395,200,080	67.4%
8.0%	13.008%	$1,061,879,475	$246,021,187	76.8%

Volatility Ratios

The actuarial calculations supplied in this communication are based on a number of assumptions about long-term demographic and economic behavior. Unless these assumptions (terminations, deaths, disabilities, retirements, salary growth, and investment return) are exactly realized each year, there will be differences on a year-to-year basis. The year-to-year differences between actual experience and the assumptions are called actuarial gains and losses and serve to lower or raise required employer contributions from one year to the next. Therefore, employer contributions will inevitably fluctuate, especially due to the ups and downs of investment returns.

Asset Volatility Ratio (AVR)

Plans that have higher asset-to-payroll ratios experience more volatile employer contributions (as a percentage of payroll) due to investment return. For example, a plan with an asset-to-payroll ratio of 8 may experience twice the contribution volatility due to investment return volatility than a plan with an asset-to-payroll ratio of 4. Shown below is the asset volatility ratio, a measure of the plan's current volatility. It should be noted that this ratio is a measure of the current situation. It increases over time but generally tends to stabilize as the plan matures.

Liability Volatility Ratio (LVR)

Plans that have higher liability-to-payroll ratios experience more volatile employer contributions (as a percentage of payroll) due to investment return and changes in liability. For example, a plan with a liability-to-payroll ratio of 8 is expected to have twice the contribution volatility of a plan with a liability-to-payroll ratio of 4. The liability volatility ratio is also included in the table below. It should be noted that this ratio indicates a longer-term potential for contribution volatility. The asset volatility ratio, described above, will tend to move closer to the liability volatility ratio as the plan matures. Since the liability volatility ratio is a long-term measure, it is shown below at the current discount rate (7.375 percent) as well as the discount rate the Board has adopted to determine the contribution requirement in the June 30, 2018 actuarial valuation (7.00 percent).

Contribution Volatility		As of June 30, 2016
1. Market Value of Assets without Receivables	$	813,901,040
2. Payroll		171,645,737
3. Asset Volatility Ratio (AVR) [(1) / (2)]		4.7
4. Accrued Liability (7.375% discount rate)	$	1,151,634,656
5. Liability Volatility Ratio (LVR) [(4) / (2)]		6.7
6. Accrued Liability (7.00% discount rate)		1,211,058,368
7. Projected Liability Volatility Ratio [(6) / (2)]		7.1

Hypothetical Termination Liability

The hypothetical termination liability is an estimate of the financial position of the plan had the contract with CalPERS been terminated as of June 30, 2016. The plan liability on a termination basis is calculated differently compared to the plan's ongoing funding liability. For this hypothetical termination liability calculation, both compensation and service are frozen as of the valuation date and no future pay increases or service accruals are assumed. This measure of funded status is not appropriate for assessing the need for future employer contributions in the case of an ongoing plan, that is, for an employer that continues to provide CalPERS retirement benefits to active employees.

A more conservative investment policy and asset allocation strategy was adopted by the CalPERS Board for the Terminated Agency Pool. The Terminated Agency Pool has limited funding sources since no future employer contributions will be made. Therefore, expected benefit payments are secured by risk-free assets and benefit security for members is increased while limiting the funding risk. However, this asset allocation has a lower expected rate of return than the PERF and consequently, a lower discount rate assumption. The lower discount rate for the Terminated Agency Pool results in higher liabilities for terminated plans.

The effective termination discount rate will depend on actual market rates of return for risk-free securities on the date of termination. As market discount rates are variable the table below shows a range for the hypothetical termination liability based on the lowest and highest interest rates observed during an approximate 2-year period centered around the valuation date.

Market Value of Assets (MVA)	Hypothetical Termination Liability[1,2] @ 1.75%	Funded Status	Unfunded Termination Liability @ 1.75%	Hypothetical Termination Liability[1,2] @ 3.00%	Funded Status	Unfunded Termination Liability @ 3.00%
$815,858,288	$2,186,086,856	37.3%	$1,370,228,568	$1,840,430,223	44.3%	$1,024,571,935

[1] The hypothetical liabilities calculated above include a 7 percent mortality contingency load in accordance with Board policy. Other actuarial assumptions can be found in Appendix A.

[2] The current discount rate assumption used for termination valuations is a weighted average of the 10-year and 30-year U.S. Treasury yields where the weights are based on matching asset and liability durations as of the termination date. The discount rates used in the table are based on 20-year Treasury bonds, rounded to the nearest quarter percentage point, which is a good proxy for most plans. The 20-year Treasury yield was 1.75 percent on June 30, 2016, and was 2.75 percent on January 31, 2017.

In order to terminate the plan, you must first contact our Retirement Services Contract Unit to initiate a Resolution of Intent to Terminate. The completed Resolution will allow the plan actuary to give you a preliminary termination valuation with a more up-to-date estimate of the plan liabilities. CalPERS advises you to consult with the plan actuary before beginning this process.

PLAN'S MAJOR BENEFIT PROVISIONS

Plan's Major Benefit Options

Shown below is a summary of the major optional benefits for which your agency has contracted for this plan. A description of principal standard and optional plan provisions is in Appendix B of this report.

	Contract Package						
Benefit Provision	Active Misc	Active Misc	Active Misc	Inactive Misc	Inactive Misc	Receiving Misc	Receiving Misc
Benefit Formula	2.0% @ 55	2.0% @ 55	2.0% @ 62	2.0% @ 55	2.0% @ 55		
Social Security Coverage	Yes	Yes	Yes	No	No		
Full/Modified	Modified	Modified	Full	Full	Full		
Employee Contribution Rate	7.00%	7.00%	6.00%				
Final Average Compensation Period	One Year	One Year	Three Year	One Year	One Year		
Sick Leave Credit	Yes	Yes	Yes	Yes	Yes		
Non-Industrial Disability	Standard	Standard	Standard	Standard	Standard		
Industrial Disability	Yes	Yes	Yes	Yes	Yes		
Pre-Retirement Death Benefits							
Optional Settlement 2W	No	No	No	No	No		
1959 Survivor Benefit Level	No	No	No	No	No		
Special	No	No	No	No	No		
Alternate (firefighters)	No	No	No	No	No		
Post-Retirement Death Benefits							
Lump Sum	$500	$500	$500	$500	$500	$500	$500
Survivor Allowance (PRSA)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
COLA	2%	2%	2%	2%	2%	2%	2%

APPENDICES

- **APPENDIX A – ACTUARIAL METHODS AND ASSUMPTIONS**
- **APPENDIX B – PRINCIPAL PLAN PROVISIONS**
- **APPENDIX C – PARTICIPANT DATA**
- **APPENDIX D – DEVELOPMENT OF PEPRA MEMBER CONTRIBUTION RATES**
- **APPENDIX E – GLOSSARY OF ACTUARIAL TERMS**

APPENDIX A

ACTUARIAL METHODS AND ASSUMPTIONS

- **ACTUARIAL DATA**
- **ACTUARIAL METHODS**
- **ACTUARIAL ASSUMPTIONS**
- **MISCELLANEOUS**

Actuarial Data

As stated in the Actuarial Certification, the data which serves as the basis of this valuation has been obtained from the various CalPERS databases. We have reviewed the valuation data and believe that it is reasonable and appropriate in aggregate. We are unaware of any potential data issues that would have a material effect on the results of this valuation, except that data does not always contain the latest salary information for former members now in reciprocal systems and does not recognize the potential for unusually large salary deviation in certain cases such as elected officials. Therefore, salary information in these cases may not be accurate. These situations are relatively infrequent, however, and when they do occur, they generally do not have a material impact on the required employer contributions.

Actuarial Methods

Actuarial Cost Method

The actuarial cost method used is the Entry Age Normal Cost Method. Under this method, projected benefits are determined for all members and the associated liabilities are spread in a manner that produces level annual cost as a percentage of pay in each year from the member's entry age to their assumed retirement age on the valuation date. The cost allocated to the current fiscal year is called the normal cost.

The actuarial accrued liability for active members is then calculated as the portion of the total cost of the plan allocated to prior years. The actuarial accrued liability for members currently receiving benefits and for members entitled to deferred benefits is equal to the present value of the benefits expected to be paid. No normal costs are applicable for these participants.

Amortization of Unfunded Actuarial Accrued Liability

The excess of the total actuarial accrued liability over the market value of plan assets is called the unfunded actuarial accrued liability (UAL). Funding requirements are determined by adding the normal cost and an amortization payment toward the unfunded liability. The unfunded liability is amortized as a "level percent of pay". Commencing with the June 30, 2013 valuation, all new gains or losses are amortized over a fixed 30-year period with a 5-year ramp up at the beginning and a 5-year ramp down at the end of the amortization period. All changes in liability due to plan amendments (other than golden handshakes) are amortized over a 20-year period with no ramp. Changes in actuarial assumptions or changes in actuarial methodology are amortized over a 20-year period with a 5-year ramp up at the beginning and a 5-year ramp down at the end of the amortization period. Changes in unfunded accrued liability due to a Golden Handshake will be amortized over a period of five years.

The 5-year ramp up means that the payments in the first four years of the amortization period are 20 percent, 40 percent, 60 percent and 80 percent of the "full" payment which begins in year five. The 5-year ramp down means that the reverse is true in the final four years of the amortization period.

<u>Exceptions for Inconsistencies:</u>

An exception to the amortization rules above is used whenever their application results in inconsistencies. In these cases, a "fresh start" approach is used. This means that the current unfunded actuarial liability is projected and amortized over a set number of years. For example, a fresh start is needed in the following situations:

1) When a positive payment would be required on a negative unfunded actuarial liability (or conversely a negative payment on a positive unfunded actuarial liability); or
2) When there are excess assets, rather than an unfunded liability. In this situation, a 30-year fresh start is used.

It should be noted that the actuary may determine that a fresh start is necessary under other circumstances. In all cases of a fresh start, the period is set by the actuary at what is deemed appropriate; however, the period will not be greater than 30 years.

Exceptions for Inactive Plans:

The following exceptions apply to plans classified as Inactive. These plans have no active members and no expectation to have active members in the future.

- Amortization of the unfunded liability is on a "level dollar" basis rather than a "level percent of pay" basis. For amortization layers which utilize a ramp up and ramp down, the "ultimate" payment is constant.
- Actuarial judgment will be used to shorten amortization periods for Inactive plans with existing periods that are deemed too long given the duration of the liability. The specific demographics of the plan will be used to determine if shorter periods may be more appropriate.

Asset Valuation Method

It is the policy of the CalPERS Board of Administration to use professionally accepted amortization methods to eliminate a surplus or an unfunded accrued liability in a manner that maintains benefit security for the members of the System while minimizing substantial variations in required employer contributions. On April 17, 2013, the CalPERS Board of Administration approved a recommendation to change the CalPERS amortization and rate smoothing policies. Beginning with the June 30, 2013 valuations that set the employer contribution for Fiscal Year 2015-16, CalPERS employs a policy that amortizes all gains and losses over a fixed 30-year period. The increase or decrease in the rate is then spread directly over a 5-year period. This method is referred to as "direct rate smoothing." CalPERS no longer uses an actuarial value of assets and only uses the market value of assets. The direct rate smoothing method is equivalent to a method using a 5 year asset smoothing period with no actuarial value of asset corridor and a 25-year amortization period for gains and losses.

PEPRA Normal Cost Rate Methodology

Per Government Code Section 7522.30(b) the "normal cost rate" shall mean the annual actuarially determined normal cost for the plan of retirement benefits provided to the new member and shall be established based on actuarial assumptions used to determine the liabilities and costs as part of the annual actuarial valuation. The plan of retirement benefits shall include any elements that would impact the actuarial determination of the normal cost, including, but not limited to, the retirement formula, eligibility and vesting criteria, ancillary benefit provisions, and any automatic cost-of-living adjustments as determined by the public retirement system.

Each non-pooled plan is considered to be stable with a sufficiently large demographic of actives. It is preferable to determine normal cost using a large active population ongoing so that this rate remains relatively stable. The total PEPRA normal cost will be calculated using all active members within a non-pooled plan until the number of members covered under the PEPRA formula meets either:

1. 50 percent of the active population, or
2. 25 percent of the active population and 100 or more PEPRA members

Once either of the conditions above are met for a non-pooled plan, the total PEPRA normal cost will be based on the active PEPRA population in the plan.

Accordingly, the total normal cost will be funded equally between employer and employee based on the demographics of the employees of that employer.

Actuarial Assumptions

In 2014, CalPERS completed a 2-year asset liability management study incorporating actuarial assumptions and strategic asset allocation. On February 19, 2014, the CalPERS Board of Administration adopted relatively modest changes to the asset allocation that reduced the expected volatility of returns. The adopted asset allocation was expected to have a long-term blended return that continued to support a discount rate assumption of 7.5 percent at that time. The Board also approved several changes to the demographic assumptions that more closely aligned with actual experience. The most significant of these is mortality improvement to acknowledge the greater life expectancies we are seeing in our membership and expected continued improvements. These new actuarial assumptions were first used in the June 30, 2014 valuation to set the Fiscal Year 2016-17 contribution for public agency employers.

On December 21, 2016, the CalPERS Board of Administration lowered the discount rate from 7.50 percent to 7.00 percent using a three year phase-in beginning with the June 30, 2016 actuarial valuations. The minimum employer contributions for Fiscal Year 2018-19 determined in this valuation were calculated using a discount rate of 7.375 percent. The projected employer contributions on Page 5 are calculated assuming that the discount rate will be lowered to 7.25 percent next year and 7.00 percent the following year as adopted by the Board. The decision to reduce the discount rate was primarily based on reduced capital market assumptions provided by external investment consultants and CalPERS investment staff. The specific decision adopted by the Board reflected recommendations from CalPERS staff and additional input from employer and employee stakeholder groups. Based on the investment allocation adopted by the Board and capital market assumptions, the reduced discount rate schedule provides a more realistic assumption for the long term investment return of the fund.

Notwithstanding the Board's decision to phase into a 7.0 percent discount rate, subsequent analysis of the expected investment return of CalPERS assets or changes to the investment allocation may result in a change to this three year discount rate schedule. A comprehensive analysis of all actuarial assumptions and methods including the discount rate will be conducted in 2017.

For more details and additional rationale for the selection of the actuarial assumptions, please refer to the CalPERS Experience Study and Review of Actuarial Assumptions report from January 2014 that can be found on the CalPERS website under: "Forms and Publications". Click on "View All" and search for Experience Study.

All actuarial assumptions (except the discount rates used for the hypothetical termination liability) represent an estimate of future experience rather than observations of the estimates inherent in market data.

Economic Assumptions

Discount Rate

The prescribed discount rate assumption adopted by the Board on December 21, 2016 is 7.375 percent compounded annually (net of investment and administrative expenses) as of 6/30/2016.

The Board also prescribed that the assumed discount rate will reduce to 7.25 percent compounded annually (net of expenses) as of 6/30/2017, and 7.0 percent compounded annually (net of expenses) as of 6/30/2018. These further changes to the discount rate assumption are not reflected in the determination of required contributions determined in this report for Fiscal Year 2018-19.

Termination Liability Discount Rate

The current discount rate assumption used for termination valuations is a weighted average of the 10-year and 30-year U.S. Treasury yields where the weights are based on matching asset and liability durations as of the termination date.

The hypothetical termination liabilities in this report are calculated using an observed range of market interest rates. This range is based on the lowest and highest 20-year Treasury bond observed during an approximate 2-year period centered around the valuation date. The 20-year Treasury bond has a similar duration to most plan liabilities and serves as a good proxy for the termination discount rate. The 20-year Treasury yield was 1.75 percent on June 30, 2016.

Salary Growth

Annual increases vary by category, entry age, and duration of service. A sample of assumed increases are shown below.

Public Agency Miscellaneous

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.1220	0.1160	0.1020
1	0.0990	0.0940	0.0830
2	0.0860	0.0810	0.0710
3	0.0770	0.0720	0.0630
4	0.0700	0.0650	0.0570
5	0.0640	0.0600	0.0520
10	0.0460	0.0430	0.0390
15	0.0420	0.0400	0.0360
20	0.0390	0.0380	0.0340
25	0.0370	0.0360	0.0330
30	0.0350	0.0340	0.0320

Public Agency Fire

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.2000	0.1980	0.1680
1	0.1490	0.1460	0.1250
2	0.1200	0.1160	0.0990
3	0.0980	0.0940	0.0810
4	0.0820	0.0780	0.0670
5	0.0690	0.0640	0.0550
10	0.0470	0.0460	0.0420
15	0.0440	0.0420	0.0390
20	0.0420	0.0390	0.0360
25	0.0400	0.0370	0.0340
30	0.0380	0.0360	0.0340

Public Agency Police

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.1500	0.1470	0.1310
1	0.1160	0.1120	0.1010
2	0.0950	0.0920	0.0830
3	0.0810	0.0780	0.0700
4	0.0700	0.0670	0.0600
5	0.0610	0.0580	0.0520
10	0.0450	0.0430	0.0370
15	0.0450	0.0430	0.0370
20	0.0450	0.0430	0.0370
25	0.0450	0.0430	0.0370
30	0.0450	0.0430	0.0370

Salary Growth (continued)

Public Agency County Peace Officers

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.1770	0.1670	0.1500
1	0.1340	0.1260	0.1140
2	0.1080	0.1030	0.0940
3	0.0900	0.0860	0.0790
4	0.0760	0.0730	0.0670
5	0.0650	0.0620	0.0580
10	0.0470	0.0450	0.0410
15	0.0460	0.0450	0.0390
20	0.0460	0.0450	0.0380
25	0.0460	0.0450	0.0380
30	0.0460	0.0440	0.0380

Schools

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.0900	0.0880	0.0820
1	0.0780	0.0750	0.0700
2	0.0700	0.0680	0.0630
3	0.0650	0.0630	0.0580
4	0.0610	0.0590	0.0540
5	0.0580	0.0560	0.0510
10	0.0460	0.0450	0.0410
15	0.0420	0.0410	0.0380
20	0.0390	0.0380	0.0350
25	0.0370	0.0350	0.0330
30	0.0350	0.0330	0.0310

- The Miscellaneous salary scale is used for Local Prosecutors.
- The Police salary scale is used for Other Safety, Local Sheriff, and School Police.

Overall Payroll Growth

3.00 percent compounded annually (used in projecting the payroll over which the unfunded liability is amortized). This assumption is used for all plans with active members.

Inflation

2.75 percent compounded annually.

Non-valued Potential Additional Liabilities

The potential liability loss for a cost-of-living increase exceeding the 2.75 percent inflation assumption, and any potential liability loss from future member service purchases are not reflected in the valuation.

Miscellaneous Loading Factors

Credit for Unused Sick Leave

Total years of service is increased by 1 percent for those plans that have accepted the provision providing Credit for Unused Sick Leave.

Conversion of Employer Paid Member Contributions (EPMC)

Total years of service is increased by the Employee Contribution Rate for those plans with the provision providing for the Conversion of Employer Paid Member Contributions (EPMC) during the final compensation period.

Norris Decision (Best Factors)

Employees hired prior to July 1, 1982 have projected benefit amounts increased in order to reflect the use of "Best Factors" in the calculation of optional benefit forms. This is due to a 1983 Supreme Court decision, known as the Norris decision, which required males and females to be treated equally in the determination of benefit amounts. Consequently, anyone already employed at that time is given the best possible conversion factor when optional benefits are determined. No loading is necessary for employees hired after July 1, 1982.

Termination Liability

The termination liabilities include a 7 percent contingency load. This load is for unforeseen improvements in mortality.

Demographic Assumptions

Pre-Retirement Mortality

Non-industrial death rates vary by age and gender. Industrial death rates vary by age. See sample rates in table below. The non-industrial death rates are used for all plans. The industrial death rates are used for safety plans (except for Local Prosecutor safety members where the corresponding miscellaneous plan does not have the Industrial Death Benefit).

	Non-Industrial Death (Not Job-Related)		**Industrial Death (Job-Related)**
Age	Male	Female	Male and Female
20	0.00031	0.00020	0.00003
25	0.00040	0.00023	0.00007
30	0.00049	0.00025	0.00010
35	0.00057	0.00035	0.00012
40	0.00075	0.00050	0.00013
45	0.00106	0.00071	0.00014
50	0.00155	0.00100	0.00015
55	0.00228	0.00138	0.00016
60	0.00308	0.00182	0.00017
65	0.00400	0.00257	0.00018
70	0.00524	0.00367	0.00019
75	0.00713	0.00526	0.00020
80	0.00990	0.00814	0.00021

Miscellaneous plans usually have industrial death rates set to zero unless the agency has specifically contracted for industrial death benefits. If so, each non-industrial death rate shown above will be split into two components; 99 percent will become the non-industrial death rate and 1 percent will become the industrial death rate.

Post-Retirement Mortality

Rates vary by age, type of retirement, and gender. See sample rates in table below. These rates are used for all plans.

	Healthy Recipients		Non-Industrially Disabled (Not Job-Related)		Industrially Disabled (Job-Related)	
Age	Male	Female	Male	Female	Male	Female
50	0.00501	0.00466	0.01680	0.01158	0.00501	0.00466
55	0.00599	0.00416	0.01973	0.01149	0.00599	0.00416
60	0.00710	0.00436	0.02289	0.01235	0.00754	0.00518
65	0.00829	0.00588	0.02451	0.01607	0.01122	0.00838
70	0.01305	0.00993	0.02875	0.02211	0.01635	0.01395
75	0.02205	0.01722	0.03990	0.03037	0.02834	0.02319
80	0.03899	0.02902	0.06083	0.04725	0.04899	0.03910
85	0.06969	0.05243	0.09731	0.07762	0.07679	0.06251
90	0.12974	0.09887	0.14804	0.12890	0.12974	0.09887
95	0.22444	0.18489	0.22444	0.21746	0.22444	0.18489
100	0.32536	0.30017	0.32536	0.30017	0.32536	0.30017
105	0.58527	0.56093	0.58527	0.56093	0.58527	0.56093
110	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000

The post-retirement mortality rates above include 20 years of projected on-going mortality improvement using Scale BB published by the Society of Actuaries.

Marital Status

For active members, a percentage who are married upon retirement is assumed according to member category as shown in the following table.

Member Category	Percent Married
Miscellaneous Member	85%
Local Police	90%
Local Fire	90%
Other Local Safety	90%
School Police	90%

Age of Spouse

It is assumed that female spouses are 3 years younger than male spouses. This assumption is used for all plans.

Terminated Members

It is assumed that terminated members refund immediately if non-vested. Terminated members who are vested are assumed to follow the same service retirement pattern as active members but with a load to reflect the expected higher rates of retirement, especially at lower ages. The following table shows the load factors that are applied to the service retirement assumption for active members to obtain the service retirement pattern for separated vested members:

Age	Load Factor Miscellaneous	Load Factor Safety
50	190%	310%
51	110%	190%
52	110%	105%
53 through 54	100%	105%
55	100%	140%
56 and above	100% (no change)	100% (no change)

Termination with Refund

Rates vary by entry age and service for miscellaneous plans. Rates vary by service for safety plans. See sample rates in tables below.

Public Agency Miscellaneous

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40	Entry Age 45
0	0.1742	0.1674	0.1606	0.1537	0.1468	0.1400
1	0.1545	0.1477	0.1409	0.1339	0.1271	0.1203
2	0.1348	0.1280	0.1212	0.1142	0.1074	0.1006
3	0.1151	0.1083	0.1015	0.0945	0.0877	0.0809
4	0.0954	0.0886	0.0818	0.0748	0.0680	0.0612
5	0.0212	0.0193	0.0174	0.0155	0.0136	0.0116
10	0.0138	0.0121	0.0104	0.0088	0.0071	0.0055
15	0.0060	0.0051	0.0042	0.0032	0.0023	0.0014
20	0.0037	0.0029	0.0021	0.0013	0.0005	0.0001
25	0.0017	0.0011	0.0005	0.0001	0.0001	0.0001
30	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001
35	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Public Agency Safety

Duration of Service	Fire	Police	County Peace Officer
0	0.0710	0.1013	0.0997
1	0.0554	0.0636	0.0782
2	0.0398	0.0271	0.0566
3	0.0242	0.0258	0.0437
4	0.0218	0.0245	0.0414
5	0.0029	0.0086	0.0145
10	0.0009	0.0053	0.0089
15	0.0006	0.0027	0.0045
20	0.0005	0.0017	0.0020
25	0.0003	0.0012	0.0009
30	0.0003	0.0009	0.0006
35	0.0003	0.0009	0.0006

The police termination and refund rates are also used for Public Agency Local Prosecutors, Other Safety, Local Sheriff, and School Police.

Schools

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40	Entry Age 45
0	0.1730	0.1627	0.1525	0.1422	0.1319	0.1217
1	0.1585	0.1482	0.1379	0.1277	0.1174	0.1071
2	0.1440	0.1336	0.1234	0.1131	0.1028	0.0926
3	0.1295	0.1192	0.1089	0.0987	0.0884	0.0781
4	0.1149	0.1046	0.0944	0.0841	0.0738	0.0636
5	0.0278	0.0249	0.0221	0.0192	0.0164	0.0135
10	0.0172	0.0147	0.0122	0.0098	0.0074	0.0049
15	0.0115	0.0094	0.0074	0.0053	0.0032	0.0011
20	0.0073	0.0055	0.0038	0.0020	0.0002	0.0002
25	0.0037	0.0023	0.0010	0.0002	0.0002	0.0002
30	0.0015	0.0003	0.0002	0.0002	0.0002	0.0002
35	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002

Termination with Vested Benefits

Rates vary by entry age and service for miscellaneous plans. Rates vary by service for safety plans. See sample rates in tables below.

Public Agency Miscellaneous

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40
5	0.0656	0.0597	0.0537	0.0477	0.0418
10	0.0530	0.0466	0.0403	0.0339	0.0000
15	0.0443	0.0373	0.0305	0.0000	0.0000
20	0.0333	0.0261	0.0000	0.0000	0.0000
25	0.0212	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000	0.0000
35	0.0000	0.0000	0.0000	0.0000	0.0000

Public Agency Safety

Duration of Service	Fire	Police	County Peace Officer
5	0.0162	0.0163	0.0265
10	0.0061	0.0126	0.0204
15	0.0058	0.0082	0.0130
20	0.0053	0.0065	0.0074
25	0.0047	0.0058	0.0043
30	0.0045	0.0056	0.0030
35	0.0000	0.0000	0.0000

- When a member is eligible to retire, the termination with vested benefits probability is set to zero.
- After termination with vested benefits, a miscellaneous member is assumed to retire at age 59 and a safety member at age 54.
- The Police termination with vested benefits rates are also used for Public Agency Local Prosecutors, Other Safety, Local Sheriff, and School Police.

Schools

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40
5	0.0816	0.0733	0.0649	0.0566	0.0482
10	0.0629	0.0540	0.0450	0.0359	0.0000
15	0.0537	0.0440	0.0344	0.0000	0.0000
20	0.0420	0.0317	0.0000	0.0000	0.0000
25	0.0291	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000	0.0000
35	0.0000	0.0000	0.0000	0.0000	0.0000

Non-Industrial (Not Job-Related) Disability

Rates vary by age and gender for miscellaneous plans. Rates vary by age and category for safety plans.

	Miscellaneous		Fire	Police	County Peace Officer	Schools	
Age	Male	Female	Male and Female	Male and Female	Male and Female	Male	Female
20	0.0002	0.0001	0.0001	0.0001	0.0001	0.0003	0.0003
25	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
30	0.0002	0.0002	0.0001	0.0002	0.0001	0.0001	0.0002
35	0.0005	0.0008	0.0001	0.0003	0.0004	0.0005	0.0004
40	0.0012	0.0016	0.0001	0.0004	0.0007	0.0015	0.0010
45	0.0019	0.0022	0.0002	0.0005	0.0013	0.0030	0.0019
50	0.0021	0.0023	0.0005	0.0008	0.0018	0.0039	0.0024
55	0.0022	0.0018	0.0010	0.0013	0.0010	0.0036	0.0021
60	0.0022	0.0014	0.0015	0.0020	0.0006	0.0031	0.0014

- The miscellaneous non-industrial disability rates are used for Local Prosecutors.
- The police non-industrial disability rates are also used for Other Safety, Local Sheriff, and School Police.

Industrial (Job-Related) Disability

Rates vary by age and category.

Age	Fire	Police	County Peace Officer
20	0.0001	0.0000	0.0004
25	0.0003	0.0017	0.0013
30	0.0007	0.0048	0.0025
35	0.0016	0.0079	0.0037
40	0.0030	0.0110	0.0051
45	0.0053	0.0141	0.0067
50	0.0277	0.0185	0.0092
55	0.0409	0.0479	0.0151
60	0.0583	0.0602	0.0174

- The police industrial disability rates are also used for Local Sheriff and Other Safety.
- Fifty percent of the police industrial disability rates are used for School Police.
- One percent of the police industrial disability rates are used for Local Prosecutors.
- Normally, rates are zero for miscellaneous plans unless the agency has specifically contracted for industrial disability benefits. If so, each miscellaneous non-industrial disability rate will be split into two components: 50 percent will become the non-industrial disability rate and 50 percent will become the industrial disability rate.

Service Retirement

Retirement rates vary by age, service, and formula, except for the safety ½ @ 55 and 2% @ 55 formulas, where retirement rates vary by age only.

Service Retirement

Public Agency Miscellaneous 1.5% @ 65

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.008	0.011	0.013	0.015	0.017	0.019
51	0.007	0.010	0.012	0.013	0.015	0.017
52	0.010	0.014	0.017	0.019	0.021	0.024
53	0.008	0.012	0.015	0.017	0.019	0.022
54	0.012	0.016	0.019	0.022	0.025	0.028
55	0.018	0.025	0.031	0.035	0.038	0.043
56	0.015	0.021	0.025	0.029	0.032	0.036
57	0.020	0.028	0.033	0.038	0.043	0.048
58	0.024	0.033	0.040	0.046	0.052	0.058
59	0.028	0.039	0.048	0.054	0.060	0.067
60	0.049	0.069	0.083	0.094	0.105	0.118
61	0.062	0.087	0.106	0.120	0.133	0.150
62	0.104	0.146	0.177	0.200	0.223	0.251
63	0.099	0.139	0.169	0.191	0.213	0.239
64	0.097	0.136	0.165	0.186	0.209	0.233
65	0.140	0.197	0.240	0.271	0.302	0.339
66	0.092	0.130	0.157	0.177	0.198	0.222
67	0.129	0.181	0.220	0.249	0.277	0.311
68	0.092	0.129	0.156	0.177	0.197	0.221
69	0.092	0.130	0.158	0.178	0.199	0.224
70	0.103	0.144	0.175	0.198	0.221	0.248

Public Agency Miscellaneous 2% @ 60

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.010	0.013	0.015	0.018	0.019	0.021
51	0.009	0.011	0.014	0.016	0.017	0.019
52	0.011	0.014	0.017	0.020	0.022	0.024
53	0.010	0.012	0.015	0.017	0.020	0.021
54	0.015	0.019	0.023	0.025	0.029	0.031
55	0.022	0.029	0.035	0.040	0.045	0.049
56	0.018	0.024	0.028	0.033	0.036	0.040
57	0.024	0.032	0.038	0.043	0.049	0.053
58	0.027	0.036	0.043	0.049	0.055	0.061
59	0.033	0.044	0.054	0.061	0.068	0.076
60	0.056	0.077	0.092	0.105	0.117	0.130
61	0.071	0.097	0.118	0.134	0.149	0.166
62	0.117	0.164	0.198	0.224	0.250	0.280
63	0.122	0.171	0.207	0.234	0.261	0.292
64	0.114	0.159	0.193	0.218	0.244	0.271
65	0.150	0.209	0.255	0.287	0.321	0.358
66	0.114	0.158	0.192	0.217	0.243	0.270
67	0.141	0.196	0.238	0.270	0.301	0.337
68	0.103	0.143	0.174	0.196	0.219	0.245
69	0.109	0.153	0.185	0.209	0.234	0.261
70	0.117	0.162	0.197	0.222	0.248	0.277

Service Retirement

Public Agency Miscellaneous 2% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.014	0.018	0.021	0.025	0.027	0.031
51	0.012	0.014	0.017	0.020	0.021	0.025
52	0.013	0.017	0.019	0.023	0.025	0.028
53	0.015	0.020	0.023	0.027	0.030	0.034
54	0.026	0.033	0.038	0.045	0.051	0.059
55	0.048	0.061	0.074	0.088	0.100	0.117
56	0.042	0.053	0.063	0.075	0.085	0.100
57	0.044	0.056	0.067	0.081	0.091	0.107
58	0.049	0.062	0.074	0.089	0.100	0.118
59	0.057	0.072	0.086	0.103	0.118	0.138
60	0.067	0.086	0.103	0.123	0.139	0.164
61	0.081	0.103	0.124	0.148	0.168	0.199
62	0.116	0.147	0.178	0.214	0.243	0.288
63	0.114	0.144	0.174	0.208	0.237	0.281
64	0.108	0.138	0.166	0.199	0.227	0.268
65	0.155	0.197	0.238	0.285	0.325	0.386
66	0.132	0.168	0.203	0.243	0.276	0.328
67	0.122	0.155	0.189	0.225	0.256	0.304
68	0.111	0.141	0.170	0.204	0.232	0.274
69	0.114	0.144	0.174	0.209	0.238	0.282
70	0.130	0.165	0.200	0.240	0.272	0.323

Public Agency Miscellaneous 2.5% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.004	0.009	0.019	0.029	0.049	0.094
51	0.004	0.009	0.019	0.029	0.049	0.094
52	0.004	0.009	0.020	0.030	0.050	0.095
53	0.008	0.014	0.025	0.036	0.058	0.104
54	0.024	0.034	0.050	0.066	0.091	0.142
55	0.066	0.088	0.115	0.142	0.179	0.241
56	0.042	0.057	0.078	0.098	0.128	0.184
57	0.041	0.057	0.077	0.097	0.128	0.183
58	0.045	0.061	0.083	0.104	0.136	0.192
59	0.055	0.074	0.098	0.123	0.157	0.216
60	0.066	0.088	0.115	0.142	0.179	0.241
61	0.072	0.095	0.124	0.153	0.191	0.255
62	0.099	0.130	0.166	0.202	0.248	0.319
63	0.092	0.121	0.155	0.189	0.233	0.302
64	0.091	0.119	0.153	0.187	0.231	0.299
65	0.122	0.160	0.202	0.245	0.297	0.374
66	0.138	0.179	0.226	0.272	0.329	0.411
67	0.114	0.149	0.189	0.229	0.279	0.354
68	0.100	0.131	0.168	0.204	0.250	0.322
69	0.114	0.149	0.189	0.229	0.279	0.354
70	0.127	0.165	0.209	0.253	0.306	0.385

Service Retirement

Public Agency Miscellaneous 2.7% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.004	0.009	0.014	0.035	0.055	0.095
51	0.002	0.006	0.011	0.030	0.050	0.090
52	0.006	0.012	0.017	0.038	0.059	0.099
53	0.010	0.017	0.024	0.046	0.068	0.110
54	0.032	0.044	0.057	0.085	0.113	0.160
55	0.076	0.101	0.125	0.165	0.205	0.265
56	0.055	0.074	0.093	0.127	0.160	0.214
57	0.050	0.068	0.086	0.118	0.151	0.204
58	0.055	0.074	0.093	0.127	0.161	0.215
59	0.061	0.082	0.102	0.138	0.174	0.229
60	0.069	0.093	0.116	0.154	0.192	0.250
61	0.086	0.113	0.141	0.183	0.225	0.288
62	0.105	0.138	0.171	0.218	0.266	0.334
63	0.103	0.135	0.167	0.215	0.262	0.329
64	0.109	0.143	0.177	0.226	0.275	0.344
65	0.134	0.174	0.215	0.270	0.326	0.401
66	0.147	0.191	0.235	0.294	0.354	0.433
67	0.121	0.158	0.196	0.248	0.300	0.372
68	0.113	0.147	0.182	0.232	0.282	0.352
69	0.117	0.153	0.189	0.240	0.291	0.362
70	0.141	0.183	0.226	0.283	0.341	0.418

Public Agency Miscellaneous 3% @ 60

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.012	0.018	0.024	0.039	0.040	0.091
51	0.009	0.014	0.019	0.034	0.034	0.084
52	0.014	0.020	0.026	0.043	0.044	0.096
53	0.016	0.023	0.031	0.048	0.050	0.102
54	0.026	0.036	0.045	0.065	0.070	0.125
55	0.043	0.057	0.072	0.096	0.105	0.165
56	0.042	0.056	0.070	0.094	0.103	0.162
57	0.049	0.065	0.082	0.108	0.119	0.180
58	0.057	0.076	0.094	0.122	0.136	0.199
59	0.076	0.100	0.123	0.157	0.175	0.244
60	0.114	0.148	0.182	0.226	0.255	0.334
61	0.095	0.123	0.152	0.190	0.214	0.288
62	0.133	0.172	0.211	0.260	0.294	0.378
63	0.129	0.166	0.204	0.252	0.285	0.368
64	0.143	0.185	0.226	0.278	0.315	0.401
65	0.202	0.260	0.318	0.386	0.439	0.542
66	0.177	0.228	0.279	0.340	0.386	0.482
67	0.151	0.194	0.238	0.292	0.331	0.420
68	0.139	0.179	0.220	0.270	0.306	0.391
69	0.190	0.245	0.299	0.364	0.414	0.513
70	0.140	0.182	0.223	0.274	0.310	0.396

Service Retirement

Public Agency Miscellaneous 2% @ 62

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.000	0.000	0.000	0.000	0.000	0.000
51	0.000	0.000	0.000	0.000	0.000	0.000
52	0.010	0.013	0.016	0.019	0.022	0.024
53	0.013	0.017	0.020	0.024	0.027	0.031
54	0.021	0.027	0.033	0.039	0.045	0.050
55	0.044	0.056	0.068	0.080	0.092	0.104
56	0.030	0.039	0.047	0.055	0.063	0.072
57	0.036	0.046	0.056	0.066	0.076	0.086
58	0.046	0.059	0.072	0.085	0.097	0.110
59	0.058	0.074	0.089	0.105	0.121	0.137
60	0.062	0.078	0.095	0.112	0.129	0.146
61	0.062	0.079	0.096	0.113	0.129	0.146
62	0.097	0.123	0.150	0.176	0.202	0.229
63	0.089	0.113	0.137	0.162	0.186	0.210
64	0.094	0.120	0.145	0.171	0.197	0.222
65	0.129	0.164	0.199	0.234	0.269	0.304
66	0.105	0.133	0.162	0.190	0.219	0.247
67	0.105	0.133	0.162	0.190	0.219	0.247
68	0.105	0.133	0.162	0.190	0.219	0.247
69	0.105	0.133	0.162	0.190	0.219	0.247
70	0.125	0.160	0.194	0.228	0.262	0.296

Service Retirement

Public Agency Fire ½ @ 55 and 2% @ 55

Age	Rate	Age	Rate
50	0.0159	56	0.1108
51	0.0000	57	0.0000
52	0.0344	58	0.0950
53	0.0199	59	0.0441
54	0.0413	60	1.00000
55	0.0751		

Public Agency Police ½ @ 55 and 2% @ 55

Age	Rate	Age	Rate
50	0.0255	56	0.0692
51	0.0000	57	0.0511
52	0.0164	58	0.0724
53	0.0272	59	0.0704
54	0.0095	60	1.0000
55	0.1667		

Service Retirement

Public Agency Police 2% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.005	0.005	0.005	0.005	0.017	0.089
51	0.005	0.005	0.005	0.005	0.017	0.087
52	0.018	0.018	0.018	0.018	0.042	0.132
53	0.044	0.044	0.044	0.044	0.090	0.217
54	0.065	0.065	0.065	0.065	0.126	0.283
55	0.086	0.086	0.086	0.086	0.166	0.354
56	0.067	0.067	0.067	0.067	0.130	0.289
57	0.066	0.066	0.066	0.066	0.129	0.288
58	0.066	0.066	0.066	0.066	0.129	0.288
59	0.139	0.139	0.139	0.139	0.176	0.312
60	0.123	0.123	0.123	0.123	0.153	0.278
61	0.110	0.110	0.110	0.110	0.138	0.256
62	0.130	0.130	0.130	0.130	0.162	0.291
63	0.130	0.130	0.130	0.130	0.162	0.291
64	0.130	0.130	0.130	0.130	0.162	0.291
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.009	0.009	0.009	0.009	0.013	0.020
51	0.013	0.013	0.013	0.013	0.020	0.029
52	0.018	0.018	0.018	0.018	0.028	0.042
53	0.052	0.052	0.052	0.052	0.079	0.119
54	0.067	0.067	0.067	0.067	0.103	0.154
55	0.089	0.089	0.089	0.089	0.136	0.204
56	0.083	0.083	0.083	0.083	0.127	0.190
57	0.082	0.082	0.082	0.082	0.126	0.189
58	0.088	0.088	0.088	0.088	0.136	0.204
59	0.074	0.074	0.074	0.074	0.113	0.170
60	0.100	0.100	0.100	0.100	0.154	0.230
61	0.072	0.072	0.072	0.072	0.110	0.165
62	0.099	0.099	0.099	0.099	0.152	0.228
63	0.114	0.114	0.114	0.114	0.175	0.262
64	0.114	0.114	0.114	0.114	0.175	0.262
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 3% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.004	0.004	0.004	0.004	0.015	0.086
51	0.014	0.014	0.014	0.014	0.034	0.114
52	0.026	0.026	0.026	0.026	0.060	0.154
53	0.038	0.038	0.038	0.038	0.083	0.188
54	0.071	0.071	0.071	0.071	0.151	0.292
55	0.061	0.061	0.061	0.061	0.131	0.261
56	0.072	0.072	0.072	0.072	0.153	0.295
57	0.065	0.065	0.065	0.065	0.140	0.273
58	0.066	0.066	0.066	0.066	0.142	0.277
59	0.118	0.118	0.118	0.118	0.247	0.437
60	0.065	0.065	0.065	0.065	0.138	0.272
61	0.084	0.084	0.084	0.084	0.178	0.332
62	0.108	0.108	0.108	0.108	0.226	0.405
63	0.084	0.084	0.084	0.084	0.178	0.332
64	0.084	0.084	0.084	0.084	0.178	0.332
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 3% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.001	0.001	0.001	0.006	0.016	0.069
51	0.002	0.002	0.002	0.006	0.018	0.071
52	0.012	0.012	0.012	0.021	0.040	0.098
53	0.032	0.032	0.032	0.049	0.085	0.149
54	0.057	0.057	0.057	0.087	0.144	0.217
55	0.073	0.073	0.073	0.109	0.179	0.259
56	0.064	0.064	0.064	0.097	0.161	0.238
57	0.063	0.063	0.063	0.095	0.157	0.233
58	0.065	0.065	0.065	0.099	0.163	0.241
59	0.088	0.088	0.088	0.131	0.213	0.299
60	0.105	0.105	0.105	0.155	0.251	0.344
61	0.118	0.118	0.118	0.175	0.282	0.380
62	0.087	0.087	0.087	0.128	0.210	0.295
63	0.067	0.067	0.067	0.100	0.165	0.243
64	0.067	0.067	0.067	0.100	0.165	0.243
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 3% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.050	0.050	0.050	0.099	0.240	0.314
51	0.034	0.034	0.034	0.072	0.198	0.260
52	0.033	0.033	0.033	0.071	0.198	0.259
53	0.039	0.039	0.039	0.080	0.212	0.277
54	0.045	0.045	0.045	0.092	0.229	0.300
55	0.052	0.052	0.052	0.105	0.248	0.323
56	0.042	0.042	0.042	0.087	0.221	0.289
57	0.043	0.043	0.043	0.088	0.223	0.292
58	0.054	0.054	0.054	0.109	0.255	0.333
59	0.054	0.054	0.054	0.108	0.253	0.330
60	0.060	0.060	0.060	0.121	0.272	0.355
61	0.048	0.048	0.048	0.098	0.238	0.311
62	0.061	0.061	0.061	0.122	0.274	0.357
63	0.057	0.057	0.057	0.115	0.263	0.343
64	0.069	0.069	0.069	0.137	0.296	0.385
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 3% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.020	0.020	0.020	0.040	0.130	0.192
51	0.008	0.008	0.008	0.023	0.107	0.164
52	0.023	0.023	0.023	0.043	0.136	0.198
53	0.023	0.023	0.023	0.043	0.135	0.198
54	0.027	0.027	0.027	0.048	0.143	0.207
55	0.043	0.043	0.043	0.070	0.174	0.244
56	0.053	0.053	0.053	0.085	0.196	0.269
57	0.054	0.054	0.054	0.086	0.197	0.271
58	0.052	0.052	0.052	0.084	0.193	0.268
59	0.075	0.075	0.075	0.116	0.239	0.321
60	0.065	0.065	0.065	0.102	0.219	0.298
61	0.076	0.076	0.076	0.117	0.241	0.324
62	0.068	0.068	0.068	0.106	0.224	0.304
63	0.027	0.027	0.027	0.049	0.143	0.208
64	0.094	0.094	0.094	0.143	0.277	0.366
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 2% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.011	0.011	0.011	0.011	0.020	0.036
51	0.009	0.009	0.009	0.009	0.016	0.028
52	0.018	0.018	0.018	0.018	0.034	0.060
53	0.037	0.037	0.037	0.037	0.067	0.119
54	0.049	0.049	0.049	0.049	0.089	0.159
55	0.063	0.063	0.063	0.063	0.115	0.205
56	0.045	0.045	0.045	0.045	0.082	0.146
57	0.064	0.064	0.064	0.064	0.117	0.209
58	0.047	0.047	0.047	0.047	0.086	0.154
59	0.105	0.105	0.105	0.105	0.130	0.191
60	0.105	0.105	0.105	0.105	0.129	0.188
61	0.105	0.105	0.105	0.105	0.129	0.188
62	0.105	0.105	0.105	0.105	0.129	0.188
63	0.105	0.105	0.105	0.105	0.129	0.188
64	0.105	0.105	0.105	0.105	0.129	0.188
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.005	0.005	0.005	0.005	0.008	0.012
51	0.006	0.006	0.006	0.006	0.009	0.013
52	0.012	0.012	0.012	0.012	0.019	0.028
53	0.033	0.033	0.033	0.033	0.050	0.075
54	0.045	0.045	0.045	0.045	0.069	0.103
55	0.061	0.061	0.061	0.061	0.094	0.140
56	0.055	0.055	0.055	0.055	0.084	0.126
57	0.081	0.081	0.081	0.081	0.125	0.187
58	0.059	0.059	0.059	0.059	0.091	0.137
59	0.055	0.055	0.055	0.055	0.084	0.126
60	0.085	0.085	0.085	0.085	0.131	0.196
61	0.085	0.085	0.085	0.085	0.131	0.196
62	0.085	0.085	0.085	0.085	0.131	0.196
63	0.085	0.085	0.085	0.085	0.131	0.196
64	0.085	0.085	0.085	0.085	0.131	0.196
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 2.5% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.014	0.014	0.014	0.014	0.025	0.045
51	0.012	0.012	0.012	0.012	0.021	0.038
52	0.025	0.025	0.025	0.025	0.046	0.081
53	0.047	0.047	0.047	0.047	0.086	0.154
54	0.063	0.063	0.063	0.063	0.115	0.205
55	0.076	0.076	0.076	0.076	0.140	0.249
56	0.054	0.054	0.054	0.054	0.099	0.177
57	0.071	0.071	0.071	0.071	0.130	0.232
58	0.057	0.057	0.057	0.057	0.103	0.184
59	0.126	0.126	0.126	0.126	0.156	0.229
60	0.126	0.126	0.126	0.126	0.155	0.226
61	0.126	0.126	0.126	0.126	0.155	0.226
62	0.126	0.126	0.126	0.126	0.155	0.226
63	0.126	0.126	0.126	0.126	0.155	0.226
64	0.126	0.126	0.126	0.126	0.155	0.226
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2.5% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.007	0.007	0.007	0.007	0.010	0.015
51	0.008	0.008	0.008	0.008	0.012	0.018
52	0.016	0.016	0.016	0.016	0.025	0.038
53	0.042	0.042	0.042	0.042	0.064	0.096
54	0.057	0.057	0.057	0.057	0.088	0.132
55	0.074	0.074	0.074	0.074	0.114	0.170
56	0.066	0.066	0.066	0.066	0.102	0.153
57	0.090	0.090	0.090	0.090	0.139	0.208
58	0.071	0.071	0.071	0.071	0.110	0.164
59	0.066	0.066	0.066	0.066	0.101	0.151
60	0.102	0.102	0.102	0.102	0.157	0.235
61	0.102	0.102	0.102	0.102	0.157	0.236
62	0.102	0.102	0.102	0.102	0.157	0.236
63	0.102	0.102	0.102	0.102	0.157	0.236
64	0.102	0.102	0.102	0.102	0.157	0.236
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 2.7% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.0138	0.0138	0.0138	0.0138	0.0253	0.0451
51	0.0123	0.0123	0.0123	0.0123	0.0226	0.0402
52	0.0249	0.0249	0.0249	0.0249	0.0456	0.0812
53	0.0497	0.0497	0.0497	0.0497	0.0909	0.1621
54	0.0662	0.0662	0.0662	0.0662	0.1211	0.2160
55	0.0854	0.0854	0.0854	0.0854	0.1563	0.2785
56	0.0606	0.0606	0.0606	0.0606	0.1108	0.1975
57	0.0711	0.0711	0.0711	0.0711	0.1300	0.2318
58	0.0628	0.0628	0.0628	0.0628	0.1149	0.2049
59	0.1396	0.1396	0.1396	0.1396	0.1735	0.2544
60	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
61	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
62	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
63	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
64	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2.7% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.0065	0.0065	0.0065	0.0065	0.0101	0.0151
51	0.0081	0.0081	0.0081	0.0081	0.0125	0.0187
52	0.0164	0.0164	0.0164	0.0164	0.0254	0.0380
53	0.0442	0.0442	0.0442	0.0442	0.0680	0.1018
54	0.0606	0.0606	0.0606	0.0606	0.0934	0.1397
55	0.0825	0.0825	0.0825	0.0825	0.1269	0.1900
56	0.0740	0.0740	0.0740	0.0740	0.1140	0.1706
57	0.0901	0.0901	0.0901	0.0901	0.1387	0.2077
58	0.0790	0.0790	0.0790	0.0790	0.1217	0.1821
59	0.0729	0.0729	0.0729	0.0729	0.1123	0.1681
60	0.1135	0.1135	0.1135	0.1135	0.1747	0.2615
61	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
62	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
63	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
64	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Service Retirement

Schools 2% @ 55						
	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.005	0.009	0.013	0.015	0.016	0.018
51	0.005	0.010	0.014	0.017	0.019	0.021
52	0.006	0.012	0.017	0.020	0.022	0.025
53	0.007	0.014	0.019	0.023	0.026	0.029
54	0.012	0.024	0.033	0.039	0.044	0.049
55	0.024	0.048	0.067	0.079	0.088	0.099
56	0.020	0.039	0.055	0.065	0.072	0.081
57	0.021	0.042	0.059	0.070	0.078	0.087
58	0.025	0.050	0.070	0.083	0.092	0.103
59	0.029	0.057	0.080	0.095	0.105	0.118
60	0.037	0.073	0.102	0.121	0.134	0.150
61	0.046	0.090	0.126	0.149	0.166	0.186
62	0.076	0.151	0.212	0.250	0.278	0.311
63	0.069	0.136	0.191	0.225	0.251	0.281
64	0.067	0.133	0.185	0.219	0.244	0.273
65	0.091	0.180	0.251	0.297	0.331	0.370
66	0.072	0.143	0.200	0.237	0.264	0.295
67	0.067	0.132	0.185	0.218	0.243	0.272
68	0.060	0.118	0.165	0.195	0.217	0.243
69	0.067	0.133	0.187	0.220	0.246	0.275
70	0.066	0.131	0.183	0.216	0.241	0.270

Miscellaneous

Internal Revenue Code Section 415

The limitations on benefits imposed by Internal Revenue Code Section 415 are taken into account in this valuation. Each year the impact of any changes in this limitation since the prior valuation is included and amortized as part of the actuarial gain or loss base. This results in lower contributions for those employers contributing to the Replacement Benefit Fund and protects CalPERS from prefunding expected benefits in excess of limits imposed by federal tax law.

Internal Revenue Code Section 401(a)(17)

The limitations on compensation imposed by Internal Revenue Code Section 401(a)(17) are taken into account in this valuation. Each year, the impact of any changes in the compensation limitation since the prior valuation is included and amortized as part of the actuarial gain or loss base. The compensation limit for classic members for the 2016 calendar year is $265,000.

APPENDIX B

PRINCIPAL PLAN PROVISIONS

The following is a description of the principal plan provisions used in calculating costs and liabilities. We have indicated whether a plan provision is standard or optional. Standard benefits are applicable to all members while optional benefits vary among employers. Optional benefits that apply to a single period of time, such as Golden Handshakes, have not been included. Many of the statements in this summary are general in nature, and are intended to provide an easily understood summary of the Public Employees' Retirement Law. The law itself governs in all situations.

Service Retirement

Eligibility

A classic CalPERS member or PEPRA Safety member becomes eligible for Service Retirement upon attainment of age 50 with at least 5 years of credited service (total service across all CalPERS employers, and with certain other retirement systems with which CalPERS has reciprocity agreements). For employees hired into a plan with the 1.5 percent at 65 formula, eligibility for service retirement is age 55 with at least 5 years of service. PEPRA miscellaneous members become eligible for service retirement upon attainment of age 52 with at least 5 years of service.

Benefit

The service retirement benefit is a monthly allowance equal to the product of the *benefit factor*, *years of service*, and *final compensation.*

- The *benefit factor* depends on the benefit formula specified in your agency's contract. The table below shows the factors for each of the available formulas. Factors vary by the member's age at retirement. Listed are the factors for retirement at whole year ages:

Miscellaneous Plan Formulas

Retirement Age	1.5% at 65	2% at 60	2% at 55	2.5% at 55	2.7% at 55	3% at 60	PEPRA 2% at 62
50	0.5000%	1.092%	1.426%	2.000%	2.000%	2.000%	N/A
51	0.5667%	1.156%	1.522%	2.100%	2.140%	2.100%	N/A
52	0.6334%	1.224%	1.628%	2.200%	2.280%	2.200%	1.000%
53	0.7000%	1.296%	1.742%	2.300%	2.420%	2.300%	1.100%
54	0.7667%	1.376%	1.866%	2.400%	2.560%	2.400%	1.200%
55	0.8334%	1.460%	2.000%	2.500%	2.700%	2.500%	1.300%
56	0.9000%	1.552%	2.052%	2.500%	2.700%	2.600%	1.400%
57	0.9667%	1.650%	2.104%	2.500%	2.700%	2.700%	1.500%
58	1.0334%	1.758%	2.156%	2.500%	2.700%	2.800%	1.600%
59	1.1000%	1.874%	2.210%	2.500%	2.700%	2.900%	1.700%
60	1.1667%	2.000%	2.262%	2.500%	2.700%	3.000%	1.800%
61	1.2334%	2.134%	2.314%	2.500%	2.700%	3.000%	1.900%
62	1.3000%	2.272%	2.366%	2.500%	2.700%	3.000%	2.000%
63	1.3667%	2.418%	2.418%	2.500%	2.700%	3.000%	2.100%
64	1.4334%	2.418%	2.418%	2.500%	2.700%	3.000%	2.200%
65	1.5000%	2.418%	2.418%	2.500%	2.700%	3.000%	2.300%
66	1.5000%	2.418%	2.418%	2.500%	2.700%	3.000%	2.400%
67 & up	1.5000%	2.418%	2.418%	2.500%	2.700%	3.000%	2.500%

Safety Plan Formulas

Retirement Age	½ at 55 *	2% at 55	2% at 50	3% at 55	3% at 50
50	1.783%	1.426%	2.000%	2.400%	3.000%
51	1.903%	1.522%	2.140%	2.520%	3.000%
52	2.035%	1.628%	2.280%	2.640%	3.000%
53	2.178%	1.742%	2.420%	2.760%	3.000%
54	2.333%	1.866%	2.560%	2.880%	3.000%
55 & Up	2.500%	2.000%	2.700%	3.000%	3.000%

* For this formula, the benefit factor also varies by entry age. The factors shown are for members with an entry age of 35 or greater. If entry age is less than 35, then the age 55 benefit factor is 50 percent divided by the difference between age 55 and entry age. The benefit factor for ages prior to age 55 is the same proportion of the age 55 benefit factor as in the above table.

PEPRA Safety Plan Formulas

Retirement Age	2% at 57	2.5% at 57	2.7% at 57
50	1.426%	2.000%	2.000%
51	1.508%	2.071%	2.100%
52	1.590%	2.143%	2.200%
53	1.672%	2.214%	2.300%
54	1.754%	2.286%	2.400%
55	1.836%	2.357%	2.500%
56	1.918%	2.429%	2.600%
57 & Up	2.000%	2.500%	2.700%

- The *years of service* is the amount credited by CalPERS to a member while he or she is employed in this group (or for other periods that are recognized under the employer's contract with CalPERS). For a member who has earned service with multiple CalPERS employers, the benefit from each employer is calculated separately according to each employer's contract, and then added together for the total allowance. An agency may contract for an optional benefit where any unused sick leave accumulated at the time of retirement will be converted to credited service at a rate of 0.004 years of service for each day of sick leave.

- The *final compensation* is the monthly average of the member's highest 36 or 12 consecutive months' full-time equivalent monthly pay (no matter which CalPERS employer paid this compensation). The standard benefit is 36 months. Employers had the option of providing a final compensation equal to the highest 12 consecutive months for classic plans only. Final compensation must be defined by the highest 36 consecutive months' pay under the 1.5% at 65 formula. PEPRA members have a cap on the annual salary that can be used to calculate final compensation for all new members based on the Social Security contribution and benefit base. For employees that participate in Social Security this cap is $118,775 for 2016 and for those employees that do not participate in Social Security the cap for 2016 is $142,530. Adjustments to the caps are permitted annually based on changes to the CPI for all urban consumers.

- Employees must be covered by Social Security with the 1.5% at 65 formula. Social Security is optional for all other benefit formulas. For employees covered by Social Security, the modified formula is the standard benefit. Under this type of formula, the final compensation is offset by $133.33 (or by one third if the final compensation is less than $400). Employers may contract for the full benefit with Social Security that will eliminate the offset applicable to the final compensation. For employees not covered by Social Security, the full benefit is paid with

no offsets. Auxiliary organizations of the CSUC system may elect reduced contribution rates, in which case the offset is $317 if members are not covered by Social Security or $513 if members are covered by Social Security.

- The miscellaneous and PEPRA safety service retirement benefit is not capped. The classic Safety service retirement benefit is capped at 90 percent of final compensation.

Vested Deferred Retirement

Eligibility for Deferred Status

A CalPERS member becomes eligible for a deferred vested retirement benefit when he or she leaves employment, keeps his or her contribution account balance on deposit with CalPERS, **and** has earned at least 5 years of credited service (total service across all CalPERS employers, and with certain other retirement systems with which CalPERS has reciprocity agreements).

Eligibility to Start Receiving Benefits

The CalPERS classic members and PEPRA safety members become eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for deferred status and upon attainment of age 50 (55 for employees hired into a 1.5% @ 65 plan). PEPRA miscellaneous members become eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for deferred status and upon attainment of age 52.

Benefit

The vested deferred retirement benefit is the same as the service retirement benefit, where the benefit factor is based on the member's age at allowance commencement. For members who have earned service with multiple CalPERS employers, the benefit from each employer is calculated separately according to each employer's contract, and then added together for the total allowance.

Non-Industrial (Non-Job Related) Disability Retirement

Eligibility

A CalPERS member is eligible for Non-Industrial Disability Retirement if he or she becomes *disabled* and has at least 5 years of credited service (total service across all CalPERS employers, and with certain other retirement systems with which CalPERS has reciprocity agreements). There is no special age requirement. *Disabled* means the member is unable to perform his or her job because of an illness or injury, which is expected to be permanent or to last indefinitely. The illness or injury does not have to be job related. A CalPERS member must be actively employed by any CalPERS employer at the time of disability in order to be eligible for this benefit.

Standard Benefit

The standard Non-Industrial Disability Retirement benefit is a monthly allowance equal to 1.8 percent of final compensation, multiplied by *service*, which is determined as follows:

- *Service* is CalPERS credited service, for members with less than 10 years of service or greater than 18.518 years of service; or

- *Service* is CalPERS credited service plus the additional number of years that the member would have worked until age 60, for members with at least 10 years but not more than 18.518 years of service. The maximum benefit in this case is 33 1/3 percent of final compensation.

Improved Benefit

Employers have the option of providing the improved Non-Industrial Disability Retirement benefit. This benefit provides a monthly allowance equal to 30 percent of final compensation for the first 5 years of service, plus 1 percent for each additional year of service to a maximum of 50 percent of final compensation.

Members who are eligible for a larger service retirement benefit may choose to receive that benefit in lieu of a disability benefit. Members eligible to retire, and who have attained the normal retirement age determined by their service retirement benefit formula, will receive the same dollar amount for disability retirement as that payable for service retirement. For members who have earned service with multiple CalPERS employers, the benefit attributed to each employer is the total disability allowance multiplied by the ratio of service with a particular employer to the total CalPERS service.

Industrial (Job Related) Disability Retirement

All safety members have this benefit. For miscellaneous members, employers have the option of providing this benefit. An employer may choose to provide the increased benefit option or the improved benefit option.

Eligibility

An employee is eligible for Industrial Disability Retirement if he or she becomes disabled while working, where disabled means the member is unable to perform the duties of the job because of a work-related illness or injury, which is expected to be permanent or to last indefinitely. A CalPERS member who has left active employment within this group is not eligible for this benefit, except to the extent described below.

Standard Benefit

The standard Industrial Disability Retirement benefit is a monthly allowance equal to 50 percent of final compensation.

Increased Benefit (75 percent of Final Compensation)

The increased Industrial Disability Retirement benefit is a monthly allowance equal to 75 percent final compensation for total disability.

Improved Benefit (50 percent to 90 percent of Final Compensation)

The improved Industrial Disability Retirement benefit is a monthly allowance equal to the Workman's Compensation Appeals Board permanent disability rate percentage (if 50 percent or greater, with a maximum of 90 percent) times the final compensation.

For a CalPERS member not actively employed in this group who became disabled while employed by some other CalPERS employer, the benefit is a return of accumulated member contributions with respect to employment in this group. With the standard or increased benefit, a member may also choose to receive the annuitization of the accumulated member contributions.

If a member is eligible for service retirement and if the service retirement benefit is more than the industrial disability retirement benefit, the member may choose to receive the larger benefit.

Post-Retirement Death Benefit

Standard Lump Sum Payment

Upon the death of a retiree, a one-time lump sum payment of $500 will be made to the retiree's designated survivor(s), or to the retiree's estate.

Improved Lump Sum Payment

Employers have the option of providing an improved lump sum death benefit of $600, $2,000, $3,000, $4,000 or $5,000.

Form of Payment for Retirement Allowance

Standard Form of Payment

Generally, the retirement allowance is paid to the retiree in the form of an annuity for as long as he or she is alive. The retiree may choose to provide for a portion of his or her allowance to be paid to any designated beneficiary after the retiree's death. CalPERS provides for a variety of such benefit options, which the retiree pays for by taking a reduction in his or her retirement allowance. Such reduction takes into account the amount to be provided to the beneficiary and the probable duration of payments (based on the ages of the member and beneficiary) made subsequent to the member's death.

Improved Form of Payment (Post-Retirement Survivor Allowance)

Employers have the option to contract for the post-retirement survivor allowance.

For retirement allowances with respect to service subject to the modified formula, 25 percent of the retirement allowance will automatically be continued to certain statutory beneficiaries upon the death of the retiree, without a reduction in the retiree's allowance. For retirement allowances with respect to service subject to the full or supplemental formula, 50 percent of the retirement allowance will automatically be continued to certain statutory beneficiaries upon the death of the retiree, without a reduction in the retiree's allowance. This additional benefit is referred to as post-retirement survivor allowance (PRSA) or simply as survivor continuance.

In other words, 25 percent or 50 percent of the allowance, the continuance portion, is paid to the retiree for as long as he or she is alive, and that same amount is continued to the retiree's spouse (or if no eligible spouse, to unmarried child(ren) until they attain age 18; or, if no eligible child(ren), to a qualifying dependent parent) for the rest of his or her lifetime. This benefit will not be discontinued in the event the spouse remarries.

The remaining 75 percent or 50 percent of the retirement allowance, which may be referred to as the option portion of the benefit, is paid to the retiree as an annuity for as long as he or she is alive. Or, the retiree may choose to provide for some of this option portion to be paid to any designated beneficiary after the retiree's death. Benefit options applicable to the option portion are the same as those offered with the standard form. The reduction is calculated in the same manner but is applied only to the option portion.

Pre-Retirement Death Benefits

Basic Death Benefit

This is a standard benefit.

Eligibility

An employee's beneficiary (or estate) may receive the basic death benefit if the member dies while actively employed. A CalPERS member must be actively employed with the CalPERS employer providing this benefit to be eligible for this benefit. A member's survivor who is eligible for any other pre-retirement death benefit may choose to receive that death benefit instead of this basic death benefit.

Benefit

The basic death benefit is a lump sum in the amount of the member's accumulated contributions, where interest is currently credited at 7.5 percent per year, plus a lump sum in the amount of one month's salary for each completed year of current service, up to a maximum of six months' salary. For purposes of this benefit, one month's salary is defined as the member's average monthly full-time rate of compensation during the 12 months preceding death.

1957 Survivor Benefit

This is a standard benefit.

Eligibility

An employee's *eligible survivor(s)* may receive the 1957 Survivor benefit if the member dies while actively employed, has attained at least age 50 for classic and safety PEPRA members and age 52 for miscellaneous PEPRA members, and has at least 5 years of credited service (total service across all CalPERS employers and with certain other retirement systems with which CalPERS has reciprocity agreements). A CalPERS member must be actively employed with the CalPERS employer providing this benefit to be eligible for this benefit. An eligible survivor means the surviving spouse to whom the member was married at least one year before death or, if there is no eligible spouse, to the member's unmarried child(ren) under age 18. A member's survivor who is eligible for any other pre-retirement death benefit may choose to receive that death benefit instead of this 1957 Survivor benefit.

Benefit

The 1957 Survivor benefit is a monthly allowance equal to one-half of the unmodified service retirement benefit that the member would have been entitled to receive if the member had retired on the date of his or her death. If the benefit is payable to the spouse, the benefit is discontinued upon the death of the spouse. If the benefit is payable to dependent child(ren), the benefit will be discontinued upon death or attainment of age 18, unless the child(ren) is disabled. The total amount paid will be at least equal to the basic death benefit.

Optional Settlement 2W Death Benefit

This is an optional benefit.

Eligibility

An employee's *eligible survivor* may receive the Optional Settlement 2W Death benefit if the member dies while actively employed, has attained at least age 50 for classic and safety PEPRA members and age 52 for miscellaneous PEPRA members, and has at least 5 years of credited service (total service across all CalPERS employers and with certain other retirement systems with which CalPERS has reciprocity agreements). A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. An *eligible survivor* means the surviving spouse to whom the member was married at least one year before death. A member's survivor who is eligible for any other pre-retirement death benefit may choose to receive that death benefit instead of this Optional Settlement 2W Death benefit.

Benefit

The Optional Settlement 2W Death benefit is a monthly allowance equal to the service retirement benefit that the member would have received had the member retired on the date of his or her death and elected Optional Settlement 2W. (A retiree who elects Optional Settlement 2W receives an allowance that has been reduced so that it will continue to be paid after his or her death to a surviving beneficiary.) The allowance is payable as long as the surviving spouse lives, at which time it is continued to any unmarried child(ren) under age 18, if applicable. The total amount paid will be at least equal to the basic death benefit.

Special Death Benefit

This is a standard benefit for safety members. An employer may elect to provide this benefit for miscellaneous members.

Eligibility

An employee's *eligible survivor(s)* may receive the special death benefit if the member dies while actively employed and the death is job-related. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. An *eligible survivor* means the surviving spouse to whom the member was married prior to the onset of the injury or illness that resulted in death. If there is no eligible spouse, an eligible survivor means the member's unmarried child(ren) under age 22. An eligible survivor who chooses to receive this benefit will not receive any other death benefit.

Benefit

The special death benefit is a monthly allowance equal to 50 percent of final compensation, and will be increased whenever the compensation paid to active employees is increased but ceasing to increase when the member would have attained age 50. The allowance is payable to the surviving spouse until death at which time the allowance is continued to any unmarried child(ren) under age 22. There is a guarantee that the total amount paid will at least equal the basic death benefit.

If the member's death is the result of an accident or injury caused by external violence or physical force incurred in the performance of the member's duty, and there are *eligible* surviving child(ren) (*eligible* means unmarried child(ren) under age 22) in addition to an eligible spouse, then an **additional monthly allowance** is paid equal to the following:

- if 1 eligible child: 12.5 percent of final compensation
- if 2 eligible children: 20.0 percent of final compensation
- if 3 or more eligible children: 25.0 percent of final compensation

Alternate Death Benefit for Local Fire Members

This is an optional benefit available only to local fire members.

Eligibility

An employee's *eligible survivor(s)* may receive the alternate death benefit in lieu of the basic death benefit or the 1957 Survivor benefit if the member dies while actively employed and has at least 20 years of total CalPERS service. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. An *eligible survivor* means the surviving spouse to whom the member was married prior to the onset of the injury or illness that resulted in death. If there is no eligible spouse, an eligible survivor means the member's unmarried child(ren) under age 18.

Benefit

The Alternate Death benefit is a monthly allowance equal to the service retirement benefit that the member would have received had the member retired on the date of his or her death and elected Optional Settlement 2W. (A retiree who elects Optional Settlement 2W receives an allowance that has been reduced so that it will continue to be paid after his or her death to a surviving beneficiary.) If the member has not yet attained age 50, the benefit is equal to that which would be payable if the member had retired at age 50, based on service credited at the time of death. The allowance is payable as long as the surviving spouse lives, at which time it is continued to any unmarried child(ren) under age 18, if applicable. The total amount paid will be at least equal to the basic death benefit.

Cost-of-Living Adjustments (COLA)

Standard Benefit

Retirement and survivor allowances are adjusted each year in May for cost of living, beginning the second calendar year after the year of retirement. The standard cost-of-living adjustment (COLA) is 2 percent. Annual adjustments are calculated by first determining the lesser of 1) 2 percent compounded from the end of the year of retirement or 2) actual rate of inflation. The resulting increase is divided by the total increase provided in prior years. For any particular year, the COLA adjustment may be less than 2 percent (when the rate of inflation is low), may be greater than the rate of inflation (when the rate of inflation is low after several years of high inflation) or may even be greater than 2 percent (when inflation is high after several years of low inflation).

Improved Benefit

Employers have the option of providing a COLA of 3 percent, 4 percent, or 5 percent, determined in the same manner as described above for the standard 2 percent COLA. An improved COLA is not available with the 1.5% at 65 formula.

Purchasing Power Protection Allowance (PPPA)

Retirement and survivor allowances are protected against inflation by PPPA. PPPA benefits are cost-of-living adjustments that are intended to maintain an individual's allowance at 80 percent of the initial allowance at retirement adjusted for inflation since retirement. The PPPA benefit will be coordinated with other cost-of-living adjustments provided under the plan.

Employee Contributions

Each employee contributes toward his or her retirement based upon the retirement formula. The standard employee contribution is as described below.

- The percent contributed below the monthly compensation breakpoint is 0 percent.
- The monthly compensation breakpoint is $0 for full and supplemental formula members and $133.33 for employees covered by the modified formula.
- The percent contributed above the monthly compensation breakpoint depends upon the benefit formula, as shown in the table below.

Benefit Formula	Percent Contributed above the Breakpoint
Miscellaneous, 1.5% at 65	2%
Miscellaneous, 2% at 60	7%
Miscellaneous, 2% at 55	7%
Miscellaneous, 2.5% at 55	8%
Miscellaneous, 2.7% at 55	8%
Miscellaneous, 3% at 60	8%
Miscellaneous, 2% at 62	50% of the Total Normal Cost
Miscellaneous, 1.5% at 65	50% of the Total Normal Cost
Safety, 1/2 at 55	Varies by entry age
Safety, 2% at 55	7%
Safety, 2% at 50	9%
Safety, 3% at 55	9%
Safety, 3% at 50	9%
Safety, 2% at 57	50% of the Total Normal Cost
Safety, 2.5% at 57	50% of the Total Normal Cost
Safety, 2.7% at 57	50% of the Total Normal Cost

The employer may choose to "pick-up" these contributions for classic members (Employer Paid Member Contributions or EPMC). EPMC is prohibited for new PEPRA members.

An employer may also include Employee Cost Sharing in the contract, where employees agree to share the cost of the employer contribution. These contributions are paid in addition to the member contribution.

Auxiliary organizations of the CSUC system may elect reduced contribution rates, in which case the offset is $317 and the contribution rate is 6 percent if members are not covered by Social Security. If members are covered by Social Security, the offset is $513 and the contribution rate is 5 percent.

Refund of Employee Contributions

If the member's service with the employer ends, and if the member does not satisfy the eligibility conditions for any of the retirement benefits above, the member may elect to receive a refund of his or her employee contributions, which are credited with 6 percent interest compounded annually.

1959 Survivor Benefit

This is a pre-retirement death benefit available only to members not covered by Social Security. Any agency joining CalPERS subsequent to 1993 is required to provide this benefit if the members are not covered by Social Security. The benefit is optional for agencies joining CalPERS prior to 1994. Levels 1, 2 and 3 are now closed. Any new agency or any agency wishing to add this benefit or increase the current level may only choose the 4th or Indexed Level.

This benefit is not included in the results presented in this valuation. More information on this benefit is available on the CalPERS website at www.calpers.ca.gov.

APPENDIX C

PARTICIPANT DATA

- **SUMMARY OF VALUATION DATA**
- **ACTIVE MEMBERS**
- **TRANSFERRED AND TERMINATED MEMBERS**
- **RETIRED MEMBERS AND BENEFICIARIES**

Summary of Valuation Data

	June 30, 2015	June 30, 2016
1. **Active Members**		
a) Counts	2,585	2,576
b) Average Attained Age	45.20	45.55
c) Average Entry Age to Rate Plan	33.35	33.69
d) Average Years of Service	11.85	11.86
e) Average Annual Covered Pay	$ 62,498	$ 66,633
f) Annual Covered Payroll	161,556,270	171,645,737
g) Projected Annual Payroll for Contribution Year	176,536,898	187,561,931
h) Present Value of Future Payroll	1,303,371,353	1,389,578,490
2. **Transferred Members**		
a) Counts	2,290	2,334
b) Average Attained Age	44.52	44.44
c) Average Years of Service	2.15	2.21
d) Average Annual Covered Pay	$ 86,993	$ 89,154
3. **Terminated Members**		
a) Counts	1,781	1,884
b) Average Attained Age	42.92	42.93
c) Average Years of Service	2.24	2.21
d) Average Annual Covered Pay	$ 38,724	$ 38,003
4. **Retired Members and Beneficiaries**		
a) Counts	2,105	2,279
b) Average Attained Age	63.92	64.30
c) Average Annual Benefits	$ 16,720	$ 16,848
5. **Active to Retired Ratio** [(1a) / (4a)]	1.23	1.13

Counts of members included in the valuation are counts of the records processed by the valuation. Multiple records may exist for those who have service in more than one valuation group. This does not result in double counting of liabilities.

Average Annual Benefits represents benefit amounts payable by this plan only. Some members may have service with another agency and would therefore have a larger total benefit than would be included as part of the average shown here.

Active Members

Counts of members included in the valuation are counts of the records processed by the valuation. Multiple records may exist for those who have service in more than one valuation group. This does not result in double counting of liabilities.

Distribution of Active Members by Age and Service

	Years of Service at Valuation Date						
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Total**
15-24	78	0	0	0	0	0	78
25-29	190	16	2	0	0	0	208
30-34	164	54	45	1	0	0	264
35-39	141	53	84	27	3	0	308
40-44	103	63	87	58	8	2	321
45-49	82	56	103	80	43	23	387
50-54	61	43	89	74	47	97	411
55-59	25	33	77	59	42	109	345
60-64	20	20	37	31	28	53	189
65 and over	11	10	16	12	5	11	65
All Ages	**875**	**348**	**540**	**342**	**176**	**295**	**2,576**

Distribution of Average Annual Salaries by Age and Service

	Years of Service at Valuation Date						
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Average**
15-24	$30,553	$0	$0	$0	$0	$0	$30,553
25-29	38,012	48,895	73,939	0	0	0	39,194
30-34	51,625	58,292	64,221	72,401	0	0	55,214
35-39	59,651	65,913	72,065	76,363	74,257	0	65,721
40-44	63,046	70,437	76,690	75,658	72,525	56,936	70,671
45-49	63,271	70,355	73,315	80,912	85,522	77,615	73,941
50-54	55,835	67,072	71,966	81,186	76,889	79,692	73,106
55-59	72,179	68,871	76,017	71,941	80,020	79,125	75,827
60-64	67,987	60,600	73,997	79,315	72,930	77,984	73,776
65 and over	72,509	64,487	74,618	70,881	68,298	91,972	74,463
All Ages	**$52,037**	**$65,559**	**$73,157**	**$77,652**	**$78,628**	**$79,317**	**$66,633**

Transferred and Terminated Members

Distribution of Transfers to Other CalPERS Plans by Age, Service, and average Salary

	Years of Service at Valuation Date							
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Total**	**Average Salary**
15-24	24	0	0	0	0	0	24	$54,655
25-29	94	4	0	0	0	0	98	55,926
30-34	247	11	0	0	0	0	258	78,939
35-39	402	26	7	0	0	0	435	92,266
40-44	383	27	9	6	0	0	425	94,516
45-49	395	32	17	7	2	0	453	98,438
50-54	237	33	17	14	7	3	311	94,054
55-59	144	33	15	6	1	0	199	85,825
60-64	72	12	11	0	0	0	95	75,699
65 and over	29	7	0	0	0	0	36	69,680
All Ages	**2027**	**185**	**76**	**33**	**10**	**3**	**2,334**	**89,154**

Distribution of Terminated Participants with Funds on Deposit by Age, Service, and average Salary

	Years of Service at Valuation Date							
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Total**	**Average Salary**
15-24	32	0	0	0	0	0	32	$26,047
25-29	188	4	0	0	0	0	192	28,875
30-34	283	14	1	0	0	0	298	33,217
35-39	285	22	10	1	0	0	318	39,235
40-44	240	29	10	2	0	0	281	39,972
45-49	201	27	7	6	0	2	243	44,340
50-54	161	33	13	9	1	2	219	41,163
55-59	124	30	10	2	0	1	167	41,924
60-64	72	12	2	4	0	0	90	38,129
65 and over	42	0	2	0	0	0	44	31,604
All Ages	**1628**	**171**	**55**	**24**	**1**	**5**	**1,884**	**38,003**

Retired Members and Beneficiaries

Distribution of Retirees and Beneficiaries by Age and Retirement Type*

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 30	0	0	0	0	0	5	5
30-34	0	0	1	0	0	2	3
35-39	0	0	8	1	0	1	10
40-44	0	5	8	0	0	3	16
45-49	0	3	27	1	1	3	35
50-54	125	13	52	2	2	11	205
55-59	327	27	49	3	1	12	419
60-64	466	19	48	4	0	23	560
65-69	442	20	36	0	0	20	518
70-74	230	9	16	2	0	20	277
75-79	123	3	4	1	0	12	143
80-84	47	0	3	0	0	13	63
85 and Over	16	1	1	0	0	7	25
All Ages	**1776**	**100**	**253**	**14**	**4**	**132**	**2,279**

Distribution of Average Annual Disbursements to Retirees and Beneficiaries by Age and Retirement Type*

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Average
Under 30	$0	$0	$0	$0	$0	$2,325	$2,325
30-34	0	0	150	0	0	11,208	7,522
35-39	0	0	416	3,824	0	1,068	822
40-44	0	8,587	7,430	0	0	2,742	6,912
45-49	0	13,970	4,348	12,020	68	27,041	7,215
50-54	5,621	11,565	6,183	10,097	87	8,122	6,264
55-59	15,344	10,932	12,511	8,584	28	14,318	14,614
60-64	21,946	9,221	16,299	21,815	0	11,057	20,582
65-69	20,556	11,849	25,030	0	0	12,723	20,228
70-74	19,133	16,023	25,980	9,646	0	24,550	19,750
75-79	14,510	10,776	22,156	17,496	0	16,290	14,815
80-84	12,074	0	21,745	0	0	10,842	12,280
85 and Over	7,542	5,998	17,353	0	0	10,404	8,674
All Ages	**$17,965**	**$11,251**	**$13,380**	**$13,274**	**$67**	**$13,596**	**$16,848**

Retired Members and Beneficiaries (continued)

Distribution of Retirees and Beneficiaries by Years Retired and Retirement Type*

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 5 Yrs	778	21	59	6	0	61	925
5-9	588	22	39	2	0	34	685
10-14	289	25	54	5	1	22	396
15-19	80	22	37	1	1	4	145
20-24	37	6	35	0	0	9	87
25-29	4	4	26	0	1	1	36
30 and Over	0	0	3	0	1	1	5
All Years	**1776**	**100**	**253**	**14**	**4**	**132**	**2,279**

Distribution of Average Annual Disbursements to Retirees and Beneficiaries by Years Retired and Retirement Type*

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Average
Under 5 Yrs	$19,406	$13,804	$11,069	$8,503	$0	$17,212	$18,532
5-9	18,592	13,052	10,830	30,289	0	12,459	17,702
10-14	15,879	10,391	15,983	14,280	68	9,244	15,118
15-19	12,118	8,635	11,067	2,842	51	7,051	11,034
20-24	8,090	10,797	16,615	0	0	7,134	11,608
25-29	4,645	8,376	16,752	0	122	24,311	14,224
30 and Over	0	0	6,695	0	28	1,010	4,225
All Years	**$17,965**	**$11,251**	**$13,380**	**$13,274**	**$67**	**$13,596**	**$16,848**

* Counts of members do not include alternate payees receiving benefits while the member is still working. Therefore, the total counts may not match information on page 25 of the report. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

APPENDIX D

DEVELOPMENT OF PEPRA MEMBER CONTRIBUTION RATES

Development of PEPRA Members Contribution Rates

The table below shows the determination of the Member contribution rates based on 50 percent of the Total Normal Cost for each respective plan on June 30, 2016.

Assembly Bill (AB) 340 created PEPRA that implemented new benefit formulas and a final compensation period as well as new contribution requirements for new employees. In accordance with Section Code 7522.30(b), "new members … shall have an initial contribution rate of at least 50 percent of the normal cost rate." The normal cost for the plan is dependent on the benefit levels, actuarial assumptions and demographics of the plan particularly the entry age into the plan. Should the total normal cost of the plan change by one percent or more from the base total normal cost established for the plan, the new member rate shall be 50 percent of the new normal cost rounded to the nearest quarter percent.

		Basis for Current Rate		**Rates Effective July 1, 2018**			
Rate Plan Identifier	**Plan**	**Total Normal Cost**	**Member Rate**	**Total Normal Cost**	**Change**	**Change Needed**	**Member Rate**
26779	Miscellaneous PEPRA	12.204%	6.000%	13.726%	1.522%	Yes	6.750%

For a description of the methods used to determine the Total Normal Cost for this purpose, please see the "PEPRA Normal Cost Rate Methodology" section in Appendix A.

APPENDIX E

GLOSSARY OF ACTUARIAL TERMS

Glossary of Actuarial Terms

Accrued Liability *(also called Actuarial Accrued Liability or Entry Age Normal Accrued Liability)*
The total dollars needed as of the valuation date to fund all benefits earned in the past for *current* members.

Actuarial Assumptions
Assumptions made about certain events that will affect pension costs. Assumptions generally can be broken down into two categories: demographic and economic. Demographic assumptions include such things as mortality, disability and retirement rates. Economic assumptions include discount rate, salary growth and inflation.

Actuarial Methods
Procedures employed by actuaries to achieve certain funding goals of a pension plan. Actuarial methods include funding method, setting the length of time to fund the Accrued Liability and determining the Value of Assets.

Actuarial Valuation
The determination, as of a valuation date of the Normal Cost, Accrued liability, and related actuarial present values for a pension plan. These valuations are performed annually or when an employer is contemplating a change to their plan provisions.

Amortization Bases
Separate payment schedules for different portions of the Unfunded Liability. The total Unfunded Liability of a Risk Pool or non-pooled plan can be segregated by "cause," creating "bases" and each such base will be separately amortized and paid for over a specific period of time. However, all bases are amortized using investment and payroll assumptions from the current valuation. This can be likened to a home having a first mortgage of 24 years remaining payments and a second mortgage that has 10 years remaining payments. Each base or each mortgage note has its own terms (payment period, principal, etc.)

Generally, in an actuarial valuation, the separate bases consist of changes in unfunded liability due to contract amendments, actuarial assumption changes, actuarial methodology changes, and/or gains and losses. Payment periods are determined by Board policy and vary based on the cause of the change.

Amortization Period
The number of years required to pay off an Amortization Base.

Classic Member (under PEPRA)
A classic member is a member who joined CalPERS prior to January, 1, 2013 and who is not defined as a new member under PEPRA. (See definition of new member below)

Discount Rate Assumption
The actuarial assumption that was called "investment return" in earlier CalPERS reports or "actuarial interest rate" in Section 20014 of the California Public Employees' Retirement Law (PERL).

Entry Age
The earliest age at which a plan member begins to accrue benefits under a defined benefit pension plan. In most cases, this is the age of the member on their date of hire.

Entry Age Normal Cost Method
An actuarial cost method designed to fund a member's total plan benefit over the course of his or her career. This method is designed to yield a rate expressed as a level percentage of payroll.
(The assumed retirement age less the entry age is the amount of time required to fund a member's total benefit. Generally, the older a member on the date of hire, the greater the entry age normal cost. This is mainly because there is less time to earn investment income to fund the future benefits.)

Fresh Start

A Fresh Start is when multiple amortization bases are collapsed to one base and amortized together over a new funding period.

Funded Status

A measure of how well funded, or how "on track" a plan or risk pool is with respect to assets versus accrued liabilities. A ratio greater than 100 percent means the plan or risk pool has more assets than liabilities and a ratio less than 100 percent means liabilities are greater than assets.

GASB 68

Statement No. 68 of the Governmental Accounting Standards Board. The accounting standard governing a state or local governmental employer's accounting and financial reporting for pensions. GASB 68 replaces GASB 27 effective the first fiscal year beginning after June 15, 2014.

New Member (under PEPRA)

A new member includes an individual who becomes a member of a public retirement system for the first time on or after January 1, 2013, and who was not a member of another public retirement system prior to that date, and who is not subject to reciprocity with another public retirement system.

Normal Cost

The annual cost of service accrual for the upcoming fiscal year for active employees. The normal cost should be viewed as the long term contribution rate.

Pension Actuary

A business professional that is authorized by the Society of Actuaries, and the American Academy of Actuaries to perform the calculations necessary to properly fund a pension plan.

PEPRA

The California Public Employees' Pension Reform Act of 2013

Prepayment Contribution

A payment made by the employer to reduce or eliminate the year's required employer contribution.

Present Value of Benefits (PVB)

The total dollars needed as of the valuation date to fund all benefits earned in the past or expected to be earned in the future for *current* members.

Unfunded Accrued Liability (UAL)

When a plan or pool's Value of Assets is less than its Accrued Liability, the difference is the plan or pool's Unfunded Accrued Liability (or unfunded liability). If the unfunded liability is positive, the plan or pool will have to pay contributions exceeding the Normal Cost.

Exhibit A3

July 2018

Miscellaneous Plan of the City of Sacramento (CalPERS ID: 7903930500)
Annual Valuation Report as of June 30, 2017

Dear Employer,

As an attachment to this letter, you will find a copy of the June 30, 2017 actuarial valuation report of your pension plan. Your 2017 actuarial valuation report contains important actuarial information about your pension plan at CalPERS. Your CalPERS staff actuary, whose signature appears in the "Actuarial Certification" section on page 1, is available to discuss the report with you after August 1, 2018.

Required Contributions

The exhibit below displays the minimum required employer contributions and the Employee PEPRA Rate for Fiscal Year 2019-20 along with an estimate of the required contribution for Fiscal Year 2020-21. Member contributions other than cost sharing (whether paid by the employer or the employee) are in addition to the results shown below. **The required employer contributions in this report do not reflect any cost sharing arrangement you may have with your employees.**

Fiscal Year	Employer Normal Cost Rate	Employer Amortization of Unfunded Accrued Liability	Employee PEPRA Rate
2019-20	8.723%	$23,739,099	6.75%
Projected Results			
2020-21	*9.4%*	*$26,691,000*	*TBD*

The actual investment return for Fiscal Year 2017-18 was not known at the time this report was prepared. The projections above assume the investment return for that year would be 7.25 percent. ***If the actual investment return for Fiscal Year 2017-18 differs from 7.25 percent, the actual contribution requirements for the projected years will differ from those shown above.***

Moreover, the projected results for Fiscal Year 2020-21 assume that there are no future Plan changes, no further changes in assumptions other than those recently approved and no liability gains or losses. Such changes can have a significant impact on required contributions. Since they cannot be predicted in advance, the projected employer results shown above are estimates. The actual required employer contributions for Fiscal Year 2020-21 will be provided in next year's report.

For additional details regarding the assumptions and methods used for these projections please refer to the "Projected Employer Contributions" in the "Highlights and Executive Summary" section.

The required contributions shown above include a Normal Cost component expressed as a percentage of payroll and a payment toward Unfunded Accrued Liability expressed as a dollar amount. For illustrative total contribution requirements expressed as percentages of payroll, please see pages 4 and 5 of the report.

The "Risk Analysis" section of the valuation report starting on page 22 also contains estimated employer contributions in future years under a variety of investment return scenarios.

Changes since the Prior Year's Valuation

At its December 2016 meeting, the CalPERS Board of Administration lowered the discount rate from 7.50 percent to 7.00 percent using a three-year phase-in beginning with the June 30, 2016 actuarial valuation. The minimum employer contributions for Fiscal Year 2019-20 determined in this valuation were calculated using a discount rate of 7.25 percent. The projected employer contributions on Page 5 are calculated under the assumption that the discount rate will be lowered to 7.00 percent next year, as adopted by the Board.

On December 19, 2017, the CalPERS Board of Administration adopted new actuarial assumptions based on the recommendations in the December 2017 CalPERS Experience Study and Review of Actuarial Assumptions. This study reviewed the retirement rates, termination rates, mortality rates, rates of salary increases and inflation assumption for Public Agencies. These new assumptions are incorporated in your actuarial valuations and will impact the required contribution for FY 2019-20. In addition, the Board adopted a new asset portfolio as part of its Asset Liability Management. The new asset mix supports a 7.00 percent discount rate. The reduction of the inflation assumption will be implemented in two steps in conjunction with the decreases in the discount rate. For the June 30, 2017 valuation an inflation rate of 2.625 percent will be used and a rate of 2.50 percent will be used in the following valuation.

The CalPERS Board of Administration has adopted a new amortization policy effective with the June 30, 2019 actuarial valuation. The new policy shortens the period over which actuarial gains and losses are amortized from 30 years to 20 years with the payments computed using a level dollar amount. In addition, the new policy removes the 5-year ramp-up and ramp-down on UAL bases attributable to assumption changes and non-investment gains/losses. The new policy removes the 5-year ramp-down on investment gains/losses. These changes will apply only to new UAL bases established on or after June 30, 2019.

For inactive employers the new amortization policy imposes a maximum amortization period of 15 years for all unfunded accrued liabilities effective June 30, 2017. Furthermore, the plan actuary has the ability to shorten the amortization period on any valuation date based on the life expectancy of plan members and projected cash flow needs to the plan. The impact of this has been reflected in the current valuation results.

Beginning with Fiscal Year 2017-18 CalPERS began collecting employer contributions toward the plan's unfunded liability as dollar amounts instead of the prior method of a contribution rate. This change addressed potential funding issues that could arise from a declining payroll or reduction in the number of active members in the plan. Funding the unfunded liability as a percentage of payroll could lead to the underfunding of the plans. Due to stakeholder feedback regarding internal needs for total contributions expressed as a percentage of payroll, the reports include such results in the contribution projection on page 5. These results are provided for information purposes only. Contributions toward the unfunded liability will continue to be collected as dollar amounts.

The CalPERS Board of Administration adopted a Risk Mitigation Policy which is designed to reduce funding risk over time. This Policy has been temporarily suspended during the period over which the discount rate is being lowered. More details on the Risk Mitigation Policy can be found on our website.

Besides the above noted changes, there may also be changes specific to the plan such as contract amendments and funding changes.

Further descriptions of general changes are included in the "Highlights and Executive Summary" section and in Appendix A, "Actuarial Methods and Assumptions." The effects of the changes on the required contributions are included in the "Reconciliation of Required Employer Contributions" section.

We understand that you might have some questions about these results. While we are very interested in discussing these results with your agency, in the interest of allowing us to give every public agency their results, we ask that you wait until after August 1, 2018 to contact us with actuarial questions. If you have other questions, you may call the Customer Contact Center at (888)-CalPERS or (**888-225-7377**).

Sincerely,

SCOTT TERANDO
Chief Actuary

Actuarial Valuation as of June 30, 2017

for the Miscellaneous Plan of the City of Sacramento

(CalPERS ID: 7903930500)
(Rate Plan ID: 1209)

Required Contributions for Fiscal Year July 1, 2019 – June 30, 2020

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Actuarial Certification

To the best of our knowledge, this report is complete and accurate and contains sufficient information to disclose, fully and fairly, the funded condition of the Miscellaneous Plan of the City of Sacramento. This valuation is based on the member and financial data as of June 30, 2017 provided by the various CalPERS databases and the benefits under this plan with CalPERS as of the date this report was produced. It is our opinion that the valuation has been performed in accordance with generally accepted actuarial principles, in accordance with standards of practice prescribed by the Actuarial Standards Board, and that the assumptions and methods are internally consistent and reasonable for this plan, as prescribed by the CalPERS Board of Administration according to provisions set forth in the California Public Employees' Retirement Law.

The undersigned is an actuary for CalPERS, a member of the American Academy of Actuaries and the Society of Actuaries and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

MAY SHUANG YU, ASA, MAAA
Senior Pension Actuary, CalPERS

Highlights and Executive Summary

- **Introduction**
- **Purpose of the Report**
- **Required Contributions**
- **Plan's Funded Status**
- **Projected Employer Contributions**
- **Cost**
- **Changes Since the Prior Year's Valuation**
- **Subsequent Events**

Introduction

This report presents the results of the June 30, 2017 actuarial valuation of the Miscellaneous Plan of the City of Sacramento of the California Public Employees' Retirement System (CalPERS). This actuarial valuation sets the minimum required employer contributions for Fiscal Year 2019-20.

Purpose of the Report

The actuarial valuation was prepared by the CalPERS Actuarial Office using data as of June 30, 2017. The purpose of the report is to:

- Set forth the assets and accrued liabilities of this plan as of June 30, 2017;
- Determine the minimum required employer contributions for the fiscal year July 1, 2019 through June 30, 2020;
- Provide actuarial information as of June 30, 2017 to the CalPERS Board of Administration and other interested parties.

The pension funding information presented in this report should not be used in financial reports subject to Governmental Accounting Standards Board (GASB) Statement No. 68 for an Agent Employer Defined Benefit Pension Plan. A separate accounting valuation report for such purposes is available from CalPERS and details for ordering are available on our website.

The measurements shown in this actuarial valuation may not be applicable for other purposes. The employer should contact their actuary before disseminating any portion of this report for any reason that is not explicitly described above.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; changes in actuarial policies; and changes in plan provisions or applicable law.

California Actuarial Advisory Panel Recommendations

This report includes all the basic disclosure elements as described in the *Model Disclosure Elements for Actuarial Valuation Reports* recommended in 2011 by the California Actuarial Advisory Panel (CAAP), with the exception of including the original base amounts of the various components of the unfunded liability in the Schedule of Amortization Bases shown on page 16.

Additionally, this report includes the following "Enhanced Risk Disclosures" also recommended by the CAAP in the Model Disclosure Elements document:

- A "Deterministic Stress Test," projecting future results under different investment income scenarios
- A "Sensitivity Analysis," showing the impact on current valuation results using alternative discount rates of 6.0 percent, 7.0 percent and 8.0 percent.

Required Contributions

Required Employer Contribution		Fiscal Year 2019-20
Employer Normal Cost Rate		**8.723%**
Plus, Either		
1) Monthly Employer Dollar UAL Payment	**$**	**1,978,258**
Or		
2) Annual UAL Prepayment Option	**$**	**22,922,690**
Required PEPRA Member Contribution Rate		**6.75%**

*The total minimum required employer contribution is the **sum** of the Plan's Employer Normal Cost Rate (expressed as a percentage of payroll) **plus** the Employer Unfunded Accrued Liability (UAL) Contribution Amount (billed monthly in dollars).*

*Only the UAL portion of the employer contribution can be prepaid **(which must be received in full no later than July 31)**. Plan Normal Cost contributions will be made as part of the payroll reporting process. If there is contractual cost sharing or other change, this amount will change.*

In accordance with Sections 20537 and 20572 of the Public Employees' Retirement Law, if a contracting agency fails to remit the required contributions when due, interest and penalties may apply.

For additional detail regarding the determination of the required contribution for PEPRA members, see Appendix D. Required member contributions for Classic members can be found in Appendix B.

		Fiscal Year 2018-19		Fiscal Year 2019-20
Normal Cost Contribution as a Percentage of Payroll				
Total Normal Cost		14.938%		15.548%
Employee Contribution[1]		6.686%		6.825%
Employer Normal Cost[2]		8.252%		8.723%
Projected Annual Payroll for Contribution Year	$	187,561,931	$	192,140,882
Estimated Employer Contributions Based On Projected Payroll				
Total Normal Cost	$	28,018,001	$	29,874,064
Employee Contribution[1]		12,540,391		13,113,615
Employer Normal Cost[2]		15,477,610		16,760,449
Unfunded Liability Contribution		19,935,890		23,739,099
% of Projected Payroll (illustrative only)		10.629%		12.355%
Estimated Total Employer Contribution	$	35,413,500	$	40,499,548
% of Projected Payroll (illustrative only)		18.881%		21.078%

[1] For classic members, this is the percentage specified in the Public Employees Retirement Law, net of any reduction from the use of a modified formula or other factors. For PEPRA members, the member contribution rate is based on 50 percent of the normal cost. A development of PEPRA member contribution rates can be found in Appendix D. Employee cost sharing is not shown in this report.

[2] The Employer Normal Cost is a blended rate for all benefit groups in the plan. A breakout of normal cost by benefit group is shown in Appendix D.

Plan's Funded Status

		June 30, 2016		June 30, 2017
1. Present Value of Projected Benefits	$	1,351,149,137	$	1,465,648,951
2. Entry Age Normal Accrued Liability		1,151,634,656		1,244,577,324
3. Market Value of Assets (MVA)	$	815,858,288	$	904,701,886
4. Unfunded Accrued Liability (UAL) [(2) – (3)]	$	335,776,368	$	339,875,438
5. Funded Ratio [(3) / (2)]		70.8%		72.7%

This measure of funded status is an assessment of the need for future employer contributions based on the selected actuarial cost method used to fund the plan. The UAL is the present value of future employer contributions for service that has already been earned and is in addition to future normal cost contributions for active members. For a measure of funded status that is appropriate for assessing the sufficiency of plan assets to cover estimated termination liabilities, please see "Hypothetical Termination Liability" in the "Risk Analysis" section.

Projected Employer Contributions

The table below shows the required and projected employer contributions (before cost sharing) for the next six fiscal years. Projected results reflect the adopted changes to the discount rate described in Appendix A, "Actuarial Methods and Assumptions." The projections also assume that all actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur during the projection period. The projected normal cost percentages in the projections below do not reflect that the normal cost will decline over time as new employees are hired into PEPRA or other lower cost benefit tiers.

	Required Contribution	**Projected Future Employer Contributions (Assumes 7.25% Return for Fiscal Year 2017-18)**				
Fiscal Year	**2019-20**	**2020-21**	**2021-22**	**2022-23**	**2023-24**	**2024-25**
Normal Cost %	8.723%	9.4%	9.4%	9.4%	9.4%	9.4%
UAL Payment	23,739,099	26,691,000	30,513,000	33,785,000	35,718,000	37,627,000
*Total as a % of Payroll**	*21.1%*	*22.9%*	*24.5%*	*25.6%*	*26.1%*	*26.5%*
Projected Payroll	*192,140,882*	*196,945,280*	*202,361,275*	*207,926,210*	*213,644,181*	*219,519,396*

*Illustrative only and based on the projected payroll shown.

Changes in the UAL due to actuarial gains or losses as well as changes in actuarial assumptions or methods are amortized using a 5-year ramp up. For more information, please see "Amortization of the Unfunded Actuarial Accrued Liability" under "Actuarial Methods" in Appendix A. This method phases in the impact of changes in UAL over a 5-year period and attempts to minimize employer cost volatility from year to year. As a result of this methodology, dramatic changes in the required employer contributions in any one year are less likely. However, required contributions can change gradually and significantly over the next five years. In years where there is a large increase in UAL the relatively small amortization payments during the ramp up period could result in a funded ratio that is projected to decrease initially while the contribution impact of the increase in the UAL is phased in.

Due to the adopted change in the discount rate for the next valuation in combination with the 5-year phase-in ramp, the increases in the required contributions are expected to continue for six years from Fiscal Year 2019-20 through Fiscal Year 2024-25.

For projected contributions under alternate investment return scenarios, please see the "Analysis of Future Investment Return Scenarios" in the "Risk Analysis" section.

Cost

Actuarial Cost Estimates in General

What is the cost of the pension plan?

Contributions to fund the pension plan are comprised of two components:

- The Normal Cost, expressed as a percentage of total active payroll.
- The Amortization of the Unfunded Accrued Liability (UAL), expressed as a dollar amount.

For fiscal years prior to FY 2017-18, the Amortizations of UAL component was expressed as percentage of total active payroll. Starting with FY 2017-18, the Amortization of UAL component was expressed as a dollar amount and invoiced on a monthly basis. There continues to be an option to prepay this amount during July of each fiscal year.

The Normal Cost component will continue to be expressed as a percentage of active payroll with employer and employee contributions payable as part of the regular payroll reporting process.

The determination of both components requires complex actuarial calculations. The calculations are based on a set of actuarial assumptions which can be divided into two categories:

- Demographic assumptions (which includes mortality rates, retirement rates, employment termination rates and disability rates)
- Economic assumptions (which includes future investment earnings, inflation, salary growth rates)

These assumptions reflect CalPERS best estimate of the future experience of the plan and are long term in nature. We recognize that all the assumptions will not be realized in any given year. For example, the investment earnings at CalPERS have averaged 6.6 percent over the 20 years ending June 30, 2017, yet individual fiscal year returns have ranged from -24.0 percent to +21.7 percent. In addition, CalPERS reviews all the actuarial assumptions on an ongoing basis by conducting in-depth experience studies every four years, with the most recent experience study completed in 2017.

Changes since the Prior Year's Valuation

Benefits

The standard actuarial practice at CalPERS is to recognize mandated legislative benefit changes in the first annual valuation following the effective date of the legislation. Voluntary benefit changes by plan amendment are generally included in the first valuation that is prepared after the amendment becomes effective, even if the valuation date is prior to the effective date of the amendment.

This valuation generally reflects plan changes by amendments effective before the date of the report. Please refer to the "Plan's Major Benefit Options" and Appendix B for a summary of the plan provisions used in this valuation. The effect of any mandated benefit changes or plan amendments on the unfunded liability is shown in the "(Gain)/Loss Analysis" and the effect on the employer contribution is shown in the "Reconciliation of Required Employer Contributions." It should be noted that no change in liability or contribution is shown for any plan changes which were already included in the prior year's valuation.

Actuarial Methods and Assumptions

On December 21, 2016, the CalPERS Board of Administration lowered the discount rate from 7.50 percent to 7.00 percent using a three-year phase-in beginning with the June 30, 2016 actuarial valuation. The minimum employer contribution for Fiscal Year 2019-20 determined in this valuation was calculated using a discount rate of 7.25 percent. The projected employer contributions on Page 5 are calculated assuming that the discount rate will be lowered to 7.00 percent next year as adopted by the Board. The decision to reduce the discount rate was primarily based on reduced capital market assumptions provided by external investment consultants and CalPERS investment staff. The specific decision adopted by the Board reflected recommendations from CalPERS staff and additional input from employer and employee stakeholder groups. Based on the investment allocation adopted by the Board and capital market assumptions, the reduced discount rate assumption provides a more realistic assumption for the long-term investment return of the fund.

On December 19, 2017, the CalPERS Board of Administration adopted new actuarial assumptions based on the recommendations in the December 2017 CalPERS Experience Study and Review of Actuarial Assumptions. This study reviewed the retirement rates, termination rates, mortality rates, rates of salary increases and inflation assumption for Public Agencies. These new assumptions are incorporated in this actuarial valuation and will impact the required contribution for FY 2019-20. In addition, the Board adopted a new asset portfolio as part of its Asset Liability Management. The new asset mix supports a 7.00 percent discount rate. The reduction of the inflation assumption will be implemented in two steps in conjunction with the decreases in the discount rate. For the June 30, 2017 valuation an inflation rate of 2.625 percent will be used and a rate of 2.50 percent will be used in the following valuation.

Notwithstanding the Board's decision to phase into a 7.0 percent discount rate, subsequent analysis of the expected investment return of CalPERS assets or changes to the investment allocation may result in a change to this discount rate schedule.

Subsequent Events

The CalPERS Board of Administration has adopted a new amortization policy effective with the June 30, 2019 actuarial valuation. The new policy shortens the period over which actuarial gains and losses are amortized from 30 years to 20 years with the payments computed using a level dollar amount. In addition, the new policy removes the 5-year ramp-up and ramp-down on UAL bases attributable to assumption changes and non-investment gains/losses. The new policy removes the 5-year ramp-down on investment gains/losses. These changes will apply only to new UAL bases established on or after June 30, 2019.

For inactive employers the new amortization policy imposes a maximum amortization period of 15 years for all unfunded accrued liabilities effective June 30, 2017. Furthermore, the plan actuary has the ability to shorten the amortization period on any valuation date based on the life expectancy of plan members and projected cash flow needs to the plan. The impact of this has been reflected in the current valuation results.

The contribution requirements determined in this actuarial valuation report are based on demographic and financial information as of June 30, 2017. Changes in the value of assets subsequent to that date are not reflected. Investment returns below the assumed rate of return will increase the retired contribution, while investment returns above the assumed rate of return will decrease the retired contribution.

This actuarial valuation report reflects statutory changes, regulatory changes and CalPERS Board actions through January 2018. Any subsequent changes or actions are not reflected.

Assets

- **Reconciliation of the Market Value of Assets**
- **Asset Allocation**
- **CalPERS History of Investment Returns**

Reconciliation of the Market Value of Assets

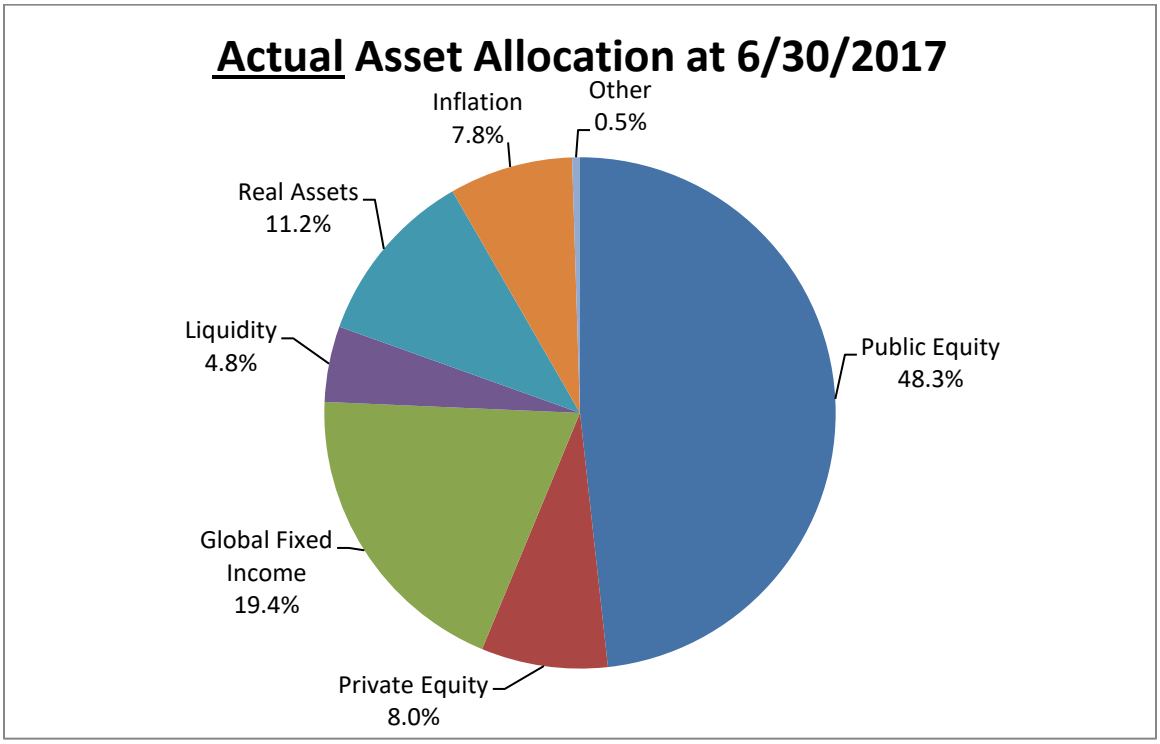
1.	Market Value of Assets as of 6/30/16 including Receivables	$	815,858,288
2.	Change in Receivables for Service Buybacks		(283,644)
3.	Employer Contributions		28,719,314
4.	Employee Contributions		11,885,323
5.	Benefit Payments to Retirees and Beneficiaries		(41,566,982)
6.	Refunds		(737,829)
7.	Lump Sum Payments		0
8.	Transfers and Miscellaneous Adjustments		662,112
9.	Net Investment Return		90,165,304
10.	Market Value of Assets as of 6/30/17 including Receivables	$	904,701,886

Asset Allocation

CalPERS adheres to an Asset Allocation Strategy which establishes asset class allocation policy targets and ranges, and manages those asset class allocations within their policy ranges. CalPERS Investment Belief No. 6 recognizes that strategic asset allocation is the dominant determinant of portfolio risk and return. On December 19, 2017, the CalPERS Board of Administration adopted changes to the current asset allocation as shown in the Policy Target Allocation below expressed as a percentage of total assets.

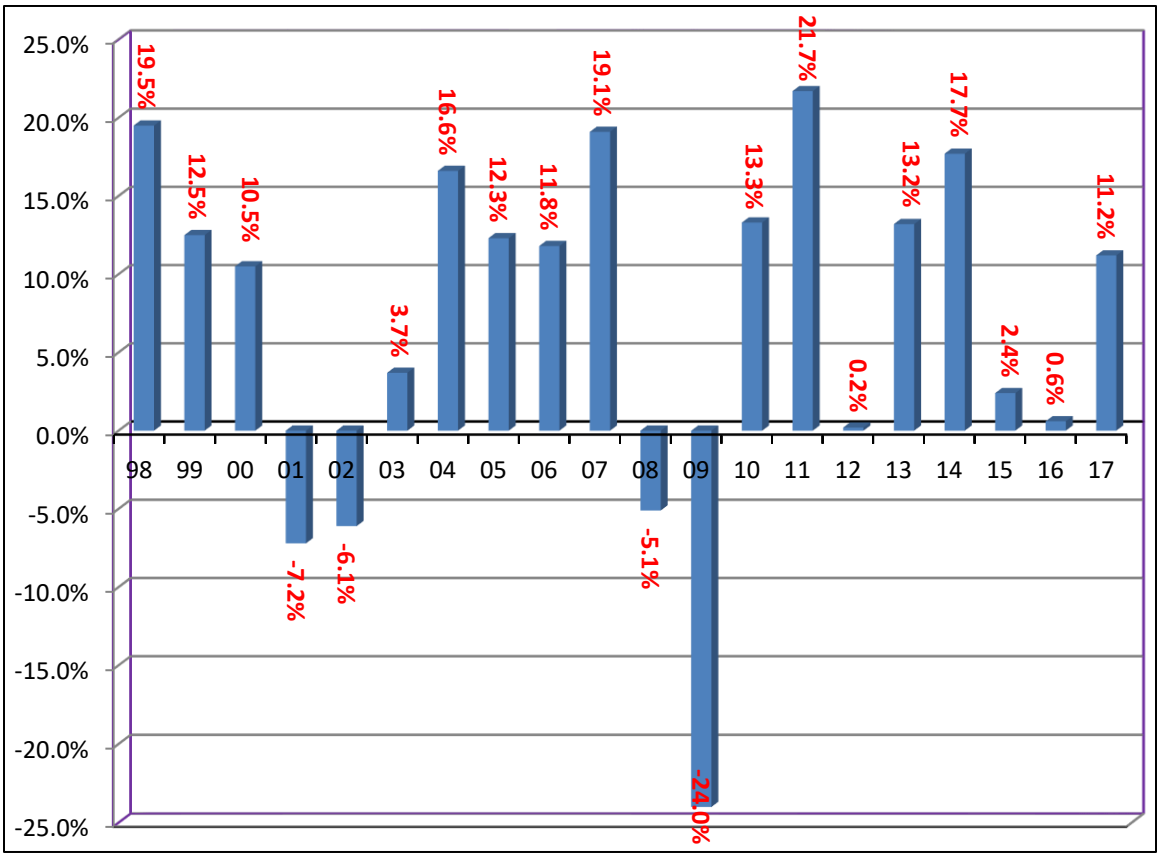
The asset allocation and market value of assets shown below reflect the values of the Public Employees' Retirement Fund (PERF) in its entirety as of June 30, 2017. The assets for City of Sacramento Miscellaneous Plan are part of the PERF and are invested accordingly.

(A) Asset Class	(B) Market Value ($ Billion)	(C) Policy Target Allocation
Public Equity	156.2	50.0%
Private Equity	25.9	8.0%
Global Fixed Income	62.9	28.0%
Liquidity	15.5	1.0%
Real Assets	36.3	13.0%
Inflation Sensitive Assets	25.3	0.0%
Other	1.6	0.0%
Total Fund	**$323.7**	**100.0%**



CalPERS History of Investment Returns

The following is a chart with the 20-year historical annual returns of the Public Employees Retirement Fund for each fiscal year ending on June 30. Beginning in 2002, the figures are reported as gross of fees.



The table below shows historical geometric mean annual returns of the Public Employees Retirement Fund for various time periods ending on June 30, 2017 (figures are reported as gross of fees). The geometric mean rate of return is the average rate per period compounded over multiple periods. It should be recognized that in any given year the rate of return is volatile. The portfolio has an expected volatility of 11.4 percent per year based on the most recent Asset Liability Modelling study. The volatility is a measure of the risk of the portfolio expressed in the standard deviation of the fund's total return distribution, expressed as a percentage. Consequently, when looking at investment returns, it is more instructive to look at returns over longer time horizons.

History of CalPERS Geometric Mean Rates of Return and Volatilities					
	1 year	**5 year**	**10 year**	**20 year**	**30 year**
Geometric Return	11.2%	8.8%	4.3%	6.6%	8.2%
Volatility	–	7.3%	13.4%	11.5%	10.1%

Liabilities and Contributions

- **Development of Accrued and Unfunded Liabilities**
- **(Gain) / Loss Analysis 06/30/16 - 06/30/17**
- **Schedule of Amortization Bases**
- **Amortization Schedule and Alternatives**
- **Reconciliation of Required Employer Contributions**
- **Employer Contribution History**
- **Funding History**

Development of Accrued and Unfunded Liabilities

		June 30, 2016	June 30, 2017
1. Present Value of Projected Benefits			
a) Active Members	$	736,895,997	763,376,045
b) Transferred Members		89,121,552	96,755,317
c) Terminated Members		26,600,231	33,547,884
d) Members and Beneficiaries Receiving Payments		498,531,357	571,969,705
e) Total	$	1,351,149,137	1,465,648,951
2. Present Value of Future Employer Normal Costs	$	106,837,670	119,925,128
3. Present Value of Future Employee Contributions	$	92,676,811	101,146,499
4. Entry Age Normal Accrued Liability			
a) Active Members [(1a) - (2) - (3)]	$	537,381,516	542,304,418
b) Transferred Members (1b)		89,121,552	96,755,317
c) Terminated Members (1c)		26,600,231	33,547,884
d) Members and Beneficiaries Receiving Payments (1d)		498,531,357	571,969,705
e) Total	$	1,151,634,656	1,244,577,324
5. Market Value of Assets (MVA)	$	815,858,288	904,701,886
6. Unfunded Accrued Liability (UAL) [(4e) - (5)]	$	335,776,368	339,875,438
7. Funded Ratio [(5) / (4e)]		70.8%	72.7%

(Gain)/Loss Analysis 6/30/16 – 6/30/17

To calculate the cost requirements of the plan, assumptions are made about future events that affect the amount and timing of benefits to be paid and assets to be accumulated. Each year, actual experience is compared to the expected experience based on the actuarial assumptions. This results in actuarial gains or losses, as shown below.

1. Total (Gain)/Loss for the Year		
a) Unfunded Accrued Liability (UAL) as of 6/30/16	$	335,776,368
b) Expected Payment on the UAL during 2016-17		14,783,607
c) Interest through 6/30/17 [.07375 x (1a) - ((1.07375)$^{1/2}$ - 1) x (1b)]		24,228,058
d) Expected UAL before all other changes [(1a) - (1b) + (1c)]		345,220,819
e) Change due to plan changes		0
f) Change due to assumption change		21,428,344
g) Expected UAL after all other changes [(1d) + (1e) + (1f)]		366,649,163
h) Actual UAL as of 6/30/17		339,875,438
i) Total (Gain)/Loss for 2016-17 [(1h) - (1g)]	$	(26,773,725)
2. Contribution (Gain)/Loss for the Year		
a) Expected Contribution (Employer and Employee)	$	40,949,283
b) Interest on Expected Contributions		1,483,146
c) Actual Contributions		40,604,637
d) Interest on Actual Contributions		1,470,663
e) Expected Contributions with Interest [(2a) + (2b)]		42,432,429
f) Actual Contributions with Interest [(2c) + (2d)]		42,075,300
g) Contribution (Gain)/Loss [(2e) - (2f)]	$	357,129
3. Asset (Gain)/Loss for the Year		
a) Market Value of Assets as of 6/30/16	$	815,858,288
b) Prior Fiscal Year Receivables		(1,957,248)
c) Current Fiscal Year Receivables		1,673,604
d) Contributions Received		40,604,637
e) Benefits and Refunds Paid		(42,304,811)
f) Transfers and Miscellaneous Adjustments		662,112
g) Expected Int. [.07375 x (3a + 3b) + ((1.07375)$^{1/2}$ - 1) x ((3d) + (3e) + (3f))]		59,987,604
h) Expected Assets as of 6/30/17 [(3a) + (3b) + (3c) + (3d) + (3e) + (3f) + (3g)]		874,524,186
i) Market Value of Assets as of 6/30/17		904,701,886
j) Asset (Gain)/Loss [(3h) **-** (3i)]	$	(30,177,700)
4. Liability (Gain)/Loss for the Year		
a) Total (Gain)/Loss (1i)	$	(26,773,725)
b) Contribution (Gain)/Loss (2g)		357,129
c) Asset (Gain)/Loss (3j)		(30,177,700)
d) Liability (Gain)/Loss [(4a) - (4b) - (4c)]	$	3,046,846

Schedule of Amortization Bases

There is a two-year lag between the valuation date and the start of the contribution fiscal year.

- The assets, liabilities, and funded status of the plan are measured as of the valuation date: June 30, 2017.
- The required employer contributions determined by the valuation are for the fiscal year beginning two years after the valuation date: Fiscal Year 2019-20.

This two-year lag is necessary due to the amount of time needed to extract and test the membership and financial data, and the need to provide public agencies with their required employer contribution well in advance of the start of the fiscal year.

The Unfunded Accrued Liability (UAL) is used to determine the employer contribution and therefore must be rolled forward two years from the valuation date to the first day of the fiscal year for which the contribution is being determined. The UAL is rolled forward each year by subtracting the expected payment on the UAL for the fiscal year and adjusting for interest. The expected payment on the UAL for a fiscal year is equal to the Expected Employer Contribution for the fiscal year minus the Expected Normal Cost for the year. The Employer Contribution for the first fiscal year is determined by the actuarial valuation two years ago and the contribution for the second year is from the actuarial valuation one year ago. Additional discretionary payments are reflected in the Expected Payments column in the fiscal year they were made by the agency.

Reason for Base	Date Established	Ramp Up/Down 2019-20	Amorti-zation Period	Balance 6/30/17	Expected Payment 2017-18	Balance 6/30/18	Expected Payment 2018-19	Balance 6/30/19	Scheduled Payment for 2019-20
BENEFIT CHANGE	06/30/05	No Ramp	7	$2,380,010	$323,759	$2,217,270	$331,119	$2,035,110	$339,974
ASSUMPTION CHANGE	06/30/07	No Ramp	6	$17,570,388	$2,635,456	$16,114,921	$2,696,661	$14,490,549	$2,768,553
ARNETT CASE	06/30/07	No Ramp	6	$140,362	$21,053	$128,736	$21,543	$115,759	$22,117
ASSETS CHANGE	06/30/07	No Ramp	6	$(118,231)	$(17,734)	$(108,438)	$(18,146)	$(97,507)	$(18,630)
METHOD CHANGE	06/30/07	No Ramp	7	$(1,311,095)	$(178,352)	$(1,221,446)	$(182,406)	$(1,121,098)	$(187,284)
BENEFIT CHANGE	06/30/08	No Ramp	10	$(297,933)	$(32,255)	$(286,129)	$(32,941)	$(272,759)	$(33,827)
ASSUMPTION CHANGE	06/30/09	No Ramp	12	$13,938,954	$1,344,671	$13,556,965	$1,371,989	$13,118,992	$1,409,029
SPECIAL (GAIN)/LOSS	06/30/09	No Ramp	22	$21,481,648	$1,454,757	$21,532,498	$1,477,946	$21,563,020	$1,518,268
SPECIAL (GAIN)/LOSS	06/30/10	No Ramp	23	$115,818	$7,664	$116,278	$7,783	$116,648	$7,996
ASSUMPTION CHANGE	06/30/11	No Ramp	14	$17,965,651	$1,575,557	$17,636,489	$1,606,098	$17,251,834	$1,649,571
SPECIAL (GAIN)/LOSS	06/30/11	No Ramp	24	$(3,457,237)	$(223,879)	$(3,476,034)	$(227,271)	$(3,492,681)	$(233,481)
PAYMENT (GAIN)/LOSS	06/30/12	No Ramp	25	$1,775,444	$112,660	$1,787,491	$114,323	$1,798,689	$117,450
(GAIN)/LOSS	06/30/12	No Ramp	25	$84,170,917	$5,341,012	$84,742,073	$5,419,888	$85,272,952	$5,568,109
SAFCA FRESH START B	06/30/13	No Ramp	26	$(272,336)	$(10,997)	$(280,692)	$(17,585)	$(282,831)	$(18,066)
SAFCA FRESH START A	06/30/13	No Ramp	17	$(247,913)	$(19,367)	$(245,830)	$(19,717)	$(243,233)	$(20,252)
(GAIN)/LOSS	06/30/13	100% →	26	$106,780,128	$4,311,737	$110,056,384	$5,835,575	$111,992,058	$7,494,105
ASSUMPTION CHANGE	06/30/14	80% ↗	17	$44,187,387	$1,644,985	$45,687,400	$2,513,464	$46,396,753	$3,442,456
(GAIN)/LOSS	06/30/14	80% ↗	27	$(87,348,272)	$(2,389,431)	$(91,206,489)	$(3,635,810)	$(94,053,657)	$(4,980,698)
(GAIN)/LOSS	06/30/15	60% ↗	28	$47,182,730	$664,405	$49,915,409	$1,346,902	$52,139,403	$2,075,886
ASSUMPTION CHANGE	06/30/16	40% ↗	19	$20,991,976	$(753,890)	$23,294,635	$439,577	$24,528,263	$903,228
(GAIN)/LOSS	06/30/16	40% ↗	29	$59,592,425	$0	$63,912,876	$886,898	$67,628,074	$1,822,673
ASSUMPTION CHANGE	06/30/17	20% ↗	20	$21,428,344	$(1,323,511)	$24,352,548	$(1,361,562)	$27,528,163	$518,787
(GAIN)/LOSS	06/30/17	20% ↗	30	$(26,773,724)	$0	$(28,714,819)	$0	$(30,796,643)	$(426,865)
TOTAL				**$339,875,438**	**$14,488,300**	**$349,512,096**	**$18,574,328**	**$355,615,858**	**$23,739,099**

Amortization Schedule and Alternatives

The amortization schedule on the previous page shows the minimum contributions required according to CalPERS amortization policy. There has been considerable interest from many agencies in paying off these unfunded accrued liabilities sooner and the possible savings in doing so. As a result, we have provided alternate amortization schedules to help analyze the current amortization schedule and illustrate the advantages of accelerating unfunded liability payments.

Shown on the following page are future year amortization payments based on 1) the current amortization schedule reflecting the individual bases and remaining periods shown on the previous page, and 2) alternate "fresh start" amortization schedules using two sample periods that would both result in interest savings relative to the current amortization schedule. Note that the payments under each alternate scenario increase by 2.875 percent per year. **The schedules do not reflect the impact of adopted discount rate changes that will become effective beyond June 30, 2017. Therefore, future amortization payments displayed in the Current Amortization Schedule on the following page will not match projected amortization payments shown in connection with Projected Employer Contributions provided elsewhere in this report.**

The Current Amortization Schedule typically contains individual bases that are both positive and negative. Positive bases result from plan changes, assumption changes or plan experience that result in increases to unfunded liability. Negative bases result from plan changes, assumption changes or plan experience that result in decreases to unfunded liability. The combination of positive and negative bases within an amortization schedule can result in unusual or problematic circumstances in future years such as:

- A positive total unfunded liability with a negative total payment,
- A negative total unfunded liability with a positive total payment, or
- Total payments that completely amortize the unfunded liability over a very short period of time

In any year where one of the above scenarios occurs, the actuary will consider corrective action such as replacing the existing unfunded liability bases with a single "fresh start" base and amortizing it over a reasonable period.

The Current Amortization Schedule on the following page may appear to show that, based on the current amortization bases, one of the above scenarios will occur at some point in the future. It is impossible to know today whether such a scenario will in fact arise since there will be additional bases added to the amortization schedule in each future year. Should such a scenario arise in any future year, the actuary will take appropriate action based on guidelines in the CalPERS amortization policy.

Amortization Schedule and Alternatives

	Current Amortization Schedule*		Alternate Schedules			
			20 Year Amortization		15 Year Amortization	
Date	**Balance**	**Payment**	**Balance**	**Payment**	**Balance**	**Payment**
6/30/2019	355,615,858	23,739,099	355,615,858	26,578,391	355,615,858	32,336,474
6/30/2020	356,813,423	26,234,536	353,873,007	27,342,520	347,909,845	33,266,148
6/30/2021	355,513,496	29,260,828	351,212,455	28,128,617	338,682,362	34,222,550
6/30/2022	350,985,252	31,686,074	347,544,919	28,937,315	327,795,422	35,206,448
6/30/2023	343,617,087	32,700,010	342,773,986	29,769,263	315,100,238	36,218,633
6/30/2024	334,664,677	33,640,133	336,795,582	30,625,129	300,436,418	37,259,919
6/30/2025	324,089,616	31,321,355	329,497,395	31,505,602	283,631,099	38,331,142
6/30/2026	315,149,222	32,035,646	320,758,258	32,411,388	264,498,019	39,433,162
6/30/2027	304,820,921	32,956,670	310,447,488	33,343,215	242,836,522	40,566,865
6/30/2028	292,789,991	33,904,174	298,424,172	34,301,833	218,430,484	41,733,163
6/30/2029	278,905,568	34,923,832	284,536,406	35,288,010	191,047,174	42,932,991
6/30/2030	262,958,552	35,927,889	268,620,476	36,302,541	160,436,011	44,167,315
6/30/2031	244,815,559	34,980,941	250,499,977	37,346,239	126,327,255	45,437,125
6/30/2032	226,337,874	34,742,597	229,984,872	38,419,943	88,430,579	46,743,442
6/30/2033	206,767,389	32,008,570	206,870,477	39,524,516	46,433,550	48,087,316
6/30/2034	188,609,446	30,921,309	180,936,374	40,660,846		
6/30/2035	170,261,036	28,928,595	151,945,248	41,829,846		
6/30/2036	152,646,054	26,828,527	119,641,631	43,032,454		
6/30/2037	135,928,848	25,983,520	83,750,563	44,269,637		
6/30/2038	118,874,744	25,067,755	43,976,145	45,542,389		
6/30/2039	101,532,602	24,873,946				
6/30/2040	83,133,866	25,589,073				
6/30/2041	62,660,624	20,696,101				
6/30/2042	45,770,309	20,788,963				
6/30/2043	27,559,279	19,980,619				
6/30/2044	8,865,084	5,234,957				
6/30/2045	4,086,397	2,434,967				
6/30/2046	1,860,972	1,927,252				
6/30/2047						
6/30/2048						
Totals		**739,317,938**		**705,159,694**		**595,942,693**
Interest Paid		**383,702,080**		**349,543,836**		**240,326,835**
Estimated Savings				**34,158,244**		**143,375,245**

* This schedule does not reflect the impact of adopted discount rate changes that will become effective beyond June 30, 2017. For Projected Employer Contributions, please see Page 5.

Reconciliation of Required Employer Contributions

Normal Cost (% of Payroll)

1. For Period 7/1/18 – 6/30/19	
a) Employer Normal Cost	8.252%
b) Employee Contribution	6.686%
c) Total Normal Cost	14.938%
2. Changes since the prior year annual valuation	
a) Effect of changes in demographics results	(0.119%)
b) Effect of plan changes	0.000%
c) Effect of changes in assumptions	0.729%
d) Net effect of the changes above [sum of (a) through (c)]	0.610%
3. For Period 7/1/19 – 6/30/20	
a) Employer Normal Cost	8.723%
b) Employee Contribution	6.825%
c) Total Normal Cost	15.548%
Employer Normal Cost Change [(3a) – (1a)]	0.471%
Employee Contribution Change [(3b) – (1b)]	0.139%

Unfunded Liability Contribution ($)

1. For Period 7/1/18 – 6/30/19	19,935,890
2. Changes since the prior year annual valuation	
a) Effect of (gain)/loss during prior year[1]	(426,865)
b) Effect of plan changes	0
c) Effect of changes in assumptions[2]	518,787
d) Changes to prior year amortization payments[3]	3,711,287
e) Effect of changes due to Fresh Start	0
f) Effect of elimination of amortization base	0
g) Net effect of the changes above [sum of (a) through (f)]	3,803,209
3. For Period 7/1/19 – 6/30/20 [(1) + (2g)]	23,739,099

[1] The unfunded liability contribution for the (gain)/loss during the year prior to the valuation date is 20 percent of the "full" annual requirement due to the 5-year ramp. Increases to this amount that occur during the ramp period will be included in line d) in future years.

[2] The unfunded liability contribution for the change in assumptions is 20 percent of the "full" annual requirement due to the 5-year ramp. Increases to this amount that occur during the ramp period will be included in line d) in future years.

[3] Includes changes due to 5-year ramp, payroll growth assumption, and re-amortization under new discount rate.

The amounts shown for the period 7/1/18 – 6/30/19 may be different if a prepayment of unfunded actuarial liability is made or a plan change became effective after the prior year's actuarial valuation was performed.

Employer Contribution History

The table below provides a recent history of the required employer contributions for the plan, as determined by the annual actuarial valuation. It does not account for prepayments or benefit changes made during a fiscal year.

Fiscal Year	Employer Normal Cost	Unfunded Rate	Unfunded Liability Payment ($)
2013 - 14	7.676%	5.969%	N/A
2014 - 15	7.582%	6.837%	N/A
2015 - 16	7.810%	7.859%	N/A
2016 - 17	7.851%	8.625%	N/A
2017 - 18	7.803%	N/A	16,565,701
2018 - 19	8.252%	N/A	19,935,890
2019 - 20	8.723%	N/A	23,739,099

Funding History

The table below shows the recent history of the actuarial accrued liability, the market value of assets, the funded ratio and the annual covered payroll.

Valuation Date	Accrued Liability	Market Value of Assets (MVA)	Unfunded Liability	Funded Ratio	Annual Covered Payroll
06/30/11	$ 819,168,698	$ 589,536,663	$ 229,632,035	72.0%	$ 164,638,959
06/30/12	860,874,899	596,115,272	264,759,627	69.2%	151,456,486
06/30/13	914,353,322	677,151,274	237,202,048	74.1%	151,487,681
06/30/14	1,004,412,173	795,788,802	208,623,371	79.2%	152,863,321
06/30/15	1,067,754,811	812,201,601	255,553,210	76.1%	161,556,270
06/30/16	1,151,634,656	815,858,288	335,776,368	70.8%	171,645,737
06/30/17	1,244,577,324	904,701,886	339,875,438	72.7%	176,477,863

Risk Analysis

- **Analysis of Future Investment Return Scenarios**
- **Analysis of Discount Rate Sensitivity**
- **Volatility Ratios**
- **Hypothetical Termination Liability**

Analysis of Future Investment Return Scenarios

Analysis was performed to determine the effects of various future investment returns on required employer contributions. The projections below provide a range of results based on five investment return scenarios assumed to occur during the next four fiscal years (2017-18, 2018-19, 2019-20 and 2020-21). The projections also assume that all other actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur.

Each of the five investment return scenarios assumes a return of 7.25 percent for fiscal year 2017-18. For fiscal years 2018-19, 2019-20, and 2020-21 each scenario assumes an alternate fixed annual return. The fixed return assumptions for the five scenarios are 1.0 percent, 4.0 percent, 7.0 percent, 9.0 percent and 12.0 percent.

The alternate investment returns were chosen based on stochastic analysis of possible future investment returns over the four-year period ending June 30, 2021. Using the expected returns and volatility of the asset classes in which the funds are invested, we produced five thousand stochastic outcomes for this period based on the recently completed Asset Liability Management process. We then selected annual returns that approximate the 5th, 25th, 50th, 75th, and 95th percentiles for these outcomes. For example, of all the 4-year outcomes generated in the stochastic analysis, approximately 25 percent of them had an average annual return of 4.0 percent or less.

Required contributions outside of this range are also possible. In particular, whereas it is unlikely that investment returns will average less than 1.0 percent or greater than 12.0 percent over this four-year period, the possibility of a single investment return less than 1.0 percent or greater than 12.0 percent in any given year is much greater.

Assumed Annual Return From 2018-19 through 2020-21	Projected Employer Contributions			
	2020-21	2021-22	2022-23	2023-24
1.0%				
Normal Cost	9.4%	9.4%	9.4%	9.4%
UAL Contribution	$26,691,000	$31,423,000	$36,581,000	$41,446,000
4.0%				
Normal Cost	9.4%	9.4%	9.4%	9.4%
UAL Contribution	$26,691,000	$30,968,000	$35,197,000	$38,638,000
7.0%				
Normal Cost	9.4%	9.4%	9.4%	9.4%
UAL Contribution	$26,691,000	$30,513,000	$33,785,000	$35,718,000
9.0%				
Normal Cost	9.4%	9.6%	9.8%	10.0%
UAL Contribution	$26,691,000	$30,228,000	$33,007,000	$34,215,000
12.0%				
Normal Cost	9.4%	9.6%	9.8%	10.0%
UAL Contribution	$26,691,000	$29,776,000	$31,570,000	$31,163,000

Given the temporary suspension of the Risk Mitigation Policy during the period over which the discount rate assumption is being phased down to 7.0 percent, the projections above were performed without reflection of any possible impact of this Policy for Fiscal Year 2020-21.

The projected normal cost percentages do not reflect that the normal cost will decline over time as new employees are hired into PEPRA or other lower cost benefit tiers. In addition, the projections above do not reflect the recent changes to the amortization policy effective with the June 30, 2019 valuation but the impact on the results above is expected to be minimal.

Analysis of Discount Rate Sensitivity

Shown below are various valuation results as of June 30, 2017 assuming alternate discount rates. Results are shown using the current discount rate of 7.25 percent as well as alternate discount rates of 6.0 percent, 7.0 percent, and 8.0 percent. The alternate rate of 7.0 percent was selected since the Board has adopted this rate as the final discount rate at the end of the three-year phase-in of the reduction in this assumption. The rates of 6.0 percent and 8.0 percent were selected since they illustrate the impact of a 1 percent increase or decrease to the 7.0 percent assumption. This analysis shows the potential plan impacts if the PERF were to realize investment returns of 6.0 percent, 7.0 percent, or 8.0 percent over the long-term.

This type of analysis gives the reader a sense of the long-term risk to required contributions. For a measure of funded status that is appropriate for assessing the sufficiency of plan assets to cover estimated termination liabilities, please see "Hypothetical Termination Liability" at the end of this section.

Sensitivity Analysis				
As of June 30, 2017	**Plan's Normal Cost**	**Accrued Liability**	**Unfunded Accrued Liability**	**Funded Status**
7.25% (current discount rate)	15.548%	$1,244,577,324	$339,875,438	72.7%
6.0%	20.519%	$1,467,015,171	$562,313,285	61.7%
7.0%	16.210%	$1,280,489,598	$375,787,712	70.7%
8.0%	12.969%	$1,127,423,302	$222,721,416	80.2%

Volatility Ratios

The actuarial calculations supplied in this communication are based on various assumptions about long-term demographic and economic behavior. Unless these assumptions (terminations, deaths, disabilities, retirements, salary growth, and investment return) are exactly realized each year, there will be differences on a year-to-year basis. The year-to-year differences between actual experience and the assumptions are called actuarial gains and losses and serve to lower or raise required employer contributions from one year to the next. Therefore, employer contributions will inevitably fluctuate, especially due to the ups and downs of investment returns.

Asset Volatility Ratio (AVR)

Plans that have higher asset-to-payroll ratios experience more volatile employer contributions (as a percentage of payroll) due to investment return. For example, a plan with an asset-to-payroll ratio of 8 may experience twice the contribution volatility due to investment return volatility than a plan with an asset-to-payroll ratio of 4. Shown below is the asset volatility ratio, a measure of the plan's current volatility. It should be noted that this ratio is a measure of the current situation. It increases over time but generally tends to stabilize as the plan matures.

Liability Volatility Ratio (LVR)

Plans that have higher liability-to-payroll ratios experience more volatile employer contributions (as a percentage of payroll) due to investment return and changes in liability. For example, a plan with a liability-to-payroll ratio of 8 is expected to have twice the contribution volatility of a plan with a liability-to-payroll ratio of 4. The liability volatility ratio is also included in the table below. It should be noted that this ratio indicates a longer-term potential for contribution volatility. The asset volatility ratio, described above, will tend to move closer to the liability volatility ratio as the plan matures. Since the liability volatility ratio is a long-term measure, it is shown below at the current discount rate (7.25 percent) as well as the discount rate the Board has adopted to determine the contribution requirement in the June 30, 2018 actuarial valuation (7.00 percent).

Contribution Volatility		As of June 30, 2017
1. Market Value of Assets without Receivables	$	903,028,282
2. Payroll		176,477,863
3. Asset Volatility Ratio (AVR) [(1) / (2)]		5.1
4. Accrued Liability (7.25% discount rate)	$	1,244,577,324
5. Liability Volatility Ratio (LVR) [(4) / (2)]		7.1
6. Accrued Liability (7.00% discount rate)		1,280,489,598
7. Projected Liability Volatility Ratio [(6) / (2)]		7.3

Hypothetical Termination Liability

The hypothetical termination liability is an estimate of the financial position of the plan had the contract with CalPERS been terminated as of June 30, 2017. The plan liability on a termination basis is calculated differently from the plan's ongoing funding liability. For this hypothetical termination liability calculation, both compensation and service are frozen as of the valuation date and no future pay increases or service accruals are assumed. This measure of funded status is not appropriate for assessing the need for future employer contributions in the case of an ongoing plan, that is, for an employer that continues to provide CalPERS retirement benefits to active employees.

A more conservative investment policy and asset allocation strategy was adopted by the CalPERS Board for the Terminated Agency Pool. The Terminated Agency Pool has limited funding sources since no future employer contributions will be made. Therefore, expected benefit payments are secured by risk-free assets and benefit security for members is increased while limiting the funding risk. However, this asset allocation has a lower expected rate of return than the PERF and consequently, a lower discount rate assumption. The lower discount rate for the Terminated Agency Pool results in higher liabilities for terminated plans.

The effective termination discount rate will depend on actual market rates of return for risk-free securities on the date of termination. As market discount rates are variable the table below shows a range for the hypothetical termination liability based on the lowest and highest interest rates observed during an approximate 2-year period centered around the valuation date.

Market Value of Assets (MVA)	Hypothetical Termination Liability[1,2] @ 1.75%	Funded Status	Unfunded Termination Liability @ 1.75%	Hypothetical Termination Liability[1,2] @ 3.00%	Funded Status	Unfunded Termination Liability @ 3.00%
$904,701,886	$2,422,894,824	37.3%	$1,518,192,938	$2,127,341,582	42.5%	$1,222,639,696

[1] The hypothetical liabilities calculated above include a 5 percent contingency load in accordance with Board policy. Other actuarial assumptions can be found in Appendix A.

[2] The current discount rate assumption used for termination valuations is a weighted average of the 10-year and 30-year U.S. Treasury yields where the weights are based on matching asset and liability durations as of the termination date. The discount rates used in the table are based on 20-year Treasury bonds, rounded to the nearest quarter percentage point, which is a good proxy for most plans. The 20-year Treasury yield was 2.61 percent on June 30, 2017, and was 2.83 percent on January 31, 2018.

In order to terminate the plan, you must first contact our Retirement Services Contract Unit to initiate a Resolution of Intent to Terminate. The completed Resolution will allow the plan actuary to give you a preliminary termination valuation with a more up-to-date estimate of the plan liabilities. CalPERS advises you to consult with the plan actuary before beginning this process.

Plan’s Major Benefit Provisions

Plan's Major Benefit Options

Shown below is a summary of the major optional benefits for which your agency has contracted for this plan. A description of principal standard and optional plan provisions is in Appendix B of this report.

	Contract Package						
Benefit Provision	Active Misc	Active Misc	Active Misc	Active Misc	Inactive Misc	Receiving Misc	Receiving Misc
Benefit Formula	2.0% @ 55	2.0% @ 55	2.0% @ 55	2.0% @ 62	2.0% @ 55		
Social Security Coverage	Yes	Yes	No	Yes	No		
Full/Modified	Modified	Modified	Full	Full	Full		
Employee Contribution Rate	7.00%	7.00%	7.00%	6.75%			
Final Average Compensation Period	One Year	One Year	One Year	Three Year	One Year		
Sick Leave Credit	Yes	Yes	Yes	Yes	Yes		
Non-Industrial Disability	Standard	Standard	Standard	Standard	Standard		
Industrial Disability	Yes	Yes	Yes	Yes	Yes		
Pre-Retirement Death Benefits							
Optional Settlement 2	No	No	No	No	No		
1959 Survivor Benefit Level	No	No	No	No	No		
Special	No	No	No	No	No		
Alternate (firefighters)	No	No	No	No	No		
Post-Retirement Death Benefits							
Lump Sum	$500	$500	$500	$500	$500	$500	$500
Survivor Allowance (PRSA)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
COLA	2%	2%	2%	2%	2%	2%	2%

Appendices

- **Appendix A – Actuarial Methods and Assumptions**
- **Appendix B – Principal Plan Provisions**
- **Appendix C – Participant Data**
- **Appendix D – Normal Cost by Benefit Group and PEPRA Member Contribution Rates**
- **Appendix E – Glossary of Actuarial Terms**

Appendix A

Actuarial Methods and Assumptions

- **Actuarial Data**
- **Actuarial Methods**
- **Actuarial Assumptions**
- **Miscellaneous**

Actuarial Data

As stated in the Actuarial Certification, the data which serves as the basis of this valuation has been obtained from the various CalPERS databases. We have reviewed the valuation data and believe that it is reasonable and appropriate in aggregate. We are unaware of any potential data issues that would have a material effect on the results of this valuation, except that data does not always contain the latest salary information for former members now in reciprocal systems and does not recognize the potential for unusually large salary deviation in certain cases such as elected officials. Therefore, salary information in these cases may not be accurate. These situations are relatively infrequent, however, and when they do occur, they generally do not have a material impact on the required employer contributions.

Actuarial Methods

Actuarial Cost Method

The actuarial cost method used is the Entry Age Normal Cost Method. Under this method, projected benefits are determined for all members and the associated liabilities are spread in a manner that produces level annual cost as a percentage of pay in each year from the member's entry age to their assumed retirement age on the valuation date. The cost allocated to the current fiscal year is called the normal cost.

The actuarial accrued liability for active members is then calculated as the portion of the total cost of the plan allocated to prior years. The actuarial accrued liability for members currently receiving benefits and for members entitled to deferred benefits is equal to the present value of the benefits expected to be paid. No normal costs are applicable for these participants.

Amortization of Unfunded Actuarial Accrued Liability

The excess of the total actuarial accrued liability over the market value of plan assets is called the unfunded actuarial accrued liability (UAL). Funding requirements are determined by adding the normal cost and an amortization payment toward the unfunded liability. The unfunded liability is amortized as a "level percent of pay". Commencing with the June 30, 2013 valuation, all new gains or losses are amortized over a fixed 30-year period with a 5-year ramp up at the beginning and a 5-year ramp down at the end of the amortization period. All changes in liability due to plan amendments (other than golden handshakes) are amortized over a 20-year period with no ramp. Changes in actuarial assumptions or changes in actuarial methodology are amortized over a 20-year period with a 5-year ramp up at the beginning and a 5-year ramp down at the end of the amortization period. Changes in unfunded accrued liability due to a Golden Handshake will be amortized over a period of five years. A summary of the current policy is provided in the table below:

	Source				
	(Gain)/Loss				
Driver	**Investment**	**Non-investment**	**Assumption/Method Change**	**Benefit Change**	**Golden Handshake**
Amortization Period	30 Years	30 Years	20 Years	20 Years	5 Years
Escalation Rate - Active Plans - Inactive Plans	 2.875% 0%	 2.875% 0%	 2.875% 0%	 2.875% 0%	 2.875% 0%
Ramp Up	5	5	5	0	0
Ramp Down	5	5	5	0	0

The 5-year ramp up means that the payments in the first four years of the amortization period are 20 percent, 40 percent, 60 percent and 80 percent of the "full" payment which begins in year five. The 5-year ramp down means that the reverse is true in the final four years of the amortization period.

Exceptions for Inconsistencies:

An exception to the amortization rules above is used whenever their application results in inconsistencies. In these cases, a "fresh start" approach is used. This means that the current unfunded actuarial liability is projected and amortized over a set number of years. For example, a fresh start is needed in the following situations:

- When a positive payment would be required on a negative unfunded actuarial liability (or conversely a negative payment on a positive unfunded actuarial liability); or
- When there are excess assets, rather than an unfunded liability. In this situation, a 30-year fresh start is used.

It should be noted that the actuary may determine that a fresh start is necessary under other circumstances. In all cases of a fresh start, the period is set by the actuary at what is deemed appropriate; however, the period will not be greater than 30 years.

Exceptions for Inactive Plans:

The following exceptions apply to plans classified as Inactive. These plans have no active members and no expectation to have active members in the future.

- Amortization of the unfunded liability is on a "level dollar" basis rather than a "level percent of pay" basis. For amortization layers, which utilize a ramp up and ramp down, the "ultimate" payment is constant.
- Actuarial judgment will be used to shorten amortization periods for Inactive plans with existing periods that are deemed too long given the duration of the liability. The specific demographics of the plan will be used to determine if shorter periods may be more appropriate.

Asset Valuation Method

It is the policy of the CalPERS Board of Administration to use professionally accepted amortization methods to eliminate a surplus or an unfunded accrued liability in a manner that maintains benefit security for the members of the System while minimizing substantial variations in required employer contributions. On April 17, 2013, the CalPERS Board of Administration approved a recommendation to change the CalPERS amortization and rate smoothing policies. Beginning with the June 30, 2013 valuations that set the employer contribution for Fiscal Year 2015-16, CalPERS employs a policy that amortizes all gains and losses over a fixed 30-year period. The increase or decrease in the rate is then spread directly over a 5-year period. This method is referred to as "direct rate smoothing." CalPERS no longer uses an actuarial value of assets and only uses the market value of assets. The direct rate smoothing method is equivalent to a method using a 5-year asset smoothing period with no actuarial value of asset corridor and a 25-year amortization period for gains and losses.

PEPRA Normal Cost Rate Methodology

Per Government Code Section 7522.30(b) the "normal cost rate" shall mean the annual actuarially determined normal cost for the plan of retirement benefits provided to the new member and shall be established based on actuarial assumptions used to determine the liabilities and costs as part of the annual actuarial valuation. The plan of retirement benefits shall include any elements that would impact the actuarial determination of the normal cost, including, but not limited to, the retirement formula, eligibility and vesting criteria, ancillary benefit provisions, and any automatic cost-of-living adjustments as determined by the public retirement system.

Each non-pooled plan is stable with a sufficiently large demographic representation of active employees. It is preferable to determine normal cost using a large active population ongoing so that this rate remains relatively stable. The total PEPRA normal cost will be calculated using all active members within a non-pooled plan until the number of members covered under the PEPRA formula meets either:

1. 50 percent of the active population, or
2. 25 percent of the active population and 100 or more PEPRA members

Once either of the conditions above is met for a non-pooled plan, the total PEPRA normal cost will be based on the active PEPRA population in the plan.

Accordingly, the total normal cost will be funded equally between employer and employee based on the demographics of the employees of that employer.

Actuarial Assumptions

In 2017, CalPERS completed its most recent asset liability management study incorporating actuarial assumptions and strategic asset allocation. In December 2017, the CalPERS Board of Administration adopted relatively modest changes to the asset allocation that reduced the expected volatility of returns. The adopted asset allocation was expected to have a long-term blended return that continued to support a discount rate assumption of 7.00 percent. The Board also approved several changes to the demographic assumptions that more closely aligned with actual experience. These new actuarial assumptions were first used in this, the June 30, 2017 valuation to set the Fiscal Year 2019-20 contribution for public agency employers.

On December 21, 2016, the CalPERS Board of Administration lowered the discount rate from 7.50 percent to 7.00 percent using a three-year phase-in beginning with the June 30, 2016 actuarial valuations. The minimum employer contributions for Fiscal Year 2019-20 determined in this valuation were calculated using a discount rate of 7.25 percent. The projected employer contributions on Page 5 are calculated assuming that the discount rate will be lowered to 7.00 percent next year as adopted by the Board. The decision to reduce the discount rate was primarily based on reduced capital market assumptions provided by external investment consultants and CalPERS investment staff. The specific decision adopted by the Board reflected recommendations from CalPERS staff and additional input from employer and employee stakeholder groups. Based on the investment allocation adopted by the Board and capital market assumptions, the reduced discount rate schedule provides a more realistic assumption for the long-term investment return of the fund.

Notwithstanding the Board's decision to phase into a 7.0 percent discount rate, subsequent analysis of the expected investment return of CalPERS assets or changes to the investment allocation may result in a change to this discount rate schedule.

For more details and additional rationale for the selection of the actuarial assumptions, please refer to the CalPERS Experience Study and Review of Actuarial Assumptions report from December 2017 that can be found on the CalPERS website under: "Forms and Publications". Click on "View All" and search for Experience Study.

All actuarial assumptions (except the discount rates used for the hypothetical termination liability) represent an estimate of future experience rather than observations of the estimates inherent in market data.

Economic Assumptions

Discount Rate

The prescribed discount rate assumption adopted by the Board on December 21, 2016 is 7.25 percent compounded annually (net of investment and administrative expenses) as of 6/30/2017.

The Board also prescribed that the assumed discount rate will reduce to 7.0 percent compounded annually (net of expenses) as of 6/30/2018. This change to the discount rate assumption is not reflected in the determination of required contributions determined in this report for Fiscal Year 2019-20.

Termination Liability Discount Rate

The current discount rate assumption used for termination valuations is a weighted average of the 10-year and 30-year U.S. Treasury yields where the weights are based on matching asset and liability durations as of the termination date.

The hypothetical termination liabilities in this report are calculated using an observed range of market interest rates. This range is based on the lowest and highest 20-year Treasury bond observed during an approximate 2-year period centered around the valuation date. The 20-year Treasury bond has a similar duration to most plan liabilities and serves as a good proxy for the termination discount rate. The 20-year Treasury yield was 2.61 percent on June 30, 2017.

Salary Growth

Annual increases vary by category, entry age, and duration of service. A sample of assumed increases are shown below. Wage inflation assumption in the valuation year (2.875% for 2017) is added to these factors for total salary growth.

Public Agency Miscellaneous

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.0850	0.0775	0.0650
1	0.0690	0.0635	0.0525
2	0.0560	0.0510	0.0410
3	0.0470	0.0425	0.0335
4	0.0400	0.0355	0.0270
5	0.0340	0.0295	0.0215
10	0.0160	0.0135	0.0090
15	0.0120	0.0100	0.0060
20	0.0090	0.0075	0.0045
25	0.0080	0.0065	0.0040
30	0.0080	0.0065	0.0040

Public Agency Fire

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.1700	0.1700	0.1700
1	0.1100	0.1100	0.1100
2	0.0700	0.0700	0.0700
3	0.0580	0.0580	0.0580
4	0.0473	0.0473	0.0473
5	0.0372	0.0372	0.0372
10	0.0165	0.0165	0.0165
15	0.0144	0.0144	0.0144
20	0.0126	0.0126	0.0126
25	0.0111	0.0111	0.0111
30	0.0097	0.0097	0.0097

Public Agency Police

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.1027	0.1027	0.1027
1	0.0803	0.0803	0.0803
2	0.0628	0.0628	0.0628
3	0.0491	0.0491	0.0491
4	0.0384	0.0384	0.0384
5	0.0300	0.0300	0.0300
10	0.0145	0.0145	0.0145
15	0.0150	0.0150	0.0150
20	0.0155	0.0155	0.0155
25	0.0160	0.0160	0.0160
30	0.0165	0.0165	0.0165

Salary Growth (continued)

Public Agency County Peace Officers

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.1320	0.1320	0.1320
1	0.0960	0.0960	0.0960
2	0.0657	0.0657	0.0657
3	0.0525	0.0525	0.0525
4	0.0419	0.0419	0.0419
5	0.0335	0.0335	0.0335
10	0.0170	0.0170	0.0170
15	0.0150	0.0150	0.0150
20	0.0150	0.0150	0.0150
25	0.0175	0.0175	0.0175
30	0.0200	0.0200	0.0200

Schools

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.0428	0.0419	0.0380
1	0.0428	0.0419	0.0380
2	0.0428	0.0419	0.0380
3	0.0354	0.0332	0.0280
4	0.0305	0.0279	0.0224
5	0.0262	0.0234	0.0180
10	0.0171	0.0154	0.0112
15	0.0152	0.0134	0.0098
20	0.0135	0.0117	0.0086
25	0.0120	0.0103	0.0076
30	0.0087	0.0071	0.0048

- The Miscellaneous salary scale is used for Local Prosecutors.
- The Police salary scale is used for Other Safety, Local Sheriff, and School Police.

Overall Payroll Growth

2.875 percent compounded annually (used in projecting the payroll over which the unfunded liability is amortized). This assumption is used for all plans with active members. For the June 30, 2018 valuation the payroll growth assumption will be 2.75 percent.

Inflation

2.625 percent compounded annually. For the June 30, 2018 valuation the inflation assumption will be 2.50 percent.

Non-valued Potential Additional Liabilities

The potential liability loss for a cost-of-living increase exceeding the 2.625 percent inflation assumption, and any potential liability loss from future member service purchases are not reflected in the valuation.

Miscellaneous Loading Factors

Credit for Unused Sick Leave

Total years of service is increased by 1 percent for those plans that have adopted the provision of providing Credit for Unused Sick Leave.

Conversion of Employer Paid Member Contributions (EPMC)

Total years of service is increased by the Employee Contribution Rate for those plans with the provision providing for the Conversion of Employer Paid Member Contributions (EPMC) during the final compensation period.

Norris Decision (Best Factors)

Employees hired prior to July 1, 1982 have projected benefit amounts increased in order to reflect the use of "Best Factors" in the calculation of optional benefit forms. This is due to a 1983 Supreme Court decision, known as the Norris decision, which required males and females to be treated equally in the determination of benefit amounts. Consequently, anyone already employed at that time is given the best possible conversion factor when optional benefits are determined. No loading is necessary for employees hired after July 1, 1982.

Termination Liability

The termination liabilities include a 5 percent contingency load. This load is for unforeseen negative experience.

Demographic Assumptions

Pre-Retirement Mortality

Non-industrial death rates vary by age and gender. Industrial death rates vary by age. See sample rates in table below. The non-industrial death rates are used for all plans. The industrial death rates are used for safety plans (except for Local Prosecutor safety members where the corresponding miscellaneous plan does not have the Industrial Death Benefit).

	Non-Industrial Death (Not Job-Related)		**Industrial Death (Job-Related)**
Age	Male	Female	Male and Female
20	0.00022	0.00007	0.00004
25	0.00029	0.00011	0.00006
30	0.00038	0.00015	0.00007
35	0.00049	0.00027	0.00009
40	0.00064	0.00037	0.00010
45	0.00080	0.00054	0.00012
50	0.00116	0.00079	0.00013
55	0.00172	0.00120	0.00015
60	0.00255	0.00166	0.00016
65	0.00363	0.00233	0.00018
70	0.00623	0.00388	0.00019
75	0.01057	0.00623	0.00021
80	0.01659	0.00939	0.00022

Miscellaneous plans usually have industrial death rates set to zero unless the agency has specifically contracted for industrial death benefits. If so, each non-industrial death rate shown above will be split into two components; 99 percent will become the non-industrial death rate and 1 percent will become the industrial death rate.

Post-Retirement Mortality

Rates vary by age, type of retirement, and gender. See sample rates in table below. These rates are used for all plans.

	Healthy Recipients		Non-Industrially Disabled (Not Job-Related)		Industrially Disabled (Job-Related)	
Age	Male	Female	Male	Female	Male	Female
50	0.00372	0.00346	0.01183	0.01083	0.00372	0.00346
55	0.00437	0.00410	0.01613	0.01178	0.00437	0.00410
60	0.00671	0.00476	0.02166	0.01404	0.00671	0.00476
65	0.00928	0.00637	0.02733	0.01757	0.01113	0.00765
70	0.01339	0.00926	0.03358	0.02183	0.01607	0.01111
75	0.02316	0.01635	0.04277	0.02969	0.02779	0.01962
80	0.03977	0.03007	0.06272	0.04641	0.04773	0.03609
85	0.07122	0.05418	0.09793	0.07847	0.08547	0.06501
90	0.13044	0.10089	0.14616	0.13220	0.14348	0.11098
95	0.21658	0.17698	0.21658	0.21015	0.21658	0.17698
100	0.32222	0.28151	0.32222	0.32226	0.32222	0.28151
105	0.46691	0.43491	0.46691	0.43491	0.46691	0.43491
110	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000

The post-retirement mortality rates above include 15 years of projected on-going mortality improvement using 90 percent of Scale MP 2016 published by the Society of Actuaries.

Marital Status

For active members, a percentage who are married upon retirement is assumed according to member category as shown in the following table.

Member Category	Percent Married
Miscellaneous Member	70%
Local Police	85%
Local Fire	90%
Other Local Safety	70%
School Police	85%
Local County Peace Officers	75%

Age of Spouse

It is assumed that female spouses are 3 years younger than male spouses. This assumption is used for all plans.

Terminated Members

It is assumed that terminated members refund immediately if non-vested. Terminated members who are vested are assumed to retire at age 59 for Miscellaneous members and age 54 for safety members.

Termination with Refund

Rates vary by entry age and service for miscellaneous plans. Rates vary by service for safety plans. See sample rates in tables below.

Public Agency Miscellaneous

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40	Entry Age 45
0	0.1742	0.1674	0.1606	0.1537	0.1468	0.1400
1	0.1545	0.1477	0.1409	0.1339	0.1271	0.1203
2	0.1348	0.1280	0.1212	0.1142	0.1074	0.1006
3	0.1151	0.1083	0.1015	0.0945	0.0877	0.0809
4	0.0954	0.0886	0.0818	0.0748	0.0680	0.0612
5	0.0212	0.0193	0.0174	0.0155	0.0136	0.0116
10	0.0138	0.0121	0.0104	0.0088	0.0071	0.0055
15	0.0060	0.0051	0.0042	0.0032	0.0023	0.0014
20	0.0037	0.0029	0.0021	0.0013	0.0005	0.0001
25	0.0017	0.0011	0.0005	0.0001	0.0001	0.0001
30	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001
35	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Public Agency Safety

Duration of Service	Fire	Police	County Peace Officer
0	0.1298	0.1013	0.1188
1	0.0674	0.0636	0.0856
2	0.0320	0.0271	0.0617
3	0.0237	0.0258	0.0445
4	0.0087	0.0245	0.0321
5	0.0052	0.0086	0.0121
10	0.0005	0.0053	0.0053
15	0.0004	0.0027	0.0025
20	0.0003	0.0017	0.0012
25	0.0002	0.0012	0.0005
30	0.0002	0.0009	0.0003
35	0.0001	0.0009	0.0002

The police termination and refund rates are also used for Public Agency Local Prosecutors, Other Safety, Local Sheriff, and School Police.

Schools

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40	Entry Age 45
0	0.2107	0.2107	0.1827	0.1546	0.1375	0.1203
1	0.1807	0.1807	0.1526	0.1246	0.1105	0.0963
2	0.1526	0.1526	0.1259	0.0992	0.0878	0.0765
3	0.1266	0.1266	0.1023	0.0780	0.0691	0.0603
4	0.1026	0.1026	0.0815	0.0605	0.0537	0.0469
5	0.0808	0.0808	0.0634	0.0461	0.0409	0.0358
10	0.0202	0.0202	0.0157	0.0112	0.0087	0.0063
15	0.0107	0.0107	0.0077	0.0048	0.0034	0.0021
20	0.0056	0.0056	0.0037	0.0017	0.0016	0.0016
25	0.0026	0.0026	0.0018	0.0009	0.0012	0.0015
30	0.0013	0.0013	0.0011	0.0009	0.0012	0.0015
35	0.0008	0.0008	0.0009	0.0009	0.0012	0.0015

Termination with Vested Benefits

Rates vary by entry age and service for miscellaneous plans. Rates vary by service for safety plans. See sample rates in tables below.

Public Agency Miscellaneous

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40
5	0.0422	0.0422	0.0393	0.0364	0.0344
10	0.0278	0.0278	0.0271	0.0263	0.0215
15	0.0192	0.0192	0.0174	0.0156	0.0120
20	0.0139	0.0139	0.0109	0.0079	0.0047
25	0.0083	0.0083	0.0048	0.0014	0.0007
30	0.0015	0.0015	0.0007	0.0000	0.0000
35	0.0000	0.0000	0.0000	0.0000	0.0000

Public Agency Safety

Duration of Service	Fire	Police	County Peace Officer
5	0.0094	0.0163	0.0187
10	0.0064	0.0126	0.0134
15	0.0048	0.0082	0.0092
20	0.0038	0.0065	0.0064
25	0.0026	0.0058	0.0042
30	0.0014	0.0056	0.0022
35	0.0000	0.0000	0.0000

- After termination with vested benefits, a miscellaneous member is assumed to retire at age 59 and a safety member at age 54.
- The Police termination with vested benefits rates are also used for Public Agency Local Prosecutors, Other Safety, Local Sheriff, and School Police.

Schools

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40
5	0.0405	0.0405	0.0346	0.0288	0.0264
10	0.0324	0.0324	0.0280	0.0235	0.0211
15	0.0202	0.0202	0.0179	0.0155	0.0126
20	0.0144	0.0144	0.0114	0.0083	0.0042
25	0.0091	0.0091	0.0046	0.0000	0.0000
30	0.0015	0.0015	0.0007	0.0000	0.0000
35	0.0000	0.0000	0.0000	0.0000	0.0000

Non-Industrial (Not Job-Related) Disability

Rates vary by age and gender for miscellaneous plans. Rates vary by age and category for safety plans.

	Miscellaneous		Fire	Police	County Peace Officer	Schools	
Age	Male	Female	Male and Female	Male and Female	Male and Female	Male	Female
20	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
25	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
30	0.0002	0.0002	0.0001	0.0002	0.0001	0.0001	0.0002
35	0.0004	0.0007	0.0001	0.0003	0.0004	0.0005	0.0004
40	0.0010	0.0014	0.0001	0.0004	0.0007	0.0012	0.0008
45	0.0015	0.0019	0.0002	0.0005	0.0013	0.0020	0.0017
50	0.0016	0.0020	0.0005	0.0008	0.0018	0.0026	0.0022
55	0.0016	0.0015	0.0007	0.0013	0.0010	0.0025	0.0018
60	0.0015	0.0011	0.0007	0.0020	0.0006	0.0022	0.0011

- The miscellaneous non-industrial disability rates are used for Local Prosecutors.
- The police non-industrial disability rates are also used for Other Safety, Local Sheriff, and School Police.

Industrial (Job-Related) Disability

Rates vary by age and category.

Age	Fire	Police	County Peace Officer
20	0.0001	0.0000	0.0004
25	0.0002	0.0017	0.0013
30	0.0006	0.0048	0.0025
35	0.0012	0.0079	0.0037
40	0.0023	0.0110	0.0051
45	0.0040	0.0141	0.0067
50	0.0208	0.0185	0.0092
55	0.0307	0.0479	0.0151
60	0.0438	0.0602	0.0174

- The police industrial disability rates are also used for Local Sheriff and Other Safety.
- Fifty percent of the police industrial disability rates are used for School Police.
- One percent of the police industrial disability rates are used for Local Prosecutors.
- Normally, rates are zero for miscellaneous plans unless the agency has specifically contracted for industrial disability benefits. If so, each miscellaneous non-industrial disability rate will be split into two components: 50 percent will become the non-industrial disability rate and 50 percent will become the industrial disability rate.

Service Retirement

Retirement rates vary by age, service, and formula, except for the safety ½ @ 55 and 2% @ 55 formulas, where retirement rates vary by age only.

Service Retirement

Public Agency Miscellaneous 1.5% @ 65

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.008	0.011	0.013	0.015	0.017	0.019
51	0.007	0.010	0.012	0.013	0.015	0.017
52	0.010	0.014	0.017	0.019	0.021	0.024
53	0.008	0.012	0.015	0.017	0.019	0.022
54	0.012	0.016	0.019	0.022	0.025	0.028
55	0.018	0.025	0.031	0.035	0.038	0.043
56	0.015	0.021	0.025	0.029	0.032	0.036
57	0.020	0.028	0.033	0.038	0.043	0.048
58	0.024	0.033	0.040	0.046	0.052	0.058
59	0.028	0.039	0.048	0.054	0.060	0.067
60	0.049	0.069	0.083	0.094	0.105	0.118
61	0.062	0.087	0.106	0.120	0.133	0.150
62	0.104	0.146	0.177	0.200	0.223	0.251
63	0.099	0.139	0.169	0.191	0.213	0.239
64	0.097	0.136	0.165	0.186	0.209	0.233
65	0.140	0.197	0.240	0.271	0.302	0.339
66	0.092	0.130	0.157	0.177	0.198	0.222
67	0.129	0.181	0.220	0.249	0.277	0.311
68	0.092	0.129	0.156	0.177	0.197	0.221
69	0.092	0.130	0.158	0.178	0.199	0.224
70	0.103	0.144	0.175	0.198	0.221	0.248

Public Agency Miscellaneous 2% @ 60

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.020	0.020	0.020	0.020	0.020	0.150
51	0.006	0.019	0.027	0.031	0.035	0.038
52	0.011	0.024	0.031	0.034	0.037	0.040
53	0.010	0.015	0.021	0.027	0.033	0.040
54	0.025	0.025	0.029	0.035	0.041	0.048
55	0.019	0.026	0.033	0.092	0.136	0.146
56	0.030	0.034	0.038	0.060	0.093	0.127
57	0.030	0.046	0.061	0.076	0.090	0.104
58	0.040	0.044	0.059	0.080	0.101	0.122
59	0.024	0.044	0.063	0.083	0.103	0.122
60	0.070	0.074	0.089	0.113	0.137	0.161
61	0.080	0.086	0.093	0.118	0.156	0.195
62	0.100	0.117	0.133	0.190	0.273	0.357
63	0.140	0.157	0.173	0.208	0.255	0.301
64	0.140	0.153	0.165	0.196	0.239	0.283
65	0.140	0.178	0.215	0.264	0.321	0.377
66	0.140	0.178	0.215	0.264	0.321	0.377
67	0.140	0.178	0.215	0.264	0.321	0.377
68	0.112	0.142	0.172	0.211	0.257	0.302
69	0.112	0.142	0.172	0.211	0.257	0.302
70	0.140	0.178	0.215	0.264	0.321	0.377

Service Retirement

Public Agency Miscellaneous 2% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.008	0.013	0.018	0.021	0.022	0.033
51	0.009	0.016	0.020	0.023	0.026	0.036
52	0.015	0.018	0.020	0.021	0.025	0.030
53	0.016	0.020	0.024	0.028	0.031	0.035
54	0.018	0.022	0.026	0.030	0.034	0.038
55	0.040	0.040	0.056	0.093	0.109	0.154
56	0.034	0.050	0.066	0.092	0.107	0.138
57	0.042	0.048	0.058	0.082	0.096	0.127
58	0.046	0.054	0.062	0.090	0.106	0.131
59	0.045	0.055	0.066	0.097	0.115	0.144
60	0.058	0.075	0.093	0.126	0.143	0.169
61	0.065	0.088	0.111	0.146	0.163	0.189
62	0.136	0.118	0.148	0.190	0.213	0.247
63	0.130	0.133	0.174	0.212	0.249	0.285
64	0.113	0.129	0.165	0.196	0.223	0.249
65	0.145	0.173	0.201	0.233	0.266	0.289
66	0.170	0.199	0.229	0.258	0.284	0.306
67	0.250	0.204	0.233	0.250	0.257	0.287
68	0.227	0.175	0.193	0.215	0.240	0.262
69	0.200	0.180	0.180	0.198	0.228	0.246
70	0.150	0.171	0.192	0.239	0.304	0.330

Public Agency Miscellaneous 2.5% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.008	0.014	0.020	0.026	0.033	0.050
51	0.008	0.015	0.023	0.030	0.037	0.059
52	0.009	0.016	0.023	0.030	0.037	0.061
53	0.014	0.021	0.028	0.035	0.042	0.063
54	0.014	0.022	0.030	0.039	0.047	0.068
55	0.020	0.038	0.055	0.073	0.122	0.192
56	0.025	0.047	0.069	0.091	0.136	0.196
57	0.030	0.048	0.065	0.083	0.123	0.178
58	0.035	0.054	0.073	0.093	0.112	0.153
59	0.035	0.054	0.073	0.092	0.131	0.183
60	0.044	0.072	0.101	0.130	0.158	0.197
61	0.050	0.078	0.105	0.133	0.161	0.223
62	0.055	0.093	0.130	0.168	0.205	0.268
63	0.090	0.124	0.158	0.192	0.226	0.279
64	0.080	0.112	0.144	0.175	0.207	0.268
65	0.120	0.156	0.193	0.229	0.265	0.333
66	0.132	0.172	0.212	0.252	0.292	0.366
67	0.132	0.172	0.212	0.252	0.292	0.366
68	0.120	0.156	0.193	0.229	0.265	0.333
69	0.120	0.156	0.193	0.229	0.265	0.333
70	0.120	0.156	0.193	0.229	0.265	0.333

Service Retirement

Public Agency Miscellaneous 2.7% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.003	0.010	0.016	0.034	0.033	0.045
51	0.009	0.016	0.023	0.042	0.038	0.047
52	0.015	0.019	0.024	0.040	0.036	0.046
53	0.012	0.020	0.028	0.047	0.046	0.060
54	0.020	0.027	0.035	0.054	0.056	0.073
55	0.033	0.055	0.078	0.113	0.156	0.234
56	0.039	0.067	0.095	0.135	0.169	0.227
57	0.050	0.067	0.084	0.113	0.142	0.198
58	0.043	0.066	0.089	0.124	0.151	0.201
59	0.050	0.070	0.090	0.122	0.158	0.224
60	0.060	0.086	0.112	0.150	0.182	0.238
61	0.071	0.094	0.117	0.153	0.184	0.241
62	0.091	0.122	0.152	0.194	0.226	0.279
63	0.143	0.161	0.179	0.209	0.222	0.250
64	0.116	0.147	0.178	0.221	0.254	0.308
65	0.140	0.174	0.208	0.254	0.306	0.389
66	0.170	0.209	0.247	0.298	0.310	0.324
67	0.170	0.199	0.228	0.269	0.296	0.342
68	0.150	0.181	0.212	0.255	0.287	0.339
69	0.150	0.181	0.212	0.255	0.287	0.339
70	0.150	0.181	0.212	0.243	0.291	0.350

Public Agency Miscellaneous 3% @ 60

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.013	0.019	0.026	0.042	0.038	0.064
51	0.035	0.037	0.039	0.052	0.047	0.062
52	0.023	0.030	0.038	0.055	0.051	0.056
53	0.025	0.032	0.040	0.057	0.056	0.066
54	0.035	0.042	0.050	0.067	0.066	0.076
55	0.040	0.052	0.064	0.085	0.095	0.120
56	0.043	0.056	0.070	0.094	0.102	0.150
57	0.045	0.060	0.074	0.099	0.109	0.131
58	0.053	0.056	0.059	0.099	0.126	0.185
59	0.050	0.068	0.085	0.113	0.144	0.202
60	0.089	0.106	0.123	0.180	0.226	0.316
61	0.100	0.117	0.133	0.212	0.230	0.298
62	0.130	0.155	0.180	0.248	0.282	0.335
63	0.120	0.163	0.206	0.270	0.268	0.352
64	0.150	0.150	0.150	0.215	0.277	0.300
65	0.200	0.242	0.283	0.330	0.300	0.342
66	0.220	0.264	0.308	0.352	0.379	0.394
67	0.250	0.279	0.309	0.338	0.371	0.406
68	0.170	0.196	0.223	0.249	0.290	0.340
69	0.220	0.261	0.302	0.344	0.378	0.408
70	0.220	0.255	0.291	0.326	0.358	0.388

Service Retirement

Public Agency Miscellaneous 2% @ 62

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.000	0.000	0.000	0.000	0.000	0.000
51	0.000	0.000	0.000	0.000	0.000	0.000
52	0.005	0.008	0.012	0.015	0.019	0.031
53	0.007	0.011	0.014	0.018	0.021	0.032
54	0.007	0.011	0.015	0.019	0.023	0.034
55	0.010	0.019	0.028	0.036	0.061	0.096
56	0.014	0.026	0.038	0.050	0.075	0.108
57	0.018	0.029	0.039	0.050	0.074	0.107
58	0.023	0.035	0.048	0.060	0.073	0.099
59	0.025	0.038	0.051	0.065	0.092	0.128
60	0.031	0.051	0.071	0.091	0.111	0.138
61	0.038	0.058	0.079	0.100	0.121	0.167
62	0.044	0.074	0.104	0.134	0.164	0.214
63	0.077	0.105	0.134	0.163	0.192	0.237
64	0.072	0.101	0.129	0.158	0.187	0.242
65	0.108	0.141	0.173	0.206	0.239	0.300
66	0.132	0.172	0.212	0.252	0.292	0.366
67	0.132	0.172	0.212	0.252	0.292	0.366
68	0.120	0.156	0.193	0.229	0.265	0.333
69	0.120	0.156	0.193	0.229	0.265	0.333
70	0.120	0.156	0.193	0.229	0.265	0.333

Service Retirement

Public Agency Fire ½ @ 55 and 2% @ 55

Age	Rate	Age	Rate
50	0.0159	56	0.1108
51	0.0000	57	0.0000
52	0.0344	58	0.0950
53	0.0199	59	0.0441
54	0.0413	60	1.00000
55	0.0751		

Public Agency Police ½ @ 55 and 2% @ 55

Age	Rate	Age	Rate
50	0.0255	56	0.0692
51	0.0000	57	0.0511
52	0.0164	58	0.0724
53	0.0272	59	0.0704
54	0.0095	60	0.3000
55	0.1667		

Service Retirement

Public Agency Police 2% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.050	0.050	0.050	0.050	0.050	0.100
51	0.040	0.040	0.040	0.040	0.058	0.094
52	0.040	0.040	0.040	0.040	0.061	0.087
53	0.040	0.040	0.040	0.040	0.082	0.123
54	0.040	0.040	0.040	0.046	0.098	0.158
55	0.072	0.072	0.072	0.096	0.141	0.255
56	0.066	0.066	0.066	0.088	0.129	0.228
57	0.060	0.060	0.060	0.080	0.118	0.213
58	0.080	0.080	0.080	0.088	0.138	0.228
59	0.080	0.080	0.080	0.092	0.140	0.228
60	0.150	0.150	0.150	0.150	0.150	0.228
61	0.144	0.144	0.144	0.144	0.144	0.170
62	0.150	0.150	0.150	0.150	0.150	0.213
63	0.150	0.150	0.150	0.150	0.150	0.213
64	0.150	0.150	0.150	0.150	0.150	0.319
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to County Peace officers, Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.009	0.009	0.009	0.009	0.013	0.020
51	0.013	0.013	0.013	0.013	0.020	0.029
52	0.018	0.018	0.018	0.018	0.028	0.042
53	0.052	0.052	0.052	0.052	0.079	0.119
54	0.067	0.067	0.067	0.067	0.103	0.154
55	0.089	0.089	0.089	0.089	0.136	0.204
56	0.083	0.083	0.083	0.083	0.127	0.190
57	0.082	0.082	0.082	0.082	0.126	0.189
58	0.088	0.088	0.088	0.088	0.136	0.204
59	0.074	0.074	0.074	0.074	0.113	0.170
60	0.100	0.100	0.100	0.100	0.154	0.230
61	0.072	0.072	0.072	0.072	0.110	0.165
62	0.099	0.099	0.099	0.099	0.152	0.228
63	0.114	0.114	0.114	0.114	0.175	0.262
64	0.114	0.114	0.114	0.114	0.175	0.262
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 3% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.035	0.035	0.035	0.035	0.070	0.090
51	0.028	0.028	0.028	0.029	0.065	0.101
52	0.032	0.032	0.032	0.039	0.066	0.109
53	0.028	0.028	0.028	0.043	0.075	0.132
54	0.038	0.038	0.038	0.074	0.118	0.333
55	0.070	0.070	0.070	0.120	0.175	0.340
56	0.060	0.060	0.060	0.110	0.165	0.330
57	0.060	0.060	0.060	0.110	0.165	0.320
58	0.080	0.080	0.080	0.100	0.185	0.350
59	0.090	0.090	0.095	0.130	0.185	0.350
60	0.150	0.150	0.150	0.150	0.185	0.350
61	0.120	0.120	0.120	0.120	0.160	0.350
62	0.150	0.150	0.150	0.150	0.200	0.350
63	0.150	0.150	0.150	0.150	0.200	0.400
64	0.150	0.150	0.150	0.150	0.175	0.350
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to County Peace officers, Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 3% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.001	0.001	0.001	0.006	0.016	0.069
51	0.002	0.002	0.002	0.006	0.018	0.071
52	0.012	0.012	0.012	0.021	0.040	0.098
53	0.032	0.032	0.032	0.049	0.085	0.149
54	0.057	0.057	0.057	0.087	0.144	0.217
55	0.073	0.073	0.073	0.109	0.179	0.259
56	0.064	0.064	0.064	0.097	0.161	0.238
57	0.063	0.063	0.063	0.095	0.157	0.233
58	0.065	0.065	0.065	0.099	0.163	0.241
59	0.088	0.088	0.088	0.131	0.213	0.299
60	0.105	0.105	0.105	0.155	0.251	0.344
61	0.118	0.118	0.118	0.175	0.282	0.380
62	0.087	0.087	0.087	0.128	0.210	0.295
63	0.067	0.067	0.067	0.100	0.165	0.243
64	0.067	0.067	0.067	0.100	0.165	0.243
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 3% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.050	0.050	0.050	0.100	0.155	0.400
51	0.040	0.040	0.040	0.090	0.140	0.380
52	0.040	0.040	0.040	0.070	0.115	0.350
53	0.040	0.040	0.040	0.080	0.135	0.350
54	0.040	0.040	0.040	0.090	0.145	0.350
55	0.070	0.070	0.070	0.120	0.175	0.340
56	0.060	0.060	0.060	0.110	0.165	0.330
57	0.060	0.060	0.060	0.110	0.165	0.320
58	0.080	0.080	0.080	0.100	0.185	0.350
59	0.090	0.090	0.095	0.130	0.185	0.350
60	0.150	0.150	0.150	0.150	0.185	0.350
61	0.120	0.120	0.120	0.120	0.160	0.350
62	0.150	0.150	0.150	0.150	0.200	0.350
63	0.150	0.150	0.150	0.150	0.200	0.400
64	0.150	0.150	0.150	0.150	0.175	0.350
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to County Peace officers, Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 3% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.020	0.020	0.020	0.040	0.130	0.192
51	0.008	0.008	0.008	0.023	0.107	0.164
52	0.023	0.023	0.023	0.043	0.136	0.198
53	0.023	0.023	0.023	0.043	0.135	0.198
54	0.027	0.027	0.027	0.048	0.143	0.207
55	0.043	0.043	0.043	0.070	0.174	0.244
56	0.053	0.053	0.053	0.085	0.196	0.269
57	0.054	0.054	0.054	0.086	0.197	0.271
58	0.052	0.052	0.052	0.084	0.193	0.268
59	0.075	0.075	0.075	0.116	0.239	0.321
60	0.065	0.065	0.065	0.102	0.219	0.298
61	0.076	0.076	0.076	0.117	0.241	0.324
62	0.068	0.068	0.068	0.106	0.224	0.304
63	0.027	0.027	0.027	0.049	0.143	0.208
64	0.094	0.094	0.094	0.143	0.277	0.366
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 2% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.040	0.040	0.040	0.040	0.040	0.080
51	0.028	0.028	0.028	0.028	0.040	0.066
52	0.028	0.028	0.028	0.028	0.043	0.061
53	0.028	0.028	0.028	0.028	0.057	0.086
54	0.028	0.028	0.028	0.032	0.069	0.110
55	0.050	0.050	0.050	0.067	0.099	0.179
56	0.046	0.046	0.046	0.062	0.090	0.160
57	0.054	0.054	0.054	0.072	0.106	0.191
58	0.060	0.060	0.060	0.066	0.103	0.171
59	0.060	0.060	0.060	0.069	0.105	0.171
60	0.113	0.113	0.113	0.113	0.113	0.171
61	0.108	0.108	0.108	0.108	0.108	0.128
62	0.113	0.113	0.113	0.113	0.113	0.159
63	0.113	0.113	0.113	0.113	0.113	0.159
64	0.113	0.113	0.113	0.113	0.113	0.239
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to County Peace officers, Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.005	0.005	0.005	0.005	0.008	0.012
51	0.006	0.006	0.006	0.006	0.009	0.013
52	0.012	0.012	0.012	0.012	0.019	0.028
53	0.033	0.033	0.033	0.033	0.050	0.075
54	0.045	0.045	0.045	0.045	0.069	0.103
55	0.061	0.061	0.061	0.061	0.094	0.140
56	0.055	0.055	0.055	0.055	0.084	0.126
57	0.081	0.081	0.081	0.081	0.125	0.187
58	0.059	0.059	0.059	0.059	0.091	0.137
59	0.055	0.055	0.055	0.055	0.084	0.126
60	0.085	0.085	0.085	0.085	0.131	0.196
61	0.085	0.085	0.085	0.085	0.131	0.196
62	0.085	0.085	0.085	0.085	0.131	0.196
63	0.085	0.085	0.085	0.085	0.131	0.196
64	0.085	0.085	0.085	0.085	0.131	0.196
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 2.5% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.050	0.050	0.050	0.050	0.050	0.100
51	0.038	0.038	0.038	0.038	0.055	0.089
52	0.038	0.038	0.038	0.038	0.058	0.082
53	0.036	0.036	0.036	0.036	0.073	0.111
54	0.036	0.036	0.036	0.041	0.088	0.142
55	0.061	0.061	0.061	0.082	0.120	0.217
56	0.056	0.056	0.056	0.075	0.110	0.194
57	0.060	0.060	0.060	0.080	0.118	0.213
58	0.072	0.072	0.072	0.079	0.124	0.205
59	0.072	0.072	0.072	0.083	0.126	0.205
60	0.135	0.135	0.135	0.135	0.135	0.205
61	0.130	0.130	0.130	0.130	0.130	0.153
62	0.135	0.135	0.135	0.135	0.135	0.191
63	0.135	0.135	0.135	0.135	0.135	0.191
64	0.135	0.135	0.135	0.135	0.135	0.287
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to County Peace officers, Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2.5% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.007	0.007	0.007	0.007	0.010	0.015
51	0.008	0.008	0.008	0.008	0.012	0.018
52	0.016	0.016	0.016	0.016	0.025	0.038
53	0.042	0.042	0.042	0.042	0.064	0.096
54	0.057	0.057	0.057	0.057	0.088	0.132
55	0.074	0.074	0.074	0.074	0.114	0.170
56	0.066	0.066	0.066	0.066	0.102	0.153
57	0.090	0.090	0.090	0.090	0.139	0.208
58	0.071	0.071	0.071	0.071	0.110	0.164
59	0.066	0.066	0.066	0.066	0.101	0.151
60	0.102	0.102	0.102	0.102	0.157	0.235
61	0.102	0.102	0.102	0.102	0.157	0.236
62	0.102	0.102	0.102	0.102	0.157	0.236
63	0.102	0.102	0.102	0.102	0.157	0.236
64	0.102	0.102	0.102	0.102	0.157	0.236
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 2.7% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.0500	0.0500	0.0500	0.0500	0.0500	0.1000
51	0.0400	0.0400	0.0400	0.0400	0.0575	0.0942
52	0.0380	0.0380	0.0380	0.0380	0.0580	0.0825
53	0.0380	0.0380	0.0380	0.0380	0.0774	0.1169
54	0.0380	0.0380	0.0380	0.0437	0.0931	0.1497
55	0.0684	0.0684	0.0684	0.0912	0.1340	0.2423
56	0.0627	0.0627	0.0627	0.0836	0.1228	0.2168
57	0.0600	0.0600	0.0600	0.0800	0.1175	0.2125
58	0.0800	0.0800	0.0800	0.0880	0.1375	0.2275
59	0.0800	0.0800	0.0800	0.0920	0.1400	0.2275
60	0.1500	0.1500	0.1500	0.1500	0.1500	0.2275
61	0.1440	0.1440	0.1440	0.1440	0.1440	0.1700
62	0.1500	0.1500	0.1500	0.1500	0.1500	0.2125
63	0.1500	0.1500	0.1500	0.1500	0.1500	0.2125
64	0.1500	0.1500	0.1500	0.1500	0.1500	0.3188
65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

- These rates also apply to County Peace officers, Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2.7% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.0065	0.0065	0.0065	0.0065	0.0101	0.0151
51	0.0081	0.0081	0.0081	0.0081	0.0125	0.0187
52	0.0164	0.0164	0.0164	0.0164	0.0254	0.0380
53	0.0442	0.0442	0.0442	0.0442	0.0680	0.1018
54	0.0606	0.0606	0.0606	0.0606	0.0934	0.1397
55	0.0825	0.0825	0.0825	0.0825	0.1269	0.1900
56	0.0740	0.0740	0.0740	0.0740	0.1140	0.1706
57	0.0901	0.0901	0.0901	0.0901	0.1387	0.2077
58	0.0790	0.0790	0.0790	0.0790	0.1217	0.1821
59	0.0729	0.0729	0.0729	0.0729	0.1123	0.1681
60	0.1135	0.1135	0.1135	0.1135	0.1747	0.2615
61	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
62	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
63	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
64	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Service Retirement

Schools 2% @ 55						
	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.004	0.007	0.011	0.012	0.013	0.015
51	0.004	0.008	0.011	0.014	0.016	0.017
52	0.005	0.010	0.014	0.016	0.018	0.021
53	0.006	0.012	0.016	0.020	0.022	0.025
54	0.008	0.017	0.023	0.027	0.031	0.034
55	0.021	0.042	0.058	0.069	0.077	0.086
56	0.019	0.037	0.053	0.062	0.069	0.078
57	0.019	0.038	0.054	0.064	0.071	0.079
58	0.022	0.045	0.062	0.074	0.082	0.092
59	0.025	0.049	0.069	0.082	0.090	0.101
60	0.033	0.066	0.092	0.109	0.121	0.135
61	0.037	0.072	0.101	0.119	0.133	0.149
62	0.066	0.131	0.184	0.218	0.242	0.271
63	0.064	0.126	0.178	0.209	0.233	0.261
64	0.059	0.117	0.163	0.193	0.215	0.240
65	0.080	0.158	0.221	0.261	0.291	0.326
66	0.081	0.160	0.224	0.265	0.296	0.330
67	0.070	0.139	0.194	0.229	0.255	0.286
68	0.063	0.124	0.173	0.205	0.228	0.255
69	0.066	0.130	0.183	0.216	0.241	0.270
70	0.071	0.140	0.196	0.231	0.258	0.289

Miscellaneous

Internal Revenue Code Section 415

The limitations on benefits imposed by Internal Revenue Code Section 415 are taken into account in this valuation. Each year the impact of any changes in this limitation since the prior valuation is included and amortized as part of the actuarial gain or loss base. This results in lower contributions for those employers contributing to the Replacement Benefit Fund and protects CalPERS from prefunding expected benefits in excess of limits imposed by federal tax law.

Internal Revenue Code Section 401(a) (17)

The limitations on compensation imposed by Internal Revenue Code Section 401(a) (17) are taken into account in this valuation. Each year, the impact of any changes in the compensation limitation since the prior valuation is included and amortized as part of the actuarial gain or loss base. The compensation limit for classic members for the 2017 calendar year is $270,000.

Appendix B

Principal Plan Provisions

The following is a description of the principal plan provisions used in calculating costs and liabilities. We have indicated whether a plan provision is standard or optional. Standard benefits are applicable to all members while optional benefits vary among employers. Optional benefits that apply to a single period of time, such as Golden Handshakes, have not been included. Many of the statements in this summary are general in nature, and are intended to provide an easily understood summary of the Public Employees' Retirement Law. The law itself governs in all situations.

Service Retirement

Eligibility

A classic CalPERS member or PEPRA Safety member becomes eligible for Service Retirement upon attainment of age 50 with at least 5 years of credited service (total service across all CalPERS employers, and with certain other retirement systems with which CalPERS has reciprocity agreements). For employees hired into a plan with the 1.5 percent at 65 formula, eligibility for service retirement is age 55 with at least 5 years of service. PEPRA miscellaneous members become eligible for service retirement upon attainment of age 52 with at least 5 years of service.

Benefit

The service retirement benefit is a monthly allowance equal to the product of the *benefit factor*, *years of service*, and *final compensation.*

- The *benefit factor* depends on the benefit formula specified in your agency's contract. The table below shows the factors for each of the available formulas. Factors vary by the member's age at retirement. Listed are the factors for retirement at whole year ages:

Miscellaneous Plan Formulas

Retirement Age	1.5% at 65	2% at 60	2% at 55	2.5% at 55	2.7% at 55	3% at 60	PEPRA 2% at 62
50	0.5000%	1.092%	1.426%	2.000%	2.000%	2.000%	N/A
51	0.5667%	1.156%	1.522%	2.100%	2.140%	2.100%	N/A
52	0.6334%	1.224%	1.628%	2.200%	2.280%	2.200%	1.000%
53	0.7000%	1.296%	1.742%	2.300%	2.420%	2.300%	1.100%
54	0.7667%	1.376%	1.866%	2.400%	2.560%	2.400%	1.200%
55	0.8334%	1.460%	2.000%	2.500%	2.700%	2.500%	1.300%
56	0.9000%	1.552%	2.052%	2.500%	2.700%	2.600%	1.400%
57	0.9667%	1.650%	2.104%	2.500%	2.700%	2.700%	1.500%
58	1.0334%	1.758%	2.156%	2.500%	2.700%	2.800%	1.600%
59	1.1000%	1.874%	2.210%	2.500%	2.700%	2.900%	1.700%
60	1.1667%	2.000%	2.262%	2.500%	2.700%	3.000%	1.800%
61	1.2334%	2.134%	2.314%	2.500%	2.700%	3.000%	1.900%
62	1.3000%	2.272%	2.366%	2.500%	2.700%	3.000%	2.000%
63	1.3667%	2.418%	2.418%	2.500%	2.700%	3.000%	2.100%
64	1.4334%	2.418%	2.418%	2.500%	2.700%	3.000%	2.200%
65	1.5000%	2.418%	2.418%	2.500%	2.700%	3.000%	2.300%
66	1.5000%	2.418%	2.418%	2.500%	2.700%	3.000%	2.400%
67 & up	1.5000%	2.418%	2.418%	2.500%	2.700%	3.000%	2.500%

Safety Plan Formulas

Retirement Age	½ at 55 *	2% at 55	2% at 50	3% at 55	3% at 50
50	1.783%	1.426%	2.000%	2.400%	3.000%
51	1.903%	1.522%	2.140%	2.520%	3.000%
52	2.035%	1.628%	2.280%	2.640%	3.000%
53	2.178%	1.742%	2.420%	2.760%	3.000%
54	2.333%	1.866%	2.560%	2.880%	3.000%
55 & Up	2.500%	2.000%	2.700%	3.000%	3.000%

* For this formula, the benefit factor also varies by entry age. The factors shown are for members with an entry age of 35 or greater. If entry age is less than 35, then the age 55 benefit factor is 50 percent divided by the difference between age 55 and entry age. The benefit factor for ages prior to age 55 is the same proportion of the age 55 benefit factor as in the above table.

PEPRA Safety Plan Formulas

Retirement Age	2% at 57	2.5% at 57	2.7% at 57
50	1.426%	2.000%	2.000%
51	1.508%	2.071%	2.100%
52	1.590%	2.143%	2.200%
53	1.672%	2.214%	2.300%
54	1.754%	2.286%	2.400%
55	1.836%	2.357%	2.500%
56	1.918%	2.429%	2.600%
57 & Up	2.000%	2.500%	2.700%

- The *years of service* is the amount credited by CalPERS to a member while he or she is employed in this group (or for other periods that are recognized under the employer's contract with CalPERS). For a member who has earned service with multiple CalPERS employers, the benefit from each employer is calculated separately according to each employer's contract, and then added together for the total allowance. An agency may contract for an optional benefit where any unused sick leave accumulated at the time of retirement will be converted to credited service at a rate of 0.004 years of service for each day of sick leave.

- The *final compensation* is the monthly average of the member's highest 36 or 12 consecutive months' full-time equivalent monthly pay (no matter which CalPERS employer paid this compensation). The standard benefit is 36 months. Employers had the option of providing a final compensation equal to the highest 12 consecutive months for classic plans only. Final compensation must be defined by the highest 36 consecutive months' pay under the 1.5% at 65 formula. PEPRA members have a cap on the annual salary that can be used to calculate final compensation for all new members based on the Social Security contribution and benefit base. For employees that participate in Social Security this cap is $118,775 for 2017 and for those employees that do not participate in Social Security the cap for 2017 is $142,530. Adjustments to the caps are permitted annually based on changes to the CPI for all urban consumers.

- Employees must be covered by Social Security with the 1.5% at 65 formula. Social Security is optional for all other benefit formulas. For employees covered by Social Security, the modified formula is the standard benefit. Under this type of formula, the final compensation is offset by $133.33 (or by one third if the final compensation is less than $400). Employers may contract for the full benefit with Social Security that will eliminate the offset applicable to the final compensation. For employees not covered by Social Security, the full benefit is paid with

no offsets. Auxiliary organizations of the CSUC system may elect reduced contribution rates, in which case the offset is $317 if members are not covered by Social Security or $513 if members are covered by Social Security.

- The miscellaneous and PEPRA safety service retirement benefit is not capped. The classic Safety service retirement benefit is capped at 90 percent of final compensation.

Vested Deferred Retirement

Eligibility for Deferred Status

A CalPERS member becomes eligible for a deferred vested retirement benefit when he or she leaves employment, keeps his or her contribution account balance on deposit with CalPERS, **and** has earned at least 5 years of credited service (total service across all CalPERS employers, and with certain other retirement systems with which CalPERS has reciprocity agreements).

Eligibility to Start Receiving Benefits

The CalPERS classic members and PEPRA safety members become eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for deferred status and upon attainment of age 50 (55 for employees hired into a 1.5% @ 65 plan). PEPRA miscellaneous members become eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for deferred status and upon attainment of age 52.

Benefit

The vested deferred retirement benefit is the same as the service retirement benefit, where the benefit factor is based on the member's age at allowance commencement. For members who have earned service with multiple CalPERS employers, the benefit from each employer is calculated separately according to each employer's contract, and then added together for the total allowance.

Non-Industrial (Non-Job Related) Disability Retirement

Eligibility

A CalPERS member is eligible for Non-Industrial Disability Retirement if he or she becomes *disabled* and has at least 5 years of credited service (total service across all CalPERS employers, and with certain other retirement systems with which CalPERS has reciprocity agreements). There is no special age requirement. *Disabled* means the member is unable to perform his or her job because of an illness or injury, which is expected to be permanent or to last indefinitely. The illness or injury does not have to be job related. A CalPERS member must be actively employed by any CalPERS employer at the time of disability in order to be eligible for this benefit.

Standard Benefit

The standard Non-Industrial Disability Retirement benefit is a monthly allowance equal to 1.8 percent of final compensation, multiplied by *service*, which is determined as follows:

- *Service* is CalPERS credited service, for members with less than 10 years of service or greater than 18.518 years of service; or

- *Service* is CalPERS credited service plus the additional number of years that the member would have worked until age 60, for members with at least 10 years but not more than 18.518 years of service. The maximum benefit in this case is 33 1/3 percent of final compensation.

Improved Benefit

Employers have the option of providing the improved Non-Industrial Disability Retirement benefit. This benefit provides a monthly allowance equal to 30 percent of final compensation for the first 5 years of service, plus 1 percent for each additional year of service to a maximum of 50 percent of final compensation.

Members who are eligible for a larger service retirement benefit may choose to receive that benefit in lieu of a disability benefit. Members eligible to retire, and who have attained the normal retirement age determined by their service retirement benefit formula, will receive the same dollar amount for disability retirement as that payable for service retirement. For members who have earned service with multiple CalPERS employers, the benefit attributed to each employer is the total disability allowance multiplied by the ratio of service with a particular employer to the total CalPERS service.

Industrial (Job Related) Disability Retirement

All safety members have this benefit. For miscellaneous members, employers have the option of providing this benefit. An employer may choose to provide the increased benefit option or the improved benefit option.

Eligibility

An employee is eligible for Industrial Disability Retirement if he or she becomes disabled while working, where disabled means the member is unable to perform the duties of the job because of a work-related illness or injury, which is expected to be permanent or to last indefinitely. A CalPERS member who has left active employment within this group is not eligible for this benefit, except to the extent described below.

Standard Benefit

The standard Industrial Disability Retirement benefit is a monthly allowance equal to 50 percent of final compensation.

Increased Benefit (75 percent of Final Compensation)

The increased Industrial Disability Retirement benefit is a monthly allowance equal to 75 percent final compensation for total disability.

Improved Benefit (50 percent to 90 percent of Final Compensation)

The improved Industrial Disability Retirement benefit is a monthly allowance equal to the Workman's Compensation Appeals Board permanent disability rate percentage (if 50 percent or greater, with a maximum of 90 percent) times the final compensation.

For a CalPERS member not actively employed in this group who became disabled while employed by some other CalPERS employer, the benefit is a return of accumulated member contributions with respect to employment in this group. With the standard or increased benefit, a member may also choose to receive the annuitization of the accumulated member contributions.

If a member is eligible for service retirement and if the service retirement benefit is more than the industrial disability retirement benefit, the member may choose to receive the larger benefit.

Post-Retirement Death Benefit

Standard Lump Sum Payment

Upon the death of a retiree, a one-time lump sum payment of $500 will be made to the retiree's designated survivor(s), or to the retiree's estate.

Improved Lump Sum Payment

Employers have the option of providing an improved lump sum death benefit of $600, $2,000, $3,000, $4,000 or $5,000.

Form of Payment for Retirement Allowance

Standard Form of Payment

Generally, the retirement allowance is paid to the retiree in the form of an annuity for as long as he or she is alive. The retiree may choose to provide for a portion of his or her allowance to be paid to any designated beneficiary after the retiree's death. CalPERS provides for a variety of such benefit options, which the retiree pays for by taking a reduction in his or her retirement allowance. Such reduction takes into account the amount to be provided to the beneficiary and the probable duration of payments (based on the ages of the member and beneficiary) made subsequent to the member's death.

Improved Form of Payment (Post-Retirement Survivor Allowance)

Employers have the option to contract for the post-retirement survivor allowance.

For retirement allowances with respect to service subject to the modified formula, 25 percent of the retirement allowance will automatically be continued to certain statutory beneficiaries upon the death of the retiree, without a reduction in the retiree's allowance. For retirement allowances with respect to service subject to the full or supplemental formula, 50 percent of the retirement allowance will automatically be continued to certain statutory beneficiaries upon the death of the retiree, without a reduction in the retiree's allowance. This additional benefit is referred to as post-retirement survivor allowance (PRSA) or simply as survivor continuance.

In other words, 25 percent or 50 percent of the allowance, the continuance portion, is paid to the retiree for as long as he or she is alive, and that same amount is continued to the retiree's spouse (or if no eligible spouse, to unmarried child(ren) until they attain age 18; or, if no eligible child(ren), to a qualifying dependent parent) for the rest of his or her lifetime. This benefit will not be discontinued in the event the spouse remarries.

The remaining 75 percent or 50 percent of the retirement allowance, which may be referred to as the option portion of the benefit, is paid to the retiree as an annuity for as long as he or she is alive. Or, the retiree may choose to provide for some of this option portion to be paid to any designated beneficiary after the retiree's death. Benefit options applicable to the option portion are the same as those offered with the standard form. The reduction is calculated in the same manner but is applied only to the option portion.

Pre-Retirement Death Benefits

Basic Death Benefit

This is a standard benefit.

Eligibility

An employee's beneficiary (or estate) may receive the basic death benefit if the member dies while actively employed. A CalPERS member must be actively employed with the CalPERS employer providing this benefit to be eligible for this benefit. A member's survivor who is eligible for any other pre-retirement death benefit may choose to receive that death benefit instead of this basic death benefit.

Benefit

The basic death benefit is a lump sum in the amount of the member's accumulated contributions, where interest is currently credited at 7.5 percent per year, plus a lump sum in the amount of one month's salary for each completed year of current service, up to a maximum of six months' salary. For purposes of this benefit, one month's salary is defined as the member's average monthly full-time rate of compensation during the 12 months preceding death.

1957 Survivor Benefit

This is a standard benefit.

Eligibility

An employee's *eligible survivor(s)* may receive the 1957 Survivor benefit if the member dies while actively employed, has attained at least age 50 for classic and safety PEPRA members and age 52 for miscellaneous PEPRA members, and has at least 5 years of credited service (total service across all CalPERS employers and with certain other retirement systems with which CalPERS has reciprocity agreements). A CalPERS member must be actively employed with the CalPERS employer providing this benefit to be eligible for this benefit. An eligible survivor means the surviving spouse to whom the member was married at least one year before death or, if there is no eligible spouse, to the member's unmarried child(ren) under age 18. A member's survivor who is eligible for any other pre-retirement death benefit may choose to receive that death benefit instead of this 1957 Survivor benefit.

Benefit

The 1957 Survivor benefit is a monthly allowance equal to one-half of the unmodified service retirement benefit that the member would have been entitled to receive if the member had retired on the date of his or her death. If the benefit is payable to the spouse, the benefit is discontinued upon the death of the spouse. If the benefit is payable to dependent child(ren), the benefit will be discontinued upon death or attainment of age 18, unless the child(ren) is disabled. The total amount paid will be at least equal to the basic death benefit.

Optional Settlement 2 Death Benefit

This is an optional benefit.

Eligibility

An employee's *eligible survivor* may receive the Optional Settlement 2 Death benefit if the member dies while actively employed, has attained at least age 50 for classic and safety PEPRA members and age 52 for miscellaneous PEPRA members, and has at least 5 years of credited service (total service across all CalPERS employers and with certain other retirement systems with which CalPERS has reciprocity agreements). A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. An *eligible survivor* means the surviving spouse to whom the member was married at least one year before death. A member's survivor who is eligible for any other pre-retirement death benefit may choose to receive that death benefit instead of this Optional Settlement 2 Death benefit.

Benefit

The Optional Settlement 2 Death benefit is a monthly allowance equal to the service retirement benefit that the member would have received had the member retired on the date of his or her death and elected 100 percent to continue to the eligible survivor after the member's death. The allowance is payable as long as the surviving spouse lives, at which time it is continued to any unmarried child(ren) under age 18, if applicable. The total amount paid will be at least equal to the basic death benefit.

Special Death Benefit

This is a standard benefit for safety members. An employer may elect to provide this benefit for miscellaneous members.

Eligibility

An employee's *eligible survivor(s)* may receive the special death benefit if the member dies while actively employed and the death is job-related. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. An *eligible survivor* means the surviving spouse to whom the member was married prior to the onset of the injury or illness that resulted in death. If there is no eligible spouse, an eligible survivor means the member's unmarried child(ren) under age 22. An eligible survivor who chooses to receive this benefit will not receive any other death benefit.

Benefit

The special death benefit is a monthly allowance equal to 50 percent of final compensation, and will be increased whenever the compensation paid to active employees is increased but ceasing to increase when the member would have attained age 50. The allowance is payable to the surviving spouse until death at which time the allowance is continued to any unmarried child(ren) under age 22. There is a guarantee that the total amount paid will at least equal the basic death benefit.

If the member's death is the result of an accident or injury caused by external violence or physical force incurred in the performance of the member's duty, and there are *eligible* surviving child(ren) (*eligible* means unmarried child(ren) under age 22) in addition to an eligible spouse, then an **additional monthly allowance** is paid equal to the following:

- if 1 eligible child: 12.5 percent of final compensation
- if 2 eligible children: 20.0 percent of final compensation
- if 3 or more eligible children: 25.0 percent of final compensation

Alternate Death Benefit for Local Fire Members

This is an optional benefit available only to local fire members.

Eligibility

An employee's *eligible survivor(s)* may receive the alternate death benefit in lieu of the basic death benefit or the 1957 Survivor benefit if the member dies while actively employed and has at least 20 years of total CalPERS service. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. An *eligible survivor* means the surviving spouse to whom the member was married prior to the onset of the injury or illness that resulted in death. If there is no eligible spouse, an eligible survivor means the member's unmarried child(ren) under age 18.

Benefit

The Alternate Death benefit is a monthly allowance equal to the service retirement benefit that the member would have received had the member retired on the date of his or her death and elected Optional Settlement 2. (A retiree who elects Optional Settlement 2 receives an allowance that has been reduced so that it will continue to be paid after his or her death to a surviving beneficiary.) If the member has not yet attained age 50, the benefit is equal to that which would be payable if the member had retired at age 50, based on service credited at the time of death. The allowance is payable as long as the surviving spouse lives, at which time it is continued to any unmarried child(ren) under age 18, if applicable. The total amount paid will be at least equal to the basic death benefit.

Cost-of-Living Adjustments (COLA)

Standard Benefit

Retirement and survivor allowances are adjusted each year in May for cost of living, beginning the second calendar year after the year of retirement. The standard cost-of-living adjustment (COLA) is 2 percent. Annual adjustments are calculated by first determining the lesser of 1) 2 percent compounded from the end of the year of retirement or 2) actual rate of inflation. The resulting increase is divided by the total increase provided in prior years. For any given year, the COLA adjustment may be less than 2 percent (when the rate of inflation is low), may be greater than the rate of inflation (when the rate of inflation is low after several years of high inflation) or may even be greater than 2 percent (when inflation is high after several years of low inflation).

Improved Benefit

Employers have the option of providing a COLA of 3 percent, 4 percent, or 5 percent, determined in the same manner as described above for the standard 2 percent COLA. An improved COLA is not available with the 1.5% at 65 formula.

Purchasing Power Protection Allowance (PPPA)

Retirement and survivor allowances are protected against inflation by PPPA. PPPA benefits are cost-of-living adjustments that are intended to maintain an individual's allowance at 80 percent of the initial allowance at retirement adjusted for inflation since retirement. The PPPA benefit will be coordinated with other cost-of-living adjustments provided under the plan.

Employee Contributions

Each employee contributes toward his or her retirement based upon the retirement formula. The standard employee contribution is as described below.

- The percent contributed below the monthly compensation breakpoint is 0 percent.
- The monthly compensation breakpoint is $0 for full and supplemental formula members and $133.33 for employees covered by the modified formula.
- The percent contributed above the monthly compensation breakpoint depends upon the benefit formula, as shown in the table below.

Benefit Formula	Percent Contributed above the Breakpoint
Miscellaneous, 1.5% at 65	2%
Miscellaneous, 2% at 60	7%
Miscellaneous, 2% at 55	7%
Miscellaneous, 2.5% at 55	8%
Miscellaneous, 2.7% at 55	8%
Miscellaneous, 3% at 60	8%
Miscellaneous, 2% at 62	50% of the Total Normal Cost
Miscellaneous, 1.5% at 65	50% of the Total Normal Cost
Safety, 1/2 at 55	Varies by entry age
Safety, 2% at 55	7%
Safety, 2% at 50	9%
Safety, 3% at 55	9%
Safety, 3% at 50	9%
Safety, 2% at 57	50% of the Total Normal Cost
Safety, 2.5% at 57	50% of the Total Normal Cost
Safety, 2.7% at 57	50% of the Total Normal Cost

The employer may choose to "pick-up" these contributions for classic members (Employer Paid Member Contributions or EPMC). EPMC is prohibited for new PEPRA members.

An employer may also include Employee Cost Sharing in the contract, where employees agree to share the cost of the employer contribution. These contributions are paid in addition to the member contribution.

Auxiliary organizations of the CSU system may elect reduced contribution rates, in which case the offset is $317 and the contribution rate is 6 percent if members are not covered by Social Security. If members are covered by Social Security, the offset is $513 and the contribution rate is 5 percent.

Refund of Employee Contributions

If the member's service with the employer ends, and if the member does not satisfy the eligibility conditions for any of the retirement benefits above, the member may elect to receive a refund of his or her employee contributions, which are credited with 6 percent interest compounded annually.

1959 Survivor Benefit

This is a pre-retirement death benefit available only to members not covered by Social Security. Any agency joining CalPERS subsequent to 1993 is required to provide this benefit if the members are not covered by Social Security. The benefit is optional for agencies joining CalPERS prior to 1994. Levels 1, 2 and 3 are now closed. Any new agency or any agency wishing to add this benefit or increase the current level may only choose the 4th or Indexed Level.

This benefit is not included in the results presented in this valuation. More information on this benefit is available on the CalPERS website at www.calpers.ca.gov.

Appendix C

Participant Data

- **Summary of Valuation Data**
- **Active Members**
- **Transferred and Terminated Members**
- **Retired Members and Beneficiaries**

Summary of Valuation Data

		June 30, 2016		June 30, 2017
1. **Active Members**				
a) Counts		2,576		2,563
b) Average Attained Age		45.55		45.36
c) Average Entry Age to Rate Plan		33.69		33.81
d) Average Years of Service		11.86		11.55
e) Average Annual Covered Pay	$	66,633	$	68,856
f) Annual Covered Payroll		171,645,737		176,477,863
g) Projected Annual Payroll for Contribution Year		187,561,931		192,140,882
h) Present Value of Future Payroll		1,389,578,490		1,480,323,358
2. **Transferred Members**				
a) Counts		2,334		2,353
b) Average Attained Age		44.44		44.53
c) Average Years of Service		2.21		2.21
d) Average Annual Covered Pay	$	89,154	$	91,634
3. **Terminated Members**				
a) Counts		1,884		1,972
b) Average Attained Age		42.93		43.18
c) Average Years of Service		2.21		2.24
d) Average Annual Covered Pay	$	38,003	$	38,893
4. **Retired Members and Beneficiaries**				
a) Counts		2,279		2,475
b) Average Attained Age		64.30		64.63
c) Average Annual Benefits	$	16,848	$	17,686
5. **Active to Retired Ratio** [(1a) / (4a)]		1.13		1.04

Counts of members included in the valuation are counts of the records processed by the valuation. Multiple records may exist for those who have service in more than one valuation group. This does not result in double counting of liabilities.

Average Annual Benefits represents benefit amounts payable by this plan only. Some members may have service with another agency and would therefore have a larger total benefit than would be included as part of the average shown here.

Active Members

Counts of members included in the valuation are counts of the records processed by the valuation. Multiple records may exist for those who have service in more than one valuation group. This does not result in double counting of liabilities.

Distribution of Active Members by Age and Service

	Years of Service at Valuation Date						
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Total**
15-24	67	0	0	0	0	0	67
25-29	199	15	1	0	0	0	215
30-34	198	37	46	1	0	0	282
35-39	161	45	91	25	1	0	323
40-44	111	40	92	66	8	0	317
45-49	94	36	104	86	39	21	380
50-54	63	29	86	82	42	86	388
55-59	39	23	59	71	37	105	334
60-64	21	12	47	39	24	48	191
65 and over	11	4	17	11	7	16	66
All Ages	**964**	**241**	**543**	**381**	**158**	**276**	**2,563**

Distribution of Average Annual Salaries by Age and Service

	Years of Service at Valuation Date						
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Average**
15-24	$31,413	$0	$0	$0	$0	$0	$31,413
25-29	41,346	52,158	70,407	0	0	0	42,236
30-34	55,707	61,830	66,090	81,513	0	0	58,295
35-39	61,692	66,520	74,256	82,360	122,609	0	67,693
40-44	63,210	75,819	77,586	77,382	77,353	0	72,281
45-49	66,925	70,091	75,804	83,801	87,024	76,961	76,092
50-54	65,370	73,550	78,798	78,860	85,485	83,731	78,056
55-59	69,415	67,494	74,691	77,155	78,240	81,099	76,511
60-64	57,614	57,437	78,697	82,867	83,006	78,397	76,361
65 and over	65,219	42,410	76,008	69,013	77,722	78,322	71,750
All Ages	**$55,347**	**$67,069**	**$75,624**	**$79,764**	**$83,271**	**$80,973**	**$68,856**

Transferred and Terminated Members

Distribution of Transfers to Other CalPERS Plans by Age, Service, and average Salary

	Years of Service at Valuation Date							
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Total**	**Average Salary**
15-24	30	0	0	0	0	0	30	$59,001
25-29	107	1	0	0	0	0	108	60,476
30-34	220	12	0	0	0	0	232	77,538
35-39	408	27	7	0	0	0	442	93,250
40-44	368	30	12	6	0	0	416	96,892
45-49	413	34	12	8	3	1	471	102,979
50-54	238	34	19	10	5	2	308	98,786
55-59	146	33	12	7	2	1	201	89,687
60-64	81	13	10	2	0	0	106	76,219
65 and over	30	8	1	0	0	0	39	70,879
All Ages	**2041**	**192**	**73**	**33**	**10**	**4**	**2,353**	**91,634**

Distribution of Terminated Participants with Funds on Deposit by Age, Service, and average Salary

	Years of Service at Valuation Date							
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Total**	**Average Salary**
15-24	38	0	0	0	0	0	38	$28,547
25-29	184	2	0	0	0	0	186	30,791
30-34	291	16	1	0	0	0	308	32,473
35-39	292	24	9	2	0	0	327	39,510
40-44	231	28	11	2	0	0	272	42,828
45-49	237	32	10	8	0	2	289	44,134
50-54	178	30	14	7	1	1	231	41,300
55-59	128	33	11	3	0	1	176	41,459
60-64	76	9	4	4	0	0	93	42,791
65 and over	48	2	2	0	0	0	52	33,511
All Ages	**1703**	**176**	**62**	**26**	**1**	**4**	**1,972**	**38,893**

Retired Members and Beneficiaries

Distribution of Retirees and Beneficiaries by Age and Retirement Type*

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 30	0	0	0	0	0	5	5
30-34	0	0	1	0	0	3	4
35-39	0	0	12	1	0	3	16
40-44	0	5	10	0	0	3	18
45-49	0	3	26	0	1	4	34
50-54	121	9	43	4	2	6	185
55-59	340	25	59	2	0	12	438
60-64	515	16	51	4	1	23	610
65-69	483	20	33	1	0	19	556
70-74	277	10	23	2	0	21	333
75-79	138	5	5	1	0	21	170
80-84	58	1	4	0	0	12	75
85 and Over	24	1	1	0	0	5	31
All Ages	**1956**	**95**	**268**	**15**	**4**	**137**	**2,475**

Distribution of Average Annual Disbursements to Retirees and Beneficiaries by Age and Retirement Type*

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Average
Under 30	$0	$0	$0	$0	$0	$2,358	$2,358
30-34	0	0	1,236	0	0	12,236	9,486
35-39	0	0	333	3,872	0	9,688	2,308
40-44	0	8,705	2,057	0	0	2,797	4,027
45-49	0	14,053	3,855	0	68	21,199	6,684
50-54	6,205	11,450	7,397	13,797	88	8,500	6,909
55-59	17,781	11,605	10,382	11,609	0	17,200	16,387
60-64	21,731	7,131	16,058	18,283	28	11,555	20,432
65-69	21,531	12,170	25,824	18,325	0	13,240	21,160
70-74	20,234	11,620	23,884	9,839	0	18,831	20,076
75-79	15,296	18,982	22,895	17,847	0	20,267	16,257
80-84	13,454	4,359	22,550	0	0	11,345	13,480
85 and Over	7,753	6,119	17,700	0	0	6,383	7,800
All Ages	**$18,951**	**$11,136**	**$13,058**	**$14,084**	**$68**	**$14,121**	**$17,686**

Retired Members and Beneficiaries (continued)

Distribution of Retirees and Beneficiaries by Years Retired and Retirement Type*

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 5 Yrs	818	14	58	6	0	65	961
5-9	652	23	46	3	0	32	756
10-14	324	23	55	3	1	23	429
15-19	115	24	37	3	1	5	185
20-24	37	7	36	0	0	9	89
25-29	10	3	31	0	1	2	47
30 and Over	0	1	5	0	1	1	8
All Years	**1956**	**95**	**268**	**15**	**4**	**137**	**2,475**

Distribution of Average Annual Disbursements to Retirees and Beneficiaries by Years Retired and Retirement Type*

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Average
Under 5 Yrs	$20,845	$13,776	$8,160	$11,884	$0	$18,107	$19,735
5-9	19,423	11,878	13,760	21,435	0	13,047	18,587
10-14	16,687	11,891	14,568	12,708	68	8,572	15,656
15-19	13,257	8,954	11,868	12,508	52	9,392	12,233
20-24	10,048	9,904	14,819	0	0	7,225	11,681
25-29	5,113	9,937	18,265	0	124	14,983	14,410
30 and Over	0	4,359	10,641	0	28	1,030	7,328
All Years	**$18,951**	**$11,136**	**$13,058**	**$14,084**	**$68**	**$14,121**	**$17,686**

* Counts of members do not include alternate payees receiving benefits while the member is still working. Therefore, the total counts may not match information on C-1 of the report. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Appendix D

Normal Cost Information by Group

- **Normal Cost by Benefit Group**
- **PEPRA Member Contribution Rates**

Normal Cost by Benefit Group

The table below displays the Total Normal Cost broken out by benefit group for Fiscal Year 2019-20. The Total Normal Cost is the annual cost of service accrual for the fiscal year for active employees and can be viewed as the long-term contribution rate for the benefits contracted. Generally, the normal cost for a benefit group subject to more generous benefit provisions will exceed the normal cost for a group with less generous benefits. However, based on the characteristics of the members (particularly when the number of actives is small), this may not be the case. Future measurements of the Total Normal Cost for each group may differ significantly from the current values due to such factors as: changes in the demographics of the group, changes in economic and demographic assumptions, changes in plan benefits or applicable law.

Rate Plan Identifier	Benefit Group Name	Total Normal Cost FY 2019-20	Number of Actives	Payroll on 6/30/2017
1209	Miscellaneous First Tier	14.070%	453	36,373,049
26779	Miscellaneous PEPRA	14.332%	789	42,301,714
30588	Miscellaneous Second Tier	16.603%	1,321	97,803,099

Note that if a Benefit Group above has multiple bargaining units, each of which has separately contracted for different benefits such as Employer Paid Member Contributions, then the Normal Cost split does not reflect those differences. Additionally, if a 2nd Tier Benefit Group amended to the same benefit formula as a 1st Tier Benefit Group their Normal Costs may be dissimilar due to demographic or other population differences. In these situations you should consult with your plan actuary.

PEPRA Member Contribution Rates

The table below shows the determination of the PEPRA Member contribution rates based on 50 percent of the Total Normal Cost for each respective plan on June 30, 2017. Assembly Bill (AB) 340 created PEPRA that implemented new benefit formulas and a final compensation period as well as new contribution requirements for new employees. In accordance with Section Code 7522.30(b), "new members … shall have an initial contribution rate of at least 50 percent of the normal cost rate." The normal cost for the plan is dependent on the benefit levels, actuarial assumptions and demographics of the plan particularly the entry age into the plan. Should the total normal cost of the plan change by one percent or more from the base total normal cost established for the plan, the new member rate shall be 50 percent of the new normal cost rounded to the nearest quarter percent.

		Basis for Current Rate		Rates Effective July 1, 2019			
Rate Plan Identifier	**Benefit Group Name**	**Total Normal Cost**	**Member Rate**	**Total Normal Cost**	**Change**	**Change Needed**	**Member Rate**
26779	Miscellaneous PEPRA	13.726%	6.750%	14.332%	0.606%	No	6.750%

The PEPRA employee contribution rate determined in the table above may not necessarily be 50 percent of the Total Normal Cost by Group based on the PEPRA Normal Cost calculation methodology. Each non-pooled plan is stable with a sufficiently large demographic representation of active employees. It is preferable to determine normal cost using a large active population ongoing so that this rate remains relatively stable. The total PEPRA normal cost will be calculated using all active members within a non-pooled plan until the number of members covered under the PEPRA formula meets either:

1. 50 percent of the active population, or
2. 25 percent of the active population and 100 or more PEPRA members

Once either of the conditions above is met for a non-pooled plan, the total PEPRA normal cost will be based on the active PEPRA population in the plan.

Accordingly, the total normal cost will be funded equally between employer and employee based on the demographics of the employees of that employer.

Appendix E

Glossary of Actuarial Terms

Glossary of Actuarial Terms

Accrued Liability *(also called Actuarial Accrued Liability or Entry Age Normal Accrued Liability)*
The total dollars needed as of the valuation date to fund all benefits earned in the past for *current* members.

Actuarial Assumptions
Assumptions made about certain events that will affect pension costs. Assumptions generally can be broken down into two categories: demographic and economic. Demographic assumptions include such things as mortality, disability and retirement rates. Economic assumptions include discount rate, salary growth and inflation.

Actuarial Methods
Procedures employed by actuaries to achieve certain funding goals of a pension plan. Actuarial methods include funding method, setting the length of time to fund the Accrued Liability and determining the Value of Assets.

Actuarial Valuation
The determination, as of a valuation date of the Normal Cost, Accrued liability, and related actuarial present values for a pension plan. These valuations are performed annually or when an employer is contemplating a change to their plan provisions.

Amortization Bases
Separate payment schedules for different portions of the Unfunded Liability. The total Unfunded Liability of a Risk Pool or non-pooled plan can be segregated by "cause," creating "bases" and each such base will be separately amortized and paid for over a specific period of time. However, all bases are amortized using investment and payroll assumptions from the current valuation. This can be likened to a home having a first mortgage of 24 years remaining payments and a second mortgage that has 10 years remaining payments. Each base or each mortgage note has its own terms (payment period, principal, etc.)

Generally, in an actuarial valuation, the separate bases consist of changes in unfunded liability due to contract amendments, actuarial assumption changes, actuarial methodology changes, and/or gains and losses. Payment periods are determined by Board policy and vary based on the cause of the change.

Amortization Period
The number of years required to pay off an Amortization Base.

Classic Member (under PEPRA)
A classic member is a member who joined CalPERS prior to January 1, 2013 and who is not defined as a new member under PEPRA. (See definition of new member below)

Discount Rate Assumption
The actuarial assumption that was called "investment return" in earlier CalPERS reports or "actuarial interest rate" in Section 20014 of the California Public Employees' Retirement Law (PERL).

Entry Age
The earliest age at which a plan member begins to accrue benefits under a defined benefit pension plan. In most cases, this is the age of the member on their date of hire.

Entry Age Normal Cost Method
An actuarial cost method designed to fund a member's total plan benefit over the course of his or her career. This method is designed to yield a rate expressed as a level percentage of payroll.
(The assumed retirement age less the entry age is the amount of time required to fund a member's total benefit. Generally, the older a member on the date of hire, the greater the entry age normal cost. This is mainly because there is less time to earn investment income to fund the future benefits.)

Fresh Start

A Fresh Start is when multiple amortization bases are collapsed to one base and amortized together over a new funding period.

Funded Status

A measure of how well funded, or how "on track" a plan or risk pool is with respect to assets versus accrued liabilities. A ratio greater than 100 percent means the plan or risk pool has more assets than liabilities and a ratio less than 100 percent means liabilities are greater than assets.

GASB 68

Statement No. 68 of the Governmental Accounting Standards Board. The accounting standard governing a state or local governmental employer's accounting and financial reporting for pensions. GASB 68 replaces GASB 27 effective the first fiscal year beginning after June 15, 2014.

New Member (under PEPRA)

A new member includes an individual who becomes a member of a public retirement system for the first time on or after January 1, 2013, and who was not a member of another public retirement system prior to that date, and who is not subject to reciprocity with another public retirement system.

Normal Cost

The annual cost of service accrual for the upcoming fiscal year for active employees. The normal cost should be viewed as the long-term contribution rate.

Pension Actuary

A business professional that is authorized by the Society of Actuaries, and the American Academy of Actuaries to perform the calculations necessary to properly fund a pension plan.

PEPRA

The California Public Employees' Pension Reform Act of 2013

Prepayment Contribution

A payment made by the employer to reduce or eliminate the year's required employer contribution towards the UAL.

Present Value of Benefits (PVB)

The total dollars needed as of the valuation date to fund all benefits earned in the past or expected to be earned in the future for *current* members.

Unfunded Accrued Liability (UAL)

When a plan or pool's Value of Assets is less than its Accrued Liability, the difference is the plan or pool's Unfunded Accrued Liability (or unfunded liability). If the unfunded liability is positive, the plan or pool will have to pay contributions exceeding the Normal Cost.

Exhibit B1

California Public Employees' Retirement System
Actuarial Office
P.O. Box 942701
Sacramento, CA 94229-2701
TTY: (916) 795-3240
(888) 225-7377 phone · (916) 795-2744 fax
www.calpers.ca.gov

August 2016

SAFETY PLAN OF THE CITY OF SACRAMENTO (CalPERS ID: 7903930500)
Annual Valuation Report as of June 30, 2015

Dear Employer,

As an attachment to this letter, you will find a copy of the June 30, 2015 actuarial valuation report of your pension plan. Your 2015 actuarial valuation report contains important actuarial information about your pension plan at CalPERS. Your CalPERS staff actuary, whose signature appears in the "Actuarial Certification" section on page 1, is available to discuss the report with you after August 31, 2016.

Future Contributions

The exhibit below displays the minimum employer contributions for Fiscal Year 2017-18 and projected contributions for Fiscal Year 2018-19, before any cost sharing. The projected contributions for Fiscal Year 2018-19 are based on the most recent information available, including an estimate of the investment return for Fiscal Year 2015-16, namely 0.0 percent. For a projection of employer contributions beyond Fiscal Year 2018-19, please refer to the "Projected Employer Contributions" in the "Highlights and Executive Summary" section. This 5-year projection of future employer contributions supersedes any previous projections we have provided. The "Risk Analysis" section of the valuation report also contains estimated employer contributions in future years under a variety of investment return scenarios.

Fiscal Year	Employer Normal Cost Rate	Employer Payment of Unfunded Liability	Employee PEPRA Rate
2017-18	18.161%	$26,419,603	11.50%
2018-19 (projected)	18.2%	$32,482,781	N/A

Member contributions other than cost sharing (whether paid by the employer or the employee) are in addition to the above. **The employer contributions in this report do not reflect any cost sharing arrangement you may have with your employees.**

The estimates for Fiscal Year 2018-19 also assume that there are no future contract amendments and no liability gains or losses (such as larger than expected pay increases, more retirements than expected, etc.). This is a very important assumption because these gains and losses do occur and can have a significant impact on required contributions. These gains and losses cannot be predicted in advance so the projected employer contributions are just estimates. The actual required employer contributions for Fiscal Year 2018-19 will be provided in next year's report.

Changes since the Prior Year's Valuation

Beginning with Fiscal Year 2017-18 CalPERS will collect employer contributions toward the plan's unfunded liability as dollar amounts instead of the prior method of a contribution rate. This change will address potential funding issues that could arise from a declining payroll or reduction in the number of active members in the plan. Funding the unfunded liability as a percentage of payroll could lead to the underfunding of the plans. Although employers will be invoiced at the beginning of the fiscal year for their unfunded liability payment the plan's normal cost contribution will continue to be collected as a percentage of payroll.

The CalPERS Board of Administration adopted a Risk Mitigation Policy which is designed to reduce funding risk over time. The policy establishes a mechanism whereby CalPERS investment performance that significantly outperforms the discount rate triggers adjustments to the discount rate, expected investment return and strategic asset allocation targets. A minimum excess investment return of 4% above the existing discount rate is necessary to cause a funding risk mitigation event. The policy has no impact on the current year valuation results but is expected to have an impact in future years. More details on the Risk Mitigation Policy can be found on our website.

Besides the above noted changes, there may also be changes specific to the plan such as contract amendments and funding changes.

Further descriptions of general changes are included in the "Highlights and Executive Summary" section and in Appendix A, "Actuarial Methods and Assumptions." The effects of the changes on the required contributions are included in the "Reconciliation of Required Employer Contributions" section.

We understand that you might have a number of questions about these results. While we are very interested in discussing these results with your agency, in the interest of allowing us to give every public agency their results, we ask that you wait until after August 31 to contact us with actuarial questions. If you have other questions, you may call the Customer Contact Center at (888)-CalPERS or (**888-225-7377**).

Sincerely,

ALAN MILLIGAN
Chief Actuary

ACTUARIAL VALUATION

as of June 30, 2015

for the
SAFETY PLAN
of the
CITY OF SACRAMENTO

(CalPERS ID: 7903930500)
(Rate Plan ID: 1210)

REQUIRED CONTRIBUTIONS
FOR FISCAL YEAR
July 1, 2017 – June 30, 2018

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ACTUARIAL CERTIFICATION

To the best of our knowledge, this report is complete and accurate and contains sufficient information to disclose, fully and fairly, the funded condition of the SAFETY PLAN OF THE CITY OF SACRAMENTO. This valuation is based on the member and financial data as of June 30, 2015 provided by the various CalPERS databases and the benefits under this plan with CalPERS as of the date this report was produced. It is our opinion that the valuation has been performed in accordance with generally accepted actuarial principles, in accordance with standards of practice prescribed by the Actuarial Standards Board, and that the assumptions and methods are internally consistent and reasonable for this plan, as prescribed by the CalPERS Board of Administration according to provisions set forth in the California Public Employees' Retirement Law.

The undersigned is an actuary for CalPERS, who is a member of the American Academy of Actuaries and the Society of Actuaries and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

MAY SHUANG YU, ASA, MAAA
Senior Pension Actuary, CalPERS

HIGHLIGHTS AND EXECUTIVE SUMMARY

- **INTRODUCTION**
- **PURPOSE OF THE REPORT**
- **REQUIRED CONTRIBUTIONS**
- **PLAN'S FUNDED STATUS**
- **PROJECTED EMPLOYER CONTRIBUTIONS**
- **COST**
- **CHANGES SINCE THE PRIOR YEAR'S VALUATION**
- **SUBSEQUENT EVENTS**

Introduction

This report presents the results of the June 30, 2015 actuarial valuation of the SAFETY PLAN OF THE CITY OF SACRAMENTO of the California Public Employees' Retirement System (CalPERS). This actuarial valuation sets the required employer contributions for Fiscal Year 2017-18.

The CalPERS Board of Administration adopted a Risk Mitigation Policy which is designed to reduce funding risk over time. The policy establishes a mechanism whereby CalPERS investment performance that significantly outperforms the discount rate triggers adjustments to the discount rate, expected investment return and strategic asset allocation targets. A minimum excess investment return of 4% above the existing discount rate is necessary to cause a funding risk mitigation event. The Risk Mitigation Policy does not have an impact on the current year actuarial valuation. More details on the Risk Mitigation Policy can be found on our website.

Purpose of the Report

The actuarial valuation was prepared by the CalPERS Actuarial Office using data as of June 30, 2015. The purpose of the report is to:

- Set forth the assets and accrued liabilities of this plan as of June 30, 2015;
- Determine the required employer contributions for the fiscal year July 1, 2017 through June 30, 2018;
- Provide actuarial information as of June 30, 2015 to the CalPERS Board of Administration and other interested parties.

The pension funding information presented in this report should not be used in financial reports subject to Governmental Accounting Standards Board (GASB) Statement No. 68 for an Agent Employer Defined Benefit Pension Plan. A separate accounting valuation report for such purposes is available from CalPERS and details for ordering are available on our website.

The use of this report for any other purposes may be inappropriate. In particular, this report does not contain information applicable to alternative benefit costs. The employer should contact their actuary before disseminating any portion of this report for any reason that is not explicitly described above.

California Actuarial Advisory Panel Recommendations

This report includes all the basic disclosure elements as described in the *Model Disclosure Elements for Actuarial Valuation Reports* recommended in 2011 by the California Actuarial Advisory Panel (CAAP), with the exception of including the original base amounts of the various components of the unfunded liability in the Schedule of Amortization Bases shown on page 15.

Additionally, this report includes the following "Enhanced Risk Disclosures" also recommended by the CAAP in the Model Disclosure Elements document:

- A "Deterministic Stress Test," projecting future results under different investment income scenarios
- A "Sensitivity Analysis," showing the impact on current valuation results using a 1 percent plus or minus change in the discount rate.

Required Contributions

		Fiscal Year
Required Employer Contribution		**2017-18**
Employer Normal Cost Rate		**18.161%**
Plus Either		
1) Monthly Employer Dollar UAL Payment	**$**	**2,201,634**
Or		
2) Annual UAL Prepayment Option	**$**	**25,481,328**
Required PEPRA Member Contribution Rate		**11.50%**

*The total minimum required employer contribution is the **sum** of the Plan's Employer Normal Cost Rate (expressed as a percentage of payroll) **plus** the Employer Unfunded Accrued Liability (UAL) Contribution Amount (billed monthly in dollars). Only the UAL portion of the employer contribution can be prepaid (which must be received in full no later than July 31). Plan Normal Cost contributions will be made as part of the payroll reporting process. If there is contractual cost sharing or other change, this amount will change. §20572 of the Public Employees' Retirement Law assesses interest at an annual rate of 10 percent if a contracting agency fails to remit the required contributions when due. For additional detail regarding the determination of the required contribution for PEPRA members, see Appendix D. Required member contributions for Classic members can be found in Appendix B.*

		Fiscal Year 2016-17		Fiscal Year 2017-18
Normal Cost Contribution as a Percentage of Payroll				
Total Normal Cost		27.436%		27.336%
Employee Contribution[1]		9.075%		9.175%
Employer Normal Cost		18.361%		18.161%
Projected Annual Payroll for Contribution Year	$	118,892,337	$	127,435,395
Estimated Employer Contributions Based On Projected Payroll				
Total Normal Cost	$	32,619,302	$	34,835,740
Employee Contribution[1]		10,789,480		11,692,197
Employer Normal Cost		21,829,822		23,143,543
Unfunded Liability Contribution		21,980,970		26,419,603
Estimated Total Employer Contribution[2]	$	43,810,792	$	49,563,146

[1] For classic members, this is the percentage specified in the Public Employees Retirement Law, net of any reduction from the use of a modified formula or other factors. For PEPRA members, the member contribution rate is based on 50 percent of the normal cost. A development of PEPRA member contribution rates can be found in Appendix D. Employee cost sharing is not shown in this report.

[2] As a percentage of projected payroll the UAL contribution for Fiscal Year 2017-18 is 20.732 percent for an estimated total employer contribution rate of 38.893 percent. As determined in the June 30, 2014 valuation, the Fiscal Year 2016-17 UAL contribution is 18.488 percent for a total employer contribution rate of 36.849 percent.

Plan's Funded Status

	June 30, 2014	June 30, 2015
1. Present Value of Projected Benefits	$ 1,798,183,157	$ 1,903,397,078
2. Entry Age Normal Accrued Liability	1,517,439,523	1,604,715,617
3. Market Value of Assets (MVA)	$ 1,142,219,279	$ 1,142,199,265
4. Unfunded Accrued Liability (UAL) [(2) – (3)]	$ 375,220,244	$ 462,516,352
5. Funded Ratio [(3) / (2)]	75.3%	71.2%

Projected Employer Contributions

The estimated employer contribution for Fiscal Year 2018-19 is based on a projection of the most recent information we have available, including an estimated 0.0 percent investment return for Fiscal Year 2015-16.

The table below shows projected employer contributions (before cost sharing) for the next five fiscal years, assuming CalPERS earns 0.0 percent for Fiscal Year 2015-16 and 7.50 percent every fiscal year thereafter, and assuming that all other actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur during the projection period. The projected normal cost percentages do not reflect that the normal cost will decline over time as new employees are hired into PEPRA or other lower cost benefit tiers.

	Required Contribution	**Projected Future Employer Contributions**				
Fiscal Year	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
Normal Cost %	18.161%	18.2%	18.2%	18.2%	18.2%	18.2%
UAL $	26,419,603	32,482,781	38,885,976	43,045,612	47,162,823	50,128,673

For projected contributions under alternate investment return scenarios, please see the "Analysis of Future Investment Return Scenarios" in the "Risk Analysis" section.

Cost

Actuarial Cost Estimates in General

What will this pension plan cost? Unfortunately, there is no simple answer. There are two major reasons for the complexity of the answer. First, actuarial calculations, including the ones in this report, are based on a number of assumptions about the future. These assumptions can be divided into two categories.

- Demographic assumptions include the percentage of employees that will terminate, die, become disabled, and retire in each future year.
- Economic assumptions include future salary increases for each active employee, and the assumption with the greatest impact: future asset returns at CalPERS for each year into the future until the last dollar is paid to current members of the plan.

While CalPERS has set these assumptions to reflect our best estimate of the real future of the plan, it must be understood that these assumptions are very long-term predictors and will surely not be realized in any one year. For example, while the asset earnings at CalPERS have averaged more than the assumed return of 7.5 percent for the past twenty year period ending June 30, 2015, returns for each fiscal year ranged from negative -24 percent to +21.7 percent.

Second, the very nature of actuarial funding produces the answer to the question of plan cost as the sum of two separate pieces.

- The Normal Cost (i.e., the annual cost associated with one year of service accrual) expressed as a percentage of total active payroll.
- The Past Service Cost or Accrued Liability (i.e., the current value of the benefit for all credited past service of current members) which is expressed as a lump sum dollar amount.

The cost is the sum of a percent of future pay and a lump sum dollar amount. In prior years CalPERS converted Past Service Cost to a percent of payroll and expressed the total required employer contribution as a single rate. Going forward the Past Service Cost will no longer be converted to a percent of payroll and this cost will be invoiced to the employer as a monthly dollar contribution amount with the option to prepay the annual amount at the beginning of the fiscal year. The normal cost will continue to be expressed as a percentage of active payroll with employer and employee contributions payable as part of the payroll reporting process.

Changes since the Prior Year's Valuation

Benefits

The standard actuarial practice at CalPERS is to recognize mandated legislative benefit changes in the first annual valuation following the effective date of the legislation. Voluntary benefit changes by plan amendment are generally included in the first valuation that is prepared after the amendment becomes effective, even if the valuation date is prior to the effective date of the amendment.

This valuation generally reflects plan changes by amendments effective before the date of the report. Please refer to the "Plan's Major Benefit Options" and Appendix B for a summary of the plan provisions used in this valuation. The effect of any mandated benefit changes or plan amendments on the unfunded liability is shown in the "(Gain)/Loss Analysis" and the effect on the employer contribution is shown in the "Reconciliation of Required Employer Contributions." It should be noted that no change in liability or contribution is shown for any plan changes which were already included in the prior year's valuation.

Actuarial Methods and Assumptions

Beginning with Fiscal Year 2017-18 CalPERS will collect employer contributions toward the plan's unfunded liability as dollar amounts instead of the prior method of a contribution rate. This change will address potential funding issues that could arise from a declining payroll or reduction in the number of active members in the plan. Funding the unfunded liability as a percentage of payroll could lead to the underfunding of the plans. Although employers will be invoiced at the beginning of the fiscal year for their unfunded liability payment the plan's normal cost contribution will continue to be collected as a percentage of payroll.

Subsequent Events

Risk Mitigation

The CalPERS Board of Administration adopted a Risk Mitigation Policy which is designed to reduce funding risk over time. The policy establishes a mechanism whereby CalPERS investment performance that significantly outperforms the discount rate triggers adjustments to the discount rate, expected investment return and strategic asset allocation targets. A minimum excess investment return of 4% above the existing discount rate is necessary to cause a funding risk mitigation event. More details on the Risk Mitigation Policy can be found on our website.

ASSETS

- **RECONCILIATION OF THE MARKET VALUE OF ASSETS**
- **ASSET ALLOCATION**
- **CALPERS HISTORY OF INVESTMENT RETURNS**

Reconciliation of the Market Value of Assets

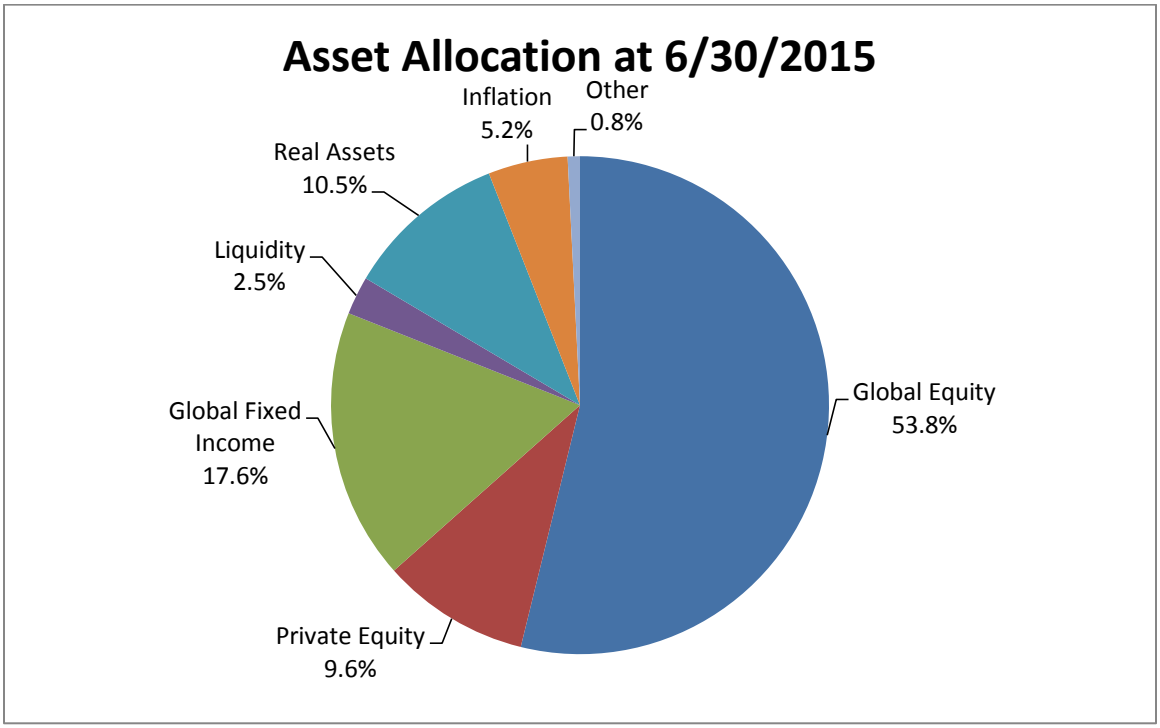
1.	Market Value of Assets as of 6/30/14 including Receivables	$	1,142,219,279
2.	Change in Receivables for Service Buybacks as of 6/30/14		(310,302)
3.	Employer Contributions		30,798,271
4.	Employee Contributions		15,443,411
5.	Benefit Payments to Retirees and Beneficiaries		(70,336,902)
6.	Refunds		(207,797)
7.	Lump Sum Payments		0
8.	Transfers and Miscellaneous Adjustments		432,297
9.	Investment Return		24,161,008
10.	Market Value of Assets as of 6/30/15 including Receivables	$	1,142,199,265

Asset Allocation

CalPERS adheres to an Asset Allocation Strategy which establishes asset class allocation policy targets and ranges, and manages those asset class allocations within their policy ranges. CalPERS Investment Belief No. 6 recognizes that strategic asset allocation is the dominant determinant of portfolio risk and return. On February 19, 2014, the CalPERS Board of Administration adopted changes to the current asset allocation as shown in the Policy Target Allocation below expressed as a percentage of total assets. The asset allocation has an expected long term blended rate of return of 7.5 percent.

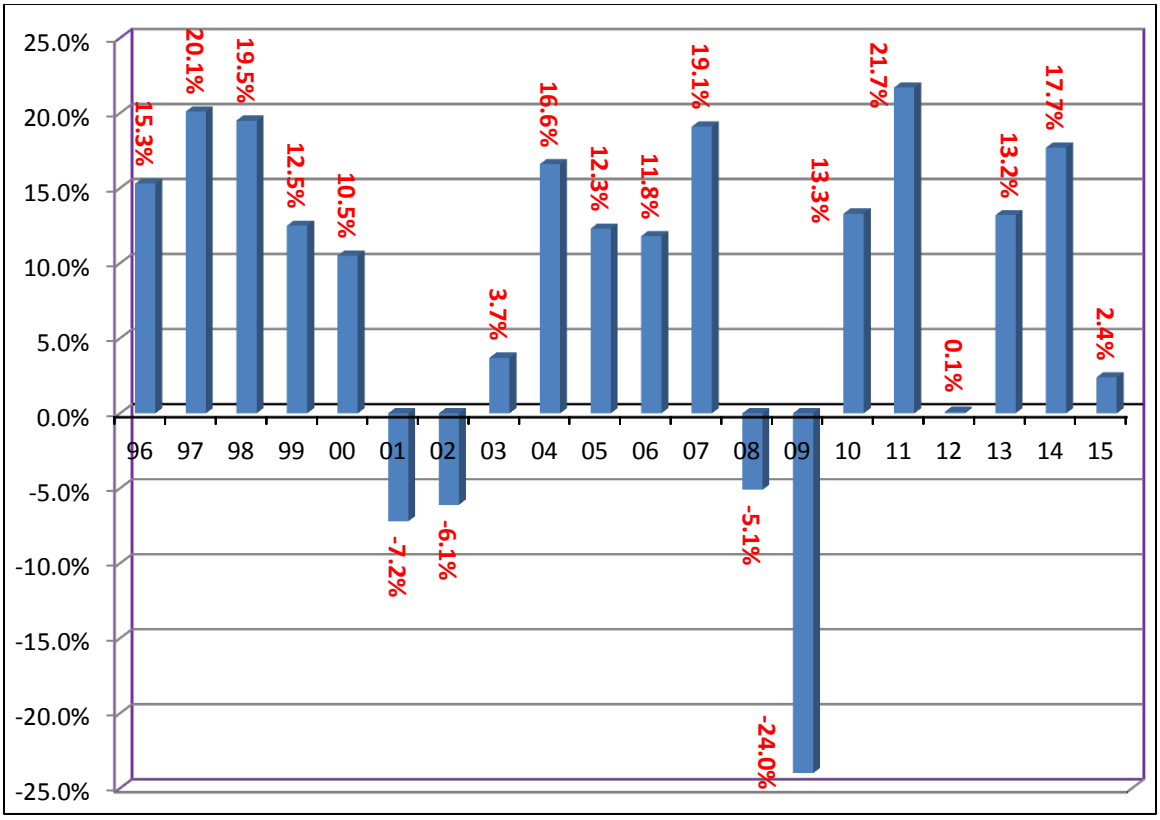
The asset allocation and market value of assets shown below reflect the values of the Public Employees' Retirement Fund (PERF) in its entirety as of June 30, 2015. The assets for CITY OF SACRAMENTO SAFETY PLAN are part of the PERF and are invested accordingly.

(A) Asset Class	(B) Market Value ($ Billion)	(C) Policy Target Allocation
Global Equity	162.5	51.0%
Private Equity	29.0	10.0%
Global Fixed Income	53.1	20.0%
Liquidity	7.5	1.0%
Real Assets	31.8	12.0%
Inflation Sensitive Assets	15.6	6.0%
Other	2.4	0.0%
Total Fund	**$301.9**	**100.0%**



CalPERS History of Investment Returns

The following is a chart with the 20-year historical annual returns of the Public Employees Retirement Fund for each fiscal year ending on June 30. Beginning in 2002, the figures are reported as gross of fees.



The table below shows historical geometric mean annual returns of the Public Employees Retirement Fund for various time periods ending on June 30, 2015, (figures are reported as gross of fees). The geometric mean rate of return is the average rate per period compounded over multiple periods. It should be recognized that in any given year the rate of return is volatile. Although the expected rate of return on the recently adopted new asset allocation is 7.5 percent, the portfolio has an expected volatility of 11.76 percent per year. The volatility is a measure of the risk of the portfolio expressed in the standard deviation of the fund's total return distribution, expressed as a percentage. Consequently, when looking at investment returns, it is more instructive to look at returns over longer time horizons.

History of CalPERS Geometric Mean Rates of Return and Volatilities					
	1 year	**5 year**	**10 year**	**20 year**	**30 year**
Geometric Return	2.4%	10.7%	6.1%	7.7%	9.1%
Volatility	–	9.4%	14.0%	11.8%	10.5%

LIABILITIES AND CONTRIBUTIONS

- **DEVELOPMENT OF ACCRUED AND UNFUNDED LIABILITIES**
- **(GAIN) / LOSS ANALYSIS 06/30/14 - 06/30/15**
- **SCHEDULE OF AMORTIZATION BASES**
- **30-YEAR AMORTIZATION SCHEDULES AND ALTERNATIVES**
- **RECONCILIATION OF REQUIRED EMPLOYER CONTRIBUTIONS**
- **EMPLOYER CONTRIBUTION HISTORY**
- **FUNDING HISTORY**

Development of Accrued and Unfunded Liabilities

		June 30, 2014	June 30, 2015
1. Present Value of Projected Benefits			
a) Active Members	$	815,365,262	867,422,156
b) Transferred Members		35,826,921	36,974,802
c) Terminated Members		6,565,521	7,597,793
d) Members and Beneficiaries Receiving Payments		940,425,453	991,402,327
e) Total	$	1,798,183,157	1,903,397,078
2. Present Value of Future Employer Normal Costs	$	185,759,435	194,916,532
3. Present Value of Future Employee Contributions	$	94,984,199	103,764,929
4. Entry Age Normal Accrued Liability			
a) Active Members [(1a) - (2) - (3)]	$	534,621,628	568,740,695
b) Transferred Members (1b)		35,826,921	36,974,802
c) Terminated Members (1c)		6,565,521	7,597,793
d) Members and Beneficiaries Receiving Payments (1d)		940,425,453	991,402,327
e) Total	$	1,517,439,523	1,604,715,617
5. Market Value of Assets (MVA)	$	1,142,219,279	1,142,199,265
6. Unfunded Accrued Liability (UAL) [(4e) - (5)]	$	375,220,244	462,516,352
7. Funded Ratio [(5) / (4e)]		75.3%	71.2%

(Gain)/Loss Analysis 6/30/14 – 6/30/15

To calculate the cost requirements of the plan, assumptions are made about future events that affect the amount and timing of benefits to be paid and assets to be accumulated. Each year, actual experience is compared to the expected experience based on the actuarial assumptions. This results in actuarial gains or losses, as shown below.

1. Total (Gain)/Loss for the Year		
a) Unfunded Accrued Liability (UAL) as of 6/30/14	$	375,220,244
b) Expected Payment on the UAL during 2014/2015		14,212,392
c) Interest through 6/30/15 [.075 x (1a) - ((1.075)^{½} - 1) x (1b)]		27,618,189
d) Expected UAL before all other changes [(1a) - (1b) + (1c)]		388,626,041
e) Change due to plan changes		0
f) Change due to assumption change		0
g) Expected UAL after all other changes [(1d) + (1e) + (1f)]		388,626,041
h) Actual UAL as of 6/30/15		462,516,352
i) Total (Gain)/Loss for 2014/2015 [(1h) - (1g)]	$	73,890,311
2. Contribution (Gain)/Loss for the Year		
a) Expected Contribution (Employer and Employee)	$	45,043,263
b) Interest on Expected Contributions		1,658,586
c) Actual Contributions		46,241,682
d) Interest on Actual Contributions		1,702,714
e) Expected Contributions with Interest [(2a) + (2b)]		46,701,849
f) Actual Contributions with Interest [(2c) + (2d)]		47,944,396
g) Contribution (Gain)/Loss [(2e) - (2f)]	$	(1,242,547)
3. Asset (Gain)/Loss for the Year		
a) Market Value of Assets as of 6/30/14	$	1,142,219,279
b) Prior Fiscal Year Receivables		(1,980,060)
c) Current Fiscal Year Receivables		1,669,758
d) Contributions Received		46,241,682
e) Benefits and Refunds Paid		(70,544,699)
f) Transfers and Miscellaneous Adjustments		432,297
g) Expected Int. [.075 x (3a + 3b) + ((1.075)^{½} - 1) x ((3d) + (3e) + (3f))]		84,638,972
h) Expected Assets as of 6/30/15 [(3a) + (3b) + (3c) + (3d) + (3e) + (3f) + (3g)]		1,202,677,229
i) Market Value of Assets as of 6/30/15		1,142,199,265
j) Asset (Gain)/Loss [(3h) **-** (3i)]	$	60,477,964
4. Liability (Gain)/Loss for the Year		
a) Total (Gain)/Loss (1i)	$	73,890,311
b) Contribution (Gain)/Loss (2g)		(1,242,547)
c) Asset (Gain)/Loss (3j)		60,477,964
d) Liability (Gain)/Loss [(4a) - (4b) - (4c)]	$	14,654,894

Schedule of Amortization Bases

There is a two-year lag between the valuation date and the start of the contribution fiscal year.

- The assets, liabilities, and funded status of the plan are measured as of the valuation date: June 30, 2015.
- The required employer contributions determined by the valuation are for the fiscal year beginning two years after the valuation date: Fiscal Year 2017-18.

This two-year lag is necessary due to the amount of time needed to extract and test the membership and financial data, and the need to provide public agencies with their required employer contribution well in advance of the start of the fiscal year.

The Unfunded Accrued Liability (UAL) is used to determine the employer contribution and therefore must be rolled forward two years from the valuation date to the first day of the fiscal year for which the contribution is being determined. The UAL is rolled forward each year by subtracting the expected payment on the UAL for the fiscal year and adjusting for interest. The expected payment on the UAL for a fiscal year is equal to the Expected Employer Contribution for the fiscal year minus the Expected Normal Cost for the year. The Employer Contribution for the first fiscal year is determined by the actuarial valuation two years ago and the contribution for the second year is from the actuarial valuation one year ago. The Normal Cost Rate for each of the two fiscal years is assumed to be the same as the rate determined by the current valuation. All expected dollar amounts are determined by multiplying the rate by the expected payroll for the applicable fiscal year, based on payroll as of the valuation date.

Reason for Base	Date Established	Amorti-zation Period	Balance 6/30/15	Expected Payment 2015-16	Balance 6/30/16	Expected Payment 2016-17	Balance 6/30/17	Scheduled Payment for 2017-18
BENEFIT CHANGE	06/30/01	6	$1,057,829	$158,470	$972,862	$163,224	$876,592	$168,121
BENEFIT CHANGE	06/30/04	8	$1,511,005	$188,482	$1,428,908	$194,136	$1,334,791	$199,961
BENEFIT CHANGE	06/30/05	9	$1,461,341	$169,027	$1,395,690	$174,098	$1,319,859	$179,321
ASSUMPTION CHANGE	06/30/07	8	$2,592,500	$323,387	$2,451,642	$333,089	$2,290,162	$343,081
ARNETT CASE	06/30/07	8	$61,640	$7,689	$58,291	$7,920	$54,451	$8,157
METHOD CHANGE	06/30/07	9	$(2,971,397)	$(343,689)	$(2,837,908)	$(353,999)	$(2,683,717)	$(364,619)
BENEFIT CHANGE	06/30/08	12	$654,631	$63,074	$638,331	$64,967	$618,847	$66,916
BENEFIT CHANGE	06/30/08	12	$1,006,726	$96,999	$981,659	$99,909	$951,696	$102,906
ASSUMPTION CHANGE	06/30/09	14	$26,173,208	$2,292,559	$25,759,223	$2,361,336	$25,242,879	$2,432,176
SPECIAL (GAIN)/LOSS	06/30/09	24	$31,891,178	$2,062,684	$32,144,380	$2,124,565	$32,352,413	$2,188,302
SPECIAL (GAIN)/LOSS	06/30/10	25	$(493,092)	$(31,251)	$(497,672)	$(32,189)	$(501,623)	$(33,155)
ASSUMPTION CHANGE	06/30/11	16	$18,417,105	$1,488,926	$18,254,636	$1,533,594	$18,033,669	$1,579,602
SPECIAL (GAIN)/LOSS	06/30/11	26	$(6,079,165)	$(378,004)	$(6,143,180)	$(389,344)	$(6,200,238)	$(401,024)
PAYMENT (GAIN)/LOSS	06/30/12	27	$1,218,048	$74,391	$1,232,271	$76,623	$1,245,247	$78,922
(GAIN)/LOSS	06/30/12	27	$171,427,242	$10,469,758	$173,429,009	$10,783,851	$175,255,249	$11,107,367
(GAIN)/LOSS	06/30/13	28	$159,366,925	$2,241,501	$168,995,406	$4,617,493	$176,882,543	$7,134,026
ASSUMPTION CHANGE	06/30/14	19	$90,303,770	$(1,349,370)	$98,475,609	$1,875,733	$103,916,479	$3,864,009
(GAIN)/LOSS	06/30/14	29	$(108,973,451)	$436,579	$(117,599,115)	$(1,654,036)	$(124,704,108)	$(3,407,313)
(GAIN)/LOSS	06/30/15	30	$73,890,309	$850,404	$78,550,365	$1,016,788	$83,387,414	$1,172,847
TOTAL			**$462,516,352**	**$18,821,616**	**$477,690,407**	**$22,997,758**	**$489,672,605**	**$26,419,603**

30-Year Amortization Schedule and Alternatives

The amortization schedule on the previous page shows the minimum contributions required according to CalPERS amortization policy. There has been considerable interest from many agencies in paying off these unfunded accrued liabilities sooner and the possible savings in doing so. As a result, we have provided alternate amortization schedules to help analyze the current amortization schedule and illustrate the advantages of accelerating unfunded liability payments.

Shown on the following page are future year amortization payments based on 1) the current amortization schedule reflecting the individual bases and remaining periods shown on the previous page, and 2) alternate "fresh start" amortization schedules using two sample periods that would both result in interest savings relative to the current amortization schedule. Note that the payments under each alternate scenario increase by 3 percent for each year into the future. The schedules do not attempt to reflect any experience after June 30, 2015 that may deviate from the actuarial assumptions. Therefore, future amortization payments displayed in the Current Amortization Schedule may not match projected amortization payments shown in connection with Projected Employer Contributions provided elsewhere in this report.

The Current Amortization Schedule typically contains individual bases that are both positive and negative. Positive bases result from plan changes, assumption changes or plan experience that result in increases to unfunded liability. Negative bases result from plan changes, assumption changes or plan experience that result in decreases to unfunded liability. The combination of positive and negative bases within an amortization schedule can result in unusual or problematic circumstances in future years such as:

- A positive total unfunded liability with a negative total payment,
- A negative total unfunded liability with a positive total payment, or
- Total payments that completely amortize the unfunded liability over a very short period of time

In any year where one of the above scenarios occurs, the actuary will consider corrective action such as replacing the existing unfunded liability bases with a single "fresh start" base and amortizing it over a reasonable period.

The Current Amortization Schedule on the following page may appear to show that, based on the current amortization bases, one of the above scenarios will occur at some point in the future. It is impossible to know today whether such a scenario will in fact arise since there will be additional bases added to the amortization schedule in each future year. Should such a scenario arise in any future year, the actuary will take appropriate action based on guidelines in the CalPERS amortization policy. For purposes of this display, total payments include any negative payments. Therefore, the amount of estimated savings may be understated to the extent that negative payments appear in the current schedule.

30-Year Amortization Schedule and Alternatives

	Current Amortization Schedule		Alternate Schedules			
			20 Year Amortization		15 Year Amortization	
Date	**Balance**	**Payment**	**Balance**	**Payment**	**Balance**	**Payment**
6/30/2017	489,672,605	26,419,603	489,672,605	36,972,940	489,672,605	44,888,060
6/30/2018	499,005,627	31,104,768	488,063,691	38,082,128	479,857,119	46,234,702
6/30/2019	504,180,938	36,047,269	485,184,077	39,224,592	467,909,244	47,621,743
6/30/2020	504,619,902	38,659,810	480,903,961	40,401,329	453,627,163	49,050,395
6/30/2021	502,383,049	41,139,655	475,082,768	41,613,369	436,792,668	50,521,907
6/30/2022	497,407,276	42,373,844	467,568,316	42,861,770	417,169,890	52,037,564
6/30/2023	490,778,688	43,444,315	458,195,911	44,147,623	394,503,936	53,598,691
6/30/2024	482,543,066	44,747,645	446,787,374	45,472,052	368,519,426	55,206,652
6/30/2025	472,338,452	45,391,832	433,150,000	46,836,214	338,918,907	56,862,852
6/30/2026	460,700,582	46,995,358	417,075,430	48,241,300	305,381,166	58,568,737
6/30/2027	446,527,302	48,405,218	398,338,443	49,688,539	267,559,394	60,325,799
6/30/2028	429,829,251	49,857,375	376,695,652	51,179,195	225,079,229	62,135,573
6/30/2029	410,373,218	51,110,971	351,884,107	52,714,571	177,536,638	63,999,640
6/30/2030	388,158,225	52,644,301	323,619,784	54,296,008	124,495,646	65,919,630
6/30/2031	362,687,320	50,544,746	291,595,969	55,924,888	65,485,893	67,897,219
6/30/2032	337,482,961	49,051,087	255,481,508	57,602,635		
6/30/2033	311,936,934	44,887,523	214,918,938	59,330,714		
6/30/2034	288,791,830	43,040,838	169,522,464	61,110,636		
6/30/2035	265,825,526	41,042,955	118,875,794	62,943,955		
6/30/2036	243,208,199	38,886,462	62,529,797	64,832,273		
6/30/2037	221,130,472	40,053,056				
6/30/2038	196,187,365	41,254,648				
6/30/2039	168,127,687	42,492,288				
6/30/2040	136,680,324	43,767,056				
6/30/2041	101,552,698	35,797,698				
6/30/2042	72,053,307	35,529,104				
6/30/2043	40,619,945	33,476,169				
6/30/2044	8,957,610	5,529,313				
6/30/2045	3,896,517	1,468,935				
6/30/2046	2,665,733	2,763,891				
Totals		**1,147,927,733**		**993,476,731**		**834,869,164**
Estimated Savings				**154,451,002**		**313,058,569**

Reconciliation of Required Employer Contributions

Normal Cost (% of Payroll)

1. For Period 7/1/16 – 6/30/17	
a) Employer Normal Cost	18.361%
b) Employee Contribution	9.075%
c) Total Normal Cost	27.436%
2. Effect of changes since the prior year annual valuation	
a) Effect of changes in demographics results	(0.100%)
b) Effect of plan changes	0.000%
c) Effect of changes in assumptions	0.000%
d) Net effect of the changes above [sum of (a) through (c)]	(0.100%)
3. For Period 7/1/17 – 6/30/18	
a) Employer Normal Cost	18.161%
b) Employee Contribution	9.175%
c) Total Normal Cost	27.336%
Employer Normal Cost Change [(3a) – (1a)]	(0.200%)
Employee Contribution Change [(3b) – (1b)]	0.100%

Unfunded Liability Contribution ($)

1. For Period 7/1/16 – 6/30/17	21,980,970
2. Effect of changes since the prior year annual valuation	
a) Effect of changes in demographics and financial results	1,172,847
b) Effect of plan changes	0
c) Effect of changes in assumptions	0
d) Effect of progression of amortization payments	3,265,786
e) Effect of changes due to Fresh Start	0
f) Effect of elimination of amortization base	0
g) Net effect of the changes above [sum of (a) through (f)]	4,438,633
3. For Period 7/1/17 – 6/30/18 [(1)+(2g)]	26,419,603

The amounts shown for the period 7/1/16 – 6/30/17 may be different if a prepayment of unfunded actuarial liability is made or a plan change became effective after the prior year's actuarial valuation was performed.

Employer Contribution History

The table below provides a recent history of the required employer contributions for the plan, as determined by the annual actuarial valuation. It does not account for prepayments or benefit changes made during a fiscal year.

		Required By Valuation	
Fiscal Year	**Employer Normal Cost**	**Unfunded Rate**	**Unfunded Liability Payment ($)**
2012 - 13	16.933%	10.848%	N/A
2013 - 14	17.324%	11.351%	N/A
2014 - 15	17.403%	13.715%	N/A
2015 - 16	17.394%	16.608%	N/A
2016 - 17	18.361%	18.488%	N/A
2017 - 18	18.161%	N/A	26,419,603

Funding History

The table below shows the recent history of the actuarial accrued liability, the market value of assets, the funded ratio and the annual covered payroll.

Valuation Date	Accrued Liability	Market Value of Assets (MVA)	Unfunded Liability	Funded Ratio	Annual Covered Payroll
06/30/10	$ 1,183,446,683	$ 770,296,873	$ 413,149,810	65.1%	$ 110,512,734
06/30/11	1,249,347,774	916,725,639	332,622,135	73.4%	109,446,416
06/30/12	1,313,218,710	897,431,991	415,786,719	68.3%	107,811,628
06/30/13	1,370,866,286	992,363,894	378,502,392	72.4%	104,054,754
06/30/14	1,517,439,523	1,142,219,279	375,220,244	75.3%	108,803,331
06/30/15	1,604,715,617	1,142,199,265	462,516,352	71.2%	116,621,439

RISK ANALYSIS

- **ANALYSIS OF FUTURE INVESTMENT RETURN SCENARIOS**
- **ANALYSIS OF DISCOUNT RATE SENSITIVITY**
- **VOLATILITY RATIOS**
- **HYPOTHETICAL TERMINATION LIABILITY**

Analysis of Future Investment Return Scenarios

The investment return for Fiscal Year 2015-16 was not known at the time this report was produced. The investment return in Fiscal Year 2015-16 as of April 30, 2016 is 0.0 percent before administrative expenses. For purposes of projecting future employer contributions, we are assuming a 0.0 percent investment return for Fiscal Year 2015-16.

The investment return realized during a fiscal year first affects the required contribution for the fiscal year two years later. For example, the investment return for Fiscal Year 2015-16 will first be reflected in the June 30, 2016 actuarial valuation that will be used to set the employer contribution for Fiscal Year 2018-19. The Fiscal Year 2016-17 investment return will first be reflected in the June 30, 2017 actuarial valuation that will be used to set the employer contribution for Fiscal Year 2019-20 and so forth.

As part of this report, a sensitivity analysis was performed to determine the effects of various investment returns during fiscal years 2016-17, 2017-18 and 2018-19 on the 2019-20, 2020-21 and 2021-22 employer contributions. Once again, the projections assume that all other actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur.

Five different investment return scenarios were selected.

- The first scenario is a -3.8 percent return for each of the 2016-17, 2017-18, and 2018-19 fiscal years. Based on the current investment allocation, this is what one would expect if the markets were to give us about a 5th percentile return from July 1, 2016 through June 30, 2019.
- The second scenario is a 2.8 percent return for each of the 2016-17, 2017-18, and 2018-19 fiscal years. Based on the current investment allocation, this is what one would expect if the markets were to give us about a 25th percentile return from July 1, 2016 through June 30, 2019.
- The third scenario is a 7.5 percent return for each of the 2016-17, 2017-18, and 2018-19 fiscal years. Based on the current investment allocation, this is what one would expect if the markets were to give us about a 49th percentile return from July 1, 2016 through June 30, 2019.
- The fourth scenario is a 12.0 percent return for each of the 2016-17, 2017-18, and 2018-19 fiscal years. Based on the current investment allocation, this is what one would expect if the markets were to give us about a 75th percentile return from July 1, 2016 through June 30, 2019.
- Finally, the last scenario is an 18.9 percent return for each of the 2016-17, 2017-18, and 2018-19 fiscal years. Based on the current investment allocation, this is what one would expect if the markets were to give us about a 95th percentile return from July 1, 2016 through June 30, 2019.

The table below shows the estimated projected contributions and the estimated increases for the plan under the five different scenarios.

2016-19 Investment Return Scenario	Fiscal Year			Estimated Change Between 2018-19 and 2021-22
	2019-20	2020-21	2021-22	
(3.8%)				
Normal Cost	18.2%	18.2%	18.2%	0.0%
UAL Contribution	$40,926,941	$49,183,273	$59,477,472	$26,994,691
2.8%				
Normal Cost	18.2%	18.2%	18.2%	0.0%
UAL Contribution	$39,734,980	$45,654,780	$52,511,504	$20,028,723
7.5%				
Normal Cost	18.2%	18.2%	18.2%	0.0%
UAL Contribution	$38,885,976	$43,045,612	$47,162,823	$14,680,042
12.0%				
Normal Cost	18.5%	18.9%	19.3%	1.1%
UAL Contribution	$38,074,018	$40,662,240	$42,308,775	$9,825,994
18.9%				
Normal Cost	19.3%	20.5%	21.6%	3.4%
UAL Contribution	$36,848,409	$37,074,336	$34,906,675	$2,423,894

For the last two scenarios in the table above the results incorporate the impact of CalPERS Risk Mitigation Policy. A 12.0% return would result in a reduction of the discount rate by 0.05% and a return of 18.9% would reduce the discount rate by 0.15%. Reducing the discount rate increases both the plan's accrued liability and normal cost. While the projections reflect estimated changes to the normal cost due to lower discount rates, they do not reflect the possible increase in the PEPRA member contribution rate in such scenarios. More details about the Risk Mitigation policy can be found on our website.

The projected normal cost percentages do not reflect that the normal cost will decline over time as new employees are hired into PEPRA or other lower cost benefit tiers.

Analysis of Discount Rate Sensitivity

The following analysis looks at the Fiscal Year 2017-18 total normal cost rates and liabilities under two different discount rate scenarios. Shown below are the total normal cost rates assuming discount rates that are 1 percent lower and 1 percent higher than the current valuation discount rate. This analysis shows the potential plan impacts if the PERF were to realize investment returns of 6.50 percent or 8.50 percent over the long-term.

This type of analysis gives the reader a sense of the long-term risk to required contributions.

Sensitivity Analysis			
As of June 30, 2015	**6.50% Discount Rate (-1%)**	**7.50% Discount Rate (assumed rate)**	**8.50% Discount Rate (+1%)**
Plan's Total Normal Cost	34.993%	27.336%	21.579%
Accrued Liability	$1,830,099,129	$1,604,715,617	$1,420,116,281
Unfunded Accrued Liability	$687,899,864	$462,516,352	$277,917,016

Volatility Ratios

The actuarial calculations supplied in this communication are based on a number of assumptions about long-term demographic and economic behavior. Unless these assumptions (terminations, deaths, disabilities, retirements, salary growth, and investment return) are exactly realized each year, there will be differences on a year-to-year basis. The year-to-year differences between actual experience and the assumptions are called actuarial gains and losses and serve to lower or raise required employer contributions from one year to the next. Therefore, employer contributions will inevitably fluctuate, especially due to the ups and downs of investment returns.

Asset Volatility Ratio (AVR)

Plans that have higher asset-to-payroll ratios experience more volatile employer contributions (as a percentage of payroll) due to investment return. For example, a plan with an asset-to-payroll ratio of 8 may experience twice the contribution volatility due to investment return volatility than a plan with an asset-to-payroll ratio of 4. Shown below is the asset volatility ratio, a measure of the plan's current volatility. It should be noted that this ratio is a measure of the current situation. It increases over time but generally tends to stabilize as the plan matures.

Liability Volatility Ratio (LVR)

Plans that have higher liability-to-payroll ratios experience more volatile employer contributions (as a percentage of payroll) due to investment return and changes in liability. For example, a plan with a liability-to-payroll ratio of 8 is expected to have twice the contribution volatility of a plan with a liability-to-payroll ratio of 4. The liability volatility ratio is also included in the table below. It should be noted that this ratio indicates a longer-term potential for contribution volatility. The asset volatility ratio, described above, will tend to move closer to the liability volatility ratio as the plan matures.

Contribution Volatility		As of June 30, 2015
1. Market Value of Assets without Receivables	$	1,140,529,507
2. Payroll		116,621,439
3. Asset Volatility Ratio (AVR) [(1) / (2)]		9.8
4. Accrued Liability	$	1,604,715,617
5. Liability Volatility Ratio (LVR) [(4) / (2)]		13.8

Hypothetical Termination Liability

The hypothetical termination liability is an estimate of the financial position of the plan had the contract with CalPERS been terminated as of June 30, 2015. The plan liability on a termination basis is calculated differently compared to the plan's ongoing funding liability. For this hypothetical termination liability calculation, both compensation and service are frozen as of the valuation date and no future pay increases or service accruals are assumed.

A more conservative investment policy and asset allocation strategy was adopted by the CalPERS Board for the Terminated Agency Pool. The Terminated Agency Pool has limited funding sources since no future employer contributions will be made. Therefore, expected benefit payments are secured by risk-free assets and benefit security for members is increased while limiting the funding risk. However, this asset allocation has a lower expected rate of return than the PERF and consequently, a lower discount rate assumption. The lower discount rate for the Terminated Agency Pool results in higher liabilities for terminated plans.

The effective termination discount rate will depend on actual market rates of return for risk-free securities on the date of termination. As market discount rates are variable the table below shows a range for the hypothetical termination liability based on the lowest and highest interest rates observed during an approximate 2-year period centered around the valuation date.

Market Value of Assets (MVA)	Hypothetical Termination Liability[1,2] @ 2.00%	Funded Status	Unfunded Termination Liability @ 2.00%	Hypothetical Termination Liability[1,2] @ 3.25%	Funded Status	Unfunded Termination Liability @ 3.25%
$1,142,199,265	$3,301,912,516	34.6%	$2,159,713,251	$2,718,968,347	42.0%	$1,576,769,082

[1] The hypothetical liabilities calculated above include a 7 percent mortality contingency load in accordance with Board policy. Other actuarial assumptions, such as wage and inflation assumptions, can be found in Appendix A.

[2] The current discount rate assumption used for termination valuations is a weighted average of the 10-year and 30-year U.S. Treasury yields where the weights are based on matching asset and liability durations as of the termination date. The discount rates used in the table are based on 20-year Treasury bonds, rounded to the nearest quarter percentage point, which is a good proxy for most plans. The 20-year Treasury yield was 2.75 percent on June 30, 2015.

In order to terminate the plan, you must first contact our Retirement Services Contract Unit to initiate a Resolution of Intent to Terminate. The completed Resolution will allow the plan actuary to give you a preliminary termination valuation with a more up-to-date estimate of the plan liabilities. CalPERS advises you to consult with the plan actuary before beginning this process.

PLAN'S MAJOR BENEFIT PROVISIONS

Plan's Major Benefit Options

Shown below is a summary of the major optional benefits for which your agency has contracted. A description of principal standard and optional plan provisions is in the following section of this Appendix.

	Contract Package						
Benefit Provision	Active Police	Active Fire	Active Fire	Active Police	Active Police	Active Fire	Inactive Fire
Benefit Formula	3.0% @ 50	3.0% @ 55	3.0% @ 55	3.0% @ 50	2.7% @ 57	2.7% @ 57	3.0% @ 55
Social Security Coverage	No	No	No	No	No	No	No
Full/Modified	Full	Full	Full	Full	Full	Full	Full
Employee Contribution Rate	9.00%	9.00%	9.00%	9.00%	11.50%	11.50%	
Final Average Compensation Period	One Year	One Year	One Year	One Year	Three Year	Three Year	One Year
Sick Leave Credit	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Non-Industrial Disability	Standard	Standard	Standard	Standard	Standard	Standard	Standard
Industrial Disability	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pre-Retirement Death Benefits							
Optional Settlement 2W	Yes	No	No	Yes	Yes	No	No
1959 Survivor Benefit Level	Indexed	No	No	Indexed	Indexed	No	Level 2
Special	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Alternate (firefighters)	No	No	No	No	No	No	No
Post-Retirement Death Benefits							
Lump Sum	$500	$500	$500	$500	$500	$500	$500
Survivor Allowance (PRSA)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
COLA	2%	2%	2%	2%	2%	2%	2%

Plan's Major Benefit Options

Shown below is a summary of the major optional benefits for which your agency has contracted. A description of principal standard and optional plan provisions is in the following section of this Appendix.

	Contract Package				
Benefit Provision	Receiving Fire	Receiving Police	Receiving Fire	Receiving Police	
Benefit Formula					
Social Security Coverage					
Full/Modified					
Employee Contribution Rate					
Final Average Compensation Period					
Sick Leave Credit					
Non-Industrial Disability					
Industrial Disability					
Pre-Retirement Death Benefits					
Optional Settlement 2W					
1959 Survivor Benefit Level					
Special					
Alternate (firefighters)					
Post-Retirement Death Benefits					
Lump Sum	$500	$500	$500	$500	
Survivor Allowance (PRSA)	Yes	Yes	Yes	Yes	
COLA	2%	2%	3%	3%	

APPENDICES

- **APPENDIX A – ACTUARIAL METHODS AND ASSUMPTIONS**
- **APPENDIX B – PRINCIPAL PLAN PROVISIONS**
- **APPENDIX C – PARTICIPANT DATA**
- **APPENDIX D – DEVELOPMENT OF PEPRA MEMBER CONTRIBUTION RATES**
- **APPENDIX E – GLOSSARY OF ACTUARIAL TERMS**

APPENDIX A

ACTUARIAL METHODS AND ASSUMPTIONS

- **ACTUARIAL DATA**
- **ACTUARIAL METHODS**
- **ACTUARIAL ASSUMPTIONS**
- **MISCELLANEOUS**

Actuarial Data

As stated in the Actuarial Certification, the data which serves as the basis of this valuation has been obtained from the various CalPERS databases. We have reviewed the valuation data and believe that it is reasonable and appropriate in aggregate. We are unaware of any potential data issues that would have a material effect on the results of this valuation, except that data does not always contain the latest salary information for former members now in reciprocal systems and does not recognize the potential for unusually large salary deviation in certain cases such as elected officials. Therefore, salary information in these cases may not be accurate. These situations are relatively infrequent, however, and when they do occur, they generally do not have a material impact on the required employer contributions.

Actuarial Methods

Actuarial Cost Method

The actuarial cost method used is the Entry Age Normal Cost Method. Under this method, projected benefits are determined for all members and the associated liabilities are spread in a manner that produces level annual cost as a percentage of pay in each year from the member's age of hire (entry age) to their assumed retirement age on the valuation date. The cost allocated to the current fiscal year is called the normal cost.

The actuarial accrued liability for active members is then calculated as the portion of the total cost of the plan allocated to prior years. The actuarial accrued liability for members currently receiving benefits and for members entitled to deferred benefits is equal to the present value of the benefits expected to be paid. No normal costs are applicable for these participants.

Amortization of Unfunded Actuarial Accrued Liability

The excess of the total actuarial accrued liability over the market value of plan assets is called the unfunded actuarial accrued liability (UAL). Funding requirements are determined by adding the normal cost and an amortization payment toward the unfunded liability. Commencing with the June 30, 2013 valuation, all new gains or losses are tracked and amortized over a fixed 30-year period with a 5 year ramp up at the beginning and a 5 year ramp down at the end of the amortization period. All changes in liability due to plan amendments (other than golden handshakes) are amortized over a 20-year period with no ramp. Changes in actuarial assumptions, or changes in actuarial methodology are amortized over a 20-year period with a 5 year ramp up at the beginning and a 5 year ramp down at the end of the amortization period. Changes in unfunded accrued liability due to a Golden Handshake will be amortized over a period of 5 years.

<u>Exceptions for Inconsistencies:</u>

An exception to the amortization rules above is used whenever their application results in inconsistencies. In these cases, a "fresh start" approach is used. This means that the current unfunded actuarial liability is projected and amortized over a set number of years. For example, a fresh start is needed in the following situations:

1) When a positive payment would be required on a negative unfunded actuarial liability (or conversely a negative payment on a positive unfunded actuarial liability); or
2) When there are excess assets, rather than an unfunded liability. In this situation, a 30-year fresh start is used.

It should be noted that the actuary may determine that a fresh start is necessary under other circumstances. In all cases of a fresh start, the period is set by the actuary at what is deemed appropriate; however, the period will not be greater than 30 years.

Exceptions for Inactive Plans:

The following exceptions apply to plans classified as Inactive. These plans have no active members and no expectation to have active members in the future.

- Amortization of unfunded liability is on a "level dollar" basis rather than a "level percent of pay" basis
- Actuarial judgment will be used to shorten amortization periods for Inactive plans with existing periods that are deemed too long given the duration of the liability. In many cases, a Fresh Start approach with a 20 year closed period will be used. However, the specific demographics of the plan will be used to determine if periods shorter or longer than 20 years may be more appropriate.

Asset Valuation Method

It is the policy of the CalPERS Board of Administration to use professionally accepted amortization methods to eliminate a surplus or an unfunded accrued liability in a manner that maintains benefit security for the members of the System while minimizing substantial variations in required employer contributions. On April 17, 2013, the CalPERS Board of Administration approved a recommendation to change the CalPERS amortization and rate smoothing policies. Beginning with the June 30, 2013 valuations that set the employer contribution for Fiscal Year 2015-16, CalPERS employs a policy that amortizes all gains and losses over a fixed 30-year period. The increase or decrease in the rate is then spread directly over a 5-year period. This method is referred to as "direct rate smoothing." CalPERS no longer uses an actuarial value of assets and only uses the market value of assets. The direct rate smoothing method is equivalent to a method using a 5 year asset smoothing period with no actuarial value of asset corridor and a 25-year amortization period for gains and losses.

PEPRA Normal Cost Rate Methodology

Per Government Code Section 7522.30(b) the "normal cost rate" shall mean the annual actuarially determined normal cost for the plan of retirement benefits provided to the new member and shall be established based on actuarial assumptions used to determine the liabilities and costs as part of the annual actuarial valuation. The plan of retirement benefits shall include any elements that would impact the actuarial determination of the normal cost, including, but not limited to, the retirement formula, eligibility and vesting criteria, ancillary benefit provisions, and any automatic cost-of-living adjustments as determined by the public retirement system.

Each non-pooled plan is considered to be stable with a sufficiently large demographic of actives. It is preferable to determine normal cost using a large active population ongoing so that this rate remains relatively stable. The total PEPRA normal cost will be calculated using all active members within a non-pooled plan. Accordingly, plans will be funded equally between employer and employee based on the demographics of the employees of that employer. As each non-pooled plan builds up to either 100+ active PEPRA members or half of their active population is under the PEPRA formula, the total PEPRA normal cost will be based on the active PEPRA population in the plan.

Actuarial Assumptions

In 2014, CalPERS completed a 2-year asset liability management study incorporating actuarial assumptions and strategic asset allocation. On February 19, 2014, the CalPERS Board of Administration adopted relatively modest changes to the current asset allocation that will reduce the expected volatility of returns. The adopted asset allocation is expected to have a long-term blended return that continues to support a discount rate assumption of 7.5 percent. The Board also approved several changes to the demographic assumptions that more closely align with actual experience. The most significant of these is mortality improvement to acknowledge the greater life expectancies we are seeing in our membership and expected continued improvements. The new actuarial assumptions were first used in the June 30, 2014 valuation to set the Fiscal Year 2016-17 contribution for public agency employers. The increase in liability due to new actuarial assumptions is amortized over a 20-year period with a 5-year ramp-up/ramp-down in accordance with Board policy. These new actuarial assumptions are set forth in this section.

For more details and additional rationale for the selection of the actuarial assumptions, please refer to the CalPERS Experience Study and Review of Actuarial Assumptions report from January 2014 that can be found on the CalPERS website under: "Forms and Publications". Click on "View All" and search for Experience Study.

All actuarial assumptions (except the discount rates used for the hypothetical termination liability) represent an estimate of future experience rather than observations of the estimates inherent in market data.

Economic Assumptions

Discount Rate

7.5 percent compounded annually (net of expenses). This assumption is used for all plans.

Termination Liability Discount Rate

The current discount rate assumption used for termination valuations is a weighted average of the 10-year and 30-year U.S. Treasury yields where the weights are based on matching asset and liability durations as of the termination date.

The hypothetical termination liabilities in this report are calculated using an observed range of market interest rates. This range is based on the lowest and highest 20-year Treasury bond observed during an approximate 2-year period centered around the valuation date. The 20-year Treasury bond has a similar duration to most plan liabilities and serves as a good proxy for the termination discount rate. The 20-year Treasury yield was 2.75 percent on June 30, 2015.

Salary Growth

Annual increases vary by category, entry age, and duration of service. A sample of assumed increases are shown below.

Public Agency Miscellaneous

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.1220	0.1160	0.1020
1	0.0990	0.0940	0.0830
2	0.0860	0.0810	0.0710
3	0.0770	0.0720	0.0630
4	0.0700	0.0650	0.0570
5	0.0640	0.0600	0.0520
10	0.0460	0.0430	0.0390
15	0.0420	0.0400	0.0360
20	0.0390	0.0380	0.0340
25	0.0370	0.0360	0.0330
30	0.0350	0.0340	0.0320

Public Agency Fire

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.2000	0.1980	0.1680
1	0.1490	0.1460	0.1250
2	0.1200	0.1160	0.0990
3	0.0980	0.0940	0.0810
4	0.0820	0.0780	0.0670
5	0.0690	0.0640	0.0550
10	0.0470	0.0460	0.0420
15	0.0440	0.0420	0.0390
20	0.0420	0.0390	0.0360
25	0.0400	0.0370	0.0340
30	0.0380	0.0360	0.0340

Public Agency Police

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.1500	0.1470	0.1310
1	0.1160	0.1120	0.1010
2	0.0950	0.0920	0.0830
3	0.0810	0.0780	0.0700
4	0.0700	0.0670	0.0600
5	0.0610	0.0580	0.0520
10	0.0450	0.0430	0.0370
15	0.0450	0.0430	0.0370
20	0.0450	0.0430	0.0370
25	0.0450	0.0430	0.0370
30	0.0450	0.0430	0.0370

Salary Growth (continued)

Public Agency County Peace Officers

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.1770	0.1670	0.1500
1	0.1340	0.1260	0.1140
2	0.1080	0.1030	0.0940
3	0.0900	0.0860	0.0790
4	0.0760	0.0730	0.0670
5	0.0650	0.0620	0.0580
10	0.0470	0.0450	0.0410
15	0.0460	0.0450	0.0390
20	0.0460	0.0450	0.0380
25	0.0460	0.0450	0.0380
30	0.0460	0.0440	0.0380

Schools

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.0900	0.0880	0.0820
1	0.0780	0.0750	0.0700
2	0.0700	0.0680	0.0630
3	0.0650	0.0630	0.0580
4	0.0610	0.0590	0.0540
5	0.0580	0.0560	0.0510
10	0.0460	0.0450	0.0410
15	0.0420	0.0410	0.0380
20	0.0390	0.0380	0.0350
25	0.0370	0.0350	0.0330
30	0.0350	0.0330	0.0310

- The Miscellaneous salary scale is used for Local Prosecutors.
- The Police salary scale is used for Other Safety, Local Sheriff, and School Police.

Overall Payroll Growth

3.00 percent compounded annually (used in projecting the payroll over which the unfunded liability is amortized). This assumption is used for all plans.

Inflation

2.75 percent compounded annually. This assumption is used for all plans.

Non-valued Potential Additional Liabilities

The potential liability loss for a cost-of-living increase exceeding the 2.75 percent inflation assumption, and any potential liability loss from future member service purchases are not reflected in the valuation.

Miscellaneous Loading Factors

Credit for Unused Sick Leave

Total years of service is increased by 1 percent for those plans that have accepted the provision providing Credit for Unused Sick Leave.

Conversion of Employer Paid Member Contributions (EPMC)

Total years of service is increased by the Employee Contribution Rate for those plans with the provision providing for the Conversion of Employer Paid Member Contributions (EPMC) during the final compensation period.

Norris Decision (Best Factors)

Employees hired prior to July 1, 1982 have projected benefit amounts increased in order to reflect the use of "Best Factors" in the calculation of optional benefit forms. This is due to a 1983 Supreme Court decision, known as the Norris decision, which required males and females to be treated equally in the determination of benefit amounts. Consequently, anyone already employed at that time is given the best possible conversion factor when optional benefits are determined. No loading is necessary for employees hired after July 1, 1982.

Termination Liability

The termination liabilities include a 7 percent contingency load. This load is for unforeseen improvements in mortality.

Demographic Assumptions

Pre-Retirement Mortality

Non-industrial death rates vary by age and gender. Industrial death rates vary by age. See sample rates in table below. The non-industrial death rates are used for all plans. The industrial death rates are used for safety plans (except for Local Prosecutor safety members where the corresponding miscellaneous plan does not have the Industrial Death Benefit).

	Non-Industrial Death (Not Job-Related)		**Industrial Death (Job-Related)**
Age	Male	Female	Male and Female
20	0.00031	0.00020	0.00003
25	0.00040	0.00023	0.00007
30	0.00049	0.00025	0.00010
35	0.00057	0.00035	0.00012
40	0.00075	0.00050	0.00013
45	0.00106	0.00071	0.00014
50	0.00155	0.00100	0.00015
55	0.00228	0.00138	0.00016
60	0.00308	0.00182	0.00017
65	0.00400	0.00257	0.00018
70	0.00524	0.00367	0.00019
75	0.00713	0.00526	0.00020
80	0.00990	0.00814	0.00021

Miscellaneous plans usually have industrial death rates set to zero unless the agency has specifically contracted for industrial death benefits. If so, each non-industrial death rate shown above will be split into two components; 99 percent will become the non-industrial death rate and 1 percent will become the industrial death rate.

Post-Retirement Mortality

Rates vary by age, type of retirement, and gender. See sample rates in table below. These rates are used for all plans.

	Healthy Recipients		Non-Industrially Disabled (Not Job-Related)		Industrially Disabled (Job-Related)	
Age	Male	Female	Male	Female	Male	Female
50	0.00501	0.00466	0.01680	0.01158	0.00501	0.00466
55	0.00599	0.00416	0.01973	0.01149	0.00599	0.00416
60	0.00710	0.00436	0.02289	0.01235	0.00754	0.00518
65	0.00829	0.00588	0.02451	0.01607	0.01122	0.00838
70	0.01305	0.00993	0.02875	0.02211	0.01635	0.01395
75	0.02205	0.01722	0.03990	0.03037	0.02834	0.02319
80	0.03899	0.02902	0.06083	0.04725	0.04899	0.03910
85	0.06969	0.05243	0.09731	0.07762	0.07679	0.06251
90	0.12974	0.09887	0.14804	0.12890	0.12974	0.09887
95	0.22444	0.18489	0.22444	0.21746	0.22444	0.18489
100	0.32536	0.30017	0.32536	0.30017	0.32536	0.30017
105	0.58527	0.56093	0.58527	0.56093	0.58527	0.56093
110	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000

The post-retirement mortality rates above include 20 years of projected on-going mortality improvement using Scale BB published by the Society of Actuaries.

Marital Status

For active members, a percentage who are married upon retirement is assumed according to member category as shown in the following table.

Member Category	Percent Married
Miscellaneous Member	85%
Local Police	90%
Local Fire	90%
Other Local Safety	90%
School Police	90%

Age of Spouse

It is assumed that female spouses are 3 years younger than male spouses. This assumption is used for all plans.

Terminated Members

It is assumed that terminated members refund immediately if non-vested. Terminated members who are vested are assumed to follow the same service retirement pattern as active members but with a load to reflect the expected higher rates of retirement, especially at lower ages. The following table shows the load factors that are applied to the service retirement assumption for active members to obtain the service retirement pattern for separated vested members:

Age	Load Factor Miscellaneous	Load Factor Safety
50	190%	310%
51	110%	190%
52	110%	105%
53 through 54	100%	105%
55	100%	140%
56 and above	100% (no change)	100% (no change)

Termination with Refund

Rates vary by entry age and service for miscellaneous plans. Rates vary by service for safety plans. See sample rates in tables below.

Public Agency Miscellaneous

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40	Entry Age 45
0	0.1742	0.1674	0.1606	0.1537	0.1468	0.1400
1	0.1545	0.1477	0.1409	0.1339	0.1271	0.1203
2	0.1348	0.1280	0.1212	0.1142	0.1074	0.1006
3	0.1151	0.1083	0.1015	0.0945	0.0877	0.0809
4	0.0954	0.0886	0.0818	0.0748	0.0680	0.0612
5	0.0212	0.0193	0.0174	0.0155	0.0136	0.0116
10	0.0138	0.0121	0.0104	0.0088	0.0071	0.0055
15	0.0060	0.0051	0.0042	0.0032	0.0023	0.0014
20	0.0037	0.0029	0.0021	0.0013	0.0005	0.0001
25	0.0017	0.0011	0.0005	0.0001	0.0001	0.0001
30	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001
35	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Public Agency Safety

Duration of Service	Fire	Police	County Peace Officer
0	0.0710	0.1013	0.0997
1	0.0554	0.0636	0.0782
2	0.0398	0.0271	0.0566
3	0.0242	0.0258	0.0437
4	0.0218	0.0245	0.0414
5	0.0029	0.0086	0.0145
10	0.0009	0.0053	0.0089
15	0.0006	0.0027	0.0045
20	0.0005	0.0017	0.0020
25	0.0003	0.0012	0.0009
30	0.0003	0.0009	0.0006
35	0.0003	0.0009	0.0006

The police termination and refund rates are also used for Public Agency Local Prosecutors, Other Safety, Local Sheriff, and School Police.

Schools

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40	Entry Age 45
0	0.1730	0.1627	0.1525	0.1422	0.1319	0.1217
1	0.1585	0.1482	0.1379	0.1277	0.1174	0.1071
2	0.1440	0.1336	0.1234	0.1131	0.1028	0.0926
3	0.1295	0.1192	0.1089	0.0987	0.0884	0.0781
4	0.1149	0.1046	0.0944	0.0841	0.0738	0.0636
5	0.0278	0.0249	0.0221	0.0192	0.0164	0.0135
10	0.0172	0.0147	0.0122	0.0098	0.0074	0.0049
15	0.0115	0.0094	0.0074	0.0053	0.0032	0.0011
20	0.0073	0.0055	0.0038	0.0020	0.0002	0.0002
25	0.0037	0.0023	0.0010	0.0002	0.0002	0.0002
30	0.0015	0.0003	0.0002	0.0002	0.0002	0.0002
35	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002

Termination with Vested Benefits

Rates vary by entry age and service for miscellaneous plans. Rates vary by service for safety plans. See sample rates in tables below.

Public Agency Miscellaneous

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40
5	0.0656	0.0597	0.0537	0.0477	0.0418
10	0.0530	0.0466	0.0403	0.0339	0.0000
15	0.0443	0.0373	0.0305	0.0000	0.0000
20	0.0333	0.0261	0.0000	0.0000	0.0000
25	0.0212	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000	0.0000
35	0.0000	0.0000	0.0000	0.0000	0.0000

Public Agency Safety

Duration of Service	Fire	Police	County Peace Officer
5	0.0162	0.0163	0.0265
10	0.0061	0.0126	0.0204
15	0.0058	0.0082	0.0130
20	0.0053	0.0065	0.0074
25	0.0047	0.0058	0.0043
30	0.0045	0.0056	0.0030
35	0.0000	0.0000	0.0000

- When a member is eligible to retire, the termination with vested benefits probability is set to zero.
- After termination with vested benefits, a miscellaneous member is assumed to retire at age 59 and a safety member at age 54.
- The Police termination with vested benefits rates are also used for Public Agency Local Prosecutors, Other Safety, Local Sheriff, and School Police.

Schools

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40
5	0.0816	0.0733	0.0649	0.0566	0.0482
10	0.0629	0.0540	0.0450	0.0359	0.0000
15	0.0537	0.0440	0.0344	0.0000	0.0000
20	0.0420	0.0317	0.0000	0.0000	0.0000
25	0.0291	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000	0.0000
35	0.0000	0.0000	0.0000	0.0000	0.0000

Non-Industrial (Not Job-Related) Disability

Rates vary by age and gender for miscellaneous plans. Rates vary by age and category for safety plans.

	Miscellaneous		Fire	Police	County Peace Officer	Schools	
Age	Male	Female	Male and Female	Male and Female	Male and Female	Male	Female
20	0.0002	0.0001	0.0001	0.0001	0.0001	0.0003	0.0003
25	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
30	0.0002	0.0002	0.0001	0.0002	0.0001	0.0001	0.0002
35	0.0005	0.0008	0.0001	0.0003	0.0004	0.0005	0.0004
40	0.0012	0.0016	0.0001	0.0004	0.0007	0.0015	0.0010
45	0.0019	0.0022	0.0002	0.0005	0.0013	0.0030	0.0019
50	0.0021	0.0023	0.0005	0.0008	0.0018	0.0039	0.0024
55	0.0022	0.0018	0.0010	0.0013	0.0010	0.0036	0.0021
60	0.0022	0.0014	0.0015	0.0020	0.0006	0.0031	0.0014

- The miscellaneous non-industrial disability rates are used for Local Prosecutors.
- The police non-industrial disability rates are also used for Other Safety, Local Sheriff, and School Police.

Industrial (Job-Related) Disability

Rates vary by age and category.

Age	Fire	Police	County Peace Officer
20	0.0001	0.0000	0.0004
25	0.0003	0.0017	0.0013
30	0.0007	0.0048	0.0025
35	0.0016	0.0079	0.0037
40	0.0030	0.0110	0.0051
45	0.0053	0.0141	0.0067
50	0.0277	0.0185	0.0092
55	0.0409	0.0479	0.0151
60	0.0583	0.0602	0.0174

- The police industrial disability rates are also used for Local Sheriff and Other Safety.
- Fifty percent of the police industrial disability rates are used for School Police.
- One percent of the police industrial disability rates are used for Local Prosecutors.
- Normally, rates are zero for miscellaneous plans unless the agency has specifically contracted for industrial disability benefits. If so, each miscellaneous non-industrial disability rate will be split into two components: 50 percent will become the non-industrial disability rate and 50 percent will become the industrial disability rate.

Service Retirement

Retirement rates vary by age, service, and formula, except for the safety ½ @ 55 and 2% @ 55 formulas, where retirement rates vary by age only.

Service Retirement

Public Agency Miscellaneous 1.5% @ 65

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.008	0.011	0.013	0.015	0.017	0.019
51	0.007	0.010	0.012	0.013	0.015	0.017
52	0.010	0.014	0.017	0.019	0.021	0.024
53	0.008	0.012	0.015	0.017	0.019	0.022
54	0.012	0.016	0.019	0.022	0.025	0.028
55	0.018	0.025	0.031	0.035	0.038	0.043
56	0.015	0.021	0.025	0.029	0.032	0.036
57	0.020	0.028	0.033	0.038	0.043	0.048
58	0.024	0.033	0.040	0.046	0.052	0.058
59	0.028	0.039	0.048	0.054	0.060	0.067
60	0.049	0.069	0.083	0.094	0.105	0.118
61	0.062	0.087	0.106	0.120	0.133	0.150
62	0.104	0.146	0.177	0.200	0.223	0.251
63	0.099	0.139	0.169	0.191	0.213	0.239
64	0.097	0.136	0.165	0.186	0.209	0.233
65	0.140	0.197	0.240	0.271	0.302	0.339
66	0.092	0.130	0.157	0.177	0.198	0.222
67	0.129	0.181	0.220	0.249	0.277	0.311
68	0.092	0.129	0.156	0.177	0.197	0.221
69	0.092	0.130	0.158	0.178	0.199	0.224
70	0.103	0.144	0.175	0.198	0.221	0.248

Public Agency Miscellaneous 2% @ 60

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.010	0.013	0.015	0.018	0.019	0.021
51	0.009	0.011	0.014	0.016	0.017	0.019
52	0.011	0.014	0.017	0.020	0.022	0.024
53	0.010	0.012	0.015	0.017	0.020	0.021
54	0.015	0.019	0.023	0.025	0.029	0.031
55	0.022	0.029	0.035	0.040	0.045	0.049
56	0.018	0.024	0.028	0.033	0.036	0.040
57	0.024	0.032	0.038	0.043	0.049	0.053
58	0.027	0.036	0.043	0.049	0.055	0.061
59	0.033	0.044	0.054	0.061	0.068	0.076
60	0.056	0.077	0.092	0.105	0.117	0.130
61	0.071	0.097	0.118	0.134	0.149	0.166
62	0.117	0.164	0.198	0.224	0.250	0.280
63	0.122	0.171	0.207	0.234	0.261	0.292
64	0.114	0.159	0.193	0.218	0.244	0.271
65	0.150	0.209	0.255	0.287	0.321	0.358
66	0.114	0.158	0.192	0.217	0.243	0.270
67	0.141	0.196	0.238	0.270	0.301	0.337
68	0.103	0.143	0.174	0.196	0.219	0.245
69	0.109	0.153	0.185	0.209	0.234	0.261
70	0.117	0.162	0.197	0.222	0.248	0.277

Service Retirement

Public Agency Miscellaneous 2% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.014	0.018	0.021	0.025	0.027	0.031
51	0.012	0.014	0.017	0.020	0.021	0.025
52	0.013	0.017	0.019	0.023	0.025	0.028
53	0.015	0.020	0.023	0.027	0.030	0.034
54	0.026	0.033	0.038	0.045	0.051	0.059
55	0.048	0.061	0.074	0.088	0.100	0.117
56	0.042	0.053	0.063	0.075	0.085	0.100
57	0.044	0.056	0.067	0.081	0.091	0.107
58	0.049	0.062	0.074	0.089	0.100	0.118
59	0.057	0.072	0.086	0.103	0.118	0.138
60	0.067	0.086	0.103	0.123	0.139	0.164
61	0.081	0.103	0.124	0.148	0.168	0.199
62	0.116	0.147	0.178	0.214	0.243	0.288
63	0.114	0.144	0.174	0.208	0.237	0.281
64	0.108	0.138	0.166	0.199	0.227	0.268
65	0.155	0.197	0.238	0.285	0.325	0.386
66	0.132	0.168	0.203	0.243	0.276	0.328
67	0.122	0.155	0.189	0.225	0.256	0.304
68	0.111	0.141	0.170	0.204	0.232	0.274
69	0.114	0.144	0.174	0.209	0.238	0.282
70	0.130	0.165	0.200	0.240	0.272	0.323

Public Agency Miscellaneous 2.5% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.004	0.009	0.019	0.029	0.049	0.094
51	0.004	0.009	0.019	0.029	0.049	0.094
52	0.004	0.009	0.020	0.030	0.050	0.095
53	0.008	0.014	0.025	0.036	0.058	0.104
54	0.024	0.034	0.050	0.066	0.091	0.142
55	0.066	0.088	0.115	0.142	0.179	0.241
56	0.042	0.057	0.078	0.098	0.128	0.184
57	0.041	0.057	0.077	0.097	0.128	0.183
58	0.045	0.061	0.083	0.104	0.136	0.192
59	0.055	0.074	0.098	0.123	0.157	0.216
60	0.066	0.088	0.115	0.142	0.179	0.241
61	0.072	0.095	0.124	0.153	0.191	0.255
62	0.099	0.130	0.166	0.202	0.248	0.319
63	0.092	0.121	0.155	0.189	0.233	0.302
64	0.091	0.119	0.153	0.187	0.231	0.299
65	0.122	0.160	0.202	0.245	0.297	0.374
66	0.138	0.179	0.226	0.272	0.329	0.411
67	0.114	0.149	0.189	0.229	0.279	0.354
68	0.100	0.131	0.168	0.204	0.250	0.322
69	0.114	0.149	0.189	0.229	0.279	0.354
70	0.127	0.165	0.209	0.253	0.306	0.385

Service Retirement

Public Agency Miscellaneous 2.7% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.004	0.009	0.014	0.035	0.055	0.095
51	0.002	0.006	0.011	0.030	0.050	0.090
52	0.006	0.012	0.017	0.038	0.059	0.099
53	0.010	0.017	0.024	0.046	0.068	0.110
54	0.032	0.044	0.057	0.085	0.113	0.160
55	0.076	0.101	0.125	0.165	0.205	0.265
56	0.055	0.074	0.093	0.127	0.160	0.214
57	0.050	0.068	0.086	0.118	0.151	0.204
58	0.055	0.074	0.093	0.127	0.161	0.215
59	0.061	0.082	0.102	0.138	0.174	0.229
60	0.069	0.093	0.116	0.154	0.192	0.250
61	0.086	0.113	0.141	0.183	0.225	0.288
62	0.105	0.138	0.171	0.218	0.266	0.334
63	0.103	0.135	0.167	0.215	0.262	0.329
64	0.109	0.143	0.177	0.226	0.275	0.344
65	0.134	0.174	0.215	0.270	0.326	0.401
66	0.147	0.191	0.235	0.294	0.354	0.433
67	0.121	0.158	0.196	0.248	0.300	0.372
68	0.113	0.147	0.182	0.232	0.282	0.352
69	0.117	0.153	0.189	0.240	0.291	0.362
70	0.141	0.183	0.226	0.283	0.341	0.418

Public Agency Miscellaneous 3% @ 60

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.012	0.018	0.024	0.039	0.040	0.091
51	0.009	0.014	0.019	0.034	0.034	0.084
52	0.014	0.020	0.026	0.043	0.044	0.096
53	0.016	0.023	0.031	0.048	0.050	0.102
54	0.026	0.036	0.045	0.065	0.070	0.125
55	0.043	0.057	0.072	0.096	0.105	0.165
56	0.042	0.056	0.070	0.094	0.103	0.162
57	0.049	0.065	0.082	0.108	0.119	0.180
58	0.057	0.076	0.094	0.122	0.136	0.199
59	0.076	0.100	0.123	0.157	0.175	0.244
60	0.114	0.148	0.182	0.226	0.255	0.334
61	0.095	0.123	0.152	0.190	0.214	0.288
62	0.133	0.172	0.211	0.260	0.294	0.378
63	0.129	0.166	0.204	0.252	0.285	0.368
64	0.143	0.185	0.226	0.278	0.315	0.401
65	0.202	0.260	0.318	0.386	0.439	0.542
66	0.177	0.228	0.279	0.340	0.386	0.482
67	0.151	0.194	0.238	0.292	0.331	0.420
68	0.139	0.179	0.220	0.270	0.306	0.391
69	0.190	0.245	0.299	0.364	0.414	0.513
70	0.140	0.182	0.223	0.274	0.310	0.396

Service Retirement

Public Agency Miscellaneous 2% @ 62

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.000	0.000	0.000	0.000	0.000	0.000
51	0.000	0.000	0.000	0.000	0.000	0.000
52	0.010	0.013	0.016	0.019	0.022	0.024
53	0.013	0.017	0.020	0.024	0.027	0.031
54	0.021	0.027	0.033	0.039	0.045	0.050
55	0.044	0.056	0.068	0.080	0.092	0.104
56	0.030	0.039	0.047	0.055	0.063	0.072
57	0.036	0.046	0.056	0.066	0.076	0.086
58	0.046	0.059	0.072	0.085	0.097	0.110
59	0.058	0.074	0.089	0.105	0.121	0.137
60	0.062	0.078	0.095	0.112	0.129	0.146
61	0.062	0.079	0.096	0.113	0.129	0.146
62	0.097	0.123	0.150	0.176	0.202	0.229
63	0.089	0.113	0.137	0.162	0.186	0.210
64	0.094	0.120	0.145	0.171	0.197	0.222
65	0.129	0.164	0.199	0.234	0.269	0.304
66	0.105	0.133	0.162	0.190	0.219	0.247
67	0.105	0.133	0.162	0.190	0.219	0.247
68	0.105	0.133	0.162	0.190	0.219	0.247
69	0.105	0.133	0.162	0.190	0.219	0.247
70	0.125	0.160	0.194	0.228	0.262	0.296

Service Retirement

Public Agency Fire ½ @ 55 and 2% @ 55

Age	Rate	Age	Rate
50	0.0159	56	0.1108
51	0.0000	57	0.0000
52	0.0344	58	0.0950
53	0.0199	59	0.0441
54	0.0413	60	1.00000
55	0.0751		

Public Agency Police ½ @ 55 and 2% @ 55

Age	Rate	Age	Rate
50	0.0255	56	0.0692
51	0.0000	57	0.0511
52	0.0164	58	0.0724
53	0.0272	59	0.0704
54	0.0095	60	1.0000
55	0.1667		

Service Retirement

Public Agency Police 2% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.005	0.005	0.005	0.005	0.017	0.089
51	0.005	0.005	0.005	0.005	0.017	0.087
52	0.018	0.018	0.018	0.018	0.042	0.132
53	0.044	0.044	0.044	0.044	0.090	0.217
54	0.065	0.065	0.065	0.065	0.126	0.283
55	0.086	0.086	0.086	0.086	0.166	0.354
56	0.067	0.067	0.067	0.067	0.130	0.289
57	0.066	0.066	0.066	0.066	0.129	0.288
58	0.066	0.066	0.066	0.066	0.129	0.288
59	0.139	0.139	0.139	0.139	0.176	0.312
60	0.123	0.123	0.123	0.123	0.153	0.278
61	0.110	0.110	0.110	0.110	0.138	0.256
62	0.130	0.130	0.130	0.130	0.162	0.291
63	0.130	0.130	0.130	0.130	0.162	0.291
64	0.130	0.130	0.130	0.130	0.162	0.291
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.009	0.009	0.009	0.009	0.013	0.020
51	0.013	0.013	0.013	0.013	0.020	0.029
52	0.018	0.018	0.018	0.018	0.028	0.042
53	0.052	0.052	0.052	0.052	0.079	0.119
54	0.067	0.067	0.067	0.067	0.103	0.154
55	0.089	0.089	0.089	0.089	0.136	0.204
56	0.083	0.083	0.083	0.083	0.127	0.190
57	0.082	0.082	0.082	0.082	0.126	0.189
58	0.088	0.088	0.088	0.088	0.136	0.204
59	0.074	0.074	0.074	0.074	0.113	0.170
60	0.100	0.100	0.100	0.100	0.154	0.230
61	0.072	0.072	0.072	0.072	0.110	0.165
62	0.099	0.099	0.099	0.099	0.152	0.228
63	0.114	0.114	0.114	0.114	0.175	0.262
64	0.114	0.114	0.114	0.114	0.175	0.262
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 3% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.004	0.004	0.004	0.004	0.015	0.086
51	0.014	0.014	0.014	0.014	0.034	0.114
52	0.026	0.026	0.026	0.026	0.060	0.154
53	0.038	0.038	0.038	0.038	0.083	0.188
54	0.071	0.071	0.071	0.071	0.151	0.292
55	0.061	0.061	0.061	0.061	0.131	0.261
56	0.072	0.072	0.072	0.072	0.153	0.295
57	0.065	0.065	0.065	0.065	0.140	0.273
58	0.066	0.066	0.066	0.066	0.142	0.277
59	0.118	0.118	0.118	0.118	0.247	0.437
60	0.065	0.065	0.065	0.065	0.138	0.272
61	0.084	0.084	0.084	0.084	0.178	0.332
62	0.108	0.108	0.108	0.108	0.226	0.405
63	0.084	0.084	0.084	0.084	0.178	0.332
64	0.084	0.084	0.084	0.084	0.178	0.332
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 3% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.001	0.001	0.001	0.006	0.016	0.069
51	0.002	0.002	0.002	0.006	0.018	0.071
52	0.012	0.012	0.012	0.021	0.040	0.098
53	0.032	0.032	0.032	0.049	0.085	0.149
54	0.057	0.057	0.057	0.087	0.144	0.217
55	0.073	0.073	0.073	0.109	0.179	0.259
56	0.064	0.064	0.064	0.097	0.161	0.238
57	0.063	0.063	0.063	0.095	0.157	0.233
58	0.065	0.065	0.065	0.099	0.163	0.241
59	0.088	0.088	0.088	0.131	0.213	0.299
60	0.105	0.105	0.105	0.155	0.251	0.344
61	0.118	0.118	0.118	0.175	0.282	0.380
62	0.087	0.087	0.087	0.128	0.210	0.295
63	0.067	0.067	0.067	0.100	0.165	0.243
64	0.067	0.067	0.067	0.100	0.165	0.243
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 3% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.050	0.050	0.050	0.099	0.240	0.314
51	0.034	0.034	0.034	0.072	0.198	0.260
52	0.033	0.033	0.033	0.071	0.198	0.259
53	0.039	0.039	0.039	0.080	0.212	0.277
54	0.045	0.045	0.045	0.092	0.229	0.300
55	0.052	0.052	0.052	0.105	0.248	0.323
56	0.042	0.042	0.042	0.087	0.221	0.289
57	0.043	0.043	0.043	0.088	0.223	0.292
58	0.054	0.054	0.054	0.109	0.255	0.333
59	0.054	0.054	0.054	0.108	0.253	0.330
60	0.060	0.060	0.060	0.121	0.272	0.355
61	0.048	0.048	0.048	0.098	0.238	0.311
62	0.061	0.061	0.061	0.122	0.274	0.357
63	0.057	0.057	0.057	0.115	0.263	0.343
64	0.069	0.069	0.069	0.137	0.296	0.385
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 3% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.020	0.020	0.020	0.040	0.130	0.192
51	0.008	0.008	0.008	0.023	0.107	0.164
52	0.023	0.023	0.023	0.043	0.136	0.198
53	0.023	0.023	0.023	0.043	0.135	0.198
54	0.027	0.027	0.027	0.048	0.143	0.207
55	0.043	0.043	0.043	0.070	0.174	0.244
56	0.053	0.053	0.053	0.085	0.196	0.269
57	0.054	0.054	0.054	0.086	0.197	0.271
58	0.052	0.052	0.052	0.084	0.193	0.268
59	0.075	0.075	0.075	0.116	0.239	0.321
60	0.065	0.065	0.065	0.102	0.219	0.298
61	0.076	0.076	0.076	0.117	0.241	0.324
62	0.068	0.068	0.068	0.106	0.224	0.304
63	0.027	0.027	0.027	0.049	0.143	0.208
64	0.094	0.094	0.094	0.143	0.277	0.366
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 2% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.011	0.011	0.011	0.011	0.020	0.036
51	0.009	0.009	0.009	0.009	0.016	0.028
52	0.018	0.018	0.018	0.018	0.034	0.060
53	0.037	0.037	0.037	0.037	0.067	0.119
54	0.049	0.049	0.049	0.049	0.089	0.159
55	0.063	0.063	0.063	0.063	0.115	0.205
56	0.045	0.045	0.045	0.045	0.082	0.146
57	0.064	0.064	0.064	0.064	0.117	0.209
58	0.047	0.047	0.047	0.047	0.086	0.154
59	0.105	0.105	0.105	0.105	0.130	0.191
60	0.105	0.105	0.105	0.105	0.129	0.188
61	0.105	0.105	0.105	0.105	0.129	0.188
62	0.105	0.105	0.105	0.105	0.129	0.188
63	0.105	0.105	0.105	0.105	0.129	0.188
64	0.105	0.105	0.105	0.105	0.129	0.188
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.005	0.005	0.005	0.005	0.008	0.012
51	0.006	0.006	0.006	0.006	0.009	0.013
52	0.012	0.012	0.012	0.012	0.019	0.028
53	0.033	0.033	0.033	0.033	0.050	0.075
54	0.045	0.045	0.045	0.045	0.069	0.103
55	0.061	0.061	0.061	0.061	0.094	0.140
56	0.055	0.055	0.055	0.055	0.084	0.126
57	0.081	0.081	0.081	0.081	0.125	0.187
58	0.059	0.059	0.059	0.059	0.091	0.137
59	0.055	0.055	0.055	0.055	0.084	0.126
60	0.085	0.085	0.085	0.085	0.131	0.196
61	0.085	0.085	0.085	0.085	0.131	0.196
62	0.085	0.085	0.085	0.085	0.131	0.196
63	0.085	0.085	0.085	0.085	0.131	0.196
64	0.085	0.085	0.085	0.085	0.131	0.196
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 2.5% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.014	0.014	0.014	0.014	0.025	0.045
51	0.012	0.012	0.012	0.012	0.021	0.038
52	0.025	0.025	0.025	0.025	0.046	0.081
53	0.047	0.047	0.047	0.047	0.086	0.154
54	0.063	0.063	0.063	0.063	0.115	0.205
55	0.076	0.076	0.076	0.076	0.140	0.249
56	0.054	0.054	0.054	0.054	0.099	0.177
57	0.071	0.071	0.071	0.071	0.130	0.232
58	0.057	0.057	0.057	0.057	0.103	0.184
59	0.126	0.126	0.126	0.126	0.156	0.229
60	0.126	0.126	0.126	0.126	0.155	0.226
61	0.126	0.126	0.126	0.126	0.155	0.226
62	0.126	0.126	0.126	0.126	0.155	0.226
63	0.126	0.126	0.126	0.126	0.155	0.226
64	0.126	0.126	0.126	0.126	0.155	0.226
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2.5% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.007	0.007	0.007	0.007	0.010	0.015
51	0.008	0.008	0.008	0.008	0.012	0.018
52	0.016	0.016	0.016	0.016	0.025	0.038
53	0.042	0.042	0.042	0.042	0.064	0.096
54	0.057	0.057	0.057	0.057	0.088	0.132
55	0.074	0.074	0.074	0.074	0.114	0.170
56	0.066	0.066	0.066	0.066	0.102	0.153
57	0.090	0.090	0.090	0.090	0.139	0.208
58	0.071	0.071	0.071	0.071	0.110	0.164
59	0.066	0.066	0.066	0.066	0.101	0.151
60	0.102	0.102	0.102	0.102	0.157	0.235
61	0.102	0.102	0.102	0.102	0.157	0.236
62	0.102	0.102	0.102	0.102	0.157	0.236
63	0.102	0.102	0.102	0.102	0.157	0.236
64	0.102	0.102	0.102	0.102	0.157	0.236
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 2.7% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.0138	0.0138	0.0138	0.0138	0.0253	0.0451
51	0.0123	0.0123	0.0123	0.0123	0.0226	0.0402
52	0.0249	0.0249	0.0249	0.0249	0.0456	0.0812
53	0.0497	0.0497	0.0497	0.0497	0.0909	0.1621
54	0.0662	0.0662	0.0662	0.0662	0.1211	0.2160
55	0.0854	0.0854	0.0854	0.0854	0.1563	0.2785
56	0.0606	0.0606	0.0606	0.0606	0.1108	0.1975
57	0.0711	0.0711	0.0711	0.0711	0.1300	0.2318
58	0.0628	0.0628	0.0628	0.0628	0.1149	0.2049
59	0.1396	0.1396	0.1396	0.1396	0.1735	0.2544
60	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
61	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
62	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
63	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
64	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2.7% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.0065	0.0065	0.0065	0.0065	0.0101	0.0151
51	0.0081	0.0081	0.0081	0.0081	0.0125	0.0187
52	0.0164	0.0164	0.0164	0.0164	0.0254	0.0380
53	0.0442	0.0442	0.0442	0.0442	0.0680	0.1018
54	0.0606	0.0606	0.0606	0.0606	0.0934	0.1397
55	0.0825	0.0825	0.0825	0.0825	0.1269	0.1900
56	0.0740	0.0740	0.0740	0.0740	0.1140	0.1706
57	0.0901	0.0901	0.0901	0.0901	0.1387	0.2077
58	0.0790	0.0790	0.0790	0.0790	0.1217	0.1821
59	0.0729	0.0729	0.0729	0.0729	0.1123	0.1681
60	0.1135	0.1135	0.1135	0.1135	0.1747	0.2615
61	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
62	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
63	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
64	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Service Retirement

Schools 2% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.005	0.009	0.013	0.015	0.016	0.018
51	0.005	0.010	0.014	0.017	0.019	0.021
52	0.006	0.012	0.017	0.020	0.022	0.025
53	0.007	0.014	0.019	0.023	0.026	0.029
54	0.012	0.024	0.033	0.039	0.044	0.049
55	0.024	0.048	0.067	0.079	0.088	0.099
56	0.020	0.039	0.055	0.065	0.072	0.081
57	0.021	0.042	0.059	0.070	0.078	0.087
58	0.025	0.050	0.070	0.083	0.092	0.103
59	0.029	0.057	0.080	0.095	0.105	0.118
60	0.037	0.073	0.102	0.121	0.134	0.150
61	0.046	0.090	0.126	0.149	0.166	0.186
62	0.076	0.151	0.212	0.250	0.278	0.311
63	0.069	0.136	0.191	0.225	0.251	0.281
64	0.067	0.133	0.185	0.219	0.244	0.273
65	0.091	0.180	0.251	0.297	0.331	0.370
66	0.072	0.143	0.200	0.237	0.264	0.295
67	0.067	0.132	0.185	0.218	0.243	0.272
68	0.060	0.118	0.165	0.195	0.217	0.243
69	0.067	0.133	0.187	0.220	0.246	0.275
70	0.066	0.131	0.183	0.216	0.241	0.270

Miscellaneous

Internal Revenue Code Section 415

The limitations on benefits imposed by Internal Revenue Code Section 415 are taken into account in this valuation. Each year the impact of any changes in this limitation since the prior valuation is included and amortized as part of the actuarial gain or loss base. This results in lower contributions for those employers contributing to the Replacement Benefit Fund and protects CalPERS from prefunding expected benefits in excess of limits imposed by federal tax law.

Internal Revenue Code Section 401(a)(17)

The limitations on compensation imposed by Internal Revenue Code Section 401(a)(17) are taken into account in this valuation. Each year, the impact of any changes in the compensation limitation since the prior valuation is included and amortized as part of the actuarial gain or loss base. The compensation limit for classic members for the 2015 calendar year is $265,000.

APPENDIX B

PRINCIPAL PLAN PROVISIONS

The following is a description of the principal plan provisions used in calculating costs and liabilities. We have indicated whether a plan provision is standard or optional. Standard benefits are applicable to all members while optional benefits vary among employers. Optional benefits that apply to a single period of time, such as Golden Handshakes, have not been included. Many of the statements in this summary are general in nature, and are intended to provide an easily understood summary of the Public Employees' Retirement Law. The law itself governs in all situations.

Service Retirement

Eligibility

A classic CalPERS member or PEPRA Safety member becomes eligible for Service Retirement upon attainment of age 50 with at least 5 years of credited service (total service across all CalPERS employers, and with certain other retirement systems with which CalPERS has reciprocity agreements). For employees hired into a plan with the 1.5 percent at 65 formula, eligibility for service retirement is age 55 with at least 5 years of service. PEPRA miscellaneous members become eligible for service retirement upon attainment of age 52 with at least 5 years of service.

Benefit

The service retirement benefit is a monthly allowance equal to the product of the *benefit factor*, *years of service*, and *final compensation.*

- The *benefit factor* depends on the benefit formula specified in your agency's contract. The table below shows the factors for each of the available formulas. Factors vary by the member's age at retirement. Listed are the factors for retirement at whole year ages:

Miscellaneous Plan Formulas

Retirement Age	1.5% at 65	2% at 60	2% at 55	2.5% at 55	2.7% at 55	3% at 60	PEPRA 2% at 62
50	0.5000%	1.092%	1.426%	2.000%	2.000%	2.000%	N/A
51	0.5667%	1.156%	1.522%	2.100%	2.140%	2.100%	N/A
52	0.6334%	1.224%	1.628%	2.200%	2.280%	2.200%	1.000%
53	0.7000%	1.296%	1.742%	2.300%	2.420%	2.300%	1.100%
54	0.7667%	1.376%	1.866%	2.400%	2.560%	2.400%	1.200%
55	0.8334%	1.460%	2.000%	2.500%	2.700%	2.500%	1.300%
56	0.9000%	1.552%	2.052%	2.500%	2.700%	2.600%	1.400%
57	0.9667%	1.650%	2.104%	2.500%	2.700%	2.700%	1.500%
58	1.0334%	1.758%	2.156%	2.500%	2.700%	2.800%	1.600%
59	1.1000%	1.874%	2.210%	2.500%	2.700%	2.900%	1.700%
60	1.1667%	2.000%	2.262%	2.500%	2.700%	3.000%	1.800%
61	1.2334%	2.134%	2.314%	2.500%	2.700%	3.000%	1.900%
62	1.3000%	2.272%	2.366%	2.500%	2.700%	3.000%	2.000%
63	1.3667%	2.418%	2.418%	2.500%	2.700%	3.000%	2.100%
64	1.4334%	2.418%	2.418%	2.500%	2.700%	3.000%	2.200%
65	1.5000%	2.418%	2.418%	2.500%	2.700%	3.000%	2.300%
66	1.5000%	2.418%	2.418%	2.500%	2.700%	3.000%	2.400%
67 & up	1.5000%	2.418%	2.418%	2.500%	2.700%	3.000%	2.500%

Safety Plan Formulas

Retirement Age	½ at 55 *	2% at 55	2% at 50	3% at 55	3% at 50
50	1.783%	1.426%	2.000%	2.400%	3.000%
51	1.903%	1.522%	2.140%	2.520%	3.000%
52	2.035%	1.628%	2.280%	2.640%	3.000%
53	2.178%	1.742%	2.420%	2.760%	3.000%
54	2.333%	1.866%	2.560%	2.880%	3.000%
55 & Up	2.500%	2.000%	2.700%	3.000%	3.000%

* For this formula, the benefit factor also varies by entry age. The factors shown are for members with an entry age of 35 or greater. If entry age is less than 35, then the age 55 benefit factor is 50 percent divided by the difference between age 55 and entry age. The benefit factor for ages prior to age 55 is the same proportion of the age 55 benefit factor as in the above table.

PEPRA Safety Plan Formulas

Retirement Age	2% at 57	2.5% at 57	2.7% at 57
50	1.426%	2.000%	2.000%
51	1.508%	2.071%	2.100%
52	1.590%	2.143%	2.200%
53	1.672%	2.214%	2.300%
54	1.754%	2.286%	2.400%
55	1.836%	2.357%	2.500%
56	1.918%	2.429%	2.600%
57 & Up	2.000%	2.500%	2.700%

- The *years of service* is the amount credited by CalPERS to a member while he or she is employed in this group (or for other periods that are recognized under the employer's contract with CalPERS). For a member who has earned service with multiple CalPERS employers, the benefit from each employer is calculated separately according to each employer's contract, and then added together for the total allowance. An agency may contract for an optional benefit where any unused sick leave accumulated at the time of retirement will be converted to credited service at a rate of 0.004 years of service for each day of sick leave.

- The *final compensation* is the monthly average of the member's highest 36 or 12 consecutive months' full-time equivalent monthly pay (no matter which CalPERS employer paid this compensation). The standard benefit is 36 months. Employers had the option of providing a final compensation equal to the highest 12 consecutive months for classic plans only. Final compensation must be defined by the highest 36 consecutive months' pay under the 1.5% at 65 formula. PEPRA members have a cap on the annual salary that can be used to calculate final compensation for all new members based on the Social Security contribution and benefit base. For employees that participate in Social Security this cap is $117,020 for 2015 and for those employees that do not participate in Social Security the cap for 2015 is $140,424. Adjustments to the caps are permitted annually based on changes to the CPI for all urban consumers.

- Employees must be covered by Social Security with the 1.5% at 65 formula. Social Security is optional for all other benefit formulas. For employees covered by Social Security, the modified formula is the standard benefit. Under this type of formula, the final compensation is offset by $133.33 (or by one third if the final compensation is less than $400). Employers may contract for the full benefit with Social Security that will eliminate the offset applicable to the final compensation. For employees not covered by Social Security, the full benefit is paid with

no offsets. Auxiliary organizations of the CSUC system may elect reduced contribution rates, in which case the offset is $317 if members are not covered by Social Security or $513 if members are covered by Social Security.

- The miscellaneous and PEPRA safety service retirement benefit is not capped. The classic service retirement benefit is capped at 90 percent of final compensation.

Vested Deferred Retirement

Eligibility for Deferred Status

A CalPERS member becomes eligible for a deferred vested retirement benefit when he or she leaves employment, keeps his or her contribution account balance on deposit with CalPERS, **and** has earned at least 5 years of credited service (total service across all CalPERS employers, and with certain other retirement systems with which CalPERS has reciprocity agreements).

Eligibility to Start Receiving Benefits

The CalPERS classic members and PEPRA safety members become eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for deferred status and upon attainment of age 50 (55 for employees hired into a 1.5% @ 65 plan). PEPRA miscellaneous members become eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for deferred status and upon attainment of age 52.

Benefit

The vested deferred retirement benefit is the same as the service retirement benefit, where the benefit factor is based on the member's age at allowance commencement. For members who have earned service with multiple CalPERS employers, the benefit from each employer is calculated separately according to each employer's contract, and then added together for the total allowance.

Non-Industrial (Non-Job Related) Disability Retirement

Eligibility

A CalPERS member is eligible for Non-Industrial Disability Retirement if he or she becomes *disabled* and has at least 5 years of credited service (total service across all CalPERS employers, and with certain other retirement systems with which CalPERS has reciprocity agreements). There is no special age requirement. *Disabled* means the member is unable to perform his or her job because of an illness or injury, which is expected to be permanent or to last indefinitely. The illness or injury does not have to be job related. A CalPERS member must be actively employed by any CalPERS employer at the time of disability in order to be eligible for this benefit.

Standard Benefit

The standard Non-Industrial Disability Retirement benefit is a monthly allowance equal to 1.8 percent of final compensation, multiplied by *service*, which is determined as follows:

- *Service* is CalPERS credited service, for members with less than 10 years of service or greater than 18.518 years of service; or

- *Service* is CalPERS credited service plus the additional number of years that the member would have worked until age 60, for members with at least 10 years but not more than 18.518 years of service. The maximum benefit in this case is 33 1/3 percent of final compensation.

Improved Benefit

Employers have the option of providing the improved Non-Industrial Disability Retirement benefit. This benefit provides a monthly allowance equal to 30 percent of final compensation for the first 5 years of service, plus 1 percent for each additional year of service to a maximum of 50 percent of final compensation.

Members who are eligible for a larger service retirement benefit may choose to receive that benefit in lieu of a disability benefit. Members eligible to retire, and who have attained the normal retirement age determined by their service retirement benefit formula, will receive the same dollar amount for disability retirement as that payable for service retirement. For members who have earned service with multiple CalPERS employers, the benefit attributed to each employer is the total disability allowance multiplied by the ratio of service with a particular employer to the total CalPERS service.

Industrial (Job Related) Disability Retirement

All safety members have this benefit. For miscellaneous members, employers have the option of providing this benefit. An employer may choose to provide the increased benefit option or the improved benefit option.

Eligibility

An employee is eligible for Industrial Disability Retirement if he or she becomes disabled while working, where disabled means the member is unable to perform the duties of the job because of a work-related illness or injury, which is expected to be permanent or to last indefinitely. A CalPERS member who has left active employment within this group is not eligible for this benefit, except to the extent described below.

Standard Benefit

The standard Industrial Disability Retirement benefit is a monthly allowance equal to 50 percent of final compensation.

Increased Benefit (75 percent of Final Compensation)

The increased Industrial Disability Retirement benefit is a monthly allowance equal to 75 percent final compensation for total disability.

Improved Benefit (50 percent to 90 percent of Final Compensation)

The improved Industrial Disability Retirement benefit is a monthly allowance equal to the Workman's Compensation Appeals Board permanent disability rate percentage (if 50 percent or greater, with a maximum of 90 percent) times the final compensation.

For a CalPERS member not actively employed in this group who became disabled while employed by some other CalPERS employer, the benefit is a return of accumulated member contributions with respect to employment in this group. With the standard or increased benefit, a member may also choose to receive the annuitization of the accumulated member contributions.

If a member is eligible for service retirement and if the service retirement benefit is more than the industrial disability retirement benefit, the member may choose to receive the larger benefit.

Post-Retirement Death Benefit

Standard Lump Sum Payment

Upon the death of a retiree, a one-time lump sum payment of $500 will be made to the retiree's designated survivor(s), or to the retiree's estate.

Improved Lump Sum Payment

Employers have the option of providing an improved lump sum death benefit of $600, $2,000, $3,000, $4,000 or $5,000.

Form of Payment for Retirement Allowance

Standard Form of Payment

Generally, the retirement allowance is paid to the retiree in the form of an annuity for as long as he or she is alive. The retiree may choose to provide for a portion of his or her allowance to be paid to any designated beneficiary after the retiree's death. CalPERS provides for a variety of such benefit options, which the retiree pays for by taking a reduction in his or her retirement allowance. Such reduction takes into account the amount to be provided to the beneficiary and the probable duration of payments (based on the ages of the member and beneficiary) made subsequent to the member's death.

Improved Form of Payment (Post-Retirement Survivor Allowance)

Employers have the option to contract for the post-retirement survivor allowance.

For retirement allowances with respect to service subject to the modified formula, 25 percent of the retirement allowance will automatically be continued to certain statutory beneficiaries upon the death of the retiree, without a reduction in the retiree's allowance. For retirement allowances with respect to service subject to the full or supplemental formula, 50 percent of the retirement allowance will automatically be continued to certain statutory beneficiaries upon the death of the retiree, without a reduction in the retiree's allowance. This additional benefit is referred to as post-retirement survivor allowance (PRSA) or simply as survivor continuance.

In other words, 25 percent or 50 percent of the allowance, the continuance portion, is paid to the retiree for as long as he or she is alive, and that same amount is continued to the retiree's spouse (or if no eligible spouse, to unmarried child(ren) until they attain age 18; or, if no eligible child(ren), to a qualifying dependent parent) for the rest of his or her lifetime. This benefit will not be discontinued in the event the spouse remarries.

The remaining 75 percent or 50 percent of the retirement allowance, which may be referred to as the option portion of the benefit, is paid to the retiree as an annuity for as long as he or she is alive. Or, the retiree may choose to provide for some of this option portion to be paid to any designated beneficiary after the retiree's death. Benefit options applicable to the option portion are the same as those offered with the standard form. The reduction is calculated in the same manner but is applied only to the option portion.

Pre-Retirement Death Benefits

Basic Death Benefit

This is a standard benefit.

Eligibility

An employee's beneficiary (or estate) may receive the basic death benefit if the member dies while actively employed. A CalPERS member must be actively employed with the CalPERS employer providing this benefit to be eligible for this benefit. A member's survivor who is eligible for any other pre-retirement death benefit may choose to receive that death benefit instead of this basic death benefit.

Benefit

The basic death benefit is a lump sum in the amount of the member's accumulated contributions, where interest is currently credited at 7.5 percent per year, plus a lump sum in the amount of one month's salary for each completed year of current service, up to a maximum of six months' salary. For purposes of this benefit, one month's salary is defined as the member's average monthly full-time rate of compensation during the 12 months preceding death.

1957 Survivor Benefit

This is a standard benefit.

Eligibility

An employee's *eligible survivor(s)* may receive the 1957 Survivor benefit if the member dies while actively employed, has attained at least age 50 for classic and safety PEPRA members and age 52 for miscellaneous PEPRA members, and has at least 5 years of credited service (total service across all CalPERS employers and with certain other retirement systems with which CalPERS has reciprocity agreements). A CalPERS member must be actively employed with the CalPERS employer providing this benefit to be eligible for this benefit. An eligible survivor means the surviving spouse to whom the member was married at least one year before death or, if there is no eligible spouse, to the member's unmarried child(ren) under age 18. A member's survivor who is eligible for any other pre-retirement death benefit may choose to receive that death benefit instead of this 1957 Survivor benefit.

Benefit

The 1957 Survivor benefit is a monthly allowance equal to one-half of the unmodified service retirement benefit that the member would have been entitled to receive if the member had retired on the date of his or her death. If the benefit is payable to the spouse, the benefit is discontinued upon the death of the spouse. If the benefit is payable to dependent child(ren), the benefit will be discontinued upon death or attainment of age 18, unless the child(ren) is disabled. The total amount paid will be at least equal to the basic death benefit.

Optional Settlement 2W Death Benefit

This is an optional benefit.

Eligibility

An employee's *eligible survivor* may receive the Optional Settlement 2W Death benefit if the member dies while actively employed, has attained at least age 50 for classic and safety PEPRA members and age 52 for miscellaneous PEPRA members, and has at least 5 years of credited service (total service across all CalPERS employers and with certain other retirement systems with which CalPERS has reciprocity agreements). A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. An *eligible survivor* means the surviving spouse to whom the member was married at least one year before death. A member's survivor who is eligible for any other pre-retirement death benefit may choose to receive that death benefit instead of this Optional Settlement 2W Death benefit.

Benefit

The Optional Settlement 2W Death benefit is a monthly allowance equal to the service retirement benefit that the member would have received had the member retired on the date of his or her death and elected Optional Settlement 2W. (A retiree who elects Optional Settlement 2W receives an allowance that has been reduced so that it will continue to be paid after his or her death to a surviving beneficiary.) The allowance is payable as long as the surviving spouse lives, at which time it is continued to any unmarried child(ren) under age 18, if applicable. The total amount paid will be at least equal to the basic death benefit.

Special Death Benefit

This is a standard benefit for safety members. An employer may elect to provide this benefit for miscellaneous members.

Eligibility

An employee's *eligible survivor(s)* may receive the special death benefit if the member dies while actively employed and the death is job-related. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. An *eligible survivor* means the surviving spouse to whom the member was married prior to the onset of the injury or illness that resulted in death. If there is no eligible spouse, an eligible survivor means the member's unmarried child(ren) under age 22. An eligible survivor who chooses to receive this benefit will not receive any other death benefit.

Benefit

The special death benefit is a monthly allowance equal to 50 percent of final compensation, and will be increased whenever the compensation paid to active employees is increased but ceasing to increase when the member would have attained age 50. The allowance is payable to the surviving spouse until death at which time the allowance is continued to any unmarried child(ren) under age 22. There is a guarantee that the total amount paid will at least equal the basic death benefit.

If the member's death is the result of an accident or injury caused by external violence or physical force incurred in the performance of the member's duty, and there are *eligible* surviving child(ren) (*eligible* means unmarried child(ren) under age 22) in addition to an eligible spouse, then an **additional monthly allowance** is paid equal to the following:

- if 1 eligible child: 12.5 percent of final compensation
- if 2 eligible children: 20.0 percent of final compensation
- if 3 or more eligible children: 25.0 percent of final compensation

Alternate Death Benefit for Local Fire Members

This is an optional benefit available only to local fire members.

Eligibility

An employee's *eligible survivor(s)* may receive the alternate death benefit in lieu of the basic death benefit or the 1957 Survivor benefit if the member dies while actively employed and has at least 20 years of total CalPERS service. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. An *eligible survivor* means the surviving spouse to whom the member was married prior to the onset of the injury or illness that resulted in death. If there is no eligible spouse, an eligible survivor means the member's unmarried child(ren) under age 18.

Benefit

The Alternate Death benefit is a monthly allowance equal to the service retirement benefit that the member would have received had the member retired on the date of his or her death and elected Optional Settlement 2W. (A retiree who elects Optional Settlement 2W receives an allowance that has been reduced so that it will continue to be paid after his or her death to a surviving beneficiary.) If the member has not yet attained age 50, the benefit is equal to that which would be payable if the member had retired at age 50, based on service credited at the time of death. The allowance is payable as long as the surviving spouse lives, at which time it is continued to any unmarried child(ren) under age 18, if applicable. The total amount paid will be at least equal to the basic death benefit.

Cost-of-Living Adjustments (COLA)

Standard Benefit

Retirement and survivor allowances are adjusted each year in May for cost of living, beginning the second calendar year after the year of retirement. The standard cost-of-living adjustment (COLA) is 2 percent. Annual adjustments are calculated by first determining the lesser of 1) 2 percent compounded from the end of the year of retirement or 2) actual rate of inflation. The resulting increase is divided by the total increase provided in prior years. For any particular year, the COLA adjustment may be less than 2 percent (when the rate of inflation is low), may be greater than the rate of inflation (when the rate of inflation is low after several years of high inflation) or may even be greater than 2 percent (when inflation is high after several years of low inflation).

Improved Benefit

Employers have the option of providing a COLA of 3 percent, 4 percent, or 5 percent, determined in the same manner as described above for the standard 2 percent COLA. An improved COLA is not available with the 1.5% at 65 formula.

Purchasing Power Protection Allowance (PPPA)

Retirement and survivor allowances are protected against inflation by PPPA. PPPA benefits are cost-of-living adjustments that are intended to maintain an individual's allowance at 80 percent of the initial allowance at retirement adjusted for inflation since retirement. The PPPA benefit will be coordinated with other cost-of-living adjustments provided under the plan.

Employee Contributions

Each employee contributes toward his or her retirement based upon the retirement formula. The standard employee contribution is as described below.

- The percent contributed below the monthly compensation breakpoint is 0 percent.
- The monthly compensation breakpoint is $0 for full and supplemental formula members and $133.33 for employees covered by the modified formula.
- The percent contributed above the monthly compensation breakpoint depends upon the benefit formula, as shown in the table below.

Benefit Formula	Percent Contributed above the Breakpoint
Miscellaneous, 1.5% at 65	2%
Miscellaneous, 2% at 60	7%
Miscellaneous, 2% at 55	7%
Miscellaneous, 2.5% at 55	8%
Miscellaneous, 2.7% at 55	8%
Miscellaneous, 3% at 60	8%
Miscellaneous, 2% at 62	50% of the Total Normal Cost
Miscellaneous, 1.5% at 65	50% of the Total Normal Cost
Safety, 1/2 at 55	Varies by entry age
Safety, 2% at 55	7%
Safety, 2% at 50	9%
Safety, 3% at 55	9%
Safety, 3% at 50	9%
Safety, 2% at 57	50% of the Total Normal Cost
Safety, 2.5% at 57	50% of the Total Normal Cost
Safety, 2.7% at 57	50% of the Total Normal Cost

The employer may choose to "pick-up" these contributions for classic members (Employer Paid Member Contributions or EPMC). EPMC is prohibited for new PEPRA members.

An employer may also include Employee Cost Sharing in the contract, where employees agree to share the cost of the employer contribution. These contributions are paid in addition to the member contribution.

Auxiliary organizations of the CSUC system may elect reduced contribution rates, in which case the offset is $317 and the contribution rate is 6 percent if members are not covered by Social Security. If members are covered by Social Security, the offset is $513 and the contribution rate is 5 percent.

Refund of Employee Contributions

If the member's service with the employer ends, and if the member does not satisfy the eligibility conditions for any of the retirement benefits above, the member may elect to receive a refund of his or her employee contributions, which are credited with 6 percent interest compounded annually.

1959 Survivor Benefit

This is a pre-retirement death benefit available only to members not covered by Social Security. Any agency joining CalPERS subsequent to 1993 is required to provide this benefit if the members are not covered by Social Security. The benefit is optional for agencies joining CalPERS prior to 1994. Levels 1, 2 and 3 are now closed. Any new agency or any agency wishing to add this benefit or increase the current level may only choose the 4th or Indexed Level.

This benefit is not included in the results presented in this valuation. More information on this benefit is available on the CalPERS website at www.calpers.ca.gov.

APPENDIX C

PARTICIPANT DATA

- **SUMMARY OF VALUATION DATA**
- **ACTIVE MEMBERS**
- **TRANSFERRED AND TERMINATED MEMBERS**
- **RETIRED MEMBERS AND BENEFICIARIES**

Summary of Valuation Data

	June 30, 2014	June 30, 2015
1. **Active Members**		
a) Counts	1,148	1,185
b) Average Attained Age	40.87	40.69
c) Average Entry Age to Rate Plan	27.48	27.54
d) Average Years of Service	13.39	13.15
e) Average Annual Covered Pay	$ 94,776	$ 98,415
f) Annual Covered Payroll	108,803,331	116,621,439
g) Projected Annual Payroll for Contribution Year	118,892,337	127,435,395
h) Present Value of Future Payroll	1,040,366,966	1,116,857,722
2. **Transferred Members**		
a) Counts	246	243
b) Average Attained Age	42.07	41.92
c) Average Years of Service	4.50	4.33
d) Average Annual Covered Pay	$ 94,331	$ 97,919
3. **Terminated Members**		
a) Counts	120	137
b) Average Attained Age	41.36	41.22
c) Average Years of Service	3.77	3.80
d) Average Annual Covered Pay	$ 64,434	$ 66,547
4. **Retired Members and Beneficiaries**		
a) Counts	1,070	1,113
b) Average Attained Age	64.66	65.00
c) Average Annual Benefits	$ 63,881	$ 65,390
5. **Active to Retired Ratio** [(1a) / (4a)]	1.07	1.06

Counts of members included in the valuation are counts of the records processed by the valuation. Multiple records may exist for those who have service in more than one valuation group. This does not result in double counting of liabilities.

Average Annual Benefits represents benefit amounts payable by this plan only. Some members may have service with another agency and would therefore have a larger total benefit than would be included as part of the average shown here.

Active Members

Counts of members included in the valuation are counts of the records processed by the valuation. Multiple records may exist for those who have service in more than one valuation group. This does not result in double counting of liabilities.

Distribution of Active Members by Age and Service

	Years of Service at Valuation Date						
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Total**
15-24	25	0	0	0	0	0	25
25-29	77	18	0	0	0	0	95
30-34	49	100	21	0	0	0	170
35-39	16	91	129	26	1	0	263
40-44	3	36	86	107	20	1	253
45-49	6	10	43	71	92	13	235
50-54	1	2	7	15	42	40	107
55-59	2	3	0	5	4	17	31
60-64	0	0	0	0	2	1	3
65 and over	3	0	0	0	0	0	3
All Ages	**182**	**260**	**286**	**224**	**161**	**72**	**1,185**

Distribution of Average Annual Salaries by Age and Service

	Years of Service at Valuation Date						
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Average**
15-24	$61,187	$0	$0	$0	$0	$0	$61,187
25-29	68,002	88,505	0	0	0	0	71,886
30-34	70,205	93,982	101,031	0	0	0	87,999
35-39	81,591	97,070	98,651	105,083	87,707	0	97,660
40-44	82,173	96,950	99,582	106,484	116,909	89,258	103,249
45-49	67,558	96,638	103,809	106,451	115,424	116,989	108,653
50-54	686	99,001	103,648	109,197	111,472	121,311	113,051
55-59	49,012	93,802	0	104,170	116,412	126,240	113,290
60-64	0	0	0	0	107,742	129,692	115,058
65 and over	3,005	0	0	0	0	0	3,005
All Ages	**$67,422**	**$95,233**	**$100,004**	**$106,441**	**$114,335**	**$121,366**	**$98,415**

Transferred and Terminated Members

Distribution of Transfers to Other CalPERS Plans by Age and Service

	Years of Service at Valuation Date							
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Total**	**Average Salary**
15-24	0	0	0	0	0	0	0	$0
25-29	11	0	0	0	0	0	11	61,361
30-34	34	9	0	0	0	0	43	86,871
35-39	35	7	2	0	0	0	44	99,988
40-44	40	13	5	0	0	0	58	95,923
45-49	23	13	5	6	1	0	48	106,080
50-54	18	4	6	2	0	1	31	117,338
55-59	6	1	0	1	0	0	8	86,444
60-64	0	0	0	0	0	0	0	0
65 and over	0	0	0	0	0	0	0	0
All Ages	**167**	**47**	**18**	**9**	**1**	**1**	**243**	**97,919**

Distribution of Terminated Participants with Funds on Deposit by Age and Service

	Years of Service at Valuation Date							
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Total**	**Average Salary**
15-24	1	0	0	0	0	0	1	$59,487
25-29	9	0	0	0	0	0	9	62,061
30-34	15	2	0	0	0	0	17	60,289
35-39	27	2	1	0	0	0	30	61,510
40-44	25	8	7	1	0	0	41	79,051
45-49	12	4	5	0	2	0	23	62,901
50-54	9	1	1	0	0	0	11	60,187
55-59	4	1	0	0	0	0	5	55,778
60-64	0	0	0	0	0	0	0	0
65 and over	0	0	0	0	0	0	0	0
All Ages	**102**	**18**	**14**	**1**	**2**	**0**	**137**	**66,547**

Retired Members and Beneficiaries

Distribution of Retirees and Beneficiaries by Age and Retirement Type*

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 30	0	0	0	0	0	1	1
30-34	0	0	2	0	0	1	3
35-39	0	0	4	0	0	0	4
40-44	0	1	8	0	0	0	9
45-49	0	0	20	0	1	0	21
50-54	84	1	45	0	2	3	135
55-59	133	1	33	1	1	5	174
60-64	143	0	34	0	0	18	195
65-69	148	1	45	0	1	20	215
70-74	116	0	44	0	1	23	184
75-79	90	0	17	0	0	18	125
80-84	28	0	8	0	0	4	40
85 and Over	3	0	0	0	0	4	7
All Ages	**745**	**4**	**260**	**1**	**6**	**97**	**1,113**

Distribution of Average Annual Amounts for Retirees and Beneficiaries by Age and Retirement Type*

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Average
Under 30	$0	$0	$0	$0	$0	$16,920	$16,920
30-34	0	0	44,849	0	0	12,250	33,983
35-39	0	0	33,713	0	0	0	33,713
40-44	0	13,188	26,732	0	0	0	25,227
45-49	0	0	40,287	0	58,257	0	41,142
50-54	75,101	4,306	42,338	0	44,336	66,586	63,011
55-59	82,612	1,326	54,278	13,345	65,040	46,947	75,247
60-64	72,341	0	60,595	0	0	48,900	68,129
65-69	74,602	26,609	59,082	0	42,337	46,008	68,320
70-74	66,097	0	54,344	0	33,688	51,556	61,293
75-79	65,607	0	58,679	0	0	50,128	62,436
80-84	64,551	0	55,427	0	0	48,196	61,091
85 and Over	61,159	0	0	0	0	37,783	47,801
All Ages	**$72,811**	**$11,357**	**$51,891**	**$13,345**	**$47,999**	**$48,413**	**$65,390**

Retired Members and Beneficiaries (continued)

Distribution of Retirees and Beneficiaries by Years Retired and Retirement Type*

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 5 Yrs	174	1	41	1	0	42	259
5-9	182	1	27	0	1	32	243
10-14	172	0	63	0	1	11	247
15-19	106	1	63	0	1	7	178
20-24	101	0	52	0	2	4	159
25-29	9	1	12	0	0	1	23
30 and Over	1	0	2	0	1	0	4
All Years	**745**	**4**	**260**	**1**	**6**	**97**	**1,113**

Distribution of Average Annual Amounts for Retirees and Beneficiaries by Years Retired and Retirement Type*

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Average
Under 5 Yrs	$78,643	$13,188	$58,086	$13,345	$0	$50,121	$70,259
5-9	78,672	1,326	58,820	0	58,257	50,577	72,364
10-14	75,365	0	59,436	0	49,842	48,176	69,988
15-19	58,991	26,609	44,353	0	42,337	45,676	53,011
20-24	63,300	0	48,942	0	36,259	22,713	57,243
25-29	69,365	4,306	32,930	0	0	31,984	45,901
30 and Over	8,987	0	21,520	0	65,040	0	29,267
All Years	**$72,811**	**$11,357**	**$51,891**	**$13,345**	**$47,999**	**$48,413**	**$65,390**

* Counts of members do not include alternate payees receiving benefits while the member is still working. Therefore, the total counts may not match information on page 25 of the report. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

APPENDIX D

DEVELOPMENT OF PEPRA MEMBER CONTRIBUTION RATES

Development of PEPRA Members Contribution Rates

The table below shows the determination of the Member contribution rates based on 50 percent of the Total Normal Cost for each respective plan on June 30, 2015.

Assembly Bill (AB) 340 created PEPRA that implemented new benefit formulas and a final compensation period as well as new contribution requirements for new employees. In accordance with Section Code 7522.30(b), "new members … shall have an initial contribution rate of at least 50 percent of the normal cost rate." The normal cost for the plan is dependent on the benefit levels, actuarial assumptions and demographics of the plan particularly the entry age into the plan. The PEPRA total normal cost for the plan is calculated assuming the entire active population, including classic members, is subject to the adopted PEPRA formula and applicable compensation limits. Should the total normal cost of the plan change by one percent or more from the base total normal cost established for the plan, the new member rate shall be 50% of the new normal cost rounded up to the next highest quarter percent.

		Basis for Current Rate		**Rates Effective July 1, 2017**			
Rate Plan Identifier	**Plan**	**Total Normal Cost**	**Member Rate**	**Total Normal Cost**	**Change**	**Change Needed**	**Member Rate**
25568	Safety Fire PEPRA	22.817%	11.500%	22.831%	0.014%	No	11.500%
25569	Safety Police PEPRA	22.817%	11.500%	22.831%	0.014%	No	11.500%

APPENDIX E

GLOSSARY OF ACTUARIAL TERMS

Glossary of Actuarial Terms

Accrued Liability *(also called Actuarial Accrued Liability or Entry Age Normal Accrued Liability)*
The total dollars needed as of the valuation date to fund all benefits earned in the past for *current* members.

Actuarial Assumptions
Assumptions made about certain events that will affect pension costs. Assumptions generally can be broken down into two categories: demographic and economic. Demographic assumptions include such things as mortality, disability and retirement rates. Economic assumptions include discount rate, salary growth and inflation.

Actuarial Methods
Procedures employed by actuaries to achieve certain funding goals of a pension plan. Actuarial methods include funding method, setting the length of time to fund the Accrued Liability and determining the Value of Assets.

Actuarial Valuation
The determination, as of a valuation date of the Normal Cost, Accrued liability, and related actuarial present values for a pension plan. These valuations are performed annually or when an employer is contemplating a change to their plan provisions.

Amortization Bases
Separate payment schedules for different portions of the Unfunded Liability. The total Unfunded Liability of a Risk Pool or non-pooled plan can be segregated by "cause," creating "bases" and each such base will be separately amortized and paid for over a specific period of time. However, all bases are amortized using investment and payroll assumptions from the current valuation. This can be likened to a home having a first mortgage of 24 years remaining payments and a second mortgage that has 10 years remaining payments. Each base or each mortgage note has its own terms (payment period, principal, etc.)

Generally, in an actuarial valuation, the separate bases consist of changes in unfunded liability due to contract amendments, actuarial assumption changes, actuarial methodology changes, and/or gains and losses. Payment periods are determined by Board policy and vary based on the cause of the change.

Amortization Period
The number of years required to pay off an Amortization Base.

Classic Member (under PEPRA)
A classic member is a member who joined CalPERS prior to January, 1, 2013 and who is not defined as a new member under PEPRA. (See definition of new member below)

Discount Rate Assumption
The actuarial assumption that was called "investment return" in earlier CalPERS reports or "actuarial interest rate" in Section 20014 of the California Public Employees' Retirement Law (PERL).

Entry Age
The earliest age at which a plan member begins to accrue benefits under a defined benefit pension plan. In most cases, this is the age of the member on their date of hire.

Entry Age Normal Cost Method
An actuarial cost method designed to fund a member's total plan benefit over the course of his or her career. This method is designed to yield a rate expressed as a level percentage of payroll.
(The assumed retirement age less the entry age is the amount of time required to fund a member's total benefit. Generally, the older a member on the date of hire, the greater the entry age normal cost. This is mainly because there is less time to earn investment income to fund the future benefits.)

Fresh Start

A Fresh Start is when multiple amortization bases are collapsed to one base and amortized together over a new funding period.

Funded Status

A measure of how well funded, or how "on track" a plan or risk pool is with respect to assets versus accrued liabilities. A ratio greater than 100% means the plan or risk pool has more assets than liabilities and a ratio less than 100% means liabilities are greater than assets.

GASB 68

Statement No. 68 of the Governmental Accounting Standards Board. The accounting standard governing a state or local governmental employer's accounting and financial reporting for pensions. GASB 68 replaces GASB 27 effective the first fiscal year beginning after June 15, 2014.

New Member (under PEPRA)

A new member includes an individual who becomes a member of a public retirement system for the first time on or after January 1, 2013, and who was not a member of another public retirement system prior to that date, and who is not subject to reciprocity with another public retirement system.

Normal Cost

The annual cost of service accrual for the upcoming fiscal year for active employees. The normal cost should be viewed as the long term contribution rate.

Pension Actuary

A business professional that is authorized by the Society of Actuaries, and the American Academy of Actuaries to perform the calculations necessary to properly fund a pension plan.

PEPRA

The California Public Employees' Pension Reform Act of 2013

Prepayment Contribution

A payment made by the employer to reduce or eliminate the year's required employer contribution.

Present Value of Benefits (PVB)

The total dollars needed as of the valuation date to fund all benefits earned in the past or expected to be earned in the future for *current* members.

Superfunded

A condition existing when a plan's Actuarial Value of Assets exceeds its Present Value of Benefits. Prior to the passage of PEPRA, when this condition existed on a given valuation date for a given plan, employee contributions for the rate year covered by that valuation could be waived.

Unfunded Liability (UAL)

When a plan or pool's Value of Assets is less than its Accrued Liability, the difference is the plan or pool's Unfunded Liability. If the Unfunded Liability is positive, the plan or pool will have to pay contributions exceeding the Normal Cost.

Exhibit B2

California Public Employees' Retirement System
Actuarial Office
P.O. Box 942701
Sacramento, CA 94229-2701
TTY: (916) 795-3240
(888) 225-7377 phone · (916) 795-2744 fax
www.calpers.ca.gov

July 2017

SAFETY PLAN OF THE CITY OF SACRAMENTO (CalPERS ID: 7903930500)
Annual Valuation Report as of June 30, 2016

Dear Employer,

As an attachment to this letter, you will find a copy of the June 30, 2016 actuarial valuation report of your pension plan. Your 2016 actuarial valuation report contains important actuarial information about your pension plan at CalPERS. Your CalPERS staff actuary, whose signature appears in the "Actuarial Certification" section on page 1, is available to discuss the report with you after August 31, 2017.

Required Contributions

The exhibit below displays the minimum required employer contributions and the Employee PEPRA Rate for Fiscal Year 2018-19 along with estimates of the required contributions for Fiscal Years 2019-20 and 2020-21. Member contributions other than cost sharing (whether paid by the employer or the employee) are in addition to the results shown below. **The required employer contributions in this report do not reflect any cost sharing arrangement you may have with your employees.**

Fiscal Year	Employer Normal Cost Rate	Employer Amortization of Unfunded Accrued Liability	Employee PEPRA Rate
2018-19	18.693%	$32,317,739	11.50%
Projected Results			
2019-20	*19.6%*	*$39,085,000*	*TBD*
2020-21	*21.4%*	*$44,409,000*	*TBD*

The actual investment return for Fiscal Year 2016-17 was not known at the time this report was prepared. The projections above assume the investment return for that year would be 7.375 percent. ***If the actual investment return for Fiscal year 2016-17 differs from 7.375 percent, the actual contribution requirements for the projected years will differ from those shown above.***

Moreover, the projected results for Fiscal Years 2019-20 and 2020-21 also assume that there are no future plan changes, no further changes in assumptions other than those recently approved, and no liability gains or losses. Such changes can have a significant impact on required contributions. Since they cannot be predicted in advance, the projected employer results shown above are estimates. The actual required employer contributions for Fiscal year 2019-20 will be provided in next year's report.

For additional details regarding the assumptions and methods used for these projections please refer to the "Projected Employer Contributions" in the "Highlights and Executive Summary" section.

The required contributions shown above include a Normal Cost component expressed as a percentage of payroll and a payment toward Unfunded Accrued Liability expressed as a dollar amount. Actual contributions for Fiscal Year 2018-19 and all future years will be collected on that basis. For illustrative total contribution requirements expressed as percentages of payroll, please see pages 4 and 5 of the report.

The "Risk Analysis" section of the valuation report on page 21 also contains estimated employer contributions in future years under a variety of investment return scenarios.

Changes since the Prior Year's Valuation

On December 21, 2016, the CalPERS Board of Administration lowered the discount rate from 7.50 percent to 7.00 percent using a three year phase-in beginning with the June 30, 2016 actuarial valuations. The minimum employer contributions for Fiscal Year 2018-19 determined in this valuation were calculated using a discount rate of 7.375 percent. The projected employer contributions on Page 5 are calculated assuming that the discount rate will be lowered to 7.25 percent next year and to 7.00 percent the following year as adopted by the Board.

Beginning with Fiscal Year 2017-18 CalPERS began collecting employer contributions toward the plan's unfunded liability as dollar amounts instead of the prior method of a contribution rate. This change addresses potential funding issues that could arise from a declining payroll or reduction in the number of active members in the plan. Funding the unfunded liability as a percentage of payroll could lead to the underfunding of the plans. Due to stakeholder feedback regarding internal needs for total contributions expressed as a percentage of payroll, the reports have been modified to include such results in the contribution projection on page 5. These results are provided for information purposes only. Contributions toward the unfunded liability will continue to be collected as dollar amounts.

The CalPERS Board of Administration adopted a Risk Mitigation Policy which is designed to reduce funding risk over time. This Policy has been temporarily suspended during the period over which the discount rate is being lowered. More details on the Risk Mitigation Policy can be found on our website.

Besides the above noted changes, there may also be changes specific to the plan such as contract amendments and funding changes.

Further descriptions of general changes are included in the "Highlights and Executive Summary" section and in Appendix A, "Actuarial Methods and Assumptions." The effects of the changes on the required contributions are included in the "Reconciliation of Required Employer Contributions" section.

We understand that you might have a number of questions about these results. While we are very interested in discussing these results with your agency, in the interest of allowing us to give every public agency their results, we ask that you wait until after August 31 to contact us with actuarial questions. If you have other questions, you may call the Customer Contact Center at (888)-CalPERS or (**888-225-7377**).

Sincerely,

SCOTT TERANDO
Chief Actuary

Exhibit C3

ACTUARIAL VALUATION
as of June 30, 2016

for the
SAFETY PLAN
of the
CITY OF SACRAMENTO

(CalPERS ID: 7903930500)
(Rate Plan ID: 1210)

REQUIRED CONTRIBUTIONS
FOR FISCAL YEAR
July 1, 2018 – June 30, 2019

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ACTUARIAL CERTIFICATION

To the best of our knowledge, this report is complete and accurate and contains sufficient information to disclose, fully and fairly, the funded condition of the SAFETY PLAN OF THE CITY OF SACRAMENTO. This valuation is based on the member and financial data as of June 30, 2016 provided by the various CalPERS databases and the benefits under this plan with CalPERS as of the date this report was produced. It is our opinion that the valuation has been performed in accordance with generally accepted actuarial principles, in accordance with standards of practice prescribed by the Actuarial Standards Board, and that the assumptions and methods are internally consistent and reasonable for this plan, as prescribed by the CalPERS Board of Administration according to provisions set forth in the California Public Employees' Retirement Law.

The undersigned is an actuary for CalPERS, a member of the American Academy of Actuaries and the Society of Actuaries and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

MAY SHUANG YU, ASA, MAAA
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HIGHLIGHTS AND EXECUTIVE SUMMARY

- **INTRODUCTION**
- **PURPOSE OF THE REPORT**
- **REQUIRED CONTRIBUTIONS**
- **PLAN'S FUNDED STATUS**
- **PROJECTED EMPLOYER CONTRIBUTIONS**
- **COST**
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- **SUBSEQUENT EVENTS**

Introduction

This report presents the results of the June 30, 2016 actuarial valuation of the SAFETY PLAN OF THE CITY OF SACRAMENTO of the California Public Employees' Retirement System (CalPERS). This actuarial valuation sets the required employer contributions for Fiscal Year 2018-19.

Purpose of the Report

The actuarial valuation was prepared by the CalPERS Actuarial Office using data as of June 30, 2016. The purpose of the report is to:

- Set forth the assets and accrued liabilities of this plan as of June 30, 2016;
- Determine the required employer contributions for the fiscal year July 1, 2018 through June 30, 2019;
- Provide actuarial information as of June 30, 2016 to the CalPERS Board of Administration and other interested parties.

The pension funding information presented in this report should not be used in financial reports subject to Governmental Accounting Standards Board (GASB) Statement No. 68 for an Agent Employer Defined Benefit Pension Plan. A separate accounting valuation report for such purposes is available from CalPERS and details for ordering are available on our website.

The measurements shown in this actuarial valuation may not be applicable for other purposes. The employer should contact their actuary before disseminating any portion of this report for any reason that is not explicitly described above.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; changes in actuarial policies; and changes in plan provisions or applicable law.

California Actuarial Advisory Panel Recommendations

This report includes all the basic disclosure elements as described in the *Model Disclosure Elements for Actuarial Valuation Reports* recommended in 2011 by the California Actuarial Advisory Panel (CAAP), with the exception of including the original base amounts of the various components of the unfunded liability in the Schedule of Amortization Bases shown on page 15.

Additionally, this report includes the following "Enhanced Risk Disclosures" also recommended by the CAAP in the Model Disclosure Elements document:

- A "Deterministic Stress Test," projecting future results under different investment income scenarios
- A "Sensitivity Analysis," showing the impact on current valuation results using alternative discount rates of 6.0 percent, 7.0 percent and 8.0 percent.

Required Contributions

		Fiscal Year
Required Employer Contribution		**2018-19**
Employer Normal Cost Rate		**18.693%**
Plus Either		
1) Monthly Employer Dollar UAL Payment	**$**	**2,693,145**
Or		
2) Annual UAL Prepayment Option	**$**	**31,188,133**
Required PEPRA Member Contribution Rate		**11.50%**

*The total minimum required employer contribution is the **sum** of the Plan's Employer Normal Cost Rate (expressed as a percentage of payroll) **plus** the Employer Unfunded Accrued Liability (UAL) Contribution Amount (billed monthly in dollars).*

*Only the UAL portion of the employer contribution can be prepaid **(which must be received in full no later than July 31)**. Plan Normal Cost contributions will be made as part of the payroll reporting process. If there is contractual cost sharing or other change, this amount will change.*

§20572 of the Public Employees' Retirement Law assesses interest at an annual rate of 10 percent if a contracting agency fails to remit the required contributions when due.

For additional detail regarding the determination of the required contribution for PEPRA members, see Appendix D. Required member contributions for Classic members can be found in Appendix B.

		Fiscal Year 2017-18		Fiscal Year 2018-19
Normal Cost Contribution as a Percentage of Payroll				
Total Normal Cost		27.336%		27.979%
Employee Contribution[1]		9.175%		9.286%
Employer Normal Cost		18.161%		18.693%
Projected Annual Payroll for Contribution Year	$	127,435,395	$	134,137,989
Estimated Employer Contributions Based On Projected Payroll				
Total Normal Cost	$	34,835,740	$	37,530,467
Employee Contribution[1]		11,692,197		12,456,054
Employer Normal Cost		23,143,543		25,074,413
Unfunded Liability Contribution		26,419,603		32,317,739
% of Projected Payroll (illustrative only)		20.732%		24.093%
Estimated Total Employer Contribution	$	49,563,146	$	57,392,152
% of Projected Payroll (illustrative only)		38.893%		42.786%

[1] For classic members, this is the percentage specified in the Public Employees Retirement Law, net of any reduction from the use of a modified formula or other factors. For PEPRA members, the member contribution rate is based on 50 percent of the normal cost. A development of PEPRA member contribution rates can be found in Appendix D. Employee cost sharing is not shown in this report.

Plan's Funded Status

	June 30, 2015	June 30, 2016
1. Present Value of Projected Benefits	$ 1,903,397,078	$ 2,018,031,964
2. Entry Age Normal Accrued Liability	1,604,715,617	1,693,049,933
3. Market Value of Assets (MVA)	$ 1,142,199,265	$ 1,125,555,355
4. Unfunded Accrued Liability (UAL) [(2) – (3)]	$ 462,516,352	$ 567,494,578
5. Funded Ratio [(3) / (2)]	71.2%	66.5%

This measure of funded status is an assessment of the need for future employer contributions based on the selected actuarial cost method used to fund the plan. The UAL is the present value of future employer contributions for service that has already been earned and is in addition to future normal cost contributions for active members. For a measure of funded status that is appropriate for assessing the sufficiency of plan assets to cover estimated termination liabilities, please see "Hypothetical Termination Liability" in the "Risk Analysis" section.

Projected Employer Contributions

The table below shows the required and projected employer contributions (before cost sharing) for the next six fiscal years. Projected results reflect the adopted changes to the discount rate described in Appendix A, "Actuarial Methods and Assumptions." The projections also assume that all actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur during the projection period. The projected normal cost percentages in the projections below do not reflect that the normal cost will decline over time as new employees are hired into PEPRA or other lower cost benefit tiers.

	Required Contribution	**Projected Future Employer Contributions (Assumes 7.375% Return for Fiscal Year 2016-17)**					
Fiscal Year	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**	**2023-24**	**2024-25**
Normal Cost %	18.693%	19.6%	21.4%	21.4%	21.4%	21.4%	21.4%
UAL Payment	32,317,739	39,085,000	44,409,000	50,761,000	56,176,000	59,873,000	63,186,000
*Total as a % of Payroll**	*42.8%*	*47.9%*	*52.6%*	*56.0%*	*58.6%*	*59.9%*	*60.9%*
Projected Payroll	*134,137,989*	*138,162,129*	*142,306,993*	*146,576,203*	*150,973,490*	*155,502,695*	*160,167,776*

*Illustrative only and based on the projected payroll shown.

Changes in the UAL due to actuarial gains or losses as well as changes in actuarial assumptions or methods are amortized using a 5-year ramp up. For more information, please see "Amortization of the Unfunded Actuarial Accrued Liability" under "Actuarial Methods" in Appendix A. This method phases in the impact of unanticipated changes in UAL over a 5-year period and attempts to minimize employer cost volatility from year to year. As a result of this methodology, dramatic changes in the required employer contributions in any one year are less likely. However, required contributions can change gradually and significantly over the next five years. In years where there is a large increase in UAL the relatively small amortization payments during the ramp up period could result in a funded ratio that is projected to decrease initially while the contribution impact of the increase in the UAL is phased in.

Due to the adopted changes in the discount rate for the next two valuations in combination with the 5-year phase-in ramp, the increases in the required contributions are expected to continue for seven years from Fiscal Year 2018-19 through Fiscal Year 2024-25.

For projected contributions under alternate investment return scenarios, please see the "Analysis of Future Investment Return Scenarios" in the "Risk Analysis" section.

Cost

Actuarial Cost Estimates in General

What is the cost of the pension plan?

Contributions to fund the pension plan are comprised of two components:

- The Normal Cost, expressed as a percentage of total active payroll.
- The Amortization of the Unfunded Accrued Liability (UAL), expressed as a dollar amount.

For fiscal years prior to FY 2017-18, the Amortizations of UAL component was expressed as percentage of total active payroll. Starting with FY 2017-18, the Amortization of UAL component will be expressed as a dollar amount and will be invoiced on a monthly basis. There will be an option to prepay this amount during July of each fiscal year.

The Normal Cost component will continue to be expressed as a percentage of active payroll with employer and employee contributions payable as part of the regular payroll reporting process.

The determination of both components requires complex actuarial calculations. The calculations are based on a set of actuarial assumptions which can be divided into two categories:

- Demographic assumptions (which includes mortality rates, retirement rates, employment termination rates, disability rates)
- Economic assumptions (which includes future investment earnings, inflation, salary growth rates)

These assumptions reflect CalPERS best estimate of the future experience of the plan and are long term in nature. We recognize that all the assumptions will not be realized in any given year. For example, the investment earnings at CalPERS have averaged 7.0 percent over the 20 years ending June 30, 2016, yet individual fiscal year returns have ranged from -24 percent to +21.7 percent. In addition, CalPERS reviews all the actuarial assumptions on an ongoing basis by conducting in depth experience studies every four years.

Changes since the Prior Year's Valuation

Benefits

The standard actuarial practice at CalPERS is to recognize mandated legislative benefit changes in the first annual valuation following the effective date of the legislation. Voluntary benefit changes by plan amendment are generally included in the first valuation that is prepared after the amendment becomes effective, even if the valuation date is prior to the effective date of the amendment.

This valuation generally reflects plan changes by amendments effective before the date of the report. Please refer to the "Plan's Major Benefit Options" and Appendix B for a summary of the plan provisions used in this valuation. The effect of any mandated benefit changes or plan amendments on the unfunded liability is shown in the "(Gain)/Loss Analysis" and the effect on the employer contribution is shown in the "Reconciliation of Required Employer Contributions." It should be noted that no change in liability or contribution is shown for any plan changes which were already included in the prior year's valuation.

Actuarial Methods and Assumptions

On December 21, 2016, the CalPERS Board of Administration lowered the discount rate from 7.50 percent to 7.00 percent using a three year phase-in beginning with the June 30, 2016 actuarial valuations. The minimum employer contributions for Fiscal Year 2018-19 determined in this valuation were calculated using a discount rate of 7.375 percent. The projected employer contributions on Page 5 are calculated assuming that the discount rate will be lowered to 7.25 percent next year and 7.00 percent the following year as adopted by the Board. The decision to reduce the discount rate was primarily based on reduced capital market assumptions provided by external investment consultants and CalPERS investment staff. The specific decision adopted by the Board reflected recommendations from CalPERS staff and additional input from employer and employee stakeholder groups. Based on the investment allocation adopted by the Board and capital market assumptions, the reduced discount rate assumption provides a more realistic assumption for the long term investment return of the fund.

Notwithstanding the Board's decision to phase into a 7.0 percent discount rate, subsequent analysis of the expected investment return of CalPERS assets or changes to the investment allocation may result in a change to this three year discount rate schedule. A comprehensive analysis of all actuarial assumptions and methods including the discount rate will be conducted in 2017.

Subsequent Events

The contribution requirements determined in this actuarial valuation report are based on demographic and financial information as of June 30, 2016. Changes in the value of assets subsequent to that date are not reflected. Declines in asset values will increase the required contribution, while investment returns above the assumed rate of return will decrease the actuarial cost of the plan.

This actuarial valuation report reflects statutory changes, regulatory changes and CalPERS Board actions through January 2017. Any subsequent changes or actions are not reflected.

ASSETS

- **RECONCILIATION OF THE MARKET VALUE OF ASSETS**
- **ASSET ALLOCATION**
- **CALPERS HISTORY OF INVESTMENT RETURNS**

Reconciliation of the Market Value of Assets

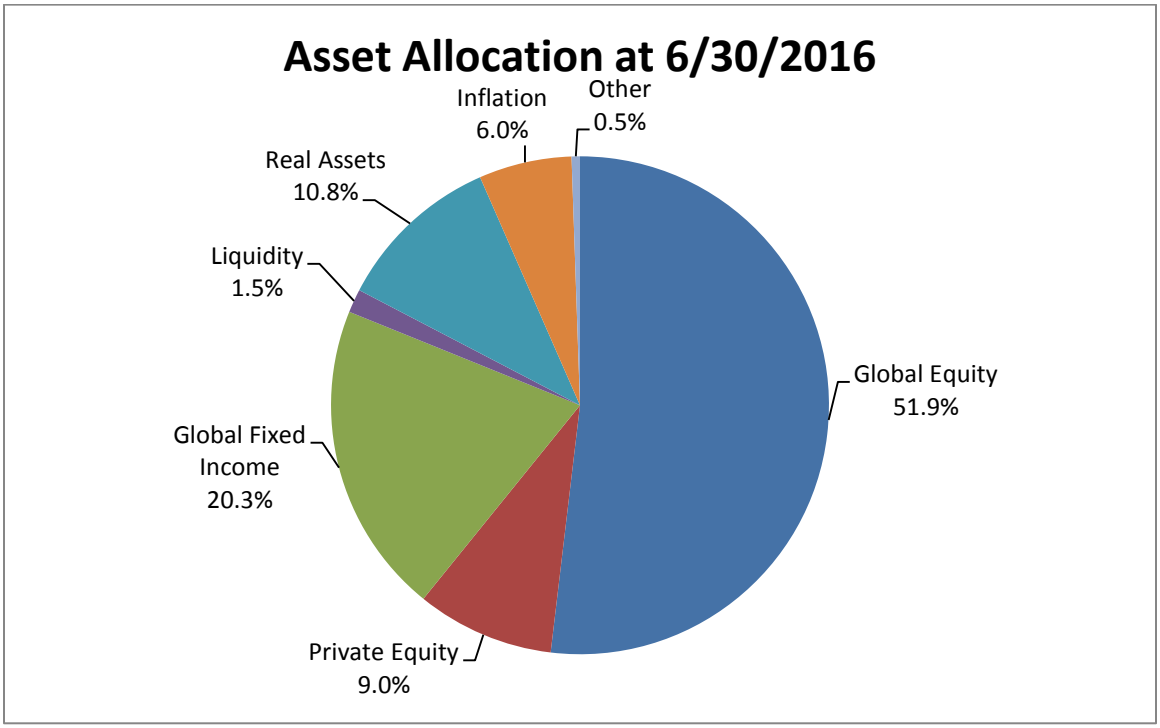
1.	Market Value of Assets as of 6/30/15 including Receivables	$	1,142,199,265
2.	Change in Receivables for Service Buybacks		(222,898)
3.	Employer Contributions		36,000,897
4.	Employee Contributions		18,093,926
5.	Benefit Payments to Retirees and Beneficiaries		(74,464,819)
6.	Refunds		(107,504)
7.	Lump Sum Payments		0
8.	Transfers and Miscellaneous Adjustments		586,304
9.	Net Investment Return		3,470,184
10.	Market Value of Assets as of 6/30/16 including Receivables	$	1,125,555,355

Asset Allocation

CalPERS adheres to an Asset Allocation Strategy which establishes asset class allocation policy targets and ranges, and manages those asset class allocations within their policy ranges. CalPERS Investment Belief No. 6 recognizes that strategic asset allocation is the dominant determinant of portfolio risk and return. On February 19, 2014, the CalPERS Board of Administration adopted changes to the current asset allocation as shown in the Policy Target Allocation below expressed as a percentage of total assets.

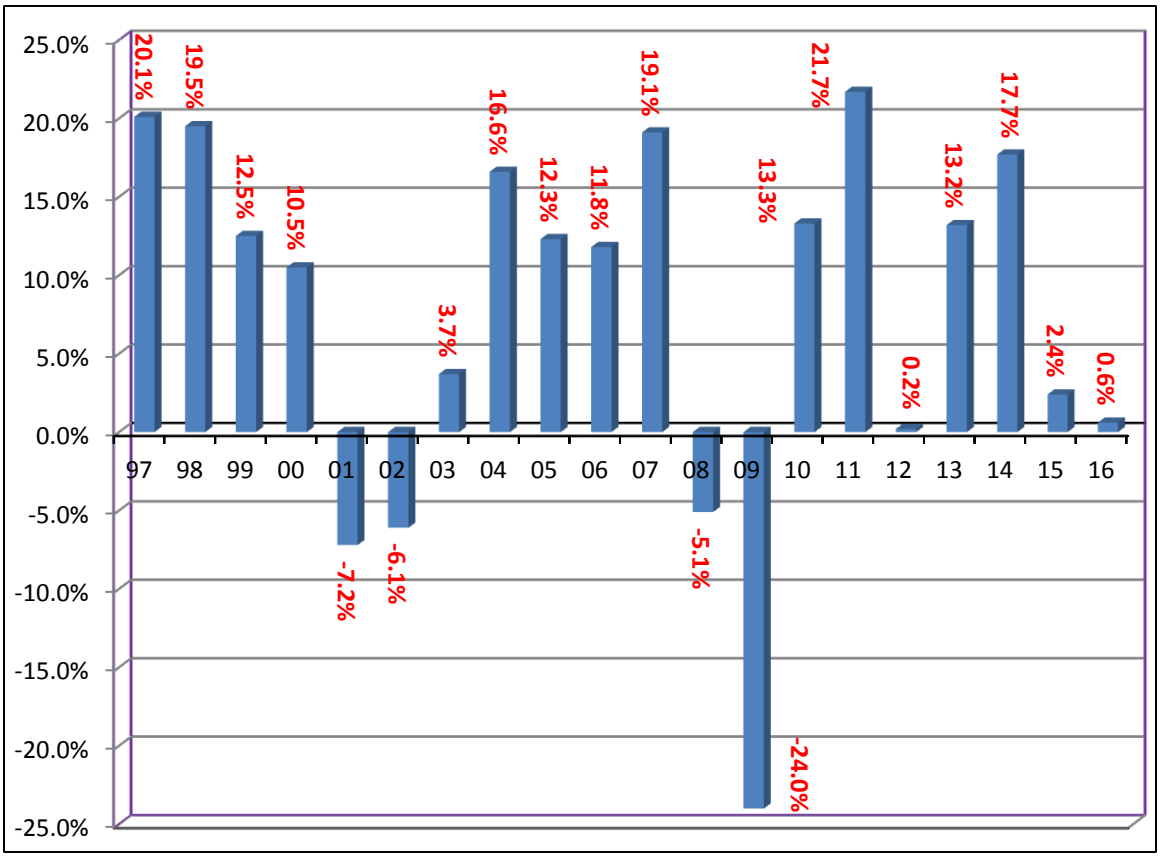
The asset allocation and market value of assets shown below reflect the values of the Public Employees' Retirement Fund (PERF) in its entirety as of June 30, 2016. The assets for CITY OF SACRAMENTO SAFETY PLAN are part of the PERF and are invested accordingly.

(A) Asset Class	(B) Market Value ($ Billion)	(C) Policy Target Allocation
Public Equity	153.1	51.0%
Private Equity	26.4	10.0%
Global Fixed Income	59.9	20.0%
Liquidity	4.5	1.0%
Real Assets	31.8	12.0%
Inflation Sensitive Assets	17.8	6.0%
Other	1.6	0.0%
Total Fund	**$295.1**	**100.0%**



CalPERS History of Investment Returns

The following is a chart with the 20-year historical annual returns of the Public Employees Retirement Fund for each fiscal year ending on June 30. Beginning in 2002, the figures are reported as gross of fees.



The table below shows historical geometric mean annual returns of the Public Employees Retirement Fund for various time periods ending on June 30, 2016, (figures are reported as gross of fees). The geometric mean rate of return is the average rate per period compounded over multiple periods. It should be recognized that in any given year the rate of return is volatile. The portfolio has an expected volatility of 11.8 percent per year based on the most recent Asset Liability Modelling study. The volatility is a measure of the risk of the portfolio expressed in the standard deviation of the fund's total return distribution, expressed as a percentage. Consequently, when looking at investment returns, it is more instructive to look at returns over longer time horizons.

History of CalPERS Geometric Mean Rates of Return and Volatilities					
	1 year	**5 year**	**10 year**	**20 year**	**30 year**
Geometric Return	0.6%	6.6%	5.0%	7.0%	8.2%
Volatility	–	8.1%	14.0%	11.8%	10.1%

LIABILITIES AND CONTRIBUTIONS

- **DEVELOPMENT OF ACCRUED AND UNFUNDED LIABILITIES**
- **(GAIN) / LOSS ANALYSIS 06/30/15 - 06/30/16**
- **SCHEDULE OF AMORTIZATION BASES**
- **30-YEAR AMORTIZATION SCHEDULES AND ALTERNATIVES**
- **RECONCILIATION OF REQUIRED EMPLOYER CONTRIBUTIONS**
- **EMPLOYER CONTRIBUTION HISTORY**
- **FUNDING HISTORY**

Development of Accrued and Unfunded Liabilities

		June 30, 2015	June 30, 2016
1. Present Value of Projected Benefits			
a) Active Members	$	867,422,156	932,076,609
b) Transferred Members		36,974,802	42,627,054
c) Terminated Members		7,597,793	8,603,726
d) Members and Beneficiaries Receiving Payments		991,402,327	1,034,724,575
e) Total	$	1,903,397,078	2,018,031,964
2. Present Value of Future Employer Normal Costs	$	194,916,532	212,028,335
3. Present Value of Future Employee Contributions	$	103,764,929	112,953,696
4. Entry Age Normal Accrued Liability			
a) Active Members [(1a) - (2) - (3)]	$	568,740,695	607,094,578
b) Transferred Members (1b)		36,974,802	42,627,054
c) Terminated Members (1c)		7,597,793	8,603,726
d) Members and Beneficiaries Receiving Payments (1d)		991,402,327	1,034,724,575
e) Total	$	1,604,715,617	1,693,049,933
5. Market Value of Assets (MVA)	$	1,142,199,265	1,125,555,355
6. Unfunded Accrued Liability (UAL) [(4e) - (5)]	$	462,516,352	567,494,578
7. Funded Ratio [(5) / (4e)]		71.2%	66.5%

(Gain)/Loss Analysis 6/30/15 – 6/30/16

To calculate the cost requirements of the plan, assumptions are made about future events that affect the amount and timing of benefits to be paid and assets to be accumulated. Each year, actual experience is compared to the expected experience based on the actuarial assumptions. This results in actuarial gains or losses, as shown below.

1. Total (Gain)/Loss for the Year		
a) Unfunded Accrued Liability (UAL) as of 6/30/15	$	462,516,352
b) Expected Payment on the UAL during 2015-16		18,821,616
c) Interest through 6/30/16 [.075 x (1a) - ((1.075)^{½} - 1) x (1b)]		33,995,676
d) Expected UAL before all other changes [(1a) - (1b) + (1c)]		477,690,412
e) Change due to plan changes		0
f) Change due to assumption change		26,552,392
g) Expected UAL after all other changes [(1d) + (1e) + (1f)]		504,242,804
h) Actual UAL as of 6/30/16		567,494,578
i) Total (Gain)/Loss for 2015-16 [(1h) - (1g)]	$	63,251,774
2. Contribution (Gain)/Loss for the Year		
a) Expected Contribution (Employer and Employee)	$	51,864,248
b) Interest on Expected Contributions		1,909,749
c) Actual Contributions		54,094,823
d) Interest on Actual Contributions		1,991,883
e) Expected Contributions with Interest [(2a) + (2b)]		53,773,997
f) Actual Contributions with Interest [(2c) + (2d)]		56,086,706
g) Contribution (Gain)/Loss [(2e) - (2f)]	$	(2,312,709)
3. Asset (Gain)/Loss for the Year		
a) Market Value of Assets as of 6/30/15	$	1,142,199,265
b) Prior Fiscal Year Receivables		(1,669,758)
c) Current Fiscal Year Receivables		1,446,860
d) Contributions Received		54,094,823
e) Benefits and Refunds Paid		(74,572,323)
f) Transfers and Miscellaneous Adjustments		586,304
g) Expected Int. [.075 x (3a + 3b) + ((1.075)^{½} - 1) x ((3d) + (3e) + (3f))]		84,807,278
h) Expected Assets as of 6/30/16 [(3a) + (3b) + (3c) + (3d) + (3e) + (3f) + (3g)]		1,206,892,449
i) Market Value of Assets as of 6/30/16		1,125,555,355
j) Asset (Gain)/Loss [(3h) **-** (3i)]	$	81,337,094
4. Liability (Gain)/Loss for the Year		
a) Total (Gain)/Loss (1i)	$	63,251,774
b) Contribution (Gain)/Loss (2g)		(2,312,709)
c) Asset (Gain)/Loss (3j)		81,337,094
d) Liability (Gain)/Loss [(4a) - (4b) - (4c)]	$	(15,772,611)

Schedule of Amortization Bases

There is a two-year lag between the valuation date and the start of the contribution fiscal year.

- The assets, liabilities, and funded status of the plan are measured as of the valuation date: June 30, 2016.
- The required employer contributions determined by the valuation are for the fiscal year beginning two years after the valuation date: Fiscal Year 2018-19.

This two-year lag is necessary due to the amount of time needed to extract and test the membership and financial data, and the need to provide public agencies with their required employer contribution well in advance of the start of the fiscal year.

The Unfunded Accrued Liability (UAL) is used to determine the employer contribution and therefore must be rolled forward two years from the valuation date to the first day of the fiscal year for which the contribution is being determined. The UAL is rolled forward each year by subtracting the expected payment on the UAL for the fiscal year and adjusting for interest. The expected payment on the UAL for a fiscal year is equal to the Expected Employer Contribution for the fiscal year minus the Expected Normal Cost for the year. The Employer Contribution for the first fiscal year is determined by the actuarial valuation two years ago and the contribution for the second year is from the actuarial valuation one year ago. The Normal Cost Rate for each of the two fiscal years is assumed to be the same as the rate determined by the current valuation. All expected dollar amounts are determined by multiplying the rate by the expected payroll for the applicable fiscal year, based on payroll as of the valuation date.

Reason for Base	Date Established	Amortization Period	Balance 6/30/16	Expected Payment 2016-17	Balance 6/30/17	Expected Payment 2017-18	Balance 6/30/18	Scheduled Payment for 2018-19
BENEFIT CHANGE	06/30/01	5	$972,862	$163,224	$875,475	$168,121	$765,831	$172,185
BENEFIT CHANGE	06/30/04	7	$1,428,908	$194,136	$1,333,123	$199,961	$1,224,237	$204,604
BENEFIT CHANGE	06/30/05	8	$1,395,690	$174,098	$1,318,218	$179,321	$1,229,621	$183,397
ASSUMPTION CHANGE	06/30/07	7	$2,451,642	$333,089	$2,287,297	$343,081	$2,100,479	$351,049
ARNETT CASE	06/30/07	7	$58,291	$7,920	$54,383	$8,157	$49,941	$8,347
METHOD CHANGE	06/30/07	8	$(2,837,908)	$(353,999)	$(2,680,383)	$(364,619)	$(2,500,236)	$(372,909)
BENEFIT CHANGE	06/30/08	11	$638,331	$64,967	$618,088	$66,916	$594,332	$68,339
BENEFIT CHANGE	06/30/08	11	$981,659	$99,909	$950,529	$102,906	$913,997	$105,095
ASSUMPTION CHANGE	06/30/09	13	$25,759,223	$2,361,336	$25,212,104	$2,432,176	$24,551,230	$2,481,587
SPECIAL (GAIN)/LOSS	06/30/09	23	$32,144,380	$2,124,565	$32,313,513	$2,188,302	$32,429,075	$2,223,182
SPECIAL (GAIN)/LOSS	06/30/10	24	$(497,672)	$(32,189)	$(501,020)	$(33,155)	$(503,615)	$(33,670)
ASSUMPTION CHANGE	06/30/11	15	$18,254,636	$1,533,594	$18,011,776	$1,579,602	$17,703,331	$1,610,221
SPECIAL (GAIN)/LOSS	06/30/11	25	$(6,143,180)	$(389,344)	$(6,192,794)	$(401,024)	$(6,233,964)	$(407,100)
PAYMENT (GAIN)/LOSS	06/30/12	26	$1,232,271	$76,623	$1,243,753	$78,922	$1,253,699	$80,087
(GAIN)/LOSS	06/30/12	26	$173,429,009	$10,783,851	$175,044,966	$11,107,367	$176,444,867	$11,271,401
(GAIN)/LOSS	06/30/13	27	$168,995,406	$4,617,493	$176,674,083	$7,134,026	$182,311,382	$9,655,306
ASSUMPTION CHANGE	06/30/14	18	$98,475,609	$1,875,733	$103,794,515	$3,864,009	$107,445,400	$5,904,032
(GAIN)/LOSS	06/30/14	28	$(117,599,115)	$(1,654,036)	$(124,558,106)	$(3,407,313)	$(130,213,544)	$(5,184,644)
(GAIN)/LOSS	06/30/15	29	$78,550,365	$1,016,788	$83,289,839	$1,172,847	$88,217,138	$2,377,634
ASSUMPTION CHANGE	06/30/16	20	$26,552,392	$(1,053,228)	$29,602,006	$(1,084,825)	$32,909,270	$620,297
(GAIN)/LOSS	06/30/16	30	$63,251,779	$744,755	$67,144,868	$0	$72,096,802	$999,299
TOTAL			**$567,494,578**	**$22,689,285**	**$585,836,233**	**$25,334,778**	**$602,789,273**	**$32,317,739**

30-Year Amortization Schedule and Alternatives

The amortization schedule on the previous page shows the minimum contributions required according to CalPERS amortization policy. There has been considerable interest from many agencies in paying off these unfunded accrued liabilities sooner and the possible savings in doing so. As a result, we have provided alternate amortization schedules to help analyze the current amortization schedule and illustrate the advantages of accelerating unfunded liability payments.

Shown on the following page are future year amortization payments based on 1) the current amortization schedule reflecting the individual bases and remaining periods shown on the previous page, and 2) alternate "fresh start" amortization schedules using two sample periods that would both result in interest savings relative to the current amortization schedule. Note that the payments under each alternate scenario increase by 3 percent per year. **The schedules do not reflect the impact of adopted discount rate changes that will become effective beyond June 30, 2016. Therefore, future amortization payments displayed in the Current Amortization Schedule on the following page will not match projected amortization payments shown in connection with Projected Employer Contributions provided elsewhere in this report.**

The Current Amortization Schedule typically contains individual bases that are both positive and negative. Positive bases result from plan changes, assumption changes or plan experience that result in increases to unfunded liability. Negative bases result from plan changes, assumption changes or plan experience that result in decreases to unfunded liability. The combination of positive and negative bases within an amortization schedule can result in unusual or problematic circumstances in future years such as:

- A positive total unfunded liability with a negative total payment,
- A negative total unfunded liability with a positive total payment, or
- Total payments that completely amortize the unfunded liability over a very short period of time

In any year where one of the above scenarios occurs, the actuary will consider corrective action such as replacing the existing unfunded liability bases with a single "fresh start" base and amortizing it over a reasonable period.

The Current Amortization Schedule on the following page may appear to show that, based on the current amortization bases, one of the above scenarios will occur at some point in the future. It is impossible to know today whether such a scenario will in fact arise since there will be additional bases added to the amortization schedule in each future year. Should such a scenario arise in any future year, the actuary will take appropriate action based on guidelines in the CalPERS amortization policy. For purposes of this display, total payments include any negative payments. Therefore, the amount of estimated savings may be understated to the extent that negative payments appear in the current schedule.

30-Year Amortization Schedule and Alternatives

	Current Amortization Schedule*		Alternate Schedules: 20 Year Amortization		Alternate Schedules: 15 Year Amortization	
Date	**Balance**	**Payment**	**Balance**	**Payment**	**Balance**	**Payment**
6/30/2018	602,789,273	32,317,739	602,789,273	45,060,000	602,789,273	54,827,203
6/30/2019	613,756,725	38,913,170	600,552,950	46,411,800	590,431,987	56,472,019
6/30/2020	618,698,712	43,314,410	596,750,937	47,804,154	575,458,962	58,166,180
6/30/2021	619,444,525	47,682,670	591,225,742	49,238,278	557,626,155	59,911,165
6/30/2022	615,718,869	50,936,021	583,806,996	50,715,427	536,669,991	61,708,500
6/30/2023	608,347,257	52,264,492	574,310,469	52,236,890	512,305,877	63,559,755
6/30/2024	599,055,405	53,832,428	562,537,004	53,803,996	484,226,603	65,466,548
6/30/2025	587,453,551	54,753,752	548,271,380	55,418,116	452,100,629	67,430,544
6/30/2026	574,041,368	56,636,432	531,281,084	57,080,660	415,570,233	69,453,461
6/30/2027	557,689,168	58,335,523	511,314,995	58,793,080	374,249,536	71,537,064
6/30/2028	538,370,360	60,085,588	488,101,964	60,556,872	327,722,368	73,683,176
6/30/2029	515,813,338	61,648,083	461,349,297	62,373,578	275,539,978	75,893,672
6/30/2030	489,973,651	63,497,524	430,741,116	64,244,785	217,218,581	78,170,482
6/30/2031	460,311,861	61,758,157	395,936,600	66,172,129	152,236,706	80,515,596
6/30/2032	430,264,880	60,634,109	356,568,101	68,157,293	80,032,365	82,931,064
6/30/2033	399,166,694	56,878,365	312,239,111	70,202,012		
6/30/2034	369,666,789	54,431,241	262,522,081	72,308,072		
6/30/2035	340,527,025	51,786,102	206,956,080	74,477,314		
6/30/2036	311,979,144	48,933,261	145,044,276	76,711,634		
6/30/2037	284,282,025	49,313,565	76,251,232	79,012,983		
6/30/2038	254,148,168	49,672,647				
6/30/2039	221,419,851	51,162,827				
6/30/2040	184,733,666	52,697,711				
6/30/2041	143,751,399	45,127,104				
6/30/2042	107,591,499	45,155,655				
6/30/2043	68,735,220	43,438,061				
6/30/2044	28,793,094	14,063,228				
6/30/2045	16,343,998	8,101,744				
6/30/2046	9,154,186	7,292,575				
6/30/2047	2,272,603	2,354,914				
Totals		**1,377,019,098**		**1,210,779,073**		**1,019,726,429**
Interest Paid		**774,229,825**		**607,989,800**		**416,937,156**
Estimated Savings				**166,240,025**		**357,292,669**

* This schedule does not reflect the impact of adopted discount rate changes that will become effective beyond June 30, 2016. For Projected Employer Contributions, please see Page 5.

Reconciliation of Required Employer Contributions

Normal Cost (% of Payroll)

1. For Period 7/1/17 – 6/30/18	
a) Employer Normal Cost	18.161%
b) Employee Contribution	9.175%
c) Total Normal Cost	27.336%
2. Changes since the prior year annual valuation	
a) Effect of changes in demographics results	(0.190%)
b) Effect of plan changes	0.000%
c) Effect of changes in assumptions	0.833%
d) Net effect of the changes above [sum of (a) through (c)]	0.643%
3. For Period 7/1/18 – 6/30/19	
a) Employer Normal Cost	18.693%
b) Employee Contribution	9.286%
c) Total Normal Cost	27.979%
Employer Normal Cost Change [(3a) – (1a)]	0.532%
Employee Contribution Change [(3b) – (1b)]	0.111%

Unfunded Liability Contribution ($)

1. For Period 7/1/17 – 6/30/18	26,419,603
2. Changes since the prior year annual valuation	
a) Effect of (gain)/loss during prior year[1]	999,299
b) Effect of plan changes	0
c) Effect of changes in assumptions[2]	620,297
d) Changes to prior year amortization payments[3]	4,278,540
e) Effect of changes due to Fresh Start	0
f) Effect of elimination of amortization base	0
g) Net effect of the changes above [sum of (a) through (f)]	5,898,136
3. For Period 7/1/18 – 6/30/19 [(1)+(2g)]	32,317,739

[1] The unfunded liability contribution for the (gain)/loss during the year prior to the valuation date is 20 percent of the "full" annual requirement due to the 5-year ramp. Increases to this amount that occur during the ramp period will be included in line d) in future years.

[2] The unfunded liability contribution for the change in assumptions is 20 percent of the "full" annual requirement due to the 5-year ramp. Increases to this amount that occur during the ramp period will be included in line d) in future years.

[3] Includes changes due to 5-year ramp, payroll growth assumption, and re-amortization under new discount rate.

The amounts shown for the period 7/1/17 – 6/30/18 may be different if a prepayment of unfunded actuarial liability is made or a plan change became effective after the prior year's actuarial valuation was performed.

Employer Contribution History

The table below provides a recent history of the required employer contributions for the plan, as determined by the annual actuarial valuation. It does not account for prepayments or benefit changes made during a fiscal year.

		Required By Valuation	
Fiscal Year	**Employer Normal Cost**	**Unfunded Rate**	**Unfunded Liability Payment ($)**
2013 - 14	17.324%	11.351%	N/A
2014 - 15	17.403%	13.715%	N/A
2015 - 16	17.394%	16.608%	N/A
2016 - 17	18.361%	18.488%	N/A
2017 - 18	18.161%	N/A	26,419,603
2018 - 19	18.693%	N/A	32,317,739

Funding History

The table below shows the recent history of the actuarial accrued liability, the market value of assets, the funded ratio and the annual covered payroll.

Valuation Date	Accrued Liability	Market Value of Assets (MVA)	Unfunded Liability	Funded Ratio	Annual Covered Payroll
06/30/11	$ 1,249,347,774	$ 916,725,639	$ 332,622,135	73.4%	$ 109,446,416
06/30/12	1,313,218,710	897,431,991	415,786,719	68.3%	107,811,628
06/30/13	1,370,866,286	992,363,894	378,502,392	72.4%	104,054,754
06/30/14	1,517,439,523	1,142,219,279	375,220,244	75.3%	108,803,331
06/30/15	1,604,715,617	1,142,199,265	462,516,352	71.2%	116,621,439
06/30/16	1,693,049,933	1,125,555,355	567,494,578	66.5%	122,755,262

RISK ANALYSIS

- **ANALYSIS OF FUTURE INVESTMENT RETURN SCENARIOS**
- **ANALYSIS OF DISCOUNT RATE SENSITIVITY**
- **VOLATILITY RATIOS**
- **HYPOTHETICAL TERMINATION LIABILITY**

Analysis of Future Investment Return Scenarios

Analysis was performed to determine the effects of various future investment returns on required employer contributions. The projections below provide a range of results based on five investment return scenarios assumed to occur during the next four fiscal years (2016-17, 2017-18, 2018-19 and 2019-20). The projections also assume that all other actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur.

Each of the five investment return scenarios assumes a return of 7.375 percent for fiscal year 2016-17. For fiscal years 2017-18, 2018-19, and 2019-20 each scenario assumes an alternate fixed annual return. The fixed return assumptions for the five scenarios are -3.0 percent, 3.0 percent, 7.0 percent (7.25 percent for 2017-18), 11.0 percent and 17.0 percent.

The alternate investment returns were chosen based on stochastic analysis of possible future investment returns over the four year period ending June 30, 2020. Using the expected returns and volatility of the asset classes in which the funds are invested, we produced ten thousand stochastic outcomes for this period. We then selected annual returns that approximate the 5th, 25th, 50th, 75th, and 95th percentiles for these outcomes. For example, of all of the 4-year outcomes generated in the stochastic analysis, approximately 25 percent of them had an average annual return of 3.0 percent or less.

Required contributions outside of this range are also possible. In particular, while it is unlikely that investment returns will average less than -3.0 percent or greater than 17.0 percent over this four year period, the possibility of a single investment return less than -3.0 percent or greater than 17.0 percent in any given year is much greater.

Assumed Annual Return From 2017-18 through 2019-20	**Projected Employer Contributions**			
	2019-20	**2020-21**	**2021-22**	**2022-23**
(3.0%)				
Normal Cost	19.6%	21.4%	21.4%	21.4%
UAL Contribution	$39,085,000	$46,245,000	$56,261,000	$67,210,000
3.0%				
Normal Cost	19.6%	21.4%	21.4%	21.4%
UAL Contribution	$39,085,000	$45,170,000	$53,060,000	$60,850,000
Assumed Discount Rate				
Normal Cost	19.6%	21.4%	21.4%	21.4%
UAL Contribution	$39,085,000	$44,409,000	$50,761,000	$56,176,000
11.0%				
Normal Cost	19.6%	21.4%	21.8%	22.3%
UAL Contribution	$39,085,000	$43,737,000	$48,576,000	$51,727,000
17.0%				
Normal Cost	19.6%	21.4%	22.7%	24.0%
UAL Contribution	$39,085,000	$42,662,000	$45,107,000	$44,714,000

Given the temporary suspension of the Risk Mitigation Policy during the period over which the discount rate assumption is being phased down to 7.0 percent, the projections above were performed without reflection of any possible impact of this Policy for Fiscal Years 2019-20 and 2020-21.

The projected normal cost percentages do not reflect that the normal cost will decline over time as new employees are hired into PEPRA or other lower cost benefit tiers.

Analysis of Discount Rate Sensitivity

Shown below are various valuation results as of June 30, 2016 assuming alternate discount rates. Results are shown using the current discount rate of 7.375 percent as well as alternate discount rates of 6.0 percent, 7.0 percent, and 8.0 percent. The alternate rate of 7.0 percent was selected since the Board has adopted this rate as the final discount rate at the end of the three year phase-in of the reduction in this assumption. The rates of 6.0 percent and 8.0 percent were selected since they illustrate the impact of a 1 percent increase or decrease to the 7.0 percent assumption. This analysis shows the potential plan impacts if the PERF were to realize investment returns of 6.0 percent, 7.0 percent, or 8.0 percent over the long-term.

This type of analysis gives the reader a sense of the long-term risk to required contributions. For a measure of funded status that is appropriate for assessing the sufficiency of plan assets to cover estimated termination liabilities, please see "Hypothetical Termination Liability" in the "Risk Analysis" section.

Sensitivity Analysis				
As of June 30, 2016	**Plan's Normal Cost**	**Accrued Liability**	**Unfunded Accrued Liability**	**Funded Status**
7.375% (current discount rate)	27.979%	$1,693,049,933	$567,494,578	66.5%
6.0%	39.453%	$2,034,693,213	$909,137,858	55.3%
7.0%	30.668%	$1,776,829,995	$651,274,640	63.3%
8.0%	24.090%	$1,566,608,179	$441,052,824	71.8%

Volatility Ratios

The actuarial calculations supplied in this communication are based on a number of assumptions about long-term demographic and economic behavior. Unless these assumptions (terminations, deaths, disabilities, retirements, salary growth, and investment return) are exactly realized each year, there will be differences on a year-to-year basis. The year-to-year differences between actual experience and the assumptions are called actuarial gains and losses and serve to lower or raise required employer contributions from one year to the next. Therefore, employer contributions will inevitably fluctuate, especially due to the ups and downs of investment returns.

Asset Volatility Ratio (AVR)

Plans that have higher asset-to-payroll ratios experience more volatile employer contributions (as a percentage of payroll) due to investment return. For example, a plan with an asset-to-payroll ratio of 8 may experience twice the contribution volatility due to investment return volatility than a plan with an asset-to-payroll ratio of 4. Shown below is the asset volatility ratio, a measure of the plan's current volatility. It should be noted that this ratio is a measure of the current situation. It increases over time but generally tends to stabilize as the plan matures.

Liability Volatility Ratio (LVR)

Plans that have higher liability-to-payroll ratios experience more volatile employer contributions (as a percentage of payroll) due to investment return and changes in liability. For example, a plan with a liability-to-payroll ratio of 8 is expected to have twice the contribution volatility of a plan with a liability-to-payroll ratio of 4. The liability volatility ratio is also included in the table below. It should be noted that this ratio indicates a longer-term potential for contribution volatility. The asset volatility ratio, described above, will tend to move closer to the liability volatility ratio as the plan matures. Since the liability volatility ratio is a long-term measure, it is shown below at the current discount rate (7.375 percent) as well as the discount rate the Board has adopted to determine the contribution requirement in the June 30, 2018 actuarial valuation (7.00 percent).

Contribution Volatility		As of June 30, 2016
1. Market Value of Assets without Receivables	$	1,124,108,495
2. Payroll		122,755,262
3. Asset Volatility Ratio (AVR) [(1) / (2)]		9.2
4. Accrued Liability (7.375% discount rate)	$	1,693,049,933
5. Liability Volatility Ratio (LVR) [(4) / (2)]		13.8
6. Accrued Liability (7.00% discount rate)		1,776,829,995
7. Projected Liability Volatility Ratio [(6) / (2)]		14.5

Hypothetical Termination Liability

The hypothetical termination liability is an estimate of the financial position of the plan had the contract with CalPERS been terminated as of June 30, 2016. The plan liability on a termination basis is calculated differently compared to the plan's ongoing funding liability. For this hypothetical termination liability calculation, both compensation and service are frozen as of the valuation date and no future pay increases or service accruals are assumed. This measure of funded status is not appropriate for assessing the need for future employer contributions in the case of an ongoing plan, that is, for an employer that continues to provide CalPERS retirement benefits to active employees.

A more conservative investment policy and asset allocation strategy was adopted by the CalPERS Board for the Terminated Agency Pool. The Terminated Agency Pool has limited funding sources since no future employer contributions will be made. Therefore, expected benefit payments are secured by risk-free assets and benefit security for members is increased while limiting the funding risk. However, this asset allocation has a lower expected rate of return than the PERF and consequently, a lower discount rate assumption. The lower discount rate for the Terminated Agency Pool results in higher liabilities for terminated plans.

The effective termination discount rate will depend on actual market rates of return for risk-free securities on the date of termination. As market discount rates are variable the table below shows a range for the hypothetical termination liability based on the lowest and highest interest rates observed during an approximate 2-year period centered around the valuation date.

Market Value of Assets (MVA)	Hypothetical Termination Liability[1,2] @ 1.75%	Funded Status	Unfunded Termination Liability @ 1.75%	Hypothetical Termination Liability[1,2] @ 3.00%	Funded Status	Unfunded Termination Liability @ 3.00%
$1,125,555,355	$3,194,477,960	35.2%	$2,068,922,605	$2,703,960,759	41.6%	$1,578,405,404

[1] The hypothetical liabilities calculated above include a 7 percent mortality contingency load in accordance with Board policy. Other actuarial assumptions can be found in Appendix A.

[2] The current discount rate assumption used for termination valuations is a weighted average of the 10-year and 30-year U.S. Treasury yields where the weights are based on matching asset and liability durations as of the termination date. The discount rates used in the table are based on 20-year Treasury bonds, rounded to the nearest quarter percentage point, which is a good proxy for most plans. The 20-year Treasury yield was 1.75 percent on June 30, 2016, and was 2.75 percent on January 31, 2017.

In order to terminate the plan, you must first contact our Retirement Services Contract Unit to initiate a Resolution of Intent to Terminate. The completed Resolution will allow the plan actuary to give you a preliminary termination valuation with a more up-to-date estimate of the plan liabilities. CalPERS advises you to consult with the plan actuary before beginning this process.

PLAN'S MAJOR BENEFIT PROVISIONS

Plan's Major Benefit Options

Shown below is a summary of the major optional benefits for which your agency has contracted for this plan. A description of principal standard and optional plan provisions is in Appendix B of this report.

	Contract Package						
Benefit Provision	Active Police	Active Fire	Active Fire	Active Police	Active Police	Active Fire	Inactive Fire
Benefit Formula	3.0% @ 50	3.0% @ 55	3.0% @ 55	3.0% @ 50	2.7% @ 57	2.7% @ 57	3.0% @ 55
Social Security Coverage	No	No	No	No	No	No	No
Full/Modified	Full	Full	Full	Full	Full	Full	Full
Employee Contribution Rate	9.00%	9.00%	9.00%	9.00%	11.50%	11.50%	
Final Average Compensation Period	One Year	One Year	One Year	One Year	Three Year	Three Year	One Year
Sick Leave Credit	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Non-Industrial Disability	Standard	Standard	Standard	Standard	Standard	Standard	Standard
Industrial Disability	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pre-Retirement Death Benefits							
Optional Settlement 2W	Yes	No	No	Yes	Yes	No	No
1959 Survivor Benefit Level	Indexed	No	No	Indexed	Indexed	No	Level 2
Special	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Alternate (firefighters)	No	No	No	No	No	No	No
Post-Retirement Death Benefits							
Lump Sum	$500	$500	$500	$500	$500	$500	$500
Survivor Allowance (PRSA)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
COLA	2%	2%	2%	2%	2%	2%	2%

Plan's Major Benefit Options

Shown below is a summary of the major optional benefits for which your agency has contracted. A description of principal standard and optional plan provisions is in the following section of this Appendix.

	Contract Package				
Benefit Provision	Receiving Fire	Receiving Police	Receiving Fire	Receiving Police	
Benefit Formula					
Social Security Coverage					
Full/Modified					
Employee Contribution Rate					
Final Average Compensation Period					
Sick Leave Credit					
Non-Industrial Disability					
Industrial Disability					
Pre-Retirement Death Benefits					
Optional Settlement 2W					
1959 Survivor Benefit Level					
Special					
Alternate (firefighters)					
Post-Retirement Death Benefits					
Lump Sum	$500	$500	$500	$500	
Survivor Allowance (PRSA)	Yes	Yes	Yes	Yes	
COLA	2%	2%	3%	3%	

APPENDICES

- **APPENDIX A – ACTUARIAL METHODS AND ASSUMPTIONS**
- **APPENDIX B – PRINCIPAL PLAN PROVISIONS**
- **APPENDIX C – PARTICIPANT DATA**
- **APPENDIX D – DEVELOPMENT OF PEPRA MEMBER CONTRIBUTION RATES**
- **APPENDIX E – GLOSSARY OF ACTUARIAL TERMS**

APPENDIX A

ACTUARIAL METHODS AND ASSUMPTIONS

- **ACTUARIAL DATA**
- **ACTUARIAL METHODS**
- **ACTUARIAL ASSUMPTIONS**
- **MISCELLANEOUS**

Actuarial Data

As stated in the Actuarial Certification, the data which serves as the basis of this valuation has been obtained from the various CalPERS databases. We have reviewed the valuation data and believe that it is reasonable and appropriate in aggregate. We are unaware of any potential data issues that would have a material effect on the results of this valuation, except that data does not always contain the latest salary information for former members now in reciprocal systems and does not recognize the potential for unusually large salary deviation in certain cases such as elected officials. Therefore, salary information in these cases may not be accurate. These situations are relatively infrequent, however, and when they do occur, they generally do not have a material impact on the required employer contributions.

Actuarial Methods

Actuarial Cost Method

The actuarial cost method used is the Entry Age Normal Cost Method. Under this method, projected benefits are determined for all members and the associated liabilities are spread in a manner that produces level annual cost as a percentage of pay in each year from the member's entry age to their assumed retirement age on the valuation date. The cost allocated to the current fiscal year is called the normal cost.

The actuarial accrued liability for active members is then calculated as the portion of the total cost of the plan allocated to prior years. The actuarial accrued liability for members currently receiving benefits and for members entitled to deferred benefits is equal to the present value of the benefits expected to be paid. No normal costs are applicable for these participants.

Amortization of Unfunded Actuarial Accrued Liability

The excess of the total actuarial accrued liability over the market value of plan assets is called the unfunded actuarial accrued liability (UAL). Funding requirements are determined by adding the normal cost and an amortization payment toward the unfunded liability. The unfunded liability is amortized as a "level percent of pay". Commencing with the June 30, 2013 valuation, all new gains or losses are amortized over a fixed 30-year period with a 5-year ramp up at the beginning and a 5-year ramp down at the end of the amortization period. All changes in liability due to plan amendments (other than golden handshakes) are amortized over a 20-year period with no ramp. Changes in actuarial assumptions or changes in actuarial methodology are amortized over a 20-year period with a 5-year ramp up at the beginning and a 5-year ramp down at the end of the amortization period. Changes in unfunded accrued liability due to a Golden Handshake will be amortized over a period of five years.

The 5-year ramp up means that the payments in the first four years of the amortization period are 20 percent, 40 percent, 60 percent and 80 percent of the "full" payment which begins in year five. The 5-year ramp down means that the reverse is true in the final four years of the amortization period.

<u>Exceptions for Inconsistencies:</u>

An exception to the amortization rules above is used whenever their application results in inconsistencies. In these cases, a "fresh start" approach is used. This means that the current unfunded actuarial liability is projected and amortized over a set number of years. For example, a fresh start is needed in the following situations:

1) When a positive payment would be required on a negative unfunded actuarial liability (or conversely a negative payment on a positive unfunded actuarial liability); or
2) When there are excess assets, rather than an unfunded liability. In this situation, a 30-year fresh start is used.

It should be noted that the actuary may determine that a fresh start is necessary under other circumstances. In all cases of a fresh start, the period is set by the actuary at what is deemed appropriate; however, the period will not be greater than 30 years.

Exceptions for Inactive Plans:

The following exceptions apply to plans classified as Inactive. These plans have no active members and no expectation to have active members in the future.

- Amortization of the unfunded liability is on a "level dollar" basis rather than a "level percent of pay" basis. For amortization layers which utilize a ramp up and ramp down, the "ultimate" payment is constant.
- Actuarial judgment will be used to shorten amortization periods for Inactive plans with existing periods that are deemed too long given the duration of the liability. The specific demographics of the plan will be used to determine if shorter periods may be more appropriate.

Asset Valuation Method

It is the policy of the CalPERS Board of Administration to use professionally accepted amortization methods to eliminate a surplus or an unfunded accrued liability in a manner that maintains benefit security for the members of the System while minimizing substantial variations in required employer contributions. On April 17, 2013, the CalPERS Board of Administration approved a recommendation to change the CalPERS amortization and rate smoothing policies. Beginning with the June 30, 2013 valuations that set the employer contribution for Fiscal Year 2015-16, CalPERS employs a policy that amortizes all gains and losses over a fixed 30-year period. The increase or decrease in the rate is then spread directly over a 5-year period. This method is referred to as "direct rate smoothing." CalPERS no longer uses an actuarial value of assets and only uses the market value of assets. The direct rate smoothing method is equivalent to a method using a 5 year asset smoothing period with no actuarial value of asset corridor and a 25-year amortization period for gains and losses.

PEPRA Normal Cost Rate Methodology

Per Government Code Section 7522.30(b) the "normal cost rate" shall mean the annual actuarially determined normal cost for the plan of retirement benefits provided to the new member and shall be established based on actuarial assumptions used to determine the liabilities and costs as part of the annual actuarial valuation. The plan of retirement benefits shall include any elements that would impact the actuarial determination of the normal cost, including, but not limited to, the retirement formula, eligibility and vesting criteria, ancillary benefit provisions, and any automatic cost-of-living adjustments as determined by the public retirement system.

Each non-pooled plan is considered to be stable with a sufficiently large demographic of actives. It is preferable to determine normal cost using a large active population ongoing so that this rate remains relatively stable. The total PEPRA normal cost will be calculated using all active members within a non-pooled plan until the number of members covered under the PEPRA formula meets either:

1. 50 percent of the active population, or
2. 25 percent of the active population and 100 or more PEPRA members

Once either of the conditions above are met for a non-pooled plan, the total PEPRA normal cost will be based on the active PEPRA population in the plan.

Accordingly, the total normal cost will be funded equally between employer and employee based on the demographics of the employees of that employer.

Actuarial Assumptions

In 2014, CalPERS completed a 2-year asset liability management study incorporating actuarial assumptions and strategic asset allocation. On February 19, 2014, the CalPERS Board of Administration adopted relatively modest changes to the asset allocation that reduced the expected volatility of returns. The adopted asset allocation was expected to have a long-term blended return that continued to support a discount rate assumption of 7.5 percent at that time. The Board also approved several changes to the demographic assumptions that more closely aligned with actual experience. The most significant of these is mortality improvement to acknowledge the greater life expectancies we are seeing in our membership and expected continued improvements. These new actuarial assumptions were first used in the June 30, 2014 valuation to set the Fiscal Year 2016-17 contribution for public agency employers.

On December 21, 2016, the CalPERS Board of Administration lowered the discount rate from 7.50 percent to 7.00 percent using a three year phase-in beginning with the June 30, 2016 actuarial valuations. The minimum employer contributions for Fiscal Year 2018-19 determined in this valuation were calculated using a discount rate of 7.375 percent. The projected employer contributions on Page 5 are calculated assuming that the discount rate will be lowered to 7.25 percent next year and 7.00 percent the following year as adopted by the Board. The decision to reduce the discount rate was primarily based on reduced capital market assumptions provided by external investment consultants and CalPERS investment staff. The specific decision adopted by the Board reflected recommendations from CalPERS staff and additional input from employer and employee stakeholder groups. Based on the investment allocation adopted by the Board and capital market assumptions, the reduced discount rate schedule provides a more realistic assumption for the long term investment return of the fund.

Notwithstanding the Board's decision to phase into a 7.0 percent discount rate, subsequent analysis of the expected investment return of CalPERS assets or changes to the investment allocation may result in a change to this three year discount rate schedule. A comprehensive analysis of all actuarial assumptions and methods including the discount rate will be conducted in 2017.

For more details and additional rationale for the selection of the actuarial assumptions, please refer to the CalPERS Experience Study and Review of Actuarial Assumptions report from January 2014 that can be found on the CalPERS website under: "Forms and Publications". Click on "View All" and search for Experience Study.

All actuarial assumptions (except the discount rates used for the hypothetical termination liability) represent an estimate of future experience rather than observations of the estimates inherent in market data.

Economic Assumptions

Discount Rate

The prescribed discount rate assumption adopted by the Board on December 21, 2016 is 7.375 percent compounded annually (net of investment and administrative expenses) as of 6/30/2016.

The Board also prescribed that the assumed discount rate will reduce to 7.25 percent compounded annually (net of expenses) as of 6/30/2017, and 7.0 percent compounded annually (net of expenses) as of 6/30/2018. These further changes to the discount rate assumption are not reflected in the determination of required contributions determined in this report for Fiscal Year 2018-19.

Termination Liability Discount Rate

The current discount rate assumption used for termination valuations is a weighted average of the 10-year and 30-year U.S. Treasury yields where the weights are based on matching asset and liability durations as of the termination date.

The hypothetical termination liabilities in this report are calculated using an observed range of market interest rates. This range is based on the lowest and highest 20-year Treasury bond observed during an approximate 2-year period centered around the valuation date. The 20-year Treasury bond has a similar duration to most plan liabilities and serves as a good proxy for the termination discount rate. The 20-year Treasury yield was 1.75 percent on June 30, 2016.

Salary Growth

Annual increases vary by category, entry age, and duration of service. A sample of assumed increases are shown below.

Public Agency Miscellaneous

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.1220	0.1160	0.1020
1	0.0990	0.0940	0.0830
2	0.0860	0.0810	0.0710
3	0.0770	0.0720	0.0630
4	0.0700	0.0650	0.0570
5	0.0640	0.0600	0.0520
10	0.0460	0.0430	0.0390
15	0.0420	0.0400	0.0360
20	0.0390	0.0380	0.0340
25	0.0370	0.0360	0.0330
30	0.0350	0.0340	0.0320

Public Agency Fire

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.2000	0.1980	0.1680
1	0.1490	0.1460	0.1250
2	0.1200	0.1160	0.0990
3	0.0980	0.0940	0.0810
4	0.0820	0.0780	0.0670
5	0.0690	0.0640	0.0550
10	0.0470	0.0460	0.0420
15	0.0440	0.0420	0.0390
20	0.0420	0.0390	0.0360
25	0.0400	0.0370	0.0340
30	0.0380	0.0360	0.0340

Public Agency Police

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.1500	0.1470	0.1310
1	0.1160	0.1120	0.1010
2	0.0950	0.0920	0.0830
3	0.0810	0.0780	0.0700
4	0.0700	0.0670	0.0600
5	0.0610	0.0580	0.0520
10	0.0450	0.0430	0.0370
15	0.0450	0.0430	0.0370
20	0.0450	0.0430	0.0370
25	0.0450	0.0430	0.0370
30	0.0450	0.0430	0.0370

Salary Growth (continued)

Public Agency County Peace Officers

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.1770	0.1670	0.1500
1	0.1340	0.1260	0.1140
2	0.1080	0.1030	0.0940
3	0.0900	0.0860	0.0790
4	0.0760	0.0730	0.0670
5	0.0650	0.0620	0.0580
10	0.0470	0.0450	0.0410
15	0.0460	0.0450	0.0390
20	0.0460	0.0450	0.0380
25	0.0460	0.0450	0.0380
30	0.0460	0.0440	0.0380

Schools

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.0900	0.0880	0.0820
1	0.0780	0.0750	0.0700
2	0.0700	0.0680	0.0630
3	0.0650	0.0630	0.0580
4	0.0610	0.0590	0.0540
5	0.0580	0.0560	0.0510
10	0.0460	0.0450	0.0410
15	0.0420	0.0410	0.0380
20	0.0390	0.0380	0.0350
25	0.0370	0.0350	0.0330
30	0.0350	0.0330	0.0310

- The Miscellaneous salary scale is used for Local Prosecutors.
- The Police salary scale is used for Other Safety, Local Sheriff, and School Police.

Overall Payroll Growth

3.00 percent compounded annually (used in projecting the payroll over which the unfunded liability is amortized). This assumption is used for all plans with active members.

Inflation

2.75 percent compounded annually.

Non-valued Potential Additional Liabilities

The potential liability loss for a cost-of-living increase exceeding the 2.75 percent inflation assumption, and any potential liability loss from future member service purchases are not reflected in the valuation.

Miscellaneous Loading Factors

Credit for Unused Sick Leave

Total years of service is increased by 1 percent for those plans that have accepted the provision providing Credit for Unused Sick Leave.

Conversion of Employer Paid Member Contributions (EPMC)

Total years of service is increased by the Employee Contribution Rate for those plans with the provision providing for the Conversion of Employer Paid Member Contributions (EPMC) during the final compensation period.

Norris Decision (Best Factors)

Employees hired prior to July 1, 1982 have projected benefit amounts increased in order to reflect the use of "Best Factors" in the calculation of optional benefit forms. This is due to a 1983 Supreme Court decision, known as the Norris decision, which required males and females to be treated equally in the determination of benefit amounts. Consequently, anyone already employed at that time is given the best possible conversion factor when optional benefits are determined. No loading is necessary for employees hired after July 1, 1982.

Termination Liability

The termination liabilities include a 7 percent contingency load. This load is for unforeseen improvements in mortality.

Demographic Assumptions

Pre-Retirement Mortality

Non-industrial death rates vary by age and gender. Industrial death rates vary by age. See sample rates in table below. The non-industrial death rates are used for all plans. The industrial death rates are used for safety plans (except for Local Prosecutor safety members where the corresponding miscellaneous plan does not have the Industrial Death Benefit).

	Non-Industrial Death (Not Job-Related)		**Industrial Death (Job-Related)**
Age	Male	Female	Male and Female
20	0.00031	0.00020	0.00003
25	0.00040	0.00023	0.00007
30	0.00049	0.00025	0.00010
35	0.00057	0.00035	0.00012
40	0.00075	0.00050	0.00013
45	0.00106	0.00071	0.00014
50	0.00155	0.00100	0.00015
55	0.00228	0.00138	0.00016
60	0.00308	0.00182	0.00017
65	0.00400	0.00257	0.00018
70	0.00524	0.00367	0.00019
75	0.00713	0.00526	0.00020
80	0.00990	0.00814	0.00021

Miscellaneous plans usually have industrial death rates set to zero unless the agency has specifically contracted for industrial death benefits. If so, each non-industrial death rate shown above will be split into two components; 99 percent will become the non-industrial death rate and 1 percent will become the industrial death rate.

Post-Retirement Mortality

Rates vary by age, type of retirement, and gender. See sample rates in table below. These rates are used for all plans.

	Healthy Recipients		Non-Industrially Disabled (Not Job-Related)		Industrially Disabled (Job-Related)	
Age	Male	Female	Male	Female	Male	Female
50	0.00501	0.00466	0.01680	0.01158	0.00501	0.00466
55	0.00599	0.00416	0.01973	0.01149	0.00599	0.00416
60	0.00710	0.00436	0.02289	0.01235	0.00754	0.00518
65	0.00829	0.00588	0.02451	0.01607	0.01122	0.00838
70	0.01305	0.00993	0.02875	0.02211	0.01635	0.01395
75	0.02205	0.01722	0.03990	0.03037	0.02834	0.02319
80	0.03899	0.02902	0.06083	0.04725	0.04899	0.03910
85	0.06969	0.05243	0.09731	0.07762	0.07679	0.06251
90	0.12974	0.09887	0.14804	0.12890	0.12974	0.09887
95	0.22444	0.18489	0.22444	0.21746	0.22444	0.18489
100	0.32536	0.30017	0.32536	0.30017	0.32536	0.30017
105	0.58527	0.56093	0.58527	0.56093	0.58527	0.56093
110	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000

The post-retirement mortality rates above include 20 years of projected on-going mortality improvement using Scale BB published by the Society of Actuaries.

Marital Status

For active members, a percentage who are married upon retirement is assumed according to member category as shown in the following table.

Member Category	Percent Married
Miscellaneous Member	85%
Local Police	90%
Local Fire	90%
Other Local Safety	90%
School Police	90%

Age of Spouse

It is assumed that female spouses are 3 years younger than male spouses. This assumption is used for all plans.

Terminated Members

It is assumed that terminated members refund immediately if non-vested. Terminated members who are vested are assumed to follow the same service retirement pattern as active members but with a load to reflect the expected higher rates of retirement, especially at lower ages. The following table shows the load factors that are applied to the service retirement assumption for active members to obtain the service retirement pattern for separated vested members:

Age	Load Factor Miscellaneous	Load Factor Safety
50	190%	310%
51	110%	190%
52	110%	105%
53 through 54	100%	105%
55	100%	140%
56 and above	100% (no change)	100% (no change)

Termination with Refund

Rates vary by entry age and service for miscellaneous plans. Rates vary by service for safety plans. See sample rates in tables below.

Public Agency Miscellaneous

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40	Entry Age 45
0	0.1742	0.1674	0.1606	0.1537	0.1468	0.1400
1	0.1545	0.1477	0.1409	0.1339	0.1271	0.1203
2	0.1348	0.1280	0.1212	0.1142	0.1074	0.1006
3	0.1151	0.1083	0.1015	0.0945	0.0877	0.0809
4	0.0954	0.0886	0.0818	0.0748	0.0680	0.0612
5	0.0212	0.0193	0.0174	0.0155	0.0136	0.0116
10	0.0138	0.0121	0.0104	0.0088	0.0071	0.0055
15	0.0060	0.0051	0.0042	0.0032	0.0023	0.0014
20	0.0037	0.0029	0.0021	0.0013	0.0005	0.0001
25	0.0017	0.0011	0.0005	0.0001	0.0001	0.0001
30	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001
35	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Public Agency Safety

Duration of Service	Fire	Police	County Peace Officer
0	0.0710	0.1013	0.0997
1	0.0554	0.0636	0.0782
2	0.0398	0.0271	0.0566
3	0.0242	0.0258	0.0437
4	0.0218	0.0245	0.0414
5	0.0029	0.0086	0.0145
10	0.0009	0.0053	0.0089
15	0.0006	0.0027	0.0045
20	0.0005	0.0017	0.0020
25	0.0003	0.0012	0.0009
30	0.0003	0.0009	0.0006
35	0.0003	0.0009	0.0006

The police termination and refund rates are also used for Public Agency Local Prosecutors, Other Safety, Local Sheriff, and School Police.

Schools

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40	Entry Age 45
0	0.1730	0.1627	0.1525	0.1422	0.1319	0.1217
1	0.1585	0.1482	0.1379	0.1277	0.1174	0.1071
2	0.1440	0.1336	0.1234	0.1131	0.1028	0.0926
3	0.1295	0.1192	0.1089	0.0987	0.0884	0.0781
4	0.1149	0.1046	0.0944	0.0841	0.0738	0.0636
5	0.0278	0.0249	0.0221	0.0192	0.0164	0.0135
10	0.0172	0.0147	0.0122	0.0098	0.0074	0.0049
15	0.0115	0.0094	0.0074	0.0053	0.0032	0.0011
20	0.0073	0.0055	0.0038	0.0020	0.0002	0.0002
25	0.0037	0.0023	0.0010	0.0002	0.0002	0.0002
30	0.0015	0.0003	0.0002	0.0002	0.0002	0.0002
35	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002

Termination with Vested Benefits

Rates vary by entry age and service for miscellaneous plans. Rates vary by service for safety plans. See sample rates in tables below.

Public Agency Miscellaneous

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40
5	0.0656	0.0597	0.0537	0.0477	0.0418
10	0.0530	0.0466	0.0403	0.0339	0.0000
15	0.0443	0.0373	0.0305	0.0000	0.0000
20	0.0333	0.0261	0.0000	0.0000	0.0000
25	0.0212	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000	0.0000
35	0.0000	0.0000	0.0000	0.0000	0.0000

Public Agency Safety

Duration of Service	Fire	Police	County Peace Officer
5	0.0162	0.0163	0.0265
10	0.0061	0.0126	0.0204
15	0.0058	0.0082	0.0130
20	0.0053	0.0065	0.0074
25	0.0047	0.0058	0.0043
30	0.0045	0.0056	0.0030
35	0.0000	0.0000	0.0000

- When a member is eligible to retire, the termination with vested benefits probability is set to zero.
- After termination with vested benefits, a miscellaneous member is assumed to retire at age 59 and a safety member at age 54.
- The Police termination with vested benefits rates are also used for Public Agency Local Prosecutors, Other Safety, Local Sheriff, and School Police.

Schools

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40
5	0.0816	0.0733	0.0649	0.0566	0.0482
10	0.0629	0.0540	0.0450	0.0359	0.0000
15	0.0537	0.0440	0.0344	0.0000	0.0000
20	0.0420	0.0317	0.0000	0.0000	0.0000
25	0.0291	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000	0.0000
35	0.0000	0.0000	0.0000	0.0000	0.0000

Non-Industrial (Not Job-Related) Disability

Rates vary by age and gender for miscellaneous plans. Rates vary by age and category for safety plans.

	Miscellaneous		Fire	Police	County Peace Officer	Schools	
Age	Male	Female	Male and Female	Male and Female	Male and Female	Male	Female
20	0.0002	0.0001	0.0001	0.0001	0.0001	0.0003	0.0003
25	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
30	0.0002	0.0002	0.0001	0.0002	0.0001	0.0001	0.0002
35	0.0005	0.0008	0.0001	0.0003	0.0004	0.0005	0.0004
40	0.0012	0.0016	0.0001	0.0004	0.0007	0.0015	0.0010
45	0.0019	0.0022	0.0002	0.0005	0.0013	0.0030	0.0019
50	0.0021	0.0023	0.0005	0.0008	0.0018	0.0039	0.0024
55	0.0022	0.0018	0.0010	0.0013	0.0010	0.0036	0.0021
60	0.0022	0.0014	0.0015	0.0020	0.0006	0.0031	0.0014

- The miscellaneous non-industrial disability rates are used for Local Prosecutors.
- The police non-industrial disability rates are also used for Other Safety, Local Sheriff, and School Police.

Industrial (Job-Related) Disability

Rates vary by age and category.

Age	Fire	Police	County Peace Officer
20	0.0001	0.0000	0.0004
25	0.0003	0.0017	0.0013
30	0.0007	0.0048	0.0025
35	0.0016	0.0079	0.0037
40	0.0030	0.0110	0.0051
45	0.0053	0.0141	0.0067
50	0.0277	0.0185	0.0092
55	0.0409	0.0479	0.0151
60	0.0583	0.0602	0.0174

- The police industrial disability rates are also used for Local Sheriff and Other Safety.
- Fifty percent of the police industrial disability rates are used for School Police.
- One percent of the police industrial disability rates are used for Local Prosecutors.
- Normally, rates are zero for miscellaneous plans unless the agency has specifically contracted for industrial disability benefits. If so, each miscellaneous non-industrial disability rate will be split into two components: 50 percent will become the non-industrial disability rate and 50 percent will become the industrial disability rate.

Service Retirement

Retirement rates vary by age, service, and formula, except for the safety ½ @ 55 and 2% @ 55 formulas, where retirement rates vary by age only.

Service Retirement

Public Agency Miscellaneous 1.5% @ 65

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.008	0.011	0.013	0.015	0.017	0.019
51	0.007	0.010	0.012	0.013	0.015	0.017
52	0.010	0.014	0.017	0.019	0.021	0.024
53	0.008	0.012	0.015	0.017	0.019	0.022
54	0.012	0.016	0.019	0.022	0.025	0.028
55	0.018	0.025	0.031	0.035	0.038	0.043
56	0.015	0.021	0.025	0.029	0.032	0.036
57	0.020	0.028	0.033	0.038	0.043	0.048
58	0.024	0.033	0.040	0.046	0.052	0.058
59	0.028	0.039	0.048	0.054	0.060	0.067
60	0.049	0.069	0.083	0.094	0.105	0.118
61	0.062	0.087	0.106	0.120	0.133	0.150
62	0.104	0.146	0.177	0.200	0.223	0.251
63	0.099	0.139	0.169	0.191	0.213	0.239
64	0.097	0.136	0.165	0.186	0.209	0.233
65	0.140	0.197	0.240	0.271	0.302	0.339
66	0.092	0.130	0.157	0.177	0.198	0.222
67	0.129	0.181	0.220	0.249	0.277	0.311
68	0.092	0.129	0.156	0.177	0.197	0.221
69	0.092	0.130	0.158	0.178	0.199	0.224
70	0.103	0.144	0.175	0.198	0.221	0.248

Public Agency Miscellaneous 2% @ 60

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.010	0.013	0.015	0.018	0.019	0.021
51	0.009	0.011	0.014	0.016	0.017	0.019
52	0.011	0.014	0.017	0.020	0.022	0.024
53	0.010	0.012	0.015	0.017	0.020	0.021
54	0.015	0.019	0.023	0.025	0.029	0.031
55	0.022	0.029	0.035	0.040	0.045	0.049
56	0.018	0.024	0.028	0.033	0.036	0.040
57	0.024	0.032	0.038	0.043	0.049	0.053
58	0.027	0.036	0.043	0.049	0.055	0.061
59	0.033	0.044	0.054	0.061	0.068	0.076
60	0.056	0.077	0.092	0.105	0.117	0.130
61	0.071	0.097	0.118	0.134	0.149	0.166
62	0.117	0.164	0.198	0.224	0.250	0.280
63	0.122	0.171	0.207	0.234	0.261	0.292
64	0.114	0.159	0.193	0.218	0.244	0.271
65	0.150	0.209	0.255	0.287	0.321	0.358
66	0.114	0.158	0.192	0.217	0.243	0.270
67	0.141	0.196	0.238	0.270	0.301	0.337
68	0.103	0.143	0.174	0.196	0.219	0.245
69	0.109	0.153	0.185	0.209	0.234	0.261
70	0.117	0.162	0.197	0.222	0.248	0.277

Service Retirement

Public Agency Miscellaneous 2% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.014	0.018	0.021	0.025	0.027	0.031
51	0.012	0.014	0.017	0.020	0.021	0.025
52	0.013	0.017	0.019	0.023	0.025	0.028
53	0.015	0.020	0.023	0.027	0.030	0.034
54	0.026	0.033	0.038	0.045	0.051	0.059
55	0.048	0.061	0.074	0.088	0.100	0.117
56	0.042	0.053	0.063	0.075	0.085	0.100
57	0.044	0.056	0.067	0.081	0.091	0.107
58	0.049	0.062	0.074	0.089	0.100	0.118
59	0.057	0.072	0.086	0.103	0.118	0.138
60	0.067	0.086	0.103	0.123	0.139	0.164
61	0.081	0.103	0.124	0.148	0.168	0.199
62	0.116	0.147	0.178	0.214	0.243	0.288
63	0.114	0.144	0.174	0.208	0.237	0.281
64	0.108	0.138	0.166	0.199	0.227	0.268
65	0.155	0.197	0.238	0.285	0.325	0.386
66	0.132	0.168	0.203	0.243	0.276	0.328
67	0.122	0.155	0.189	0.225	0.256	0.304
68	0.111	0.141	0.170	0.204	0.232	0.274
69	0.114	0.144	0.174	0.209	0.238	0.282
70	0.130	0.165	0.200	0.240	0.272	0.323

Public Agency Miscellaneous 2.5% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.004	0.009	0.019	0.029	0.049	0.094
51	0.004	0.009	0.019	0.029	0.049	0.094
52	0.004	0.009	0.020	0.030	0.050	0.095
53	0.008	0.014	0.025	0.036	0.058	0.104
54	0.024	0.034	0.050	0.066	0.091	0.142
55	0.066	0.088	0.115	0.142	0.179	0.241
56	0.042	0.057	0.078	0.098	0.128	0.184
57	0.041	0.057	0.077	0.097	0.128	0.183
58	0.045	0.061	0.083	0.104	0.136	0.192
59	0.055	0.074	0.098	0.123	0.157	0.216
60	0.066	0.088	0.115	0.142	0.179	0.241
61	0.072	0.095	0.124	0.153	0.191	0.255
62	0.099	0.130	0.166	0.202	0.248	0.319
63	0.092	0.121	0.155	0.189	0.233	0.302
64	0.091	0.119	0.153	0.187	0.231	0.299
65	0.122	0.160	0.202	0.245	0.297	0.374
66	0.138	0.179	0.226	0.272	0.329	0.411
67	0.114	0.149	0.189	0.229	0.279	0.354
68	0.100	0.131	0.168	0.204	0.250	0.322
69	0.114	0.149	0.189	0.229	0.279	0.354
70	0.127	0.165	0.209	0.253	0.306	0.385

Service Retirement

Public Agency Miscellaneous 2.7% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.004	0.009	0.014	0.035	0.055	0.095
51	0.002	0.006	0.011	0.030	0.050	0.090
52	0.006	0.012	0.017	0.038	0.059	0.099
53	0.010	0.017	0.024	0.046	0.068	0.110
54	0.032	0.044	0.057	0.085	0.113	0.160
55	0.076	0.101	0.125	0.165	0.205	0.265
56	0.055	0.074	0.093	0.127	0.160	0.214
57	0.050	0.068	0.086	0.118	0.151	0.204
58	0.055	0.074	0.093	0.127	0.161	0.215
59	0.061	0.082	0.102	0.138	0.174	0.229
60	0.069	0.093	0.116	0.154	0.192	0.250
61	0.086	0.113	0.141	0.183	0.225	0.288
62	0.105	0.138	0.171	0.218	0.266	0.334
63	0.103	0.135	0.167	0.215	0.262	0.329
64	0.109	0.143	0.177	0.226	0.275	0.344
65	0.134	0.174	0.215	0.270	0.326	0.401
66	0.147	0.191	0.235	0.294	0.354	0.433
67	0.121	0.158	0.196	0.248	0.300	0.372
68	0.113	0.147	0.182	0.232	0.282	0.352
69	0.117	0.153	0.189	0.240	0.291	0.362
70	0.141	0.183	0.226	0.283	0.341	0.418

Public Agency Miscellaneous 3% @ 60

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.012	0.018	0.024	0.039	0.040	0.091
51	0.009	0.014	0.019	0.034	0.034	0.084
52	0.014	0.020	0.026	0.043	0.044	0.096
53	0.016	0.023	0.031	0.048	0.050	0.102
54	0.026	0.036	0.045	0.065	0.070	0.125
55	0.043	0.057	0.072	0.096	0.105	0.165
56	0.042	0.056	0.070	0.094	0.103	0.162
57	0.049	0.065	0.082	0.108	0.119	0.180
58	0.057	0.076	0.094	0.122	0.136	0.199
59	0.076	0.100	0.123	0.157	0.175	0.244
60	0.114	0.148	0.182	0.226	0.255	0.334
61	0.095	0.123	0.152	0.190	0.214	0.288
62	0.133	0.172	0.211	0.260	0.294	0.378
63	0.129	0.166	0.204	0.252	0.285	0.368
64	0.143	0.185	0.226	0.278	0.315	0.401
65	0.202	0.260	0.318	0.386	0.439	0.542
66	0.177	0.228	0.279	0.340	0.386	0.482
67	0.151	0.194	0.238	0.292	0.331	0.420
68	0.139	0.179	0.220	0.270	0.306	0.391
69	0.190	0.245	0.299	0.364	0.414	0.513
70	0.140	0.182	0.223	0.274	0.310	0.396

Service Retirement

Public Agency Miscellaneous 2% @ 62

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.000	0.000	0.000	0.000	0.000	0.000
51	0.000	0.000	0.000	0.000	0.000	0.000
52	0.010	0.013	0.016	0.019	0.022	0.024
53	0.013	0.017	0.020	0.024	0.027	0.031
54	0.021	0.027	0.033	0.039	0.045	0.050
55	0.044	0.056	0.068	0.080	0.092	0.104
56	0.030	0.039	0.047	0.055	0.063	0.072
57	0.036	0.046	0.056	0.066	0.076	0.086
58	0.046	0.059	0.072	0.085	0.097	0.110
59	0.058	0.074	0.089	0.105	0.121	0.137
60	0.062	0.078	0.095	0.112	0.129	0.146
61	0.062	0.079	0.096	0.113	0.129	0.146
62	0.097	0.123	0.150	0.176	0.202	0.229
63	0.089	0.113	0.137	0.162	0.186	0.210
64	0.094	0.120	0.145	0.171	0.197	0.222
65	0.129	0.164	0.199	0.234	0.269	0.304
66	0.105	0.133	0.162	0.190	0.219	0.247
67	0.105	0.133	0.162	0.190	0.219	0.247
68	0.105	0.133	0.162	0.190	0.219	0.247
69	0.105	0.133	0.162	0.190	0.219	0.247
70	0.125	0.160	0.194	0.228	0.262	0.296

Service Retirement

Public Agency Fire ½ @ 55 and 2% @ 55

Age	Rate	Age	Rate
50	0.0159	56	0.1108
51	0.0000	57	0.0000
52	0.0344	58	0.0950
53	0.0199	59	0.0441
54	0.0413	60	1.00000
55	0.0751		

Public Agency Police ½ @ 55 and 2% @ 55

Age	Rate	Age	Rate
50	0.0255	56	0.0692
51	0.0000	57	0.0511
52	0.0164	58	0.0724
53	0.0272	59	0.0704
54	0.0095	60	1.0000
55	0.1667		

Service Retirement

Public Agency Police 2% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.005	0.005	0.005	0.005	0.017	0.089
51	0.005	0.005	0.005	0.005	0.017	0.087
52	0.018	0.018	0.018	0.018	0.042	0.132
53	0.044	0.044	0.044	0.044	0.090	0.217
54	0.065	0.065	0.065	0.065	0.126	0.283
55	0.086	0.086	0.086	0.086	0.166	0.354
56	0.067	0.067	0.067	0.067	0.130	0.289
57	0.066	0.066	0.066	0.066	0.129	0.288
58	0.066	0.066	0.066	0.066	0.129	0.288
59	0.139	0.139	0.139	0.139	0.176	0.312
60	0.123	0.123	0.123	0.123	0.153	0.278
61	0.110	0.110	0.110	0.110	0.138	0.256
62	0.130	0.130	0.130	0.130	0.162	0.291
63	0.130	0.130	0.130	0.130	0.162	0.291
64	0.130	0.130	0.130	0.130	0.162	0.291
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.009	0.009	0.009	0.009	0.013	0.020
51	0.013	0.013	0.013	0.013	0.020	0.029
52	0.018	0.018	0.018	0.018	0.028	0.042
53	0.052	0.052	0.052	0.052	0.079	0.119
54	0.067	0.067	0.067	0.067	0.103	0.154
55	0.089	0.089	0.089	0.089	0.136	0.204
56	0.083	0.083	0.083	0.083	0.127	0.190
57	0.082	0.082	0.082	0.082	0.126	0.189
58	0.088	0.088	0.088	0.088	0.136	0.204
59	0.074	0.074	0.074	0.074	0.113	0.170
60	0.100	0.100	0.100	0.100	0.154	0.230
61	0.072	0.072	0.072	0.072	0.110	0.165
62	0.099	0.099	0.099	0.099	0.152	0.228
63	0.114	0.114	0.114	0.114	0.175	0.262
64	0.114	0.114	0.114	0.114	0.175	0.262
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 3% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.004	0.004	0.004	0.004	0.015	0.086
51	0.014	0.014	0.014	0.014	0.034	0.114
52	0.026	0.026	0.026	0.026	0.060	0.154
53	0.038	0.038	0.038	0.038	0.083	0.188
54	0.071	0.071	0.071	0.071	0.151	0.292
55	0.061	0.061	0.061	0.061	0.131	0.261
56	0.072	0.072	0.072	0.072	0.153	0.295
57	0.065	0.065	0.065	0.065	0.140	0.273
58	0.066	0.066	0.066	0.066	0.142	0.277
59	0.118	0.118	0.118	0.118	0.247	0.437
60	0.065	0.065	0.065	0.065	0.138	0.272
61	0.084	0.084	0.084	0.084	0.178	0.332
62	0.108	0.108	0.108	0.108	0.226	0.405
63	0.084	0.084	0.084	0.084	0.178	0.332
64	0.084	0.084	0.084	0.084	0.178	0.332
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 3% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.001	0.001	0.001	0.006	0.016	0.069
51	0.002	0.002	0.002	0.006	0.018	0.071
52	0.012	0.012	0.012	0.021	0.040	0.098
53	0.032	0.032	0.032	0.049	0.085	0.149
54	0.057	0.057	0.057	0.087	0.144	0.217
55	0.073	0.073	0.073	0.109	0.179	0.259
56	0.064	0.064	0.064	0.097	0.161	0.238
57	0.063	0.063	0.063	0.095	0.157	0.233
58	0.065	0.065	0.065	0.099	0.163	0.241
59	0.088	0.088	0.088	0.131	0.213	0.299
60	0.105	0.105	0.105	0.155	0.251	0.344
61	0.118	0.118	0.118	0.175	0.282	0.380
62	0.087	0.087	0.087	0.128	0.210	0.295
63	0.067	0.067	0.067	0.100	0.165	0.243
64	0.067	0.067	0.067	0.100	0.165	0.243
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 3% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.050	0.050	0.050	0.099	0.240	0.314
51	0.034	0.034	0.034	0.072	0.198	0.260
52	0.033	0.033	0.033	0.071	0.198	0.259
53	0.039	0.039	0.039	0.080	0.212	0.277
54	0.045	0.045	0.045	0.092	0.229	0.300
55	0.052	0.052	0.052	0.105	0.248	0.323
56	0.042	0.042	0.042	0.087	0.221	0.289
57	0.043	0.043	0.043	0.088	0.223	0.292
58	0.054	0.054	0.054	0.109	0.255	0.333
59	0.054	0.054	0.054	0.108	0.253	0.330
60	0.060	0.060	0.060	0.121	0.272	0.355
61	0.048	0.048	0.048	0.098	0.238	0.311
62	0.061	0.061	0.061	0.122	0.274	0.357
63	0.057	0.057	0.057	0.115	0.263	0.343
64	0.069	0.069	0.069	0.137	0.296	0.385
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 3% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.020	0.020	0.020	0.040	0.130	0.192
51	0.008	0.008	0.008	0.023	0.107	0.164
52	0.023	0.023	0.023	0.043	0.136	0.198
53	0.023	0.023	0.023	0.043	0.135	0.198
54	0.027	0.027	0.027	0.048	0.143	0.207
55	0.043	0.043	0.043	0.070	0.174	0.244
56	0.053	0.053	0.053	0.085	0.196	0.269
57	0.054	0.054	0.054	0.086	0.197	0.271
58	0.052	0.052	0.052	0.084	0.193	0.268
59	0.075	0.075	0.075	0.116	0.239	0.321
60	0.065	0.065	0.065	0.102	0.219	0.298
61	0.076	0.076	0.076	0.117	0.241	0.324
62	0.068	0.068	0.068	0.106	0.224	0.304
63	0.027	0.027	0.027	0.049	0.143	0.208
64	0.094	0.094	0.094	0.143	0.277	0.366
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 2% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.011	0.011	0.011	0.011	0.020	0.036
51	0.009	0.009	0.009	0.009	0.016	0.028
52	0.018	0.018	0.018	0.018	0.034	0.060
53	0.037	0.037	0.037	0.037	0.067	0.119
54	0.049	0.049	0.049	0.049	0.089	0.159
55	0.063	0.063	0.063	0.063	0.115	0.205
56	0.045	0.045	0.045	0.045	0.082	0.146
57	0.064	0.064	0.064	0.064	0.117	0.209
58	0.047	0.047	0.047	0.047	0.086	0.154
59	0.105	0.105	0.105	0.105	0.130	0.191
60	0.105	0.105	0.105	0.105	0.129	0.188
61	0.105	0.105	0.105	0.105	0.129	0.188
62	0.105	0.105	0.105	0.105	0.129	0.188
63	0.105	0.105	0.105	0.105	0.129	0.188
64	0.105	0.105	0.105	0.105	0.129	0.188
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.005	0.005	0.005	0.005	0.008	0.012
51	0.006	0.006	0.006	0.006	0.009	0.013
52	0.012	0.012	0.012	0.012	0.019	0.028
53	0.033	0.033	0.033	0.033	0.050	0.075
54	0.045	0.045	0.045	0.045	0.069	0.103
55	0.061	0.061	0.061	0.061	0.094	0.140
56	0.055	0.055	0.055	0.055	0.084	0.126
57	0.081	0.081	0.081	0.081	0.125	0.187
58	0.059	0.059	0.059	0.059	0.091	0.137
59	0.055	0.055	0.055	0.055	0.084	0.126
60	0.085	0.085	0.085	0.085	0.131	0.196
61	0.085	0.085	0.085	0.085	0.131	0.196
62	0.085	0.085	0.085	0.085	0.131	0.196
63	0.085	0.085	0.085	0.085	0.131	0.196
64	0.085	0.085	0.085	0.085	0.131	0.196
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 2.5% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.014	0.014	0.014	0.014	0.025	0.045
51	0.012	0.012	0.012	0.012	0.021	0.038
52	0.025	0.025	0.025	0.025	0.046	0.081
53	0.047	0.047	0.047	0.047	0.086	0.154
54	0.063	0.063	0.063	0.063	0.115	0.205
55	0.076	0.076	0.076	0.076	0.140	0.249
56	0.054	0.054	0.054	0.054	0.099	0.177
57	0.071	0.071	0.071	0.071	0.130	0.232
58	0.057	0.057	0.057	0.057	0.103	0.184
59	0.126	0.126	0.126	0.126	0.156	0.229
60	0.126	0.126	0.126	0.126	0.155	0.226
61	0.126	0.126	0.126	0.126	0.155	0.226
62	0.126	0.126	0.126	0.126	0.155	0.226
63	0.126	0.126	0.126	0.126	0.155	0.226
64	0.126	0.126	0.126	0.126	0.155	0.226
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2.5% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.007	0.007	0.007	0.007	0.010	0.015
51	0.008	0.008	0.008	0.008	0.012	0.018
52	0.016	0.016	0.016	0.016	0.025	0.038
53	0.042	0.042	0.042	0.042	0.064	0.096
54	0.057	0.057	0.057	0.057	0.088	0.132
55	0.074	0.074	0.074	0.074	0.114	0.170
56	0.066	0.066	0.066	0.066	0.102	0.153
57	0.090	0.090	0.090	0.090	0.139	0.208
58	0.071	0.071	0.071	0.071	0.110	0.164
59	0.066	0.066	0.066	0.066	0.101	0.151
60	0.102	0.102	0.102	0.102	0.157	0.235
61	0.102	0.102	0.102	0.102	0.157	0.236
62	0.102	0.102	0.102	0.102	0.157	0.236
63	0.102	0.102	0.102	0.102	0.157	0.236
64	0.102	0.102	0.102	0.102	0.157	0.236
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 2.7% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.0138	0.0138	0.0138	0.0138	0.0253	0.0451
51	0.0123	0.0123	0.0123	0.0123	0.0226	0.0402
52	0.0249	0.0249	0.0249	0.0249	0.0456	0.0812
53	0.0497	0.0497	0.0497	0.0497	0.0909	0.1621
54	0.0662	0.0662	0.0662	0.0662	0.1211	0.2160
55	0.0854	0.0854	0.0854	0.0854	0.1563	0.2785
56	0.0606	0.0606	0.0606	0.0606	0.1108	0.1975
57	0.0711	0.0711	0.0711	0.0711	0.1300	0.2318
58	0.0628	0.0628	0.0628	0.0628	0.1149	0.2049
59	0.1396	0.1396	0.1396	0.1396	0.1735	0.2544
60	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
61	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
62	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
63	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
64	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2.7% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.0065	0.0065	0.0065	0.0065	0.0101	0.0151
51	0.0081	0.0081	0.0081	0.0081	0.0125	0.0187
52	0.0164	0.0164	0.0164	0.0164	0.0254	0.0380
53	0.0442	0.0442	0.0442	0.0442	0.0680	0.1018
54	0.0606	0.0606	0.0606	0.0606	0.0934	0.1397
55	0.0825	0.0825	0.0825	0.0825	0.1269	0.1900
56	0.0740	0.0740	0.0740	0.0740	0.1140	0.1706
57	0.0901	0.0901	0.0901	0.0901	0.1387	0.2077
58	0.0790	0.0790	0.0790	0.0790	0.1217	0.1821
59	0.0729	0.0729	0.0729	0.0729	0.1123	0.1681
60	0.1135	0.1135	0.1135	0.1135	0.1747	0.2615
61	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
62	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
63	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
64	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Service Retirement

Schools 2% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.005	0.009	0.013	0.015	0.016	0.018
51	0.005	0.010	0.014	0.017	0.019	0.021
52	0.006	0.012	0.017	0.020	0.022	0.025
53	0.007	0.014	0.019	0.023	0.026	0.029
54	0.012	0.024	0.033	0.039	0.044	0.049
55	0.024	0.048	0.067	0.079	0.088	0.099
56	0.020	0.039	0.055	0.065	0.072	0.081
57	0.021	0.042	0.059	0.070	0.078	0.087
58	0.025	0.050	0.070	0.083	0.092	0.103
59	0.029	0.057	0.080	0.095	0.105	0.118
60	0.037	0.073	0.102	0.121	0.134	0.150
61	0.046	0.090	0.126	0.149	0.166	0.186
62	0.076	0.151	0.212	0.250	0.278	0.311
63	0.069	0.136	0.191	0.225	0.251	0.281
64	0.067	0.133	0.185	0.219	0.244	0.273
65	0.091	0.180	0.251	0.297	0.331	0.370
66	0.072	0.143	0.200	0.237	0.264	0.295
67	0.067	0.132	0.185	0.218	0.243	0.272
68	0.060	0.118	0.165	0.195	0.217	0.243
69	0.067	0.133	0.187	0.220	0.246	0.275
70	0.066	0.131	0.183	0.216	0.241	0.270

Miscellaneous

Internal Revenue Code Section 415

The limitations on benefits imposed by Internal Revenue Code Section 415 are taken into account in this valuation. Each year the impact of any changes in this limitation since the prior valuation is included and amortized as part of the actuarial gain or loss base. This results in lower contributions for those employers contributing to the Replacement Benefit Fund and protects CalPERS from prefunding expected benefits in excess of limits imposed by federal tax law.

Internal Revenue Code Section 401(a)(17)

The limitations on compensation imposed by Internal Revenue Code Section 401(a)(17) are taken into account in this valuation. Each year, the impact of any changes in the compensation limitation since the prior valuation is included and amortized as part of the actuarial gain or loss base. The compensation limit for classic members for the 2016 calendar year is $265,000.

APPENDIX B

PRINCIPAL PLAN PROVISIONS

The following is a description of the principal plan provisions used in calculating costs and liabilities. We have indicated whether a plan provision is standard or optional. Standard benefits are applicable to all members while optional benefits vary among employers. Optional benefits that apply to a single period of time, such as Golden Handshakes, have not been included. Many of the statements in this summary are general in nature, and are intended to provide an easily understood summary of the Public Employees' Retirement Law. The law itself governs in all situations.

Service Retirement

Eligibility

A classic CalPERS member or PEPRA Safety member becomes eligible for Service Retirement upon attainment of age 50 with at least 5 years of credited service (total service across all CalPERS employers, and with certain other retirement systems with which CalPERS has reciprocity agreements). For employees hired into a plan with the 1.5 percent at 65 formula, eligibility for service retirement is age 55 with at least 5 years of service. PEPRA miscellaneous members become eligible for service retirement upon attainment of age 52 with at least 5 years of service.

Benefit

The service retirement benefit is a monthly allowance equal to the product of the *benefit factor*, *years of service*, and *final compensation.*

- The *benefit factor* depends on the benefit formula specified in your agency's contract. The table below shows the factors for each of the available formulas. Factors vary by the member's age at retirement. Listed are the factors for retirement at whole year ages:

Miscellaneous Plan Formulas

Retirement Age	1.5% at 65	2% at 60	2% at 55	2.5% at 55	2.7% at 55	3% at 60	PEPRA 2% at 62
50	0.5000%	1.092%	1.426%	2.000%	2.000%	2.000%	N/A
51	0.5667%	1.156%	1.522%	2.100%	2.140%	2.100%	N/A
52	0.6334%	1.224%	1.628%	2.200%	2.280%	2.200%	1.000%
53	0.7000%	1.296%	1.742%	2.300%	2.420%	2.300%	1.100%
54	0.7667%	1.376%	1.866%	2.400%	2.560%	2.400%	1.200%
55	0.8334%	1.460%	2.000%	2.500%	2.700%	2.500%	1.300%
56	0.9000%	1.552%	2.052%	2.500%	2.700%	2.600%	1.400%
57	0.9667%	1.650%	2.104%	2.500%	2.700%	2.700%	1.500%
58	1.0334%	1.758%	2.156%	2.500%	2.700%	2.800%	1.600%
59	1.1000%	1.874%	2.210%	2.500%	2.700%	2.900%	1.700%
60	1.1667%	2.000%	2.262%	2.500%	2.700%	3.000%	1.800%
61	1.2334%	2.134%	2.314%	2.500%	2.700%	3.000%	1.900%
62	1.3000%	2.272%	2.366%	2.500%	2.700%	3.000%	2.000%
63	1.3667%	2.418%	2.418%	2.500%	2.700%	3.000%	2.100%
64	1.4334%	2.418%	2.418%	2.500%	2.700%	3.000%	2.200%
65	1.5000%	2.418%	2.418%	2.500%	2.700%	3.000%	2.300%
66	1.5000%	2.418%	2.418%	2.500%	2.700%	3.000%	2.400%
67 & up	1.5000%	2.418%	2.418%	2.500%	2.700%	3.000%	2.500%

Safety Plan Formulas

Retirement Age	½ at 55 *	2% at 55	2% at 50	3% at 55	3% at 50
50	1.783%	1.426%	2.000%	2.400%	3.000%
51	1.903%	1.522%	2.140%	2.520%	3.000%
52	2.035%	1.628%	2.280%	2.640%	3.000%
53	2.178%	1.742%	2.420%	2.760%	3.000%
54	2.333%	1.866%	2.560%	2.880%	3.000%
55 & Up	2.500%	2.000%	2.700%	3.000%	3.000%

* For this formula, the benefit factor also varies by entry age. The factors shown are for members with an entry age of 35 or greater. If entry age is less than 35, then the age 55 benefit factor is 50 percent divided by the difference between age 55 and entry age. The benefit factor for ages prior to age 55 is the same proportion of the age 55 benefit factor as in the above table.

PEPRA Safety Plan Formulas

Retirement Age	2% at 57	2.5% at 57	2.7% at 57
50	1.426%	2.000%	2.000%
51	1.508%	2.071%	2.100%
52	1.590%	2.143%	2.200%
53	1.672%	2.214%	2.300%
54	1.754%	2.286%	2.400%
55	1.836%	2.357%	2.500%
56	1.918%	2.429%	2.600%
57 & Up	2.000%	2.500%	2.700%

- The *years of service* is the amount credited by CalPERS to a member while he or she is employed in this group (or for other periods that are recognized under the employer's contract with CalPERS). For a member who has earned service with multiple CalPERS employers, the benefit from each employer is calculated separately according to each employer's contract, and then added together for the total allowance. An agency may contract for an optional benefit where any unused sick leave accumulated at the time of retirement will be converted to credited service at a rate of 0.004 years of service for each day of sick leave.

- The *final compensation* is the monthly average of the member's highest 36 or 12 consecutive months' full-time equivalent monthly pay (no matter which CalPERS employer paid this compensation). The standard benefit is 36 months. Employers had the option of providing a final compensation equal to the highest 12 consecutive months for classic plans only. Final compensation must be defined by the highest 36 consecutive months' pay under the 1.5% at 65 formula. PEPRA members have a cap on the annual salary that can be used to calculate final compensation for all new members based on the Social Security contribution and benefit base. For employees that participate in Social Security this cap is $118,775 for 2016 and for those employees that do not participate in Social Security the cap for 2016 is $142,530. Adjustments to the caps are permitted annually based on changes to the CPI for all urban consumers.

- Employees must be covered by Social Security with the 1.5% at 65 formula. Social Security is optional for all other benefit formulas. For employees covered by Social Security, the modified formula is the standard benefit. Under this type of formula, the final compensation is offset by $133.33 (or by one third if the final compensation is less than $400). Employers may contract for the full benefit with Social Security that will eliminate the offset applicable to the final compensation. For employees not covered by Social Security, the full benefit is paid with

no offsets. Auxiliary organizations of the CSUC system may elect reduced contribution rates, in which case the offset is $317 if members are not covered by Social Security or $513 if members are covered by Social Security.

- The miscellaneous and PEPRA safety service retirement benefit is not capped. The classic Safety service retirement benefit is capped at 90 percent of final compensation.

Vested Deferred Retirement

Eligibility for Deferred Status

A CalPERS member becomes eligible for a deferred vested retirement benefit when he or she leaves employment, keeps his or her contribution account balance on deposit with CalPERS, **and** has earned at least 5 years of credited service (total service across all CalPERS employers, and with certain other retirement systems with which CalPERS has reciprocity agreements).

Eligibility to Start Receiving Benefits

The CalPERS classic members and PEPRA safety members become eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for deferred status and upon attainment of age 50 (55 for employees hired into a 1.5% @ 65 plan). PEPRA miscellaneous members become eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for deferred status and upon attainment of age 52.

Benefit

The vested deferred retirement benefit is the same as the service retirement benefit, where the benefit factor is based on the member's age at allowance commencement. For members who have earned service with multiple CalPERS employers, the benefit from each employer is calculated separately according to each employer's contract, and then added together for the total allowance.

Non-Industrial (Non-Job Related) Disability Retirement

Eligibility

A CalPERS member is eligible for Non-Industrial Disability Retirement if he or she becomes *disabled* and has at least 5 years of credited service (total service across all CalPERS employers, and with certain other retirement systems with which CalPERS has reciprocity agreements). There is no special age requirement. *Disabled* means the member is unable to perform his or her job because of an illness or injury, which is expected to be permanent or to last indefinitely. The illness or injury does not have to be job related. A CalPERS member must be actively employed by any CalPERS employer at the time of disability in order to be eligible for this benefit.

Standard Benefit

The standard Non-Industrial Disability Retirement benefit is a monthly allowance equal to 1.8 percent of final compensation, multiplied by *service*, which is determined as follows:

- *Service* is CalPERS credited service, for members with less than 10 years of service or greater than 18.518 years of service; or

- *Service* is CalPERS credited service plus the additional number of years that the member would have worked until age 60, for members with at least 10 years but not more than 18.518 years of service. The maximum benefit in this case is 33 1/3 percent of final compensation.

Improved Benefit

Employers have the option of providing the improved Non-Industrial Disability Retirement benefit. This benefit provides a monthly allowance equal to 30 percent of final compensation for the first 5 years of service, plus 1 percent for each additional year of service to a maximum of 50 percent of final compensation.

Members who are eligible for a larger service retirement benefit may choose to receive that benefit in lieu of a disability benefit. Members eligible to retire, and who have attained the normal retirement age determined by their service retirement benefit formula, will receive the same dollar amount for disability retirement as that payable for service retirement. For members who have earned service with multiple CalPERS employers, the benefit attributed to each employer is the total disability allowance multiplied by the ratio of service with a particular employer to the total CalPERS service.

Industrial (Job Related) Disability Retirement

All safety members have this benefit. For miscellaneous members, employers have the option of providing this benefit. An employer may choose to provide the increased benefit option or the improved benefit option.

Eligibility

An employee is eligible for Industrial Disability Retirement if he or she becomes disabled while working, where disabled means the member is unable to perform the duties of the job because of a work-related illness or injury, which is expected to be permanent or to last indefinitely. A CalPERS member who has left active employment within this group is not eligible for this benefit, except to the extent described below.

Standard Benefit

The standard Industrial Disability Retirement benefit is a monthly allowance equal to 50 percent of final compensation.

Increased Benefit (75 percent of Final Compensation)

The increased Industrial Disability Retirement benefit is a monthly allowance equal to 75 percent final compensation for total disability.

Improved Benefit (50 percent to 90 percent of Final Compensation)

The improved Industrial Disability Retirement benefit is a monthly allowance equal to the Workman's Compensation Appeals Board permanent disability rate percentage (if 50 percent or greater, with a maximum of 90 percent) times the final compensation.

For a CalPERS member not actively employed in this group who became disabled while employed by some other CalPERS employer, the benefit is a return of accumulated member contributions with respect to employment in this group. With the standard or increased benefit, a member may also choose to receive the annuitization of the accumulated member contributions.

If a member is eligible for service retirement and if the service retirement benefit is more than the industrial disability retirement benefit, the member may choose to receive the larger benefit.

Post-Retirement Death Benefit

Standard Lump Sum Payment

Upon the death of a retiree, a one-time lump sum payment of $500 will be made to the retiree's designated survivor(s), or to the retiree's estate.

Improved Lump Sum Payment

Employers have the option of providing an improved lump sum death benefit of $600, $2,000, $3,000, $4,000 or $5,000.

Form of Payment for Retirement Allowance

Standard Form of Payment

Generally, the retirement allowance is paid to the retiree in the form of an annuity for as long as he or she is alive. The retiree may choose to provide for a portion of his or her allowance to be paid to any designated beneficiary after the retiree's death. CalPERS provides for a variety of such benefit options, which the retiree pays for by taking a reduction in his or her retirement allowance. Such reduction takes into account the amount to be provided to the beneficiary and the probable duration of payments (based on the ages of the member and beneficiary) made subsequent to the member's death.

Improved Form of Payment (Post-Retirement Survivor Allowance)

Employers have the option to contract for the post-retirement survivor allowance.

For retirement allowances with respect to service subject to the modified formula, 25 percent of the retirement allowance will automatically be continued to certain statutory beneficiaries upon the death of the retiree, without a reduction in the retiree's allowance. For retirement allowances with respect to service subject to the full or supplemental formula, 50 percent of the retirement allowance will automatically be continued to certain statutory beneficiaries upon the death of the retiree, without a reduction in the retiree's allowance. This additional benefit is referred to as post-retirement survivor allowance (PRSA) or simply as survivor continuance.

In other words, 25 percent or 50 percent of the allowance, the continuance portion, is paid to the retiree for as long as he or she is alive, and that same amount is continued to the retiree's spouse (or if no eligible spouse, to unmarried child(ren) until they attain age 18; or, if no eligible child(ren), to a qualifying dependent parent) for the rest of his or her lifetime. This benefit will not be discontinued in the event the spouse remarries.

The remaining 75 percent or 50 percent of the retirement allowance, which may be referred to as the option portion of the benefit, is paid to the retiree as an annuity for as long as he or she is alive. Or, the retiree may choose to provide for some of this option portion to be paid to any designated beneficiary after the retiree's death. Benefit options applicable to the option portion are the same as those offered with the standard form. The reduction is calculated in the same manner but is applied only to the option portion.

Pre-Retirement Death Benefits

Basic Death Benefit

This is a standard benefit.

Eligibility

An employee's beneficiary (or estate) may receive the basic death benefit if the member dies while actively employed. A CalPERS member must be actively employed with the CalPERS employer providing this benefit to be eligible for this benefit. A member's survivor who is eligible for any other pre-retirement death benefit may choose to receive that death benefit instead of this basic death benefit.

Benefit

The basic death benefit is a lump sum in the amount of the member's accumulated contributions, where interest is currently credited at 7.5 percent per year, plus a lump sum in the amount of one month's salary for each completed year of current service, up to a maximum of six months' salary. For purposes of this benefit, one month's salary is defined as the member's average monthly full-time rate of compensation during the 12 months preceding death.

1957 Survivor Benefit

This is a standard benefit.

Eligibility

An employee's *eligible survivor(s)* may receive the 1957 Survivor benefit if the member dies while actively employed, has attained at least age 50 for classic and safety PEPRA members and age 52 for miscellaneous PEPRA members, and has at least 5 years of credited service (total service across all CalPERS employers and with certain other retirement systems with which CalPERS has reciprocity agreements). A CalPERS member must be actively employed with the CalPERS employer providing this benefit to be eligible for this benefit. An eligible survivor means the surviving spouse to whom the member was married at least one year before death or, if there is no eligible spouse, to the member's unmarried child(ren) under age 18. A member's survivor who is eligible for any other pre-retirement death benefit may choose to receive that death benefit instead of this 1957 Survivor benefit.

Benefit

The 1957 Survivor benefit is a monthly allowance equal to one-half of the unmodified service retirement benefit that the member would have been entitled to receive if the member had retired on the date of his or her death. If the benefit is payable to the spouse, the benefit is discontinued upon the death of the spouse. If the benefit is payable to dependent child(ren), the benefit will be discontinued upon death or attainment of age 18, unless the child(ren) is disabled. The total amount paid will be at least equal to the basic death benefit.

Optional Settlement 2W Death Benefit

This is an optional benefit.

Eligibility

An employee's *eligible survivor* may receive the Optional Settlement 2W Death benefit if the member dies while actively employed, has attained at least age 50 for classic and safety PEPRA members and age 52 for miscellaneous PEPRA members, and has at least 5 years of credited service (total service across all CalPERS employers and with certain other retirement systems with which CalPERS has reciprocity agreements). A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. An *eligible survivor* means the surviving spouse to whom the member was married at least one year before death. A member's survivor who is eligible for any other pre-retirement death benefit may choose to receive that death benefit instead of this Optional Settlement 2W Death benefit.

Benefit

The Optional Settlement 2W Death benefit is a monthly allowance equal to the service retirement benefit that the member would have received had the member retired on the date of his or her death and elected Optional Settlement 2W. (A retiree who elects Optional Settlement 2W receives an allowance that has been reduced so that it will continue to be paid after his or her death to a surviving beneficiary.) The allowance is payable as long as the surviving spouse lives, at which time it is continued to any unmarried child(ren) under age 18, if applicable. The total amount paid will be at least equal to the basic death benefit.

Special Death Benefit

This is a standard benefit for safety members. An employer may elect to provide this benefit for miscellaneous members.

Eligibility

An employee's *eligible survivor(s)* may receive the special death benefit if the member dies while actively employed and the death is job-related. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. An *eligible survivor* means the surviving spouse to whom the member was married prior to the onset of the injury or illness that resulted in death. If there is no eligible spouse, an eligible survivor means the member's unmarried child(ren) under age 22. An eligible survivor who chooses to receive this benefit will not receive any other death benefit.

Benefit

The special death benefit is a monthly allowance equal to 50 percent of final compensation, and will be increased whenever the compensation paid to active employees is increased but ceasing to increase when the member would have attained age 50. The allowance is payable to the surviving spouse until death at which time the allowance is continued to any unmarried child(ren) under age 22. There is a guarantee that the total amount paid will at least equal the basic death benefit.

If the member's death is the result of an accident or injury caused by external violence or physical force incurred in the performance of the member's duty, and there are *eligible* surviving child(ren) (*eligible* means unmarried child(ren) under age 22) in addition to an eligible spouse, then an **additional monthly allowance** is paid equal to the following:

- if 1 eligible child: 12.5 percent of final compensation
- if 2 eligible children: 20.0 percent of final compensation
- if 3 or more eligible children: 25.0 percent of final compensation

Alternate Death Benefit for Local Fire Members

This is an optional benefit available only to local fire members.

Eligibility

An employee's *eligible survivor(s)* may receive the alternate death benefit in lieu of the basic death benefit or the 1957 Survivor benefit if the member dies while actively employed and has at least 20 years of total CalPERS service. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. An *eligible survivor* means the surviving spouse to whom the member was married prior to the onset of the injury or illness that resulted in death. If there is no eligible spouse, an eligible survivor means the member's unmarried child(ren) under age 18.

Benefit

The Alternate Death benefit is a monthly allowance equal to the service retirement benefit that the member would have received had the member retired on the date of his or her death and elected Optional Settlement 2W. (A retiree who elects Optional Settlement 2W receives an allowance that has been reduced so that it will continue to be paid after his or her death to a surviving beneficiary.) If the member has not yet attained age 50, the benefit is equal to that which would be payable if the member had retired at age 50, based on service credited at the time of death. The allowance is payable as long as the surviving spouse lives, at which time it is continued to any unmarried child(ren) under age 18, if applicable. The total amount paid will be at least equal to the basic death benefit.

Cost-of-Living Adjustments (COLA)

Standard Benefit

Retirement and survivor allowances are adjusted each year in May for cost of living, beginning the second calendar year after the year of retirement. The standard cost-of-living adjustment (COLA) is 2 percent. Annual adjustments are calculated by first determining the lesser of 1) 2 percent compounded from the end of the year of retirement or 2) actual rate of inflation. The resulting increase is divided by the total increase provided in prior years. For any particular year, the COLA adjustment may be less than 2 percent (when the rate of inflation is low), may be greater than the rate of inflation (when the rate of inflation is low after several years of high inflation) or may even be greater than 2 percent (when inflation is high after several years of low inflation).

Improved Benefit

Employers have the option of providing a COLA of 3 percent, 4 percent, or 5 percent, determined in the same manner as described above for the standard 2 percent COLA. An improved COLA is not available with the 1.5% at 65 formula.

Purchasing Power Protection Allowance (PPPA)

Retirement and survivor allowances are protected against inflation by PPPA. PPPA benefits are cost-of-living adjustments that are intended to maintain an individual's allowance at 80 percent of the initial allowance at retirement adjusted for inflation since retirement. The PPPA benefit will be coordinated with other cost-of-living adjustments provided under the plan.

Employee Contributions

Each employee contributes toward his or her retirement based upon the retirement formula. The standard employee contribution is as described below.

- The percent contributed below the monthly compensation breakpoint is 0 percent.
- The monthly compensation breakpoint is $0 for full and supplemental formula members and $133.33 for employees covered by the modified formula.
- The percent contributed above the monthly compensation breakpoint depends upon the benefit formula, as shown in the table below.

Benefit Formula	Percent Contributed above the Breakpoint
Miscellaneous, 1.5% at 65	2%
Miscellaneous, 2% at 60	7%
Miscellaneous, 2% at 55	7%
Miscellaneous, 2.5% at 55	8%
Miscellaneous, 2.7% at 55	8%
Miscellaneous, 3% at 60	8%
Miscellaneous, 2% at 62	50% of the Total Normal Cost
Miscellaneous, 1.5% at 65	50% of the Total Normal Cost
Safety, 1/2 at 55	Varies by entry age
Safety, 2% at 55	7%
Safety, 2% at 50	9%
Safety, 3% at 55	9%
Safety, 3% at 50	9%
Safety, 2% at 57	50% of the Total Normal Cost
Safety, 2.5% at 57	50% of the Total Normal Cost
Safety, 2.7% at 57	50% of the Total Normal Cost

The employer may choose to "pick-up" these contributions for classic members (Employer Paid Member Contributions or EPMC). EPMC is prohibited for new PEPRA members.

An employer may also include Employee Cost Sharing in the contract, where employees agree to share the cost of the employer contribution. These contributions are paid in addition to the member contribution.

Auxiliary organizations of the CSUC system may elect reduced contribution rates, in which case the offset is $317 and the contribution rate is 6 percent if members are not covered by Social Security. If members are covered by Social Security, the offset is $513 and the contribution rate is 5 percent.

Refund of Employee Contributions

If the member's service with the employer ends, and if the member does not satisfy the eligibility conditions for any of the retirement benefits above, the member may elect to receive a refund of his or her employee contributions, which are credited with 6 percent interest compounded annually.

1959 Survivor Benefit

This is a pre-retirement death benefit available only to members not covered by Social Security. Any agency joining CalPERS subsequent to 1993 is required to provide this benefit if the members are not covered by Social Security. The benefit is optional for agencies joining CalPERS prior to 1994. Levels 1, 2 and 3 are now closed. Any new agency or any agency wishing to add this benefit or increase the current level may only choose the 4th or Indexed Level.

This benefit is not included in the results presented in this valuation. More information on this benefit is available on the CalPERS website at www.calpers.ca.gov.

APPENDIX C

PARTICIPANT DATA

- **SUMMARY OF VALUATION DATA**
- **ACTIVE MEMBERS**
- **TRANSFERRED AND TERMINATED MEMBERS**
- **RETIRED MEMBERS AND BENEFICIARIES**

Summary of Valuation Data

	June 30, 2015	June 30, 2016
1. **Active Members**		
a) Counts	1,185	1,212
b) Average Attained Age	40.69	40.39
c) Average Entry Age to Rate Plan	27.54	27.58
d) Average Years of Service	13.15	12.81
e) Average Annual Covered Pay	$ 98,415	$ 101,283
f) Annual Covered Payroll	116,621,439	122,755,262
g) Projected Annual Payroll for Contribution Year	127,435,395	134,137,989
h) Present Value of Future Payroll	1,116,857,722	1,192,889,744
2. **Transferred Members**		
a) Counts	243	271
b) Average Attained Age	41.92	41.86
c) Average Years of Service	4.33	4.37
d) Average Annual Covered Pay	$ 97,919	$ 98,759
3. **Terminated Members**		
a) Counts	137	134
b) Average Attained Age	41.22	42.23
c) Average Years of Service	3.80	4.09
d) Average Annual Covered Pay	$ 66,547	$ 64,919
4. **Retired Members and Beneficiaries**		
a) Counts	1,113	1,160
b) Average Attained Age	65.00	65.37
c) Average Annual Benefits	$ 65,390	$ 65,741
5. **Active to Retired Ratio** [(1a) / (4a)]	1.06	1.04

Counts of members included in the valuation are counts of the records processed by the valuation. Multiple records may exist for those who have service in more than one valuation group. This does not result in double counting of liabilities.

Average Annual Benefits represents benefit amounts payable by this plan only. Some members may have service with another agency and would therefore have a larger total benefit than would be included as part of the average shown here.

Active Members

Counts of members included in the valuation are counts of the records processed by the valuation. Multiple records may exist for those who have service in more than one valuation group. This does not result in double counting of liabilities.

Distribution of Active Members by Age and Service

Attained Age	Years of Service at Valuation Date 0-4	5-9	10-14	15-19	20-25	25+	Total
15-24	37	0	0	0	0	0	37
25-29	106	6	0	0	0	0	112
30-34	80	78	21	0	0	0	179
35-39	19	78	132	26	0	0	255
40-44	5	17	89	107	23	0	241
45-49	5	10	46	70	92	24	247
50-54	0	1	11	9	47	33	101
55-59	2	3	1	4	8	14	32
60-64	0	0	0	1	1	4	6
65 and over	2	0	0	0	0	0	2
All Ages	**256**	**193**	**300**	**217**	**171**	**75**	**1,212**

Distribution of Average Annual Salaries by Age and Service

Attained Age	Years of Service at Valuation Date 0-4	5-9	10-14	15-19	20-25	25+	Average
15-24	$62,123	$0	$0	$0	$0	$0	$62,123
25-29	71,219	93,415	0	0	0	0	72,408
30-34	75,657	95,330	103,854	0	0	0	87,538
35-39	81,742	101,472	104,920	104,196	0	0	102,064
40-44	88,896	104,019	106,118	109,502	115,584	0	108,019
45-49	64,274	95,968	107,682	110,900	122,544	115,325	113,519
50-54	0	110,077	101,466	112,120	120,789	126,724	119,745
55-59	40,062	95,015	117,297	102,011	122,519	133,891	117,036
60-64	0	0	0	104,148	97,282	132,504	121,908
65 and over	4,372	0	0	0	0	0	4,372
All Ages	**$71,516**	**$98,622**	**$105,539**	**$109,263**	**$120,977**	**$124,722**	**$101,283**

Transferred and Terminated Members

Distribution of Transfers to Other CalPERS Plans by Age, Service, and average Salary

	Years of Service at Valuation Date							
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Total**	**Average Salary**
15-24	0	0	0	0	0	0	0	$0
25-29	19	0	0	0	0	0	19	62,623
30-34	36	9	0	0	0	0	45	86,100
35-39	35	7	6	0	0	0	48	98,897
40-44	44	14	2	0	1	0	61	100,483
45-49	22	14	11	3	3	0	53	108,447
50-54	20	4	6	2	0	1	33	117,178
55-59	8	0	1	1	0	0	10	105,624
60-64	2	0	0	0	0	0	2	76,001
65 and over	0	0	0	0	0	0	0	0
All Ages	**186**	**48**	**26**	**6**	**4**	**1**	**271**	**98,759**

Distribution of Terminated Participants with Funds on Deposit by Age, Service, and average Salary

	Years of Service at Valuation Date							
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Total**	**Average Salary**
15-24	1	0	0	0	0	0	1	$59,487
25-29	4	0	0	0	0	0	4	59,942
30-34	15	0	0	0	0	0	15	54,381
35-39	23	4	4	0	0	0	31	69,267
40-44	27	5	4	1	0	0	37	69,372
45-49	12	7	6	1	2	0	28	65,169
50-54	9	0	0	0	1	0	10	64,903
55-59	6	1	0	0	0	0	7	51,139
60-64	1	0	0	0	0	0	1	38,325
65 and over	0	0	0	0	0	0	0	0
All Ages	**98**	**17**	**14**	**2**	**3**	**0**	**134**	**64,919**

Retired Members and Beneficiaries

Distribution of Retirees and Beneficiaries by Age and Retirement Type*

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 30	0	0	0	0	0	1	1
30-34	0	0	1	0	0	1	2
35-39	0	0	6	0	0	0	6
40-44	0	0	7	0	0	0	7
45-49	0	1	20	0	1	1	23
50-54	95	1	47	0	2	1	146
55-59	138	0	37	1	1	5	182
60-64	142	1	30	0	0	12	185
65-69	147	1	44	0	1	27	220
70-74	122	0	46	0	1	21	190
75-79	96	0	21	0	0	20	137
80-84	32	0	10	0	0	8	50
85 and Over	7	0	0	0	0	4	11
All Ages	**779**	**4**	**269**	**1**	**6**	**101**	**1,160**

Distribution of Average Annual Disbursements to Retirees and Beneficiaries by Age and Retirement Type*

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Average
Under 30	$0	$0	$0	$0	$0	$17,258	$17,258
30-34	0	0	45,093	0	0	12,250	28,672
35-39	0	0	37,259	0	0	0	37,259
40-44	0	0	37,564	0	0	0	37,564
45-49	0	13,188	37,906	0	58,706	12,400	36,626
50-54	73,314	4,393	44,895	0	44,379	40,612	63,073
55-59	83,393	0	49,892	13,345	36,653	76,291	75,745
60-64	72,209	1,326	66,004	0	0	34,046	68,344
65-69	76,342	26,609	57,609	0	42,337	52,924	69,340
70-74	66,605	0	56,592	0	34,361	49,913	62,166
75-79	65,661	0	54,570	0	0	53,625	62,203
80-84	64,346	0	59,807	0	0	49,592	61,077
85 and Over	60,672	0	0	0	0	37,893	52,389
All Ages	**$72,994**	**$11,379**	**$52,446**	**$13,345**	**$43,469**	**$49,212**	**$65,741**

Retired Members and Beneficiaries (continued)

Distribution of Retirees and Beneficiaries by Years Retired and Retirement Type*

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 5 Yrs	185	0	45	1	0	36	267
5-9	179	2	30	0	0	39	250
10-14	182	0	57	0	1	13	253
15-19	100	1	58	0	2	8	169
20-24	117	0	62	0	1	4	184
25-29	15	1	14	0	1	1	32
30 and Over	1	0	3	0	1	0	5
All Years	**779**	**4**	**269**	**1**	**6**	**101**	**1,160**

Distribution of Average Annual Disbursements to Retirees and Beneficiaries by Years Retired and Retirement Type*

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Average
Under 5 Yrs	$77,448	$0	$56,518	$13,345	$0	$48,478	$69,774
5-9	79,580	7,257	62,237	0	0	51,215	72,496
10-14	76,531	0	62,296	0	58,706	52,755	72,032
15-19	59,947	26,609	43,608	0	46,110	48,490	53,436
20-24	62,931	0	48,954	0	34,361	30,377	57,359
25-29	66,254	4,393	36,694	0	38,875	32,624	49,482
30 and Over	8,998	0	22,837	0	36,653	0	22,832
All Years	**$72,994**	**$11,379**	**$52,446**	**$13,345**	**$43,469**	**$49,212**	**$65,741**

* Counts of members do not include alternate payees receiving benefits while the member is still working. Therefore, the total counts may not match information on page 25 of the report. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

APPENDIX D

DEVELOPMENT OF PEPRA MEMBER CONTRIBUTION RATES

Development of PEPRA Members Contribution Rates

The table below shows the determination of the Member contribution rates based on 50 percent of the Total Normal Cost for each respective plan on June 30, 2016.

Assembly Bill (AB) 340 created PEPRA that implemented new benefit formulas and a final compensation period as well as new contribution requirements for new employees. In accordance with Section Code 7522.30(b), "new members … shall have an initial contribution rate of at least 50 percent of the normal cost rate." The normal cost for the plan is dependent on the benefit levels, actuarial assumptions and demographics of the plan particularly the entry age into the plan. Should the total normal cost of the plan change by one percent or more from the base total normal cost established for the plan, the new member rate shall be 50 percent of the new normal cost rounded to the nearest quarter percent.

		Basis for Current Rate		**Rates Effective July 1, 2018**			
Rate Plan Identifier	**Plan**	**Total Normal Cost**	**Member Rate**	**Total Normal Cost**	**Change**	**Change Needed**	**Member Rate**
25568	Safety Fire PEPRA	22.817%	11.500%	23.408%	0.591%	No	11.500%
25569	Safety Police PEPRA	22.817%	11.500%	23.408%	0.591%	No	11.500%

For a description of the methods used to determine the Total Normal Cost for this purpose, please see the "PEPRA Normal Cost Rate Methodology" section in Appendix A.

APPENDIX E

GLOSSARY OF ACTUARIAL TERMS

Glossary of Actuarial Terms

Accrued Liability *(also called Actuarial Accrued Liability or Entry Age Normal Accrued Liability)*
The total dollars needed as of the valuation date to fund all benefits earned in the past for *current* members.

Actuarial Assumptions
Assumptions made about certain events that will affect pension costs. Assumptions generally can be broken down into two categories: demographic and economic. Demographic assumptions include such things as mortality, disability and retirement rates. Economic assumptions include discount rate, salary growth and inflation.

Actuarial Methods
Procedures employed by actuaries to achieve certain funding goals of a pension plan. Actuarial methods include funding method, setting the length of time to fund the Accrued Liability and determining the Value of Assets.

Actuarial Valuation
The determination, as of a valuation date of the Normal Cost, Accrued liability, and related actuarial present values for a pension plan. These valuations are performed annually or when an employer is contemplating a change to their plan provisions.

Amortization Bases
Separate payment schedules for different portions of the Unfunded Liability. The total Unfunded Liability of a Risk Pool or non-pooled plan can be segregated by "cause," creating "bases" and each such base will be separately amortized and paid for over a specific period of time. However, all bases are amortized using investment and payroll assumptions from the current valuation. This can be likened to a home having a first mortgage of 24 years remaining payments and a second mortgage that has 10 years remaining payments. Each base or each mortgage note has its own terms (payment period, principal, etc.)

Generally, in an actuarial valuation, the separate bases consist of changes in unfunded liability due to contract amendments, actuarial assumption changes, actuarial methodology changes, and/or gains and losses. Payment periods are determined by Board policy and vary based on the cause of the change.

Amortization Period
The number of years required to pay off an Amortization Base.

Classic Member (under PEPRA)
A classic member is a member who joined CalPERS prior to January, 1, 2013 and who is not defined as a new member under PEPRA. (See definition of new member below)

Discount Rate Assumption
The actuarial assumption that was called "investment return" in earlier CalPERS reports or "actuarial interest rate" in Section 20014 of the California Public Employees' Retirement Law (PERL).

Entry Age
The earliest age at which a plan member begins to accrue benefits under a defined benefit pension plan. In most cases, this is the age of the member on their date of hire.

Entry Age Normal Cost Method
An actuarial cost method designed to fund a member's total plan benefit over the course of his or her career. This method is designed to yield a rate expressed as a level percentage of payroll.
(The assumed retirement age less the entry age is the amount of time required to fund a member's total benefit. Generally, the older a member on the date of hire, the greater the entry age normal cost. This is mainly because there is less time to earn investment income to fund the future benefits.)

Fresh Start

A Fresh Start is when multiple amortization bases are collapsed to one base and amortized together over a new funding period.

Funded Status

A measure of how well funded, or how "on track" a plan or risk pool is with respect to assets versus accrued liabilities. A ratio greater than 100 percent means the plan or risk pool has more assets than liabilities and a ratio less than 100 percent means liabilities are greater than assets.

GASB 68

Statement No. 68 of the Governmental Accounting Standards Board. The accounting standard governing a state or local governmental employer's accounting and financial reporting for pensions. GASB 68 replaces GASB 27 effective the first fiscal year beginning after June 15, 2014.

New Member (under PEPRA)

A new member includes an individual who becomes a member of a public retirement system for the first time on or after January 1, 2013, and who was not a member of another public retirement system prior to that date, and who is not subject to reciprocity with another public retirement system.

Normal Cost

The annual cost of service accrual for the upcoming fiscal year for active employees. The normal cost should be viewed as the long term contribution rate.

Pension Actuary

A business professional that is authorized by the Society of Actuaries, and the American Academy of Actuaries to perform the calculations necessary to properly fund a pension plan.

PEPRA

The California Public Employees' Pension Reform Act of 2013

Prepayment Contribution

A payment made by the employer to reduce or eliminate the year's required employer contribution.

Present Value of Benefits (PVB)

The total dollars needed as of the valuation date to fund all benefits earned in the past or expected to be earned in the future for *current* members.

Unfunded Accrued Liability (UAL)

When a plan or pool's Value of Assets is less than its Accrued Liability, the difference is the plan or pool's Unfunded Accrued Liability (or unfunded liability). If the unfunded liability is positive, the plan or pool will have to pay contributions exceeding the Normal Cost.

Exhibit C4

California Public Employees' Retirement System
Actuarial Office
P.O. Box 942701
Sacramento, CA 94229-2701
TTY: (916) 795-3240
(888) 225-7377 phone · (916) 795-2744 fax
www.calpers.ca.gov

July 2018

Safety Plan of the City of Sacramento (CalPERS ID: 7903930500)
Annual Valuation Report as of June 30, 2017

Dear Employer,

As an attachment to this letter, you will find a copy of the June 30, 2017 actuarial valuation report of your pension plan. Your 2017 actuarial valuation report contains important actuarial information about your pension plan at CalPERS. Your CalPERS staff actuary, whose signature appears in the "Actuarial Certification" section on page 1, is available to discuss the report with you after August 1, 2018.

Required Contributions

The exhibit below displays the minimum required employer contributions and the Employee PEPRA Rate for Fiscal Year 2019-20 along with an estimate of the required contribution for Fiscal Year 2020-21. Member contributions other than cost sharing (whether paid by the employer or the employee) are in addition to the results shown below. **The required employer contributions in this report do not reflect any cost sharing arrangement you may have with your employees.**

Fiscal Year	Employer Normal Cost Rate	Employer Amortization of Unfunded Accrued Liability	Employee PEPRA Rate
2019-20	19.383%	$38,748,626	12.00%
Projected Results			
2020-21	*20.7%*	*$43,495,000*	*TBD*

The actual investment return for Fiscal Year 2017-18 was not known at the time this report was prepared. The projections above assume the investment return for that year would be 7.25 percent. ***If the actual investment return for Fiscal Year 2017-18 differs from 7.25 percent, the actual contribution requirements for the projected years will differ from those shown above.***

Moreover, the projected results for Fiscal Year 2020-21 assume that there are no future Plan changes, no further changes in assumptions other than those recently approved and no liability gains or losses. Such changes can have a significant impact on required contributions. Since they cannot be predicted in advance, the projected employer results shown above are estimates. The actual required employer contributions for Fiscal Year 2020-21 will be provided in next year's report.

For additional details regarding the assumptions and methods used for these projections please refer to the "Projected Employer Contributions" in the "Highlights and Executive Summary" section.

The required contributions shown above include a Normal Cost component expressed as a percentage of payroll and a payment toward Unfunded Accrued Liability expressed as a dollar amount. For illustrative total contribution requirements expressed as percentages of payroll, please see pages 4 and 5 of the report.

The "Risk Analysis" section of the valuation report starting on page 22 also contains estimated employer contributions in future years under a variety of investment return scenarios.

DRAFT

Changes since the Prior Year's Valuation

At its December 2016 meeting, the CalPERS Board of Administration lowered the discount rate from 7.50 percent to 7.00 percent using a three-year phase-in beginning with the June 30, 2016 actuarial valuation. The minimum employer contributions for Fiscal Year 2019-20 determined in this valuation were calculated using a discount rate of 7.25 percent. The projected employer contributions on Page 5 are calculated under the assumption that the discount rate will be lowered to 7.00 percent next year, as adopted by the Board.

On December 19, 2017, the CalPERS Board of Administration adopted new actuarial assumptions based on the recommendations in the December 2017 CalPERS Experience Study and Review of Actuarial Assumptions. This study reviewed the retirement rates, termination rates, mortality rates, rates of salary increases and inflation assumption for Public Agencies. These new assumptions are incorporated in your actuarial valuations and will impact the required contribution for FY 2019-20. In addition, the Board adopted a new asset portfolio as part of its Asset Liability Management. The new asset mix supports a 7.00 percent discount rate. The reduction of the inflation assumption will be implemented in two steps in conjunction with the decreases in the discount rate. For the June 30, 2017 valuation an inflation rate of 2.625 percent will be used and a rate of 2.50 percent will be used in the following valuation.

The CalPERS Board of Administration has adopted a new amortization policy effective with the June 30, 2019 actuarial valuation. The new policy shortens the period over which actuarial gains and losses are amortized from 30 years to 20 years with the payments computed using a level dollar amount. In addition, the new policy removes the 5-year ramp-up and ramp-down on UAL bases attributable to assumption changes and non-investment gains/losses. The new policy removes the 5-year ramp-down on investment gains/losses. These changes will apply only to new UAL bases established on or after June 30, 2019.

For inactive employers the new amortization policy imposes a maximum amortization period of 15 years for all unfunded accrued liabilities effective June 30, 2017. Furthermore, the plan actuary has the ability to shorten the amortization period on any valuation date based on the life expectancy of plan members and projected cash flow needs to the plan. The impact of this has been reflected in the current valuation results.

Beginning with Fiscal Year 2017-18 CalPERS began collecting employer contributions toward the plan's unfunded liability as dollar amounts instead of the prior method of a contribution rate. This change addressed potential funding issues that could arise from a declining payroll or reduction in the number of active members in the plan. Funding the unfunded liability as a percentage of payroll could lead to the underfunding of the plans. Due to stakeholder feedback regarding internal needs for total contributions expressed as a percentage of payroll, the reports include such results in the contribution projection on page 5. These results are provided for information purposes only. Contributions toward the unfunded liability will continue to be collected as dollar amounts.

The CalPERS Board of Administration adopted a Risk Mitigation Policy which is designed to reduce funding risk over time. This Policy has been temporarily suspended during the period over which the discount rate is being lowered. More details on the Risk Mitigation Policy can be found on our website.

Besides the above noted changes, there may also be changes specific to the plan such as contract amendments and funding changes.

Further descriptions of general changes are included in the "Highlights and Executive Summary" section and in Appendix A, "Actuarial Methods and Assumptions." The effects of the changes on the required contributions are included in the "Reconciliation of Required Employer Contributions" section.

We understand that you might have some questions about these results. While we are very interested in discussing these results with your agency, in the interest of allowing us to give every public agency their results, we ask that you wait until after August 1, 2018 to contact us with actuarial questions. If you have other questions, you may call the Customer Contact Center at (888)-CalPERS or (**888-225-7377**).

Sincerely,

SCOTT TERANDO
Chief Actuary

Actuarial Valuation as of June 30, 2017

for the Safety Plan of the City of Sacramento

(CalPERS ID: 7903930500)
(Rate Plan ID: 1210)

Required Contributions for Fiscal Year July 1, 2019 – June 30, 2020

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Actuarial Certification

To the best of our knowledge, this report is complete and accurate and contains sufficient information to disclose, fully and fairly, the funded condition of the Safety Plan of the City of Sacramento. This valuation is based on the member and financial data as of June 30, 2017 provided by the various CalPERS databases and the benefits under this plan with CalPERS as of the date this report was produced. It is our opinion that the valuation has been performed in accordance with generally accepted actuarial principles, in accordance with standards of practice prescribed by the Actuarial Standards Board, and that the assumptions and methods are internally consistent and reasonable for this plan, as prescribed by the CalPERS Board of Administration according to provisions set forth in the California Public Employees' Retirement Law.

The undersigned is an actuary for CalPERS, a member of the American Academy of Actuaries and the Society of Actuaries and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

MAY SHUANG YU, ASA, MAAA
Senior Pension Actuary, CalPERS

Highlights and Executive Summary

- **Introduction**
- **Purpose of the Report**
- **Required Contributions**
- **Plan's Funded Status**
- **Projected Employer Contributions**
- **Cost**
- **Changes Since the Prior Year's Valuation**
- **Subsequent Events**

Introduction

This report presents the results of the June 30, 2017 actuarial valuation of the Safety Plan of the City of Sacramento of the California Public Employees' Retirement System (CalPERS). This actuarial valuation sets the minimum required employer contributions for Fiscal Year 2019-20.

Purpose of the Report

The actuarial valuation was prepared by the CalPERS Actuarial Office using data as of June 30, 2017. The purpose of the report is to:

- Set forth the assets and accrued liabilities of this plan as of June 30, 2017;
- Determine the minimum required employer contributions for the fiscal year July 1, 2019 through June 30, 2020;
- Provide actuarial information as of June 30, 2017 to the CalPERS Board of Administration and other interested parties.

The pension funding information presented in this report should not be used in financial reports subject to Governmental Accounting Standards Board (GASB) Statement No. 68 for an Agent Employer Defined Benefit Pension Plan. A separate accounting valuation report for such purposes is available from CalPERS and details for ordering are available on our website.

The measurements shown in this actuarial valuation may not be applicable for other purposes. The employer should contact their actuary before disseminating any portion of this report for any reason that is not explicitly described above.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; changes in actuarial policies; and changes in plan provisions or applicable law.

California Actuarial Advisory Panel Recommendations

This report includes all the basic disclosure elements as described in the *Model Disclosure Elements for Actuarial Valuation Reports* recommended in 2011 by the California Actuarial Advisory Panel (CAAP), with the exception of including the original base amounts of the various components of the unfunded liability in the Schedule of Amortization Bases shown on page 16.

Additionally, this report includes the following "Enhanced Risk Disclosures" also recommended by the CAAP in the Model Disclosure Elements document:

- A "Deterministic Stress Test," projecting future results under different investment income scenarios
- A "Sensitivity Analysis," showing the impact on current valuation results using alternative discount rates of 6.0 percent, 7.0 percent and 8.0 percent.

Required Contributions

Required Employer Contribution		Fiscal Year 2019-20
Employer Normal Cost Rate		**19.383%**
Plus, Either		
1) Monthly Employer Dollar UAL Payment	**$**	**3,229,052**
Or		
2) Annual UAL Prepayment Option	**$**	**37,416,026**
Required PEPRA Member Contribution Rate		**12.00%**

*The total minimum required employer contribution is the **sum** of the Plan's Employer Normal Cost Rate (expressed as a percentage of payroll) **plus** the Employer Unfunded Accrued Liability (UAL) Contribution Amount (billed monthly in dollars).*

*Only the UAL portion of the employer contribution can be prepaid **(which must be received in full no later than July 31)**. Plan Normal Cost contributions will be made as part of the payroll reporting process. If there is contractual cost sharing or other change, this amount will change.*

In accordance with Sections 20537 and 20572 of the Public Employees' Retirement Law, if a contracting agency fails to remit the required contributions when due, interest and penalties may apply.

For additional detail regarding the determination of the required contribution for PEPRA members, see Appendix D. Required member contributions for Classic members can be found in Appendix B.

		Fiscal Year 2018-19		Fiscal Year 2019-20
Normal Cost Contribution as a Percentage of Payroll				
Total Normal Cost		27.979%		28.799%
Employee Contribution[1]		9.286%		9.416%
Employer Normal Cost[2]		18.693%		19.383%
Projected Annual Payroll for Contribution Year	$	134,137,989	$	140,086,777
Estimated Employer Contributions Based On Projected Payroll				
Total Normal Cost	$	37,530,467	$	40,343,591
Employee Contribution[1]		12,456,054		13,190,571
Employer Normal Cost[2]		25,074,413		27,153,020
Unfunded Liability Contribution		32,317,739		38,748,626
% of Projected Payroll (illustrative only)		24.093%		27.660%
Estimated Total Employer Contribution	$	57,392,152	$	65,901,646
% of Projected Payroll (illustrative only)		42.786%		47.043%

[1] For classic members, this is the percentage specified in the Public Employees Retirement Law, net of any reduction from the use of a modified formula or other factors. For PEPRA members, the member contribution rate is based on 50 percent of the normal cost. A development of PEPRA member contribution rates can be found in Appendix D. Employee cost sharing is not shown in this report.

[2] The Employer Normal Cost is a blended rate for all benefit groups in the plan. A breakout of normal cost by benefit group is shown in Appendix D.

Plan's Funded Status

		June 30, 2016		June 30, 2017
1. Present Value of Projected Benefits	$	2,018,031,964	$	2,152,381,430
2. Entry Age Normal Accrued Liability		1,693,049,933		1,798,776,145
3. Market Value of Assets (MVA)	$	1,125,555,355	$	1,230,658,763
4. Unfunded Accrued Liability (UAL) [(2) – (3)]	$	567,494,578	$	568,117,382
5. Funded Ratio [(3) / (2)]		66.5%		68.4%

This measure of funded status is an assessment of the need for future employer contributions based on the selected actuarial cost method used to fund the plan. The UAL is the present value of future employer contributions for service that has already been earned and is in addition to future normal cost contributions for active members. For a measure of funded status that is appropriate for assessing the sufficiency of plan assets to cover estimated termination liabilities, please see "Hypothetical Termination Liability" in the "Risk Analysis" section.

Projected Employer Contributions

The table below shows the required and projected employer contributions (before cost sharing) for the next six fiscal years. Projected results reflect the adopted changes to the discount rate described in Appendix A, "Actuarial Methods and Assumptions." The projections also assume that all actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur during the projection period. The projected normal cost percentages in the projections below do not reflect that the normal cost will decline over time as new employees are hired into PEPRA or other lower cost benefit tiers.

	Required Contribution	**Projected Future Employer Contributions (Assumes 7.25% Return for Fiscal Year 2017-18)**				
Fiscal Year	**2019-20**	**2020-21**	**2021-22**	**2022-23**	**2023-24**	**2024-25**
Normal Cost %	19.383%	20.7%	20.7%	20.7%	20.7%	20.7%
UAL Payment	38,748,626	43,495,000	48,770,000	52,999,000	55,401,000	58,162,000
*Total as a % of Payroll**	*47.0%*	*51.0%*	*53.8%*	*55.7%*	*56.3%*	*57.0%*
Projected Payroll	*140,086,777*	*143,589,585*	*147,538,298*	*151,595,601*	*155,764,480*	*160,048,003*

*Illustrative only and based on the projected payroll shown.

Changes in the UAL due to actuarial gains or losses as well as changes in actuarial assumptions or methods are amortized using a 5-year ramp up. For more information, please see "Amortization of the Unfunded Actuarial Accrued Liability" under "Actuarial Methods" in Appendix A. This method phases in the impact of changes in UAL over a 5-year period and attempts to minimize employer cost volatility from year to year. As a result of this methodology, dramatic changes in the required employer contributions in any one year are less likely. However, required contributions can change gradually and significantly over the next five years. In years where there is a large increase in UAL the relatively small amortization payments during the ramp up period could result in a funded ratio that is projected to decrease initially while the contribution impact of the increase in the UAL is phased in.

Due to the adopted change in the discount rate for the next valuation in combination with the 5-year phase-in ramp, the increases in the required contributions are expected to continue for six years from Fiscal Year 2019-20 through Fiscal Year 2024-25.

For projected contributions under alternate investment return scenarios, please see the "Analysis of Future Investment Return Scenarios" in the "Risk Analysis" section.

Cost

Actuarial Cost Estimates in General

What is the cost of the pension plan?

Contributions to fund the pension plan are comprised of two components:

- The Normal Cost, expressed as a percentage of total active payroll.
- The Amortization of the Unfunded Accrued Liability (UAL), expressed as a dollar amount.

For fiscal years prior to FY 2017-18, the Amortizations of UAL component was expressed as percentage of total active payroll. Starting with FY 2017-18, the Amortization of UAL component was expressed as a dollar amount and invoiced on a monthly basis. There continues to be an option to prepay this amount during July of each fiscal year.

The Normal Cost component will continue to be expressed as a percentage of active payroll with employer and employee contributions payable as part of the regular payroll reporting process.

The determination of both components requires complex actuarial calculations. The calculations are based on a set of actuarial assumptions which can be divided into two categories:

- Demographic assumptions (which includes mortality rates, retirement rates, employment termination rates and disability rates)
- Economic assumptions (which includes future investment earnings, inflation, salary growth rates)

These assumptions reflect CalPERS best estimate of the future experience of the plan and are long term in nature. We recognize that all the assumptions will not be realized in any given year. For example, the investment earnings at CalPERS have averaged 6.6 percent over the 20 years ending June 30, 2017, yet individual fiscal year returns have ranged from -24.0 percent to +21.7 percent. In addition, CalPERS reviews all the actuarial assumptions on an ongoing basis by conducting in-depth experience studies every four years, with the most recent experience study completed in 2017.

Changes since the Prior Year's Valuation

Benefits

The standard actuarial practice at CalPERS is to recognize mandated legislative benefit changes in the first annual valuation following the effective date of the legislation. Voluntary benefit changes by plan amendment are generally included in the first valuation that is prepared after the amendment becomes effective, even if the valuation date is prior to the effective date of the amendment.

This valuation generally reflects plan changes by amendments effective before the date of the report. Please refer to the "Plan's Major Benefit Options" and Appendix B for a summary of the plan provisions used in this valuation. The effect of any mandated benefit changes or plan amendments on the unfunded liability is shown in the "(Gain)/Loss Analysis" and the effect on the employer contribution is shown in the "Reconciliation of Required Employer Contributions." It should be noted that no change in liability or contribution is shown for any plan changes which were already included in the prior year's valuation.

Actuarial Methods and Assumptions

On December 21, 2016, the CalPERS Board of Administration lowered the discount rate from 7.50 percent to 7.00 percent using a three-year phase-in beginning with the June 30, 2016 actuarial valuation. The minimum employer contribution for Fiscal Year 2019-20 determined in this valuation was calculated using a discount rate of 7.25 percent. The projected employer contributions on Page 5 are calculated assuming that the discount rate will be lowered to 7.00 percent next year as adopted by the Board. The decision to reduce the discount rate was primarily based on reduced capital market assumptions provided by external investment consultants and CalPERS investment staff. The specific decision adopted by the Board reflected recommendations from CalPERS staff and additional input from employer and employee stakeholder groups. Based on the investment allocation adopted by the Board and capital market assumptions, the reduced discount rate assumption provides a more realistic assumption for the long-term investment return of the fund.

On December 19, 2017, the CalPERS Board of Administration adopted new actuarial assumptions based on the recommendations in the December 2017 CalPERS Experience Study and Review of Actuarial Assumptions. This study reviewed the retirement rates, termination rates, mortality rates, rates of salary increases and inflation assumption for Public Agencies. These new assumptions are incorporated in this actuarial valuation and will impact the required contribution for FY 2019-20. In addition, the Board adopted a new asset portfolio as part of its Asset Liability Management. The new asset mix supports a 7.00 percent discount rate. The reduction of the inflation assumption will be implemented in two steps in conjunction with the decreases in the discount rate. For the June 30, 2017 valuation an inflation rate of 2.625 percent will be used and a rate of 2.50 percent will be used in the following valuation.

Notwithstanding the Board's decision to phase into a 7.0 percent discount rate, subsequent analysis of the expected investment return of CalPERS assets or changes to the investment allocation may result in a change to this discount rate schedule.

Subsequent Events

The CalPERS Board of Administration has adopted a new amortization policy effective with the June 30, 2019 actuarial valuation. The new policy shortens the period over which actuarial gains and losses are amortized from 30 years to 20 years with the payments computed using a level dollar amount. In addition, the new policy removes the 5-year ramp-up and ramp-down on UAL bases attributable to assumption changes and non-investment gains/losses. The new policy removes the 5-year ramp-down on investment gains/losses. These changes will apply only to new UAL bases established on or after June 30, 2019.

For inactive employers the new amortization policy imposes a maximum amortization period of 15 years for all unfunded accrued liabilities effective June 30, 2017. Furthermore, the plan actuary has the ability to shorten the amortization period on any valuation date based on the life expectancy of plan members and projected cash flow needs to the plan. The impact of this has been reflected in the current valuation results.

The contribution requirements determined in this actuarial valuation report are based on demographic and financial information as of June 30, 2017. Changes in the value of assets subsequent to that date are not reflected. Investment returns below the assumed rate of return will increase the retired contribution, while investment returns above the assumed rate of return will decrease the retired contribution.

This actuarial valuation report reflects statutory changes, regulatory changes and CalPERS Board actions through January 2018. Any subsequent changes or actions are not reflected.

Assets

- **Reconciliation of the Market Value of Assets**
- **Asset Allocation**
- **CalPERS History of Investment Returns**

Reconciliation of the Market Value of Assets

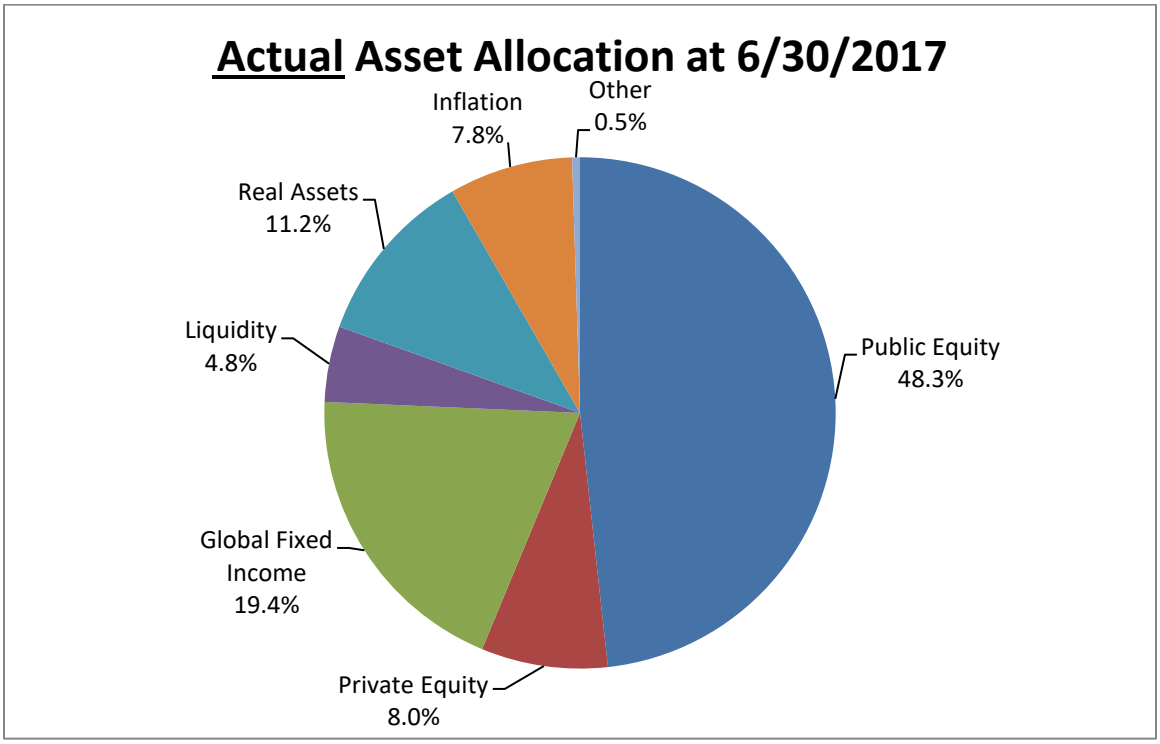
1.	Market Value of Assets as of 6/30/16 including Receivables	$	1,125,555,355
2.	Change in Receivables for Service Buybacks		(306,157)
3.	Employer Contributions		40,608,890
4.	Employee Contributions		18,758,341
5.	Benefit Payments to Retirees and Beneficiaries		(78,158,520)
6.	Refunds		(73,292)
7.	Lump Sum Payments		0
8.	Transfers and Miscellaneous Adjustments		454,659
9.	Net Investment Return		123,819,487
10.	Market Value of Assets as of 6/30/17 including Receivables	$	1,230,658,763

Asset Allocation

CalPERS adheres to an Asset Allocation Strategy which establishes asset class allocation policy targets and ranges, and manages those asset class allocations within their policy ranges. CalPERS Investment Belief No. 6 recognizes that strategic asset allocation is the dominant determinant of portfolio risk and return. On December 19, 2017, the CalPERS Board of Administration adopted changes to the current asset allocation as shown in the Policy Target Allocation below expressed as a percentage of total assets.

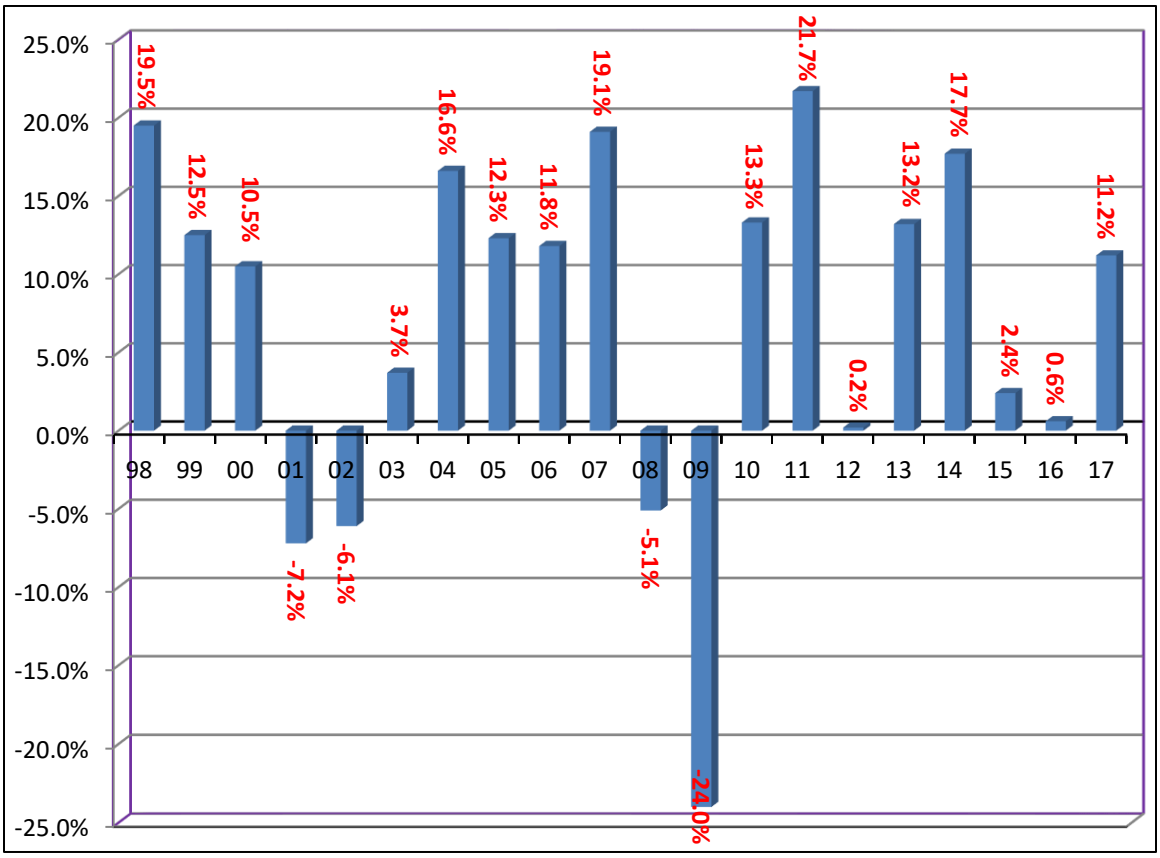
The asset allocation and market value of assets shown below reflect the values of the Public Employees' Retirement Fund (PERF) in its entirety as of June 30, 2017. The assets for City of Sacramento Safety Plan are part of the PERF and are invested accordingly.

(A) Asset Class	(B) Market Value ($ Billion)	(C) Policy Target Allocation
Public Equity	156.2	50.0%
Private Equity	25.9	8.0%
Global Fixed Income	62.9	28.0%
Liquidity	15.5	1.0%
Real Assets	36.3	13.0%
Inflation Sensitive Assets	25.3	0.0%
Other	1.6	0.0%
Total Fund	**$323.7**	**100.0%**



CalPERS History of Investment Returns

The following is a chart with the 20-year historical annual returns of the Public Employees Retirement Fund for each fiscal year ending on June 30. Beginning in 2002, the figures are reported as gross of fees.



The table below shows historical geometric mean annual returns of the Public Employees Retirement Fund for various time periods ending on June 30, 2017 (figures are reported as gross of fees). The geometric mean rate of return is the average rate per period compounded over multiple periods. It should be recognized that in any given year the rate of return is volatile. The portfolio has an expected volatility of 11.4 percent per year based on the most recent Asset Liability Modelling study. The volatility is a measure of the risk of the portfolio expressed in the standard deviation of the fund's total return distribution, expressed as a percentage. Consequently, when looking at investment returns, it is more instructive to look at returns over longer time horizons.

History of CalPERS Geometric Mean Rates of Return and Volatilities					
	1 year	**5 year**	**10 year**	**20 year**	**30 year**
Geometric Return	11.2%	8.8%	4.3%	6.6%	8.2%
Volatility	–	7.3%	13.4%	11.5%	10.1%

Liabilities and Contributions

- **Development of Accrued and Unfunded Liabilities**
- **(Gain) / Loss Analysis 06/30/16 - 06/30/17**
- **Schedule of Amortization Bases**
- **Amortization Schedule and Alternatives**
- **Reconciliation of Required Employer Contributions**
- **Employer Contribution History**
- **Funding History**

Development of Accrued and Unfunded Liabilities

		June 30, 2016	June 30, 2017
1. Present Value of Projected Benefits			
a) Active Members	$	932,076,609	999,498,798
b) Transferred Members		42,627,054	53,456,395
c) Terminated Members		8,603,726	13,902,102
d) Members and Beneficiaries Receiving Payments		1,034,724,575	1,085,524,135
e) Total	$	2,018,031,964	2,152,381,430
2. Present Value of Future Employer Normal Costs	$	212,028,335	230,992,899
3. Present Value of Future Employee Contributions	$	112,953,696	122,612,386
4. Entry Age Normal Accrued Liability			
a) Active Members [(1a) - (2) - (3)]	$	607,094,578	645,893,513
b) Transferred Members (1b)		42,627,054	53,456,395
c) Terminated Members (1c)		8,603,726	13,902,102
d) Members and Beneficiaries Receiving Payments (1d)		1,034,724,575	1,085,524,135
e) Total	$	1,693,049,933	1,798,776,145
5. Market Value of Assets (MVA)	$	1,125,555,355	1,230,658,763
6. Unfunded Accrued Liability (UAL) [(4e) - (5)]	$	567,494,578	568,117,382
7. Funded Ratio [(5) / (4e)]		66.5%	68.4%

(Gain)/Loss Analysis 6/30/16 – 6/30/17

To calculate the cost requirements of the plan, assumptions are made about future events that affect the amount and timing of benefits to be paid and assets to be accumulated. Each year, actual experience is compared to the expected experience based on the actuarial assumptions. This results in actuarial gains or losses, as shown below.

1. Total (Gain)/Loss for the Year		
a) Unfunded Accrued Liability (UAL) as of 6/30/16	$	567,494,578
b) Expected Payment on the UAL during 2016-17		22,689,285
c) Interest through 6/30/17 [.07375 x (1a) - ((1.07375)$^{1/2}$ - 1) x (1b)]		41,030,940
d) Expected UAL before all other changes [(1a) - (1b) + (1c)]		585,836,233
e) Change due to plan changes		0
f) Change due to assumption change		28,501,602
g) Expected UAL after all other changes [(1d) + (1e) + (1f)]		614,337,835
h) Actual UAL as of 6/30/17		568,117,382
i) Total (Gain)/Loss for 2016-17 [(1h) - (1g)]	$	(46,220,453)
2. Contribution (Gain)/Loss for the Year		
a) Expected Contribution (Employer and Employee)	$	58,332,134
b) Interest on Expected Contributions		2,112,737
c) Actual Contributions		59,367,231
d) Interest on Actual Contributions		2,150,227
e) Expected Contributions with Interest [(2a) + (2b)]		60,444,871
f) Actual Contributions with Interest [(2c) + (2d)]		61,517,458
g) Contribution (Gain)/Loss [(2e) - (2f)]	$	(1,072,587)
3. Asset (Gain)/Loss for the Year		
a) Market Value of Assets as of 6/30/16	$	1,125,555,355
b) Prior Fiscal Year Receivables		(1,446,860)
c) Current Fiscal Year Receivables		1,140,703
d) Contributions Received		59,367,231
e) Benefits and Refunds Paid		(78,231,812)
f) Transfers and Miscellaneous Adjustments		454,659
g) Expected Int. [.07375 x (3a + 3b) + ((1.07375)$^{1/2}$ - 1) x ((3d) + (3e) + (3f))]		82,236,211
h) Expected Assets as of 6/30/17 [(3a) + (3b) + (3c) + (3d) + (3e) + (3f) + (3g)]		1,189,075,487
i) Market Value of Assets as of 6/30/17		1,230,658,763
j) Asset (Gain)/Loss [(3h) **-** (3i)]	$	(41,583,276)
4. Liability (Gain)/Loss for the Year		
a) Total (Gain)/Loss (1i)	$	(46,220,453)
b) Contribution (Gain)/Loss (2g)		(1,072,587)
c) Asset (Gain)/Loss (3j)		(41,583,276)
d) Liability (Gain)/Loss [(4a) - (4b) - (4c)]	$	(3,564,590)

Schedule of Amortization Bases

There is a two-year lag between the valuation date and the start of the contribution fiscal year.

- The assets, liabilities, and funded status of the plan are measured as of the valuation date: June 30, 2017.
- The required employer contributions determined by the valuation are for the fiscal year beginning two years after the valuation date: Fiscal Year 2019-20.

This two-year lag is necessary due to the amount of time needed to extract and test the membership and financial data, and the need to provide public agencies with their required employer contribution well in advance of the start of the fiscal year.

The Unfunded Accrued Liability (UAL) is used to determine the employer contribution and therefore must be rolled forward two years from the valuation date to the first day of the fiscal year for which the contribution is being determined. The UAL is rolled forward each year by subtracting the expected payment on the UAL for the fiscal year and adjusting for interest. The expected payment on the UAL for a fiscal year is equal to the Expected Employer Contribution for the fiscal year minus the Expected Normal Cost for the year. The Employer Contribution for the first fiscal year is determined by the actuarial valuation two years ago and the contribution for the second year is from the actuarial valuation one year ago. Additional discretionary payments are reflected in the Expected Payments column in the fiscal year they were made by the agency.

Reason for Base	Date Established	Ramp Up/Down 2019-20	Amorti-zation Period	Balance 6/30/17	Expected Payment 2017-18	Balance 6/30/18	Expected Payment 2018-19	Balance 6/30/19	Scheduled Payment for 2019-20
BENEFIT CHANGE	06/30/01	No Ramp	4	$875,475	$168,121	$764,838	$172,185	$641,971	$176,732
BENEFIT CHANGE	06/30/04	No Ramp	6	$1,333,123	$199,961	$1,222,691	$204,604	$1,099,445	$210,059
BENEFIT CHANGE	06/30/05	No Ramp	7	$1,318,218	$179,321	$1,228,082	$183,397	$1,127,189	$188,302
ASSUMPTION CHANGE	06/30/07	No Ramp	6	$2,287,297	$343,081	$2,097,826	$351,049	$1,886,367	$360,408
ARNETT CASE	06/30/07	No Ramp	6	$54,383	$8,157	$49,878	$8,347	$44,850	$8,569
METHOD CHANGE	06/30/07	No Ramp	7	$(2,680,383)	$(364,619)	$(2,497,106)	$(372,909)	$(2,291,956)	$(382,881)
BENEFIT CHANGE	06/30/08	No Ramp	10	$618,088	$66,916	$593,600	$68,339	$565,863	$70,178
BENEFIT CHANGE	06/30/08	No Ramp	10	$950,529	$102,906	$912,871	$105,095	$870,216	$107,924
ASSUMPTION CHANGE	06/30/09	No Ramp	12	$25,212,104	$2,432,176	$24,521,182	$2,481,587	$23,728,997	$2,548,583
SPECIAL (GAIN)/LOSS	06/30/09	No Ramp	22	$32,313,513	$2,188,302	$32,390,003	$2,223,182	$32,435,916	$2,283,837
SPECIAL (GAIN)/LOSS	06/30/10	No Ramp	23	$(501,020)	$(33,155)	$(503,009)	$(33,670)	$(504,608)	$(34,589)
ASSUMPTION CHANGE	06/30/11	No Ramp	14	$18,011,776	$1,579,602	$17,681,769	$1,610,221	$17,296,127	$1,653,806
SPECIAL (GAIN)/LOSS	06/30/11	No Ramp	24	$(6,192,794)	$(401,024)	$(6,226,465)	$(407,100)	$(6,256,284)	$(418,225)
PAYMENT (GAIN)/LOSS	06/30/12	No Ramp	25	$1,243,753	$78,922	$1,252,192	$80,087	$1,260,037	$82,277
(GAIN)/LOSS	06/30/12	No Ramp	25	$175,044,966	$11,107,367	$176,232,762	$11,271,401	$177,336,797	$11,579,645
(GAIN)/LOSS	06/30/13	100% →	26	$176,674,083	$7,134,026	$182,094,844	$9,655,306	$185,297,533	$12,399,443
ASSUMPTION CHANGE	06/30/14	80% ↗	17	$103,794,515	$3,864,009	$107,317,989	$5,904,032	$108,984,234	$8,086,200
(GAIN)/LOSS	06/30/14	80% ↗	27	$(124,558,106)	$(3,407,313)	$(130,059,902)	$(5,184,644)	$(134,119,946)	$(7,102,445)
(GAIN)/LOSS	06/30/15	60% ↗	28	$83,289,839	$1,172,847	$88,113,734	$2,377,634	$92,039,664	$3,664,481
ASSUMPTION CHANGE	06/30/16	40% ↗	19	$29,602,006	$(1,084,825)	$32,871,613	$620,297	$34,612,416	$1,274,566
(GAIN)/LOSS	06/30/16	40% ↗	29	$67,144,868	$0	$72,012,871	$999,299	$76,198,914	$2,053,669
ASSUMPTION CHANGE	06/30/17	20% ↗	20	$28,501,602	$(1,393,817)	$32,011,427	$(1,433,889)	$35,817,214	$675,000
(GAIN)/LOSS	06/30/17	20% ↗	30	$(46,220,453)	$0	$(49,571,436)	$0	$(53,165,365)	$(736,913)
TOTAL				**$568,117,382**	**$23,940,961**	**$584,512,255**	**$30,883,850**	**$594,905,591**	**$38,748,626**

Amortization Schedule and Alternatives

The amortization schedule on the previous page shows the minimum contributions required according to CalPERS amortization policy. There has been considerable interest from many agencies in paying off these unfunded accrued liabilities sooner and the possible savings in doing so. As a result, we have provided alternate amortization schedules to help analyze the current amortization schedule and illustrate the advantages of accelerating unfunded liability payments.

Shown on the following page are future year amortization payments based on 1) the current amortization schedule reflecting the individual bases and remaining periods shown on the previous page, and 2) alternate "fresh start" amortization schedules using two sample periods that would both result in interest savings relative to the current amortization schedule. Note that the payments under each alternate scenario increase by 2.875 percent per year. **The schedules do not reflect the impact of adopted discount rate changes that will become effective beyond June 30, 2017. Therefore, future amortization payments displayed in the Current Amortization Schedule on the following page will not match projected amortization payments shown in connection with Projected Employer Contributions provided elsewhere in this report.**

The Current Amortization Schedule typically contains individual bases that are both positive and negative. Positive bases result from plan changes, assumption changes or plan experience that result in increases to unfunded liability. Negative bases result from plan changes, assumption changes or plan experience that result in decreases to unfunded liability. The combination of positive and negative bases within an amortization schedule can result in unusual or problematic circumstances in future years such as:

- A positive total unfunded liability with a negative total payment,
- A negative total unfunded liability with a positive total payment, or
- Total payments that completely amortize the unfunded liability over a very short period of time

In any year where one of the above scenarios occurs, the actuary will consider corrective action such as replacing the existing unfunded liability bases with a single "fresh start" base and amortizing it over a reasonable period.

The Current Amortization Schedule on the following page may appear to show that, based on the current amortization bases, one of the above scenarios will occur at some point in the future. It is impossible to know today whether such a scenario will in fact arise since there will be additional bases added to the amortization schedule in each future year. Should such a scenario arise in any future year, the actuary will take appropriate action based on guidelines in the CalPERS amortization policy.

Amortization Schedule and Alternatives

	Current Amortization Schedule*		Alternate Schedules			
			20 Year Amortization		15 Year Amortization	
Date	**Balance**	**Payment**	**Balance**	**Payment**	**Balance**	**Payment**
6/30/2019	594,905,591	38,748,626	594,905,591	44,462,678	594,905,591	54,095,308
6/30/2020	597,907,558	43,020,536	591,989,996	45,740,980	582,014,293	55,650,548
6/30/2021	596,703,111	47,245,773	587,539,190	47,056,034	566,577,745	57,250,501
6/30/2022	591,035,620	50,348,495	581,403,812	48,408,895	548,365,110	58,896,453
6/30/2023	581,744,006	51,528,721	573,422,574	49,800,650	527,127,486	60,589,726
6/30/2024	570,556,491	53,010,173	563,421,372	51,232,419	502,596,554	62,331,681
6/30/2025	557,023,666	53,847,834	551,212,321	52,705,351	474,483,133	64,123,716
6/30/2026	541,642,217	55,633,241	536,592,722	54,220,630	442,475,629	65,967,273
6/30/2027	523,296,616	57,232,699	519,343,956	55,779,473	406,238,364	67,863,832
6/30/2028	501,964,533	58,878,137	499,230,291	57,383,133	365,409,791	69,814,918
6/30/2029	477,381,834	60,334,420	475,997,611	59,032,898	319,600,572	71,822,096
6/30/2030	449,508,742	62,069,035	449,372,038	60,730,094	268,391,519	73,886,982
6/30/2031	417,818,457	60,272,414	419,058,469	62,476,084	211,331,381	76,011,232
6/30/2032	385,691,231	59,083,031	384,738,991	64,272,271	147,934,476	78,196,555
6/30/2033	352,466,530	55,316,073	346,071,190	66,120,099	77,678,140	80,444,706
6/30/2034	320,734,156	52,838,803	302,686,335	68,021,052		
6/30/2035	289,266,686	49,111,036	254,187,421	69,976,657		
6/30/2036	259,378,356	45,125,247	200,147,080	71,988,486		
6/30/2037	231,450,870	44,236,825	140,105,332	74,058,155		
6/30/2038	202,418,705	43,260,018	73,567,176	76,187,327		
6/30/2039	172,293,303	43,313,871				
6/30/2040	139,928,041	44,559,145				
6/30/2041	103,926,673	36,953,052				
6/30/2042	73,192,192	36,730,171				
6/30/2043	40,460,281	34,809,655				
6/30/2044	7,344,224	6,125,846				
6/30/2045	1,532,658	1,587,245				
6/30/2046						
6/30/2047						
6/30/2048						
Totals		**1,245,220,122**		**1,179,653,366**		**996,945,527**
Interest Paid		**650,314,531**		**584,747,775**		**402,039,936**
Estimated Savings				**65,566,756**		**248,274,595**

* This schedule does not reflect the impact of adopted discount rate changes that will become effective beyond June 30, 2017. For Projected Employer Contributions, please see Page 5.

Reconciliation of Required Employer Contributions

Normal Cost (% of Payroll)

1. For Period 7/1/18 – 6/30/19	
a) Employer Normal Cost	18.693%
b) Employee Contribution	9.286%
c) Total Normal Cost	27.979%
2. Changes since the prior year annual valuation	
a) Effect of changes in demographics results	(0.233%)
b) Effect of plan changes	0.000%
c) Effect of changes in assumptions	1.053%
d) Net effect of the changes above [sum of (a) through (c)]	0.820%
3. For Period 7/1/19 – 6/30/20	
a) Employer Normal Cost	19.383%
b) Employee Contribution	9.416%
c) Total Normal Cost	28.799%
Employer Normal Cost Change [(3a) – (1a)]	0.690%
Employee Contribution Change [(3b) – (1b)]	0.130%

Unfunded Liability Contribution ($)

1. For Period 7/1/18 – 6/30/19	32,317,739
2. Changes since the prior year annual valuation	
a) Effect of (gain)/loss during prior year[1]	(736,913)
b) Effect of plan changes	0
c) Effect of changes in assumptions[2]	675,000
d) Changes to prior year amortization payments[3]	6,492,800
e) Effect of changes due to Fresh Start	0
f) Effect of elimination of amortization base	0
g) Net effect of the changes above [sum of (a) through (f)]	6,430,887
3. For Period 7/1/19 – 6/30/20 [(1) + (2g)]	38,748,626

[1] The unfunded liability contribution for the (gain)/loss during the year prior to the valuation date is 20 percent of the "full" annual requirement due to the 5-year ramp. Increases to this amount that occur during the ramp period will be included in line d) in future years.

[2] The unfunded liability contribution for the change in assumptions is 20 percent of the "full" annual requirement due to the 5-year ramp. Increases to this amount that occur during the ramp period will be included in line d) in future years.

[3] Includes changes due to 5-year ramp, payroll growth assumption, and re-amortization under new discount rate.

The amounts shown for the period 7/1/18 – 6/30/19 may be different if a prepayment of unfunded actuarial liability is made or a plan change became effective after the prior year's actuarial valuation was performed.

Employer Contribution History

The table below provides a recent history of the required employer contributions for the plan, as determined by the annual actuarial valuation. It does not account for prepayments or benefit changes made during a fiscal year.

Fiscal Year	Employer Normal Cost	Unfunded Rate	Unfunded Liability Payment ($)
2013 - 14	17.324%	11.351%	N/A
2014 - 15	17.403%	13.715%	N/A
2015 - 16	17.394%	16.608%	N/A
2016 - 17	18.361%	18.488%	N/A
2017 - 18	18.161%	N/A	26,419,603
2018 - 19	18.693%	N/A	32,317,739
2019 - 20	19.383%	N/A	38,748,626

Funding History

The table below shows the recent history of the actuarial accrued liability, the market value of assets, the funded ratio and the annual covered payroll.

Valuation Date	Accrued Liability	Market Value of Assets (MVA)	Unfunded Liability	Funded Ratio	Annual Covered Payroll
06/30/11	$ 1,249,347,774	$ 916,725,639	$ 332,622,135	73.4%	$ 109,446,416
06/30/12	1,313,218,710	897,431,991	415,786,719	68.3%	107,811,628
06/30/13	1,370,866,286	992,363,894	378,502,392	72.4%	104,054,754
06/30/14	1,517,439,523	1,142,219,279	375,220,244	75.3%	108,803,331
06/30/15	1,604,715,617	1,142,199,265	462,516,352	71.2%	116,621,439
06/30/16	1,693,049,933	1,125,555,355	567,494,578	66.5%	122,755,262
06/30/17	1,798,776,145	1,230,658,763	568,117,382	68.4%	128,667,126

Risk Analysis

- **Analysis of Future Investment Return Scenarios**
- **Analysis of Discount Rate Sensitivity**
- **Volatility Ratios**
- **Hypothetical Termination Liability**

Analysis of Future Investment Return Scenarios

Analysis was performed to determine the effects of various future investment returns on required employer contributions. The projections below provide a range of results based on five investment return scenarios assumed to occur during the next four fiscal years (2017-18, 2018-19, 2019-20 and 2020-21). The projections also assume that all other actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur.

Each of the five investment return scenarios assumes a return of 7.25 percent for fiscal year 2017-18. For fiscal years 2018-19, 2019-20, and 2020-21 each scenario assumes an alternate fixed annual return. The fixed return assumptions for the five scenarios are 1.0 percent, 4.0 percent, 7.0 percent, 9.0 percent and 12.0 percent.

The alternate investment returns were chosen based on stochastic analysis of possible future investment returns over the four-year period ending June 30, 2021. Using the expected returns and volatility of the asset classes in which the funds are invested, we produced five thousand stochastic outcomes for this period based on the recently completed Asset Liability Management process. We then selected annual returns that approximate the 5th, 25th, 50th, 75th, and 95th percentiles for these outcomes. For example, of all the 4-year outcomes generated in the stochastic analysis, approximately 25 percent of them had an average annual return of 4.0 percent or less.

Required contributions outside of this range are also possible. In particular, whereas it is unlikely that investment returns will average less than 1.0 percent or greater than 12.0 percent over this four-year period, the possibility of a single investment return less than 1.0 percent or greater than 12.0 percent in any given year is much greater.

Assumed Annual Return From 2018-19 through 2020-21	**Projected Employer Contributions**			
	2020-21	**2021-22**	**2022-23**	**2023-24**
1.0%				
Normal Cost	20.7%	20.7%	20.7%	20.7%
UAL Contribution	$43,495,000	$49,986,000	$56,718,000	$62,990,000
4.0%				
Normal Cost	20.7%	20.7%	20.7%	20.7%
UAL Contribution	$43,495,000	$49,378,000	$54,877,000	$59,270,000
7.0%				
Normal Cost	20.7%	20.7%	20.7%	20.7%
UAL Contribution	$43,495,000	$48,770,000	$52,999,000	$55,401,000
9.0%				
Normal Cost	20.7%	21.1%	21.6%	22.0%
UAL Contribution	$43,495,000	$48,357,000	$51,914,000	$53,362,000
12.0%				
Normal Cost	20.7%	21.1%	21.6%	22.0%
UAL Contribution	$43,495,000	$47,753,000	$50,001,000	$49,315,000

Given the temporary suspension of the Risk Mitigation Policy during the period over which the discount rate assumption is being phased down to 7.0 percent, the projections above were performed without reflection of any possible impact of this Policy for Fiscal Year 2020-21.

The projected normal cost percentages do not reflect that the normal cost will decline over time as new employees are hired into PEPRA or other lower cost benefit tiers. In addition, the projections above do not reflect the recent changes to the amortization policy effective with the June 30, 2019 valuation but the impact on the results above is expected to be minimal.

Analysis of Discount Rate Sensitivity

Shown below are various valuation results as of June 30, 2017 assuming alternate discount rates. Results are shown using the current discount rate of 7.25 percent as well as alternate discount rates of 6.0 percent, 7.0 percent, and 8.0 percent. The alternate rate of 7.0 percent was selected since the Board has adopted this rate as the final discount rate at the end of the three-year phase-in of the reduction in this assumption. The rates of 6.0 percent and 8.0 percent were selected since they illustrate the impact of a 1 percent increase or decrease to the 7.0 percent assumption. This analysis shows the potential plan impacts if the PERF were to realize investment returns of 6.0 percent, 7.0 percent, or 8.0 percent over the long-term.

This type of analysis gives the reader a sense of the long-term risk to required contributions. For a measure of funded status that is appropriate for assessing the sufficiency of plan assets to cover estimated termination liabilities, please see "Hypothetical Termination Liability" at the end of this section.

Sensitivity Analysis				
As of June 30, 2017	**Plan's Normal Cost**	**Accrued Liability**	**Unfunded Accrued Liability**	**Funded Status**
7.25% (current discount rate)	28.799%	$1,798,776,145	$568,117,382	68.4%
6.0%	38.675%	$2,110,665,797	$880,007,034	58.3%
7.0%	30.120%	$1,846,675,336	$616,016,573	66.6%
8.0%	23.701%	$1,630,993,924	$400,335,161	75.5%

Volatility Ratios

The actuarial calculations supplied in this communication are based on various assumptions about long-term demographic and economic behavior. Unless these assumptions (terminations, deaths, disabilities, retirements, salary growth, and investment return) are exactly realized each year, there will be differences on a year-to-year basis. The year-to-year differences between actual experience and the assumptions are called actuarial gains and losses and serve to lower or raise required employer contributions from one year to the next. Therefore, employer contributions will inevitably fluctuate, especially due to the ups and downs of investment returns.

Asset Volatility Ratio (AVR)

Plans that have higher asset-to-payroll ratios experience more volatile employer contributions (as a percentage of payroll) due to investment return. For example, a plan with an asset-to-payroll ratio of 8 may experience twice the contribution volatility due to investment return volatility than a plan with an asset-to-payroll ratio of 4. Shown below is the asset volatility ratio, a measure of the plan's current volatility. It should be noted that this ratio is a measure of the current situation. It increases over time but generally tends to stabilize as the plan matures.

Liability Volatility Ratio (LVR)

Plans that have higher liability-to-payroll ratios experience more volatile employer contributions (as a percentage of payroll) due to investment return and changes in liability. For example, a plan with a liability-to-payroll ratio of 8 is expected to have twice the contribution volatility of a plan with a liability-to-payroll ratio of 4. The liability volatility ratio is also included in the table below. It should be noted that this ratio indicates a longer-term potential for contribution volatility. The asset volatility ratio, described above, will tend to move closer to the liability volatility ratio as the plan matures. Since the liability volatility ratio is a long-term measure, it is shown below at the current discount rate (7.25 percent) as well as the discount rate the Board has adopted to determine the contribution requirement in the June 30, 2018 actuarial valuation (7.00 percent).

Contribution Volatility		As of June 30, 2017
1. Market Value of Assets without Receivables	$	1,229,518,060
2. Payroll		128,667,126
3. Asset Volatility Ratio (AVR) [(1) / (2)]		9.6
4. Accrued Liability (7.25% discount rate)	$	1,798,776,145
5. Liability Volatility Ratio (LVR) [(4) / (2)]		14.0
6. Accrued Liability (7.00% discount rate)		1,846,675,336
7. Projected Liability Volatility Ratio [(6) / (2)]		14.4

Hypothetical Termination Liability

The hypothetical termination liability is an estimate of the financial position of the plan had the contract with CalPERS been terminated as of June 30, 2017. The plan liability on a termination basis is calculated differently from the plan's ongoing funding liability. For this hypothetical termination liability calculation, both compensation and service are frozen as of the valuation date and no future pay increases or service accruals are assumed. This measure of funded status is not appropriate for assessing the need for future employer contributions in the case of an ongoing plan, that is, for an employer that continues to provide CalPERS retirement benefits to active employees.

A more conservative investment policy and asset allocation strategy was adopted by the CalPERS Board for the Terminated Agency Pool. The Terminated Agency Pool has limited funding sources since no future employer contributions will be made. Therefore, expected benefit payments are secured by risk-free assets and benefit security for members is increased while limiting the funding risk. However, this asset allocation has a lower expected rate of return than the PERF and consequently, a lower discount rate assumption. The lower discount rate for the Terminated Agency Pool results in higher liabilities for terminated plans.

The effective termination discount rate will depend on actual market rates of return for risk-free securities on the date of termination. As market discount rates are variable the table below shows a range for the hypothetical termination liability based on the lowest and highest interest rates observed during an approximate 2-year period centered around the valuation date.

Market Value of Assets (MVA)	Hypothetical Termination Liability[1,2] @ 1.75%	Funded Status	Unfunded Termination Liability @ 1.75%	Hypothetical Termination Liability[1,2] @ 3.00%	Funded Status	Unfunded Termination Liability @ 3.00%
$1,230,658,763	$3,498,429,274	35.2%	$2,267,770,511	$3,081,747,331	39.9%	$1,851,088,568

[1] The hypothetical liabilities calculated above include a 5 percent contingency load in accordance with Board policy. Other actuarial assumptions can be found in Appendix A.

[2] The current discount rate assumption used for termination valuations is a weighted average of the 10-year and 30-year U.S. Treasury yields where the weights are based on matching asset and liability durations as of the termination date. The discount rates used in the table are based on 20-year Treasury bonds, rounded to the nearest quarter percentage point, which is a good proxy for most plans. The 20-year Treasury yield was 2.61 percent on June 30, 2017, and was 2.83 percent on January 31, 2018.

In order to terminate the plan, you must first contact our Retirement Services Contract Unit to initiate a Resolution of Intent to Terminate. The completed Resolution will allow the plan actuary to give you a preliminary termination valuation with a more up-to-date estimate of the plan liabilities. CalPERS advises you to consult with the plan actuary before beginning this process.

Plan’s Major Benefit Provisions

Plan's Major Benefit Options

Shown below is a summary of the major optional benefits for which your agency has contracted for this plan. A description of principal standard and optional plan provisions is in Appendix B of this report.

	Contract Package						
Benefit Provision	Active Police	Active Fire	Active Fire	Active Police	Active Police	Active Fire	Inactive Fire
Benefit Formula	3.0% @ 50	3.0% @ 55	3.0% @ 55	3.0% @ 50	2.7% @ 57	2.7% @ 57	3.0% @ 55
Social Security Coverage	No	No	No	No	No	No	No
Full/Modified	Full	Full	Full	Full	Full	Full	Full
Employee Contribution Rate	9.00%	9.00%	9.00%	9.00%	11.50%	11.50%	
Final Average Compensation Period	One Year	One Year	One Year	One Year	Three Year	Three Year	One Year
Sick Leave Credit	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Non-Industrial Disability	Standard	Standard	Standard	Standard	Standard	Standard	Standard
Industrial Disability	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pre-Retirement Death Benefits							
Optional Settlement 2	Yes	No	No	Yes	Yes	No	No
1959 Survivor Benefit Level	Indexed	No	No	Indexed	Indexed	No	Level 2
Special	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Alternate (firefighters)	No	No	No	No	No	No	No
Post-Retirement Death Benefits							
Lump Sum	$500	$500	$500	$500	$500	$500	$500
Survivor Allowance (PRSA)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
COLA	2%	2%	2%	2%	2%	2%	2%

Plan's Major Benefit Options

Shown below is a summary of the major optional benefits for which your agency has contracted. A description of principal standard and optional plan provisions is in the following section of this Appendix.

	Contract Package				
Benefit Provision	Receiving Fire	Receiving Police	Receiving Fire	Receiving Police	
Benefit Formula					
Social Security Coverage					
Full/Modified					
Employee Contribution Rate					
Final Average Compensation Period					
Sick Leave Credit					
Non-Industrial Disability					
Industrial Disability					
Pre-Retirement Death Benefits					
Optional Settlement 2					
1959 Survivor Benefit Level					
Special					
Alternate (firefighters)					
Post-Retirement Death Benefits					
Lump Sum	$500	$500	$500	$500	
Survivor Allowance (PRSA)	Yes	Yes	Yes	Yes	
COLA	2%	2%	3%	3%	

Appendices

- **Appendix A – Actuarial Methods and Assumptions**
- **Appendix B – Principal Plan Provisions**
- **Appendix C – Participant Data**
- **Appendix D – Normal Cost by Benefit Group and PEPRA Member Contribution Rates**
- **Appendix E – Glossary of Actuarial Terms**

Appendix A

Actuarial Methods and Assumptions

- **Actuarial Data**
- **Actuarial Methods**
- **Actuarial Assumptions**
- **Miscellaneous**

Actuarial Data

As stated in the Actuarial Certification, the data which serves as the basis of this valuation has been obtained from the various CalPERS databases. We have reviewed the valuation data and believe that it is reasonable and appropriate in aggregate. We are unaware of any potential data issues that would have a material effect on the results of this valuation, except that data does not always contain the latest salary information for former members now in reciprocal systems and does not recognize the potential for unusually large salary deviation in certain cases such as elected officials. Therefore, salary information in these cases may not be accurate. These situations are relatively infrequent, however, and when they do occur, they generally do not have a material impact on the required employer contributions.

Actuarial Methods

Actuarial Cost Method

The actuarial cost method used is the Entry Age Normal Cost Method. Under this method, projected benefits are determined for all members and the associated liabilities are spread in a manner that produces level annual cost as a percentage of pay in each year from the member's entry age to their assumed retirement age on the valuation date. The cost allocated to the current fiscal year is called the normal cost.

The actuarial accrued liability for active members is then calculated as the portion of the total cost of the plan allocated to prior years. The actuarial accrued liability for members currently receiving benefits and for members entitled to deferred benefits is equal to the present value of the benefits expected to be paid. No normal costs are applicable for these participants.

Amortization of Unfunded Actuarial Accrued Liability

The excess of the total actuarial accrued liability over the market value of plan assets is called the unfunded actuarial accrued liability (UAL). Funding requirements are determined by adding the normal cost and an amortization payment toward the unfunded liability. The unfunded liability is amortized as a "level percent of pay". Commencing with the June 30, 2013 valuation, all new gains or losses are amortized over a fixed 30-year period with a 5-year ramp up at the beginning and a 5-year ramp down at the end of the amortization period. All changes in liability due to plan amendments (other than golden handshakes) are amortized over a 20-year period with no ramp. Changes in actuarial assumptions or changes in actuarial methodology are amortized over a 20-year period with a 5-year ramp up at the beginning and a 5-year ramp down at the end of the amortization period. Changes in unfunded accrued liability due to a Golden Handshake will be amortized over a period of five years. A summary of the current policy is provided in the table below:

	Source				
	(Gain)/Loss				
Driver	**Investment**	**Non-investment**	**Assumption/Method Change**	**Benefit Change**	**Golden Handshake**
Amortization Period	30 Years	30 Years	20 Years	20 Years	5 Years
Escalation Rate - Active Plans - Inactive Plans	 2.875% 0%	 2.875% 0%	 2.875% 0%	 2.875% 0%	 2.875% 0%
Ramp Up	5	5	5	0	0
Ramp Down	5	5	5	0	0

The 5-year ramp up means that the payments in the first four years of the amortization period are 20 percent, 40 percent, 60 percent and 80 percent of the "full" payment which begins in year five. The 5-year ramp down means that the reverse is true in the final four years of the amortization period.

Exceptions for Inconsistencies:

An exception to the amortization rules above is used whenever their application results in inconsistencies. In these cases, a "fresh start" approach is used. This means that the current unfunded actuarial liability is projected and amortized over a set number of years. For example, a fresh start is needed in the following situations:

- When a positive payment would be required on a negative unfunded actuarial liability (or conversely a negative payment on a positive unfunded actuarial liability); or
- When there are excess assets, rather than an unfunded liability. In this situation, a 30-year fresh start is used.

It should be noted that the actuary may determine that a fresh start is necessary under other circumstances. In all cases of a fresh start, the period is set by the actuary at what is deemed appropriate; however, the period will not be greater than 30 years.

Exceptions for Inactive Plans:

The following exceptions apply to plans classified as Inactive. These plans have no active members and no expectation to have active members in the future.

- Amortization of the unfunded liability is on a "level dollar" basis rather than a "level percent of pay" basis. For amortization layers, which utilize a ramp up and ramp down, the "ultimate" payment is constant.
- Actuarial judgment will be used to shorten amortization periods for Inactive plans with existing periods that are deemed too long given the duration of the liability. The specific demographics of the plan will be used to determine if shorter periods may be more appropriate.

Asset Valuation Method

It is the policy of the CalPERS Board of Administration to use professionally accepted amortization methods to eliminate a surplus or an unfunded accrued liability in a manner that maintains benefit security for the members of the System while minimizing substantial variations in required employer contributions. On April 17, 2013, the CalPERS Board of Administration approved a recommendation to change the CalPERS amortization and rate smoothing policies. Beginning with the June 30, 2013 valuations that set the employer contribution for Fiscal Year 2015-16, CalPERS employs a policy that amortizes all gains and losses over a fixed 30-year period. The increase or decrease in the rate is then spread directly over a 5-year period. This method is referred to as "direct rate smoothing." CalPERS no longer uses an actuarial value of assets and only uses the market value of assets. The direct rate smoothing method is equivalent to a method using a 5-year asset smoothing period with no actuarial value of asset corridor and a 25-year amortization period for gains and losses.

PEPRA Normal Cost Rate Methodology

Per Government Code Section 7522.30(b) the "normal cost rate" shall mean the annual actuarially determined normal cost for the plan of retirement benefits provided to the new member and shall be established based on actuarial assumptions used to determine the liabilities and costs as part of the annual actuarial valuation. The plan of retirement benefits shall include any elements that would impact the actuarial determination of the normal cost, including, but not limited to, the retirement formula, eligibility and vesting criteria, ancillary benefit provisions, and any automatic cost-of-living adjustments as determined by the public retirement system.

Each non-pooled plan is stable with a sufficiently large demographic representation of active employees. It is preferable to determine normal cost using a large active population ongoing so that this rate remains relatively stable. The total PEPRA normal cost will be calculated using all active members within a non-pooled plan until the number of members covered under the PEPRA formula meets either:

1. 50 percent of the active population, or
2. 25 percent of the active population and 100 or more PEPRA members

Once either of the conditions above is met for a non-pooled plan, the total PEPRA normal cost will be based on the active PEPRA population in the plan.

Accordingly, the total normal cost will be funded equally between employer and employee based on the demographics of the employees of that employer.

Actuarial Assumptions

In 2017, CalPERS completed its most recent asset liability management study incorporating actuarial assumptions and strategic asset allocation. In December 2017, the CalPERS Board of Administration adopted relatively modest changes to the asset allocation that reduced the expected volatility of returns. The adopted asset allocation was expected to have a long-term blended return that continued to support a discount rate assumption of 7.00 percent. The Board also approved several changes to the demographic assumptions that more closely aligned with actual experience. These new actuarial assumptions were first used in this, the June 30, 2017 valuation to set the Fiscal Year 2019-20 contribution for public agency employers.

On December 21, 2016, the CalPERS Board of Administration lowered the discount rate from 7.50 percent to 7.00 percent using a three-year phase-in beginning with the June 30, 2016 actuarial valuations. The minimum employer contributions for Fiscal Year 2019-20 determined in this valuation were calculated using a discount rate of 7.25 percent. The projected employer contributions on Page 5 are calculated assuming that the discount rate will be lowered to 7.00 percent next year as adopted by the Board. The decision to reduce the discount rate was primarily based on reduced capital market assumptions provided by external investment consultants and CalPERS investment staff. The specific decision adopted by the Board reflected recommendations from CalPERS staff and additional input from employer and employee stakeholder groups. Based on the investment allocation adopted by the Board and capital market assumptions, the reduced discount rate schedule provides a more realistic assumption for the long-term investment return of the fund.

Notwithstanding the Board's decision to phase into a 7.0 percent discount rate, subsequent analysis of the expected investment return of CalPERS assets or changes to the investment allocation may result in a change to this discount rate schedule.

For more details and additional rationale for the selection of the actuarial assumptions, please refer to the CalPERS Experience Study and Review of Actuarial Assumptions report from December 2017 that can be found on the CalPERS website under: "Forms and Publications". Click on "View All" and search for Experience Study.

All actuarial assumptions (except the discount rates used for the hypothetical termination liability) represent an estimate of future experience rather than observations of the estimates inherent in market data.

Economic Assumptions

Discount Rate

The prescribed discount rate assumption adopted by the Board on December 21, 2016 is 7.25 percent compounded annually (net of investment and administrative expenses) as of 6/30/2017.

The Board also prescribed that the assumed discount rate will reduce to 7.0 percent compounded annually (net of expenses) as of 6/30/2018. This change to the discount rate assumption is not reflected in the determination of required contributions determined in this report for Fiscal Year 2019-20.

Termination Liability Discount Rate

The current discount rate assumption used for termination valuations is a weighted average of the 10-year and 30-year U.S. Treasury yields where the weights are based on matching asset and liability durations as of the termination date.

The hypothetical termination liabilities in this report are calculated using an observed range of market interest rates. This range is based on the lowest and highest 20-year Treasury bond observed during an approximate 2-year period centered around the valuation date. The 20-year Treasury bond has a similar duration to most plan liabilities and serves as a good proxy for the termination discount rate. The 20-year Treasury yield was 2.61 percent on June 30, 2017.

Salary Growth

Annual increases vary by category, entry age, and duration of service. A sample of assumed increases are shown below. Wage inflation assumption in the valuation year (2.875% for 2017) is added to these factors for total salary growth.

Public Agency Miscellaneous

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.0850	0.0775	0.0650
1	0.0690	0.0635	0.0525
2	0.0560	0.0510	0.0410
3	0.0470	0.0425	0.0335
4	0.0400	0.0355	0.0270
5	0.0340	0.0295	0.0215
10	0.0160	0.0135	0.0090
15	0.0120	0.0100	0.0060
20	0.0090	0.0075	0.0045
25	0.0080	0.0065	0.0040
30	0.0080	0.0065	0.0040

Public Agency Fire

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.1700	0.1700	0.1700
1	0.1100	0.1100	0.1100
2	0.0700	0.0700	0.0700
3	0.0580	0.0580	0.0580
4	0.0473	0.0473	0.0473
5	0.0372	0.0372	0.0372
10	0.0165	0.0165	0.0165
15	0.0144	0.0144	0.0144
20	0.0126	0.0126	0.0126
25	0.0111	0.0111	0.0111
30	0.0097	0.0097	0.0097

Public Agency Police

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.1027	0.1027	0.1027
1	0.0803	0.0803	0.0803
2	0.0628	0.0628	0.0628
3	0.0491	0.0491	0.0491
4	0.0384	0.0384	0.0384
5	0.0300	0.0300	0.0300
10	0.0145	0.0145	0.0145
15	0.0150	0.0150	0.0150
20	0.0155	0.0155	0.0155
25	0.0160	0.0160	0.0160
30	0.0165	0.0165	0.0165

Salary Growth (continued)

Public Agency County Peace Officers

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.1320	0.1320	0.1320
1	0.0960	0.0960	0.0960
2	0.0657	0.0657	0.0657
3	0.0525	0.0525	0.0525
4	0.0419	0.0419	0.0419
5	0.0335	0.0335	0.0335
10	0.0170	0.0170	0.0170
15	0.0150	0.0150	0.0150
20	0.0150	0.0150	0.0150
25	0.0175	0.0175	0.0175
30	0.0200	0.0200	0.0200

Schools

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.0428	0.0419	0.0380
1	0.0428	0.0419	0.0380
2	0.0428	0.0419	0.0380
3	0.0354	0.0332	0.0280
4	0.0305	0.0279	0.0224
5	0.0262	0.0234	0.0180
10	0.0171	0.0154	0.0112
15	0.0152	0.0134	0.0098
20	0.0135	0.0117	0.0086
25	0.0120	0.0103	0.0076
30	0.0087	0.0071	0.0048

- The Miscellaneous salary scale is used for Local Prosecutors.
- The Police salary scale is used for Other Safety, Local Sheriff, and School Police.

Overall Payroll Growth

2.875 percent compounded annually (used in projecting the payroll over which the unfunded liability is amortized). This assumption is used for all plans with active members. For the June 30, 2018 valuation the payroll growth assumption will be 2.75 percent.

Inflation

2.625 percent compounded annually. For the June 30, 2018 valuation the inflation assumption will be 2.50 percent.

Non-valued Potential Additional Liabilities

The potential liability loss for a cost-of-living increase exceeding the 2.625 percent inflation assumption, and any potential liability loss from future member service purchases are not reflected in the valuation.

Miscellaneous Loading Factors

Credit for Unused Sick Leave

Total years of service is increased by 1 percent for those plans that have adopted the provision of providing Credit for Unused Sick Leave.

Conversion of Employer Paid Member Contributions (EPMC)

Total years of service is increased by the Employee Contribution Rate for those plans with the provision providing for the Conversion of Employer Paid Member Contributions (EPMC) during the final compensation period.

Norris Decision (Best Factors)

Employees hired prior to July 1, 1982 have projected benefit amounts increased in order to reflect the use of "Best Factors" in the calculation of optional benefit forms. This is due to a 1983 Supreme Court decision, known as the Norris decision, which required males and females to be treated equally in the determination of benefit amounts. Consequently, anyone already employed at that time is given the best possible conversion factor when optional benefits are determined. No loading is necessary for employees hired after July 1, 1982.

Termination Liability

The termination liabilities include a 5 percent contingency load. This load is for unforeseen negative experience.

Demographic Assumptions

Pre-Retirement Mortality

Non-industrial death rates vary by age and gender. Industrial death rates vary by age. See sample rates in table below. The non-industrial death rates are used for all plans. The industrial death rates are used for safety plans (except for Local Prosecutor safety members where the corresponding miscellaneous plan does not have the Industrial Death Benefit).

	Non-Industrial Death (Not Job-Related)		**Industrial Death (Job-Related)**
Age	Male	Female	Male and Female
20	0.00022	0.00007	0.00004
25	0.00029	0.00011	0.00006
30	0.00038	0.00015	0.00007
35	0.00049	0.00027	0.00009
40	0.00064	0.00037	0.00010
45	0.00080	0.00054	0.00012
50	0.00116	0.00079	0.00013
55	0.00172	0.00120	0.00015
60	0.00255	0.00166	0.00016
65	0.00363	0.00233	0.00018
70	0.00623	0.00388	0.00019
75	0.01057	0.00623	0.00021
80	0.01659	0.00939	0.00022

Miscellaneous plans usually have industrial death rates set to zero unless the agency has specifically contracted for industrial death benefits. If so, each non-industrial death rate shown above will be split into two components; 99 percent will become the non-industrial death rate and 1 percent will become the industrial death rate.

Post-Retirement Mortality

Rates vary by age, type of retirement, and gender. See sample rates in table below. These rates are used for all plans.

	Healthy Recipients		Non-Industrially Disabled (Not Job-Related)		Industrially Disabled (Job-Related)	
Age	Male	Female	Male	Female	Male	Female
50	0.00372	0.00346	0.01183	0.01083	0.00372	0.00346
55	0.00437	0.00410	0.01613	0.01178	0.00437	0.00410
60	0.00671	0.00476	0.02166	0.01404	0.00671	0.00476
65	0.00928	0.00637	0.02733	0.01757	0.01113	0.00765
70	0.01339	0.00926	0.03358	0.02183	0.01607	0.01111
75	0.02316	0.01635	0.04277	0.02969	0.02779	0.01962
80	0.03977	0.03007	0.06272	0.04641	0.04773	0.03609
85	0.07122	0.05418	0.09793	0.07847	0.08547	0.06501
90	0.13044	0.10089	0.14616	0.13220	0.14348	0.11098
95	0.21658	0.17698	0.21658	0.21015	0.21658	0.17698
100	0.32222	0.28151	0.32222	0.32226	0.32222	0.28151
105	0.46691	0.43491	0.46691	0.43491	0.46691	0.43491
110	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000

The post-retirement mortality rates above include 15 years of projected on-going mortality improvement using 90 percent of Scale MP 2016 published by the Society of Actuaries.

Marital Status

For active members, a percentage who are married upon retirement is assumed according to member category as shown in the following table.

Member Category	Percent Married
Miscellaneous Member	70%
Local Police	85%
Local Fire	90%
Other Local Safety	70%
School Police	85%
Local County Peace Officers	75%

Age of Spouse

It is assumed that female spouses are 3 years younger than male spouses. This assumption is used for all plans.

Terminated Members

It is assumed that terminated members refund immediately if non-vested. Terminated members who are vested are assumed to retire at age 59 for Miscellaneous members and age 54 for safety members.

Termination with Refund

Rates vary by entry age and service for miscellaneous plans. Rates vary by service for safety plans. See sample rates in tables below.

Public Agency Miscellaneous

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40	Entry Age 45
0	0.1742	0.1674	0.1606	0.1537	0.1468	0.1400
1	0.1545	0.1477	0.1409	0.1339	0.1271	0.1203
2	0.1348	0.1280	0.1212	0.1142	0.1074	0.1006
3	0.1151	0.1083	0.1015	0.0945	0.0877	0.0809
4	0.0954	0.0886	0.0818	0.0748	0.0680	0.0612
5	0.0212	0.0193	0.0174	0.0155	0.0136	0.0116
10	0.0138	0.0121	0.0104	0.0088	0.0071	0.0055
15	0.0060	0.0051	0.0042	0.0032	0.0023	0.0014
20	0.0037	0.0029	0.0021	0.0013	0.0005	0.0001
25	0.0017	0.0011	0.0005	0.0001	0.0001	0.0001
30	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001
35	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Public Agency Safety

Duration of Service	Fire	Police	County Peace Officer
0	0.1298	0.1013	0.1188
1	0.0674	0.0636	0.0856
2	0.0320	0.0271	0.0617
3	0.0237	0.0258	0.0445
4	0.0087	0.0245	0.0321
5	0.0052	0.0086	0.0121
10	0.0005	0.0053	0.0053
15	0.0004	0.0027	0.0025
20	0.0003	0.0017	0.0012
25	0.0002	0.0012	0.0005
30	0.0002	0.0009	0.0003
35	0.0001	0.0009	0.0002

The police termination and refund rates are also used for Public Agency Local Prosecutors, Other Safety, Local Sheriff, and School Police.

Schools

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40	Entry Age 45
0	0.2107	0.2107	0.1827	0.1546	0.1375	0.1203
1	0.1807	0.1807	0.1526	0.1246	0.1105	0.0963
2	0.1526	0.1526	0.1259	0.0992	0.0878	0.0765
3	0.1266	0.1266	0.1023	0.0780	0.0691	0.0603
4	0.1026	0.1026	0.0815	0.0605	0.0537	0.0469
5	0.0808	0.0808	0.0634	0.0461	0.0409	0.0358
10	0.0202	0.0202	0.0157	0.0112	0.0087	0.0063
15	0.0107	0.0107	0.0077	0.0048	0.0034	0.0021
20	0.0056	0.0056	0.0037	0.0017	0.0016	0.0016
25	0.0026	0.0026	0.0018	0.0009	0.0012	0.0015
30	0.0013	0.0013	0.0011	0.0009	0.0012	0.0015
35	0.0008	0.0008	0.0009	0.0009	0.0012	0.0015

Termination with Vested Benefits

Rates vary by entry age and service for miscellaneous plans. Rates vary by service for safety plans. See sample rates in tables below.

Public Agency Miscellaneous

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40
5	0.0422	0.0422	0.0393	0.0364	0.0344
10	0.0278	0.0278	0.0271	0.0263	0.0215
15	0.0192	0.0192	0.0174	0.0156	0.0120
20	0.0139	0.0139	0.0109	0.0079	0.0047
25	0.0083	0.0083	0.0048	0.0014	0.0007
30	0.0015	0.0015	0.0007	0.0000	0.0000
35	0.0000	0.0000	0.0000	0.0000	0.0000

Public Agency Safety

Duration of Service	Fire	Police	County Peace Officer
5	0.0094	0.0163	0.0187
10	0.0064	0.0126	0.0134
15	0.0048	0.0082	0.0092
20	0.0038	0.0065	0.0064
25	0.0026	0.0058	0.0042
30	0.0014	0.0056	0.0022
35	0.0000	0.0000	0.0000

- After termination with vested benefits, a miscellaneous member is assumed to retire at age 59 and a safety member at age 54.
- The Police termination with vested benefits rates are also used for Public Agency Local Prosecutors, Other Safety, Local Sheriff, and School Police.

Schools

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40
5	0.0405	0.0405	0.0346	0.0288	0.0264
10	0.0324	0.0324	0.0280	0.0235	0.0211
15	0.0202	0.0202	0.0179	0.0155	0.0126
20	0.0144	0.0144	0.0114	0.0083	0.0042
25	0.0091	0.0091	0.0046	0.0000	0.0000
30	0.0015	0.0015	0.0007	0.0000	0.0000
35	0.0000	0.0000	0.0000	0.0000	0.0000

Non-Industrial (Not Job-Related) Disability

Rates vary by age and gender for miscellaneous plans. Rates vary by age and category for safety plans.

	Miscellaneous		Fire	Police	County Peace Officer	Schools	
Age	Male	Female	Male and Female	Male and Female	Male and Female	Male	Female
20	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
25	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
30	0.0002	0.0002	0.0001	0.0002	0.0001	0.0001	0.0002
35	0.0004	0.0007	0.0001	0.0003	0.0004	0.0005	0.0004
40	0.0010	0.0014	0.0001	0.0004	0.0007	0.0012	0.0008
45	0.0015	0.0019	0.0002	0.0005	0.0013	0.0020	0.0017
50	0.0016	0.0020	0.0005	0.0008	0.0018	0.0026	0.0022
55	0.0016	0.0015	0.0007	0.0013	0.0010	0.0025	0.0018
60	0.0015	0.0011	0.0007	0.0020	0.0006	0.0022	0.0011

- The miscellaneous non-industrial disability rates are used for Local Prosecutors.
- The police non-industrial disability rates are also used for Other Safety, Local Sheriff, and School Police.

Industrial (Job-Related) Disability

Rates vary by age and category.

Age	Fire	Police	County Peace Officer
20	0.0001	0.0000	0.0004
25	0.0002	0.0017	0.0013
30	0.0006	0.0048	0.0025
35	0.0012	0.0079	0.0037
40	0.0023	0.0110	0.0051
45	0.0040	0.0141	0.0067
50	0.0208	0.0185	0.0092
55	0.0307	0.0479	0.0151
60	0.0438	0.0602	0.0174

- The police industrial disability rates are also used for Local Sheriff and Other Safety.
- Fifty percent of the police industrial disability rates are used for School Police.
- One percent of the police industrial disability rates are used for Local Prosecutors.
- Normally, rates are zero for miscellaneous plans unless the agency has specifically contracted for industrial disability benefits. If so, each miscellaneous non-industrial disability rate will be split into two components: 50 percent will become the non-industrial disability rate and 50 percent will become the industrial disability rate.

Service Retirement

Retirement rates vary by age, service, and formula, except for the safety ½ @ 55 and 2% @ 55 formulas, where retirement rates vary by age only.

Service Retirement

Public Agency Miscellaneous 1.5% @ 65

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.008	0.011	0.013	0.015	0.017	0.019
51	0.007	0.010	0.012	0.013	0.015	0.017
52	0.010	0.014	0.017	0.019	0.021	0.024
53	0.008	0.012	0.015	0.017	0.019	0.022
54	0.012	0.016	0.019	0.022	0.025	0.028
55	0.018	0.025	0.031	0.035	0.038	0.043
56	0.015	0.021	0.025	0.029	0.032	0.036
57	0.020	0.028	0.033	0.038	0.043	0.048
58	0.024	0.033	0.040	0.046	0.052	0.058
59	0.028	0.039	0.048	0.054	0.060	0.067
60	0.049	0.069	0.083	0.094	0.105	0.118
61	0.062	0.087	0.106	0.120	0.133	0.150
62	0.104	0.146	0.177	0.200	0.223	0.251
63	0.099	0.139	0.169	0.191	0.213	0.239
64	0.097	0.136	0.165	0.186	0.209	0.233
65	0.140	0.197	0.240	0.271	0.302	0.339
66	0.092	0.130	0.157	0.177	0.198	0.222
67	0.129	0.181	0.220	0.249	0.277	0.311
68	0.092	0.129	0.156	0.177	0.197	0.221
69	0.092	0.130	0.158	0.178	0.199	0.224
70	0.103	0.144	0.175	0.198	0.221	0.248

Public Agency Miscellaneous 2% @ 60

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.020	0.020	0.020	0.020	0.020	0.150
51	0.006	0.019	0.027	0.031	0.035	0.038
52	0.011	0.024	0.031	0.034	0.037	0.040
53	0.010	0.015	0.021	0.027	0.033	0.040
54	0.025	0.025	0.029	0.035	0.041	0.048
55	0.019	0.026	0.033	0.092	0.136	0.146
56	0.030	0.034	0.038	0.060	0.093	0.127
57	0.030	0.046	0.061	0.076	0.090	0.104
58	0.040	0.044	0.059	0.080	0.101	0.122
59	0.024	0.044	0.063	0.083	0.103	0.122
60	0.070	0.074	0.089	0.113	0.137	0.161
61	0.080	0.086	0.093	0.118	0.156	0.195
62	0.100	0.117	0.133	0.190	0.273	0.357
63	0.140	0.157	0.173	0.208	0.255	0.301
64	0.140	0.153	0.165	0.196	0.239	0.283
65	0.140	0.178	0.215	0.264	0.321	0.377
66	0.140	0.178	0.215	0.264	0.321	0.377
67	0.140	0.178	0.215	0.264	0.321	0.377
68	0.112	0.142	0.172	0.211	0.257	0.302
69	0.112	0.142	0.172	0.211	0.257	0.302
70	0.140	0.178	0.215	0.264	0.321	0.377

Service Retirement

Public Agency Miscellaneous 2% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.008	0.013	0.018	0.021	0.022	0.033
51	0.009	0.016	0.020	0.023	0.026	0.036
52	0.015	0.018	0.020	0.021	0.025	0.030
53	0.016	0.020	0.024	0.028	0.031	0.035
54	0.018	0.022	0.026	0.030	0.034	0.038
55	0.040	0.040	0.056	0.093	0.109	0.154
56	0.034	0.050	0.066	0.092	0.107	0.138
57	0.042	0.048	0.058	0.082	0.096	0.127
58	0.046	0.054	0.062	0.090	0.106	0.131
59	0.045	0.055	0.066	0.097	0.115	0.144
60	0.058	0.075	0.093	0.126	0.143	0.169
61	0.065	0.088	0.111	0.146	0.163	0.189
62	0.136	0.118	0.148	0.190	0.213	0.247
63	0.130	0.133	0.174	0.212	0.249	0.285
64	0.113	0.129	0.165	0.196	0.223	0.249
65	0.145	0.173	0.201	0.233	0.266	0.289
66	0.170	0.199	0.229	0.258	0.284	0.306
67	0.250	0.204	0.233	0.250	0.257	0.287
68	0.227	0.175	0.193	0.215	0.240	0.262
69	0.200	0.180	0.180	0.198	0.228	0.246
70	0.150	0.171	0.192	0.239	0.304	0.330

Public Agency Miscellaneous 2.5% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.008	0.014	0.020	0.026	0.033	0.050
51	0.008	0.015	0.023	0.030	0.037	0.059
52	0.009	0.016	0.023	0.030	0.037	0.061
53	0.014	0.021	0.028	0.035	0.042	0.063
54	0.014	0.022	0.030	0.039	0.047	0.068
55	0.020	0.038	0.055	0.073	0.122	0.192
56	0.025	0.047	0.069	0.091	0.136	0.196
57	0.030	0.048	0.065	0.083	0.123	0.178
58	0.035	0.054	0.073	0.093	0.112	0.153
59	0.035	0.054	0.073	0.092	0.131	0.183
60	0.044	0.072	0.101	0.130	0.158	0.197
61	0.050	0.078	0.105	0.133	0.161	0.223
62	0.055	0.093	0.130	0.168	0.205	0.268
63	0.090	0.124	0.158	0.192	0.226	0.279
64	0.080	0.112	0.144	0.175	0.207	0.268
65	0.120	0.156	0.193	0.229	0.265	0.333
66	0.132	0.172	0.212	0.252	0.292	0.366
67	0.132	0.172	0.212	0.252	0.292	0.366
68	0.120	0.156	0.193	0.229	0.265	0.333
69	0.120	0.156	0.193	0.229	0.265	0.333
70	0.120	0.156	0.193	0.229	0.265	0.333

Service Retirement

Public Agency Miscellaneous 2.7% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.003	0.010	0.016	0.034	0.033	0.045
51	0.009	0.016	0.023	0.042	0.038	0.047
52	0.015	0.019	0.024	0.040	0.036	0.046
53	0.012	0.020	0.028	0.047	0.046	0.060
54	0.020	0.027	0.035	0.054	0.056	0.073
55	0.033	0.055	0.078	0.113	0.156	0.234
56	0.039	0.067	0.095	0.135	0.169	0.227
57	0.050	0.067	0.084	0.113	0.142	0.198
58	0.043	0.066	0.089	0.124	0.151	0.201
59	0.050	0.070	0.090	0.122	0.158	0.224
60	0.060	0.086	0.112	0.150	0.182	0.238
61	0.071	0.094	0.117	0.153	0.184	0.241
62	0.091	0.122	0.152	0.194	0.226	0.279
63	0.143	0.161	0.179	0.209	0.222	0.250
64	0.116	0.147	0.178	0.221	0.254	0.308
65	0.140	0.174	0.208	0.254	0.306	0.389
66	0.170	0.209	0.247	0.298	0.310	0.324
67	0.170	0.199	0.228	0.269	0.296	0.342
68	0.150	0.181	0.212	0.255	0.287	0.339
69	0.150	0.181	0.212	0.255	0.287	0.339
70	0.150	0.181	0.212	0.243	0.291	0.350

Public Agency Miscellaneous 3% @ 60

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.013	0.019	0.026	0.042	0.038	0.064
51	0.035	0.037	0.039	0.052	0.047	0.062
52	0.023	0.030	0.038	0.055	0.051	0.056
53	0.025	0.032	0.040	0.057	0.056	0.066
54	0.035	0.042	0.050	0.067	0.066	0.076
55	0.040	0.052	0.064	0.085	0.095	0.120
56	0.043	0.056	0.070	0.094	0.102	0.150
57	0.045	0.060	0.074	0.099	0.109	0.131
58	0.053	0.056	0.059	0.099	0.126	0.185
59	0.050	0.068	0.085	0.113	0.144	0.202
60	0.089	0.106	0.123	0.180	0.226	0.316
61	0.100	0.117	0.133	0.212	0.230	0.298
62	0.130	0.155	0.180	0.248	0.282	0.335
63	0.120	0.163	0.206	0.270	0.268	0.352
64	0.150	0.150	0.150	0.215	0.277	0.300
65	0.200	0.242	0.283	0.330	0.300	0.342
66	0.220	0.264	0.308	0.352	0.379	0.394
67	0.250	0.279	0.309	0.338	0.371	0.406
68	0.170	0.196	0.223	0.249	0.290	0.340
69	0.220	0.261	0.302	0.344	0.378	0.408
70	0.220	0.255	0.291	0.326	0.358	0.388

Service Retirement

Public Agency Miscellaneous 2% @ 62

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.000	0.000	0.000	0.000	0.000	0.000
51	0.000	0.000	0.000	0.000	0.000	0.000
52	0.005	0.008	0.012	0.015	0.019	0.031
53	0.007	0.011	0.014	0.018	0.021	0.032
54	0.007	0.011	0.015	0.019	0.023	0.034
55	0.010	0.019	0.028	0.036	0.061	0.096
56	0.014	0.026	0.038	0.050	0.075	0.108
57	0.018	0.029	0.039	0.050	0.074	0.107
58	0.023	0.035	0.048	0.060	0.073	0.099
59	0.025	0.038	0.051	0.065	0.092	0.128
60	0.031	0.051	0.071	0.091	0.111	0.138
61	0.038	0.058	0.079	0.100	0.121	0.167
62	0.044	0.074	0.104	0.134	0.164	0.214
63	0.077	0.105	0.134	0.163	0.192	0.237
64	0.072	0.101	0.129	0.158	0.187	0.242
65	0.108	0.141	0.173	0.206	0.239	0.300
66	0.132	0.172	0.212	0.252	0.292	0.366
67	0.132	0.172	0.212	0.252	0.292	0.366
68	0.120	0.156	0.193	0.229	0.265	0.333
69	0.120	0.156	0.193	0.229	0.265	0.333
70	0.120	0.156	0.193	0.229	0.265	0.333

Service Retirement

Public Agency Fire ½ @ 55 and 2% @ 55

Age	Rate	Age	Rate
50	0.0159	56	0.1108
51	0.0000	57	0.0000
52	0.0344	58	0.0950
53	0.0199	59	0.0441
54	0.0413	60	1.00000
55	0.0751		

Public Agency Police ½ @ 55 and 2% @ 55

Age	Rate	Age	Rate
50	0.0255	56	0.0692
51	0.0000	57	0.0511
52	0.0164	58	0.0724
53	0.0272	59	0.0704
54	0.0095	60	0.3000
55	0.1667		

Service Retirement

Public Agency Police 2% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.050	0.050	0.050	0.050	0.050	0.100
51	0.040	0.040	0.040	0.040	0.058	0.094
52	0.040	0.040	0.040	0.040	0.061	0.087
53	0.040	0.040	0.040	0.040	0.082	0.123
54	0.040	0.040	0.040	0.046	0.098	0.158
55	0.072	0.072	0.072	0.096	0.141	0.255
56	0.066	0.066	0.066	0.088	0.129	0.228
57	0.060	0.060	0.060	0.080	0.118	0.213
58	0.080	0.080	0.080	0.088	0.138	0.228
59	0.080	0.080	0.080	0.092	0.140	0.228
60	0.150	0.150	0.150	0.150	0.150	0.228
61	0.144	0.144	0.144	0.144	0.144	0.170
62	0.150	0.150	0.150	0.150	0.150	0.213
63	0.150	0.150	0.150	0.150	0.150	0.213
64	0.150	0.150	0.150	0.150	0.150	0.319
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to County Peace officers, Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.009	0.009	0.009	0.009	0.013	0.020
51	0.013	0.013	0.013	0.013	0.020	0.029
52	0.018	0.018	0.018	0.018	0.028	0.042
53	0.052	0.052	0.052	0.052	0.079	0.119
54	0.067	0.067	0.067	0.067	0.103	0.154
55	0.089	0.089	0.089	0.089	0.136	0.204
56	0.083	0.083	0.083	0.083	0.127	0.190
57	0.082	0.082	0.082	0.082	0.126	0.189
58	0.088	0.088	0.088	0.088	0.136	0.204
59	0.074	0.074	0.074	0.074	0.113	0.170
60	0.100	0.100	0.100	0.100	0.154	0.230
61	0.072	0.072	0.072	0.072	0.110	0.165
62	0.099	0.099	0.099	0.099	0.152	0.228
63	0.114	0.114	0.114	0.114	0.175	0.262
64	0.114	0.114	0.114	0.114	0.175	0.262
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 3% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.035	0.035	0.035	0.035	0.070	0.090
51	0.028	0.028	0.028	0.029	0.065	0.101
52	0.032	0.032	0.032	0.039	0.066	0.109
53	0.028	0.028	0.028	0.043	0.075	0.132
54	0.038	0.038	0.038	0.074	0.118	0.333
55	0.070	0.070	0.070	0.120	0.175	0.340
56	0.060	0.060	0.060	0.110	0.165	0.330
57	0.060	0.060	0.060	0.110	0.165	0.320
58	0.080	0.080	0.080	0.100	0.185	0.350
59	0.090	0.090	0.095	0.130	0.185	0.350
60	0.150	0.150	0.150	0.150	0.185	0.350
61	0.120	0.120	0.120	0.120	0.160	0.350
62	0.150	0.150	0.150	0.150	0.200	0.350
63	0.150	0.150	0.150	0.150	0.200	0.400
64	0.150	0.150	0.150	0.150	0.175	0.350
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to County Peace officers, Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 3% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.001	0.001	0.001	0.006	0.016	0.069
51	0.002	0.002	0.002	0.006	0.018	0.071
52	0.012	0.012	0.012	0.021	0.040	0.098
53	0.032	0.032	0.032	0.049	0.085	0.149
54	0.057	0.057	0.057	0.087	0.144	0.217
55	0.073	0.073	0.073	0.109	0.179	0.259
56	0.064	0.064	0.064	0.097	0.161	0.238
57	0.063	0.063	0.063	0.095	0.157	0.233
58	0.065	0.065	0.065	0.099	0.163	0.241
59	0.088	0.088	0.088	0.131	0.213	0.299
60	0.105	0.105	0.105	0.155	0.251	0.344
61	0.118	0.118	0.118	0.175	0.282	0.380
62	0.087	0.087	0.087	0.128	0.210	0.295
63	0.067	0.067	0.067	0.100	0.165	0.243
64	0.067	0.067	0.067	0.100	0.165	0.243
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 3% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.050	0.050	0.050	0.100	0.155	0.400
51	0.040	0.040	0.040	0.090	0.140	0.380
52	0.040	0.040	0.040	0.070	0.115	0.350
53	0.040	0.040	0.040	0.080	0.135	0.350
54	0.040	0.040	0.040	0.090	0.145	0.350
55	0.070	0.070	0.070	0.120	0.175	0.340
56	0.060	0.060	0.060	0.110	0.165	0.330
57	0.060	0.060	0.060	0.110	0.165	0.320
58	0.080	0.080	0.080	0.100	0.185	0.350
59	0.090	0.090	0.095	0.130	0.185	0.350
60	0.150	0.150	0.150	0.150	0.185	0.350
61	0.120	0.120	0.120	0.120	0.160	0.350
62	0.150	0.150	0.150	0.150	0.200	0.350
63	0.150	0.150	0.150	0.150	0.200	0.400
64	0.150	0.150	0.150	0.150	0.175	0.350
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to County Peace officers, Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 3% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.020	0.020	0.020	0.040	0.130	0.192
51	0.008	0.008	0.008	0.023	0.107	0.164
52	0.023	0.023	0.023	0.043	0.136	0.198
53	0.023	0.023	0.023	0.043	0.135	0.198
54	0.027	0.027	0.027	0.048	0.143	0.207
55	0.043	0.043	0.043	0.070	0.174	0.244
56	0.053	0.053	0.053	0.085	0.196	0.269
57	0.054	0.054	0.054	0.086	0.197	0.271
58	0.052	0.052	0.052	0.084	0.193	0.268
59	0.075	0.075	0.075	0.116	0.239	0.321
60	0.065	0.065	0.065	0.102	0.219	0.298
61	0.076	0.076	0.076	0.117	0.241	0.324
62	0.068	0.068	0.068	0.106	0.224	0.304
63	0.027	0.027	0.027	0.049	0.143	0.208
64	0.094	0.094	0.094	0.143	0.277	0.366
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 2% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.040	0.040	0.040	0.040	0.040	0.080
51	0.028	0.028	0.028	0.028	0.040	0.066
52	0.028	0.028	0.028	0.028	0.043	0.061
53	0.028	0.028	0.028	0.028	0.057	0.086
54	0.028	0.028	0.028	0.032	0.069	0.110
55	0.050	0.050	0.050	0.067	0.099	0.179
56	0.046	0.046	0.046	0.062	0.090	0.160
57	0.054	0.054	0.054	0.072	0.106	0.191
58	0.060	0.060	0.060	0.066	0.103	0.171
59	0.060	0.060	0.060	0.069	0.105	0.171
60	0.113	0.113	0.113	0.113	0.113	0.171
61	0.108	0.108	0.108	0.108	0.108	0.128
62	0.113	0.113	0.113	0.113	0.113	0.159
63	0.113	0.113	0.113	0.113	0.113	0.159
64	0.113	0.113	0.113	0.113	0.113	0.239
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to County Peace officers, Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.005	0.005	0.005	0.005	0.008	0.012
51	0.006	0.006	0.006	0.006	0.009	0.013
52	0.012	0.012	0.012	0.012	0.019	0.028
53	0.033	0.033	0.033	0.033	0.050	0.075
54	0.045	0.045	0.045	0.045	0.069	0.103
55	0.061	0.061	0.061	0.061	0.094	0.140
56	0.055	0.055	0.055	0.055	0.084	0.126
57	0.081	0.081	0.081	0.081	0.125	0.187
58	0.059	0.059	0.059	0.059	0.091	0.137
59	0.055	0.055	0.055	0.055	0.084	0.126
60	0.085	0.085	0.085	0.085	0.131	0.196
61	0.085	0.085	0.085	0.085	0.131	0.196
62	0.085	0.085	0.085	0.085	0.131	0.196
63	0.085	0.085	0.085	0.085	0.131	0.196
64	0.085	0.085	0.085	0.085	0.131	0.196
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 2.5% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.050	0.050	0.050	0.050	0.050	0.100
51	0.038	0.038	0.038	0.038	0.055	0.089
52	0.038	0.038	0.038	0.038	0.058	0.082
53	0.036	0.036	0.036	0.036	0.073	0.111
54	0.036	0.036	0.036	0.041	0.088	0.142
55	0.061	0.061	0.061	0.082	0.120	0.217
56	0.056	0.056	0.056	0.075	0.110	0.194
57	0.060	0.060	0.060	0.080	0.118	0.213
58	0.072	0.072	0.072	0.079	0.124	0.205
59	0.072	0.072	0.072	0.083	0.126	0.205
60	0.135	0.135	0.135	0.135	0.135	0.205
61	0.130	0.130	0.130	0.130	0.130	0.153
62	0.135	0.135	0.135	0.135	0.135	0.191
63	0.135	0.135	0.135	0.135	0.135	0.191
64	0.135	0.135	0.135	0.135	0.135	0.287
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to County Peace officers, Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2.5% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.007	0.007	0.007	0.007	0.010	0.015
51	0.008	0.008	0.008	0.008	0.012	0.018
52	0.016	0.016	0.016	0.016	0.025	0.038
53	0.042	0.042	0.042	0.042	0.064	0.096
54	0.057	0.057	0.057	0.057	0.088	0.132
55	0.074	0.074	0.074	0.074	0.114	0.170
56	0.066	0.066	0.066	0.066	0.102	0.153
57	0.090	0.090	0.090	0.090	0.139	0.208
58	0.071	0.071	0.071	0.071	0.110	0.164
59	0.066	0.066	0.066	0.066	0.101	0.151
60	0.102	0.102	0.102	0.102	0.157	0.235
61	0.102	0.102	0.102	0.102	0.157	0.236
62	0.102	0.102	0.102	0.102	0.157	0.236
63	0.102	0.102	0.102	0.102	0.157	0.236
64	0.102	0.102	0.102	0.102	0.157	0.236
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 2.7% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.0500	0.0500	0.0500	0.0500	0.0500	0.1000
51	0.0400	0.0400	0.0400	0.0400	0.0575	0.0942
52	0.0380	0.0380	0.0380	0.0380	0.0580	0.0825
53	0.0380	0.0380	0.0380	0.0380	0.0774	0.1169
54	0.0380	0.0380	0.0380	0.0437	0.0931	0.1497
55	0.0684	0.0684	0.0684	0.0912	0.1340	0.2423
56	0.0627	0.0627	0.0627	0.0836	0.1228	0.2168
57	0.0600	0.0600	0.0600	0.0800	0.1175	0.2125
58	0.0800	0.0800	0.0800	0.0880	0.1375	0.2275
59	0.0800	0.0800	0.0800	0.0920	0.1400	0.2275
60	0.1500	0.1500	0.1500	0.1500	0.1500	0.2275
61	0.1440	0.1440	0.1440	0.1440	0.1440	0.1700
62	0.1500	0.1500	0.1500	0.1500	0.1500	0.2125
63	0.1500	0.1500	0.1500	0.1500	0.1500	0.2125
64	0.1500	0.1500	0.1500	0.1500	0.1500	0.3188
65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

- These rates also apply to County Peace officers, Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2.7% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.0065	0.0065	0.0065	0.0065	0.0101	0.0151
51	0.0081	0.0081	0.0081	0.0081	0.0125	0.0187
52	0.0164	0.0164	0.0164	0.0164	0.0254	0.0380
53	0.0442	0.0442	0.0442	0.0442	0.0680	0.1018
54	0.0606	0.0606	0.0606	0.0606	0.0934	0.1397
55	0.0825	0.0825	0.0825	0.0825	0.1269	0.1900
56	0.0740	0.0740	0.0740	0.0740	0.1140	0.1706
57	0.0901	0.0901	0.0901	0.0901	0.1387	0.2077
58	0.0790	0.0790	0.0790	0.0790	0.1217	0.1821
59	0.0729	0.0729	0.0729	0.0729	0.1123	0.1681
60	0.1135	0.1135	0.1135	0.1135	0.1747	0.2615
61	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
62	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
63	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
64	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Service Retirement

Schools 2% @ 55						
	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.004	0.007	0.011	0.012	0.013	0.015
51	0.004	0.008	0.011	0.014	0.016	0.017
52	0.005	0.010	0.014	0.016	0.018	0.021
53	0.006	0.012	0.016	0.020	0.022	0.025
54	0.008	0.017	0.023	0.027	0.031	0.034
55	0.021	0.042	0.058	0.069	0.077	0.086
56	0.019	0.037	0.053	0.062	0.069	0.078
57	0.019	0.038	0.054	0.064	0.071	0.079
58	0.022	0.045	0.062	0.074	0.082	0.092
59	0.025	0.049	0.069	0.082	0.090	0.101
60	0.033	0.066	0.092	0.109	0.121	0.135
61	0.037	0.072	0.101	0.119	0.133	0.149
62	0.066	0.131	0.184	0.218	0.242	0.271
63	0.064	0.126	0.178	0.209	0.233	0.261
64	0.059	0.117	0.163	0.193	0.215	0.240
65	0.080	0.158	0.221	0.261	0.291	0.326
66	0.081	0.160	0.224	0.265	0.296	0.330
67	0.070	0.139	0.194	0.229	0.255	0.286
68	0.063	0.124	0.173	0.205	0.228	0.255
69	0.066	0.130	0.183	0.216	0.241	0.270
70	0.071	0.140	0.196	0.231	0.258	0.289

Miscellaneous

Internal Revenue Code Section 415

The limitations on benefits imposed by Internal Revenue Code Section 415 are taken into account in this valuation. Each year the impact of any changes in this limitation since the prior valuation is included and amortized as part of the actuarial gain or loss base. This results in lower contributions for those employers contributing to the Replacement Benefit Fund and protects CalPERS from prefunding expected benefits in excess of limits imposed by federal tax law.

Internal Revenue Code Section 401(a) (17)

The limitations on compensation imposed by Internal Revenue Code Section 401(a) (17) are taken into account in this valuation. Each year, the impact of any changes in the compensation limitation since the prior valuation is included and amortized as part of the actuarial gain or loss base. The compensation limit for classic members for the 2017 calendar year is $270,000.

Appendix B

Principal Plan Provisions

The following is a description of the principal plan provisions used in calculating costs and liabilities. We have indicated whether a plan provision is standard or optional. Standard benefits are applicable to all members while optional benefits vary among employers. Optional benefits that apply to a single period of time, such as Golden Handshakes, have not been included. Many of the statements in this summary are general in nature, and are intended to provide an easily understood summary of the Public Employees' Retirement Law. The law itself governs in all situations.

Service Retirement

Eligibility

A classic CalPERS member or PEPRA Safety member becomes eligible for Service Retirement upon attainment of age 50 with at least 5 years of credited service (total service across all CalPERS employers, and with certain other retirement systems with which CalPERS has reciprocity agreements). For employees hired into a plan with the 1.5 percent at 65 formula, eligibility for service retirement is age 55 with at least 5 years of service. PEPRA miscellaneous members become eligible for service retirement upon attainment of age 52 with at least 5 years of service.

Benefit

The service retirement benefit is a monthly allowance equal to the product of the *benefit factor*, *years of service*, and *final compensation.*

- The *benefit factor* depends on the benefit formula specified in your agency's contract. The table below shows the factors for each of the available formulas. Factors vary by the member's age at retirement. Listed are the factors for retirement at whole year ages:

Miscellaneous Plan Formulas

Retirement Age	1.5% at 65	2% at 60	2% at 55	2.5% at 55	2.7% at 55	3% at 60	PEPRA 2% at 62
50	0.5000%	1.092%	1.426%	2.000%	2.000%	2.000%	N/A
51	0.5667%	1.156%	1.522%	2.100%	2.140%	2.100%	N/A
52	0.6334%	1.224%	1.628%	2.200%	2.280%	2.200%	1.000%
53	0.7000%	1.296%	1.742%	2.300%	2.420%	2.300%	1.100%
54	0.7667%	1.376%	1.866%	2.400%	2.560%	2.400%	1.200%
55	0.8334%	1.460%	2.000%	2.500%	2.700%	2.500%	1.300%
56	0.9000%	1.552%	2.052%	2.500%	2.700%	2.600%	1.400%
57	0.9667%	1.650%	2.104%	2.500%	2.700%	2.700%	1.500%
58	1.0334%	1.758%	2.156%	2.500%	2.700%	2.800%	1.600%
59	1.1000%	1.874%	2.210%	2.500%	2.700%	2.900%	1.700%
60	1.1667%	2.000%	2.262%	2.500%	2.700%	3.000%	1.800%
61	1.2334%	2.134%	2.314%	2.500%	2.700%	3.000%	1.900%
62	1.3000%	2.272%	2.366%	2.500%	2.700%	3.000%	2.000%
63	1.3667%	2.418%	2.418%	2.500%	2.700%	3.000%	2.100%
64	1.4334%	2.418%	2.418%	2.500%	2.700%	3.000%	2.200%
65	1.5000%	2.418%	2.418%	2.500%	2.700%	3.000%	2.300%
66	1.5000%	2.418%	2.418%	2.500%	2.700%	3.000%	2.400%
67 & up	1.5000%	2.418%	2.418%	2.500%	2.700%	3.000%	2.500%

Safety Plan Formulas

Retirement Age	½ at 55 *	2% at 55	2% at 50	3% at 55	3% at 50
50	1.783%	1.426%	2.000%	2.400%	3.000%
51	1.903%	1.522%	2.140%	2.520%	3.000%
52	2.035%	1.628%	2.280%	2.640%	3.000%
53	2.178%	1.742%	2.420%	2.760%	3.000%
54	2.333%	1.866%	2.560%	2.880%	3.000%
55 & Up	2.500%	2.000%	2.700%	3.000%	3.000%

* For this formula, the benefit factor also varies by entry age. The factors shown are for members with an entry age of 35 or greater. If entry age is less than 35, then the age 55 benefit factor is 50 percent divided by the difference between age 55 and entry age. The benefit factor for ages prior to age 55 is the same proportion of the age 55 benefit factor as in the above table.

PEPRA Safety Plan Formulas

Retirement Age	2% at 57	2.5% at 57	2.7% at 57
50	1.426%	2.000%	2.000%
51	1.508%	2.071%	2.100%
52	1.590%	2.143%	2.200%
53	1.672%	2.214%	2.300%
54	1.754%	2.286%	2.400%
55	1.836%	2.357%	2.500%
56	1.918%	2.429%	2.600%
57 & Up	2.000%	2.500%	2.700%

- The *years of service* is the amount credited by CalPERS to a member while he or she is employed in this group (or for other periods that are recognized under the employer's contract with CalPERS). For a member who has earned service with multiple CalPERS employers, the benefit from each employer is calculated separately according to each employer's contract, and then added together for the total allowance. An agency may contract for an optional benefit where any unused sick leave accumulated at the time of retirement will be converted to credited service at a rate of 0.004 years of service for each day of sick leave.

- The *final compensation* is the monthly average of the member's highest 36 or 12 consecutive months' full-time equivalent monthly pay (no matter which CalPERS employer paid this compensation). The standard benefit is 36 months. Employers had the option of providing a final compensation equal to the highest 12 consecutive months for classic plans only. Final compensation must be defined by the highest 36 consecutive months' pay under the 1.5% at 65 formula. PEPRA members have a cap on the annual salary that can be used to calculate final compensation for all new members based on the Social Security contribution and benefit base. For employees that participate in Social Security this cap is $118,775 for 2017 and for those employees that do not participate in Social Security the cap for 2017 is $142,530. Adjustments to the caps are permitted annually based on changes to the CPI for all urban consumers.

- Employees must be covered by Social Security with the 1.5% at 65 formula. Social Security is optional for all other benefit formulas. For employees covered by Social Security, the modified formula is the standard benefit. Under this type of formula, the final compensation is offset by $133.33 (or by one third if the final compensation is less than $400). Employers may contract for the full benefit with Social Security that will eliminate the offset applicable to the final compensation. For employees not covered by Social Security, the full benefit is paid with

no offsets. Auxiliary organizations of the CSUC system may elect reduced contribution rates, in which case the offset is $317 if members are not covered by Social Security or $513 if members are covered by Social Security.

- The miscellaneous and PEPRA safety service retirement benefit is not capped. The classic Safety service retirement benefit is capped at 90 percent of final compensation.

Vested Deferred Retirement

Eligibility for Deferred Status

A CalPERS member becomes eligible for a deferred vested retirement benefit when he or she leaves employment, keeps his or her contribution account balance on deposit with CalPERS, **and** has earned at least 5 years of credited service (total service across all CalPERS employers, and with certain other retirement systems with which CalPERS has reciprocity agreements).

Eligibility to Start Receiving Benefits

The CalPERS classic members and PEPRA safety members become eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for deferred status and upon attainment of age 50 (55 for employees hired into a 1.5% @ 65 plan). PEPRA miscellaneous members become eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for deferred status and upon attainment of age 52.

Benefit

The vested deferred retirement benefit is the same as the service retirement benefit, where the benefit factor is based on the member's age at allowance commencement. For members who have earned service with multiple CalPERS employers, the benefit from each employer is calculated separately according to each employer's contract, and then added together for the total allowance.

Non-Industrial (Non-Job Related) Disability Retirement

Eligibility

A CalPERS member is eligible for Non-Industrial Disability Retirement if he or she becomes *disabled* and has at least 5 years of credited service (total service across all CalPERS employers, and with certain other retirement systems with which CalPERS has reciprocity agreements). There is no special age requirement. *Disabled* means the member is unable to perform his or her job because of an illness or injury, which is expected to be permanent or to last indefinitely. The illness or injury does not have to be job related. A CalPERS member must be actively employed by any CalPERS employer at the time of disability in order to be eligible for this benefit.

Standard Benefit

The standard Non-Industrial Disability Retirement benefit is a monthly allowance equal to 1.8 percent of final compensation, multiplied by *service*, which is determined as follows:

- *Service* is CalPERS credited service, for members with less than 10 years of service or greater than 18.518 years of service; or

- *Service* is CalPERS credited service plus the additional number of years that the member would have worked until age 60, for members with at least 10 years but not more than 18.518 years of service. The maximum benefit in this case is 33 1/3 percent of final compensation.

Improved Benefit

Employers have the option of providing the improved Non-Industrial Disability Retirement benefit. This benefit provides a monthly allowance equal to 30 percent of final compensation for the first 5 years of service, plus 1 percent for each additional year of service to a maximum of 50 percent of final compensation.

Members who are eligible for a larger service retirement benefit may choose to receive that benefit in lieu of a disability benefit. Members eligible to retire, and who have attained the normal retirement age determined by their service retirement benefit formula, will receive the same dollar amount for disability retirement as that payable for service retirement. For members who have earned service with multiple CalPERS employers, the benefit attributed to each employer is the total disability allowance multiplied by the ratio of service with a particular employer to the total CalPERS service.

Industrial (Job Related) Disability Retirement

All safety members have this benefit. For miscellaneous members, employers have the option of providing this benefit. An employer may choose to provide the increased benefit option or the improved benefit option.

Eligibility

An employee is eligible for Industrial Disability Retirement if he or she becomes disabled while working, where disabled means the member is unable to perform the duties of the job because of a work-related illness or injury, which is expected to be permanent or to last indefinitely. A CalPERS member who has left active employment within this group is not eligible for this benefit, except to the extent described below.

Standard Benefit

The standard Industrial Disability Retirement benefit is a monthly allowance equal to 50 percent of final compensation.

Increased Benefit (75 percent of Final Compensation)

The increased Industrial Disability Retirement benefit is a monthly allowance equal to 75 percent final compensation for total disability.

Improved Benefit (50 percent to 90 percent of Final Compensation)

The improved Industrial Disability Retirement benefit is a monthly allowance equal to the Workman's Compensation Appeals Board permanent disability rate percentage (if 50 percent or greater, with a maximum of 90 percent) times the final compensation.

For a CalPERS member not actively employed in this group who became disabled while employed by some other CalPERS employer, the benefit is a return of accumulated member contributions with respect to employment in this group. With the standard or increased benefit, a member may also choose to receive the annuitization of the accumulated member contributions.

If a member is eligible for service retirement and if the service retirement benefit is more than the industrial disability retirement benefit, the member may choose to receive the larger benefit.

Post-Retirement Death Benefit

Standard Lump Sum Payment

Upon the death of a retiree, a one-time lump sum payment of $500 will be made to the retiree's designated survivor(s), or to the retiree's estate.

Improved Lump Sum Payment

Employers have the option of providing an improved lump sum death benefit of $600, $2,000, $3,000, $4,000 or $5,000.

Form of Payment for Retirement Allowance

Standard Form of Payment

Generally, the retirement allowance is paid to the retiree in the form of an annuity for as long as he or she is alive. The retiree may choose to provide for a portion of his or her allowance to be paid to any designated beneficiary after the retiree's death. CalPERS provides for a variety of such benefit options, which the retiree pays for by taking a reduction in his or her retirement allowance. Such reduction takes into account the amount to be provided to the beneficiary and the probable duration of payments (based on the ages of the member and beneficiary) made subsequent to the member's death.

Improved Form of Payment (Post-Retirement Survivor Allowance)

Employers have the option to contract for the post-retirement survivor allowance.

For retirement allowances with respect to service subject to the modified formula, 25 percent of the retirement allowance will automatically be continued to certain statutory beneficiaries upon the death of the retiree, without a reduction in the retiree's allowance. For retirement allowances with respect to service subject to the full or supplemental formula, 50 percent of the retirement allowance will automatically be continued to certain statutory beneficiaries upon the death of the retiree, without a reduction in the retiree's allowance. This additional benefit is referred to as post-retirement survivor allowance (PRSA) or simply as survivor continuance.

In other words, 25 percent or 50 percent of the allowance, the continuance portion, is paid to the retiree for as long as he or she is alive, and that same amount is continued to the retiree's spouse (or if no eligible spouse, to unmarried child(ren) until they attain age 18; or, if no eligible child(ren), to a qualifying dependent parent) for the rest of his or her lifetime. This benefit will not be discontinued in the event the spouse remarries.

The remaining 75 percent or 50 percent of the retirement allowance, which may be referred to as the option portion of the benefit, is paid to the retiree as an annuity for as long as he or she is alive. Or, the retiree may choose to provide for some of this option portion to be paid to any designated beneficiary after the retiree's death. Benefit options applicable to the option portion are the same as those offered with the standard form. The reduction is calculated in the same manner but is applied only to the option portion.

Pre-Retirement Death Benefits

Basic Death Benefit

This is a standard benefit.

Eligibility

An employee's beneficiary (or estate) may receive the basic death benefit if the member dies while actively employed. A CalPERS member must be actively employed with the CalPERS employer providing this benefit to be eligible for this benefit. A member's survivor who is eligible for any other pre-retirement death benefit may choose to receive that death benefit instead of this basic death benefit.

Benefit

The basic death benefit is a lump sum in the amount of the member's accumulated contributions, where interest is currently credited at 7.5 percent per year, plus a lump sum in the amount of one month's salary for each completed year of current service, up to a maximum of six months' salary. For purposes of this benefit, one month's salary is defined as the member's average monthly full-time rate of compensation during the 12 months preceding death.

1957 Survivor Benefit

This is a standard benefit.

Eligibility

An employee's *eligible survivor(s)* may receive the 1957 Survivor benefit if the member dies while actively employed, has attained at least age 50 for classic and safety PEPRA members and age 52 for miscellaneous PEPRA members, and has at least 5 years of credited service (total service across all CalPERS employers and with certain other retirement systems with which CalPERS has reciprocity agreements). A CalPERS member must be actively employed with the CalPERS employer providing this benefit to be eligible for this benefit. An eligible survivor means the surviving spouse to whom the member was married at least one year before death or, if there is no eligible spouse, to the member's unmarried child(ren) under age 18. A member's survivor who is eligible for any other pre-retirement death benefit may choose to receive that death benefit instead of this 1957 Survivor benefit.

Benefit

The 1957 Survivor benefit is a monthly allowance equal to one-half of the unmodified service retirement benefit that the member would have been entitled to receive if the member had retired on the date of his or her death. If the benefit is payable to the spouse, the benefit is discontinued upon the death of the spouse. If the benefit is payable to dependent child(ren), the benefit will be discontinued upon death or attainment of age 18, unless the child(ren) is disabled. The total amount paid will be at least equal to the basic death benefit.

Optional Settlement 2 Death Benefit

This is an optional benefit.

Eligibility

An employee's *eligible survivor* may receive the Optional Settlement 2 Death benefit if the member dies while actively employed, has attained at least age 50 for classic and safety PEPRA members and age 52 for miscellaneous PEPRA members, and has at least 5 years of credited service (total service across all CalPERS employers and with certain other retirement systems with which CalPERS has reciprocity agreements). A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. An *eligible survivor* means the surviving spouse to whom the member was married at least one year before death. A member's survivor who is eligible for any other pre-retirement death benefit may choose to receive that death benefit instead of this Optional Settlement 2 Death benefit.

Benefit

The Optional Settlement 2 Death benefit is a monthly allowance equal to the service retirement benefit that the member would have received had the member retired on the date of his or her death and elected 100 percent to continue to the eligible survivor after the member's death. The allowance is payable as long as the surviving spouse lives, at which time it is continued to any unmarried child(ren) under age 18, if applicable. The total amount paid will be at least equal to the basic death benefit.

Special Death Benefit

This is a standard benefit for safety members. An employer may elect to provide this benefit for miscellaneous members.

Eligibility

An employee's *eligible survivor(s)* may receive the special death benefit if the member dies while actively employed and the death is job-related. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. An *eligible survivor* means the surviving spouse to whom the member was married prior to the onset of the injury or illness that resulted in death. If there is no eligible spouse, an eligible survivor means the member's unmarried child(ren) under age 22. An eligible survivor who chooses to receive this benefit will not receive any other death benefit.

Benefit

The special death benefit is a monthly allowance equal to 50 percent of final compensation, and will be increased whenever the compensation paid to active employees is increased but ceasing to increase when the member would have attained age 50. The allowance is payable to the surviving spouse until death at which time the allowance is continued to any unmarried child(ren) under age 22. There is a guarantee that the total amount paid will at least equal the basic death benefit.

If the member's death is the result of an accident or injury caused by external violence or physical force incurred in the performance of the member's duty, and there are *eligible* surviving child(ren) (*eligible* means unmarried child(ren) under age 22) in addition to an eligible spouse, then an **additional monthly allowance** is paid equal to the following:

- if 1 eligible child: 12.5 percent of final compensation
- if 2 eligible children: 20.0 percent of final compensation
- if 3 or more eligible children: 25.0 percent of final compensation

Alternate Death Benefit for Local Fire Members

This is an optional benefit available only to local fire members.

Eligibility

An employee's *eligible survivor(s)* may receive the alternate death benefit in lieu of the basic death benefit or the 1957 Survivor benefit if the member dies while actively employed and has at least 20 years of total CalPERS service. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. An *eligible survivor* means the surviving spouse to whom the member was married prior to the onset of the injury or illness that resulted in death. If there is no eligible spouse, an eligible survivor means the member's unmarried child(ren) under age 18.

Benefit

The Alternate Death benefit is a monthly allowance equal to the service retirement benefit that the member would have received had the member retired on the date of his or her death and elected Optional Settlement 2. (A retiree who elects Optional Settlement 2 receives an allowance that has been reduced so that it will continue to be paid after his or her death to a surviving beneficiary.) If the member has not yet attained age 50, the benefit is equal to that which would be payable if the member had retired at age 50, based on service credited at the time of death. The allowance is payable as long as the surviving spouse lives, at which time it is continued to any unmarried child(ren) under age 18, if applicable. The total amount paid will be at least equal to the basic death benefit.

Cost-of-Living Adjustments (COLA)

Standard Benefit

Retirement and survivor allowances are adjusted each year in May for cost of living, beginning the second calendar year after the year of retirement. The standard cost-of-living adjustment (COLA) is 2 percent. Annual adjustments are calculated by first determining the lesser of 1) 2 percent compounded from the end of the year of retirement or 2) actual rate of inflation. The resulting increase is divided by the total increase provided in prior years. For any given year, the COLA adjustment may be less than 2 percent (when the rate of inflation is low), may be greater than the rate of inflation (when the rate of inflation is low after several years of high inflation) or may even be greater than 2 percent (when inflation is high after several years of low inflation).

Improved Benefit

Employers have the option of providing a COLA of 3 percent, 4 percent, or 5 percent, determined in the same manner as described above for the standard 2 percent COLA. An improved COLA is not available with the 1.5% at 65 formula.

Purchasing Power Protection Allowance (PPPA)

Retirement and survivor allowances are protected against inflation by PPPA. PPPA benefits are cost-of-living adjustments that are intended to maintain an individual's allowance at 80 percent of the initial allowance at retirement adjusted for inflation since retirement. The PPPA benefit will be coordinated with other cost-of-living adjustments provided under the plan.

Employee Contributions

Each employee contributes toward his or her retirement based upon the retirement formula. The standard employee contribution is as described below.

- The percent contributed below the monthly compensation breakpoint is 0 percent.
- The monthly compensation breakpoint is $0 for full and supplemental formula members and $133.33 for employees covered by the modified formula.
- The percent contributed above the monthly compensation breakpoint depends upon the benefit formula, as shown in the table below.

Benefit Formula	Percent Contributed above the Breakpoint
Miscellaneous, 1.5% at 65	2%
Miscellaneous, 2% at 60	7%
Miscellaneous, 2% at 55	7%
Miscellaneous, 2.5% at 55	8%
Miscellaneous, 2.7% at 55	8%
Miscellaneous, 3% at 60	8%
Miscellaneous, 2% at 62	50% of the Total Normal Cost
Miscellaneous, 1.5% at 65	50% of the Total Normal Cost
Safety, 1/2 at 55	Varies by entry age
Safety, 2% at 55	7%
Safety, 2% at 50	9%
Safety, 3% at 55	9%
Safety, 3% at 50	9%
Safety, 2% at 57	50% of the Total Normal Cost
Safety, 2.5% at 57	50% of the Total Normal Cost
Safety, 2.7% at 57	50% of the Total Normal Cost

The employer may choose to "pick-up" these contributions for classic members (Employer Paid Member Contributions or EPMC). EPMC is prohibited for new PEPRA members.

An employer may also include Employee Cost Sharing in the contract, where employees agree to share the cost of the employer contribution. These contributions are paid in addition to the member contribution.

Auxiliary organizations of the CSU system may elect reduced contribution rates, in which case the offset is $317 and the contribution rate is 6 percent if members are not covered by Social Security. If members are covered by Social Security, the offset is $513 and the contribution rate is 5 percent.

Refund of Employee Contributions

If the member's service with the employer ends, and if the member does not satisfy the eligibility conditions for any of the retirement benefits above, the member may elect to receive a refund of his or her employee contributions, which are credited with 6 percent interest compounded annually.

1959 Survivor Benefit

This is a pre-retirement death benefit available only to members not covered by Social Security. Any agency joining CalPERS subsequent to 1993 is required to provide this benefit if the members are not covered by Social Security. The benefit is optional for agencies joining CalPERS prior to 1994. Levels 1, 2 and 3 are now closed. Any new agency or any agency wishing to add this benefit or increase the current level may only choose the 4th or Indexed Level.

This benefit is not included in the results presented in this valuation. More information on this benefit is available on the CalPERS website at www.calpers.ca.gov.

Appendix C

Participant Data

- **Summary of Valuation Data**
- **Active Members**
- **Transferred and Terminated Members**
- **Retired Members and Beneficiaries**

Summary of Valuation Data

		June 30, 2016		June 30, 2017
1. **Active Members**				
a) Counts		1,212		1,243
b) Average Attained Age		40.39		40.17
c) Average Entry Age to Rate Plan		27.58		27.70
d) Average Years of Service		12.81		12.47
e) Average Annual Covered Pay	$	101,283	$	103,513
f) Annual Covered Payroll		122,755,262		128,667,126
g) Projected Annual Payroll for Contribution Year		134,137,989		140,086,777
h) Present Value of Future Payroll		1,192,889,744		1,268,279,091
2. **Transferred Members**				
a) Counts		271		284
b) Average Attained Age		41.86		42.18
c) Average Years of Service		4.37		4.80
d) Average Annual Covered Pay	$	98,759	$	103,086
3. **Terminated Members**				
a) Counts		134		154
b) Average Attained Age		42.23		42.14
c) Average Years of Service		4.09		4.29
d) Average Annual Covered Pay	$	64,919	$	65,985
4. **Retired Members and Beneficiaries**				
a) Counts		1,160		1,206
b) Average Attained Age		65.37		65.72
c) Average Annual Benefits	$	65,741	$	66,634
5. **Active to Retired Ratio** [(1a) / (4a)]		1.04		1.03

Counts of members included in the valuation are counts of the records processed by the valuation. Multiple records may exist for those who have service in more than one valuation group. This does not result in double counting of liabilities.

Average Annual Benefits represents benefit amounts payable by this plan only. Some members may have service with another agency and would therefore have a larger total benefit than would be included as part of the average shown here.

Active Members

Counts of members included in the valuation are counts of the records processed by the valuation. Multiple records may exist for those who have service in more than one valuation group. This does not result in double counting of liabilities.

Distribution of Active Members by Age and Service

	Years of Service at Valuation Date						
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Total**
15-24	43	0	0	0	0	0	43
25-29	144	4	0	0	0	0	148
30-34	91	46	27	0	0	0	164
35-39	32	41	159	32	0	0	264
40-44	6	9	88	95	22	0	220
45-49	5	5	53	72	97	19	251
50-54	1	2	11	17	36	42	109
55-59	1	0	2	3	10	17	33
60-64	1	0	1	1	1	4	8
65 and over	3	0	0	0	0	0	3
All Ages	**327**	**107**	**341**	**220**	**166**	**82**	**1,243**

Distribution of Average Annual Salaries by Age and Service

	Years of Service at Valuation Date						
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Average**
15-24	$66,716	$0	$0	$0	$0	$0	$66,716
25-29	74,903	104,912	0	0	0	0	75,714
30-34	80,098	96,817	101,515	0	0	0	88,314
35-39	82,569	104,810	106,677	107,147	0	0	103,522
40-44	85,702	106,079	109,893	117,331	115,571	0	112,857
45-49	55,119	108,315	111,723	115,632	123,310	120,683	116,805
50-54	236,922	110,334	107,559	114,244	128,260	129,969	125,311
55-59	60,367	0	103,802	113,412	117,608	136,319	124,295
60-64	8,736	0	88,811	106,063	109,723	137,153	107,743
65 and over	3,370	0	0	0	0	0	3,370
All Ages	**$75,511**	**$101,751**	**$107,842**	**$114,950**	**$122,933**	**$129,484**	**$103,513**

Transferred and Terminated Members

Distribution of Transfers to Other CalPERS Plans by Age, Service, and average Salary

	Years of Service at Valuation Date							
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Total**	**Average Salary**
15-24	2	0	0	0	0	0	2	$55,744
25-29	14	0	0	0	0	0	14	71,319
30-34	36	9	0	0	0	0	45	87,910
35-39	40	3	12	0	0	0	55	100,300
40-44	39	10	5	1	2	0	57	107,123
45-49	28	19	11	5	5	0	68	113,658
50-54	20	6	2	1	0	0	29	112,106
55-59	8	0	1	1	0	1	11	119,274
60-64	2	0	1	0	0	0	3	98,715
65 and over	0	0	0	0	0	0	0	0
All Ages	**189**	**47**	**32**	**8**	**7**	**1**	**284**	**103,086**

Distribution of Terminated Participants with Funds on Deposit by Age, Service, and average Salary

	Years of Service at Valuation Date							
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Total**	**Average Salary**
15-24	2	0	0	0	0	0	2	$57,311
25-29	9	0	0	0	0	0	9	61,421
30-34	19	0	1	0	0	0	20	57,404
35-39	19	4	2	1	0	0	26	68,197
40-44	30	6	3	1	0	0	40	68,804
45-49	15	7	5	2	7	0	36	73,599
50-54	11	0	1	0	0	0	12	58,937
55-59	4	0	0	0	0	0	4	39,541
60-64	4	1	0	0	0	0	5	61,177
65 and over	0	0	0	0	0	0	0	0
All Ages	**113**	**18**	**12**	**4**	**7**	**0**	**154**	**65,985**

Retired Members and Beneficiaries

Distribution of Retirees and Beneficiaries by Age and Retirement Type*

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 30	0	0	0	0	0	1	1
30-34	0	0	0	0	0	0	0
35-39	0	0	10	0	0	1	11
40-44	0	0	9	0	0	0	9
45-49	0	1	24	0	1	1	27
50-54	93	0	38	0	2	1	134
55-59	128	1	46	0	0	3	178
60-64	158	1	32	1	1	13	206
65-69	145	1	35	0	1	25	207
70-74	134	0	51	0	1	20	206
75-79	95	0	28	0	0	23	146
80-84	42	0	10	0	0	12	64
85 and Over	11	0	1	0	0	5	17
All Ages	**806**	**4**	**284**	**1**	**6**	**105**	**1,206**

Distribution of Average Annual Disbursements to Retirees and Beneficiaries by Age and Retirement Type*

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Average
Under 30	$0	$0	$0	$0	$0	$17,604	$17,604
30-34	0	0	0	0	0	0	0
35-39	0	0	36,280	0	0	12,419	34,111
40-44	0	0	43,166	0	0	0	43,166
45-49	0	13,371	41,096	0	62,715	12,647	39,816
50-54	69,327	0	47,110	0	44,948	41,170	62,453
55-59	85,124	4,480	51,865	0	0	75,776	75,919
60-64	76,512	1,344	60,744	13,530	65,939	38,845	70,964
65-69	78,467	26,975	54,438	0	42,919	54,388	71,076
70-74	67,511	0	62,483	0	35,049	48,663	64,279
75-79	67,128	0	52,738	0	0	52,875	62,123
80-84	67,007	0	61,897	0	0	49,017	62,836
85 and Over	62,509	0	49,232	0	0	44,245	56,357
All Ages	**$74,114**	**$11,543**	**$53,148**	**$13,530**	**$49,420**	**$49,283**	**$66,634**

Retired Members and Beneficiaries (continued)

Distribution of Retirees and Beneficiaries by Years Retired and Retirement Type*

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 5 Yrs	188	0	51	0	0	32	271
5-9	166	2	32	1	0	40	241
10-14	192	0	50	0	1	19	262
15-19	103	1	57	0	2	7	170
20-24	121	0	68	0	0	5	194
25-29	35	1	23	0	2	2	63
30 and Over	1	0	3	0	1	0	5
All Years	**806**	**4**	**284**	**1**	**6**	**105**	**1,206**

Distribution of Average Annual Disbursements to Retirees and Beneficiaries by Years Retired and Retirement Type*

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Average
Under 5 Yrs	$76,138	$0	$56,164	$0	$0	$49,909	$69,282
5-9	83,365	7,358	62,839	13,530	0	49,042	74,022
10-14	77,721	0	61,731	0	62,715	53,013	72,820
15-19	67,034	26,975	49,546	0	46,725	50,159	60,001
20-24	60,830	0	48,853	0	0	42,373	56,156
25-29	68,186	4,480	39,855	0	37,207	22,848	54,409
30 and Over	9,111	0	23,187	0	65,939	0	28,922
All Years	**$74,114**	**$11,543**	**$53,148**	**$13,530**	**$49,420**	**$49,283**	**$66,634**

* Counts of members do not include alternate payees receiving benefits while the member is still working. Therefore, the total counts may not match information on C-1 of the report. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Appendix D

Normal Cost Information by Group

- **Normal Cost by Benefit Group**
- **PEPRA Member Contribution Rates**

Normal Cost by Benefit Group

The table below displays the Total Normal Cost broken out by benefit group for Fiscal Year 2019-20. The Total Normal Cost is the annual cost of service accrual for the fiscal year for active employees and can be viewed as the long-term contribution rate for the benefits contracted. Generally, the normal cost for a benefit group subject to more generous benefit provisions will exceed the normal cost for a group with less generous benefits. However, based on the characteristics of the members (particularly when the number of actives is small), this may not be the case. Future measurements of the Total Normal Cost for each group may differ significantly from the current values due to such factors as: changes in the demographics of the group, changes in economic and demographic assumptions, changes in plan benefits or applicable law.

Rate Plan Identifier	Benefit Group Name	Total Normal Cost FY 2019-20	Number of Actives	Payroll on 6/30/2017
1210	Safety Police Second Tier	31.684%	488	50,120,601
25568	Safety Fire PEPRA	24.177%	97	7,889,334
25569	Safety Police PEPRA	25.165%	181	12,652,052
30590	Safety Police First Tier	30.422%	10	1,399,377
30592	Safety Fire Third Tier	27.851%	455	54,963,184
30593	Safety Fire First Tier	23.908%	12	1,642,579

Note that if a Benefit Group above has multiple bargaining units, each of which has separately contracted for different benefits such as Employer Paid Member Contributions, then the Normal Cost split does not reflect those differences. Additionally, if a 2nd Tier Benefit Group amended to the same benefit formula as a 1st Tier Benefit Group their Normal Costs may be dissimilar due to demographic or other population differences. In these situations you should consult with your plan actuary.

PEPRA Member Contribution Rates

The table below shows the determination of the PEPRA Member contribution rates based on 50 percent of the Total Normal Cost for each respective plan on June 30, 2017. Assembly Bill (AB) 340 created PEPRA that implemented new benefit formulas and a final compensation period as well as new contribution requirements for new employees. In accordance with Section Code 7522.30(b), "new members … shall have an initial contribution rate of at least 50 percent of the normal cost rate." The normal cost for the plan is dependent on the benefit levels, actuarial assumptions and demographics of the plan particularly the entry age into the plan. Should the total normal cost of the plan change by one percent or more from the base total normal cost established for the plan, the new member rate shall be 50 percent of the new normal cost rounded to the nearest quarter percent.

		Basis for Current Rate		Rates Effective July 1, 2019			
Rate Plan Identifier	**Benefit Group Name**	**Total Normal Cost**	**Member Rate**	**Total Normal Cost**	**Change**	**Change Needed**	**Member Rate**
25569	Safety Police PEPRA	22.817%	11.500%	24.082%	1.265%	Yes	12.000%
25568	Safety Fire PEPRA	22.817%	11.500%	24.082%	1.265%	Yes	12.000%

The PEPRA employee contribution rate determined in the table above may not necessarily be 50 percent of the Total Normal Cost by Group based on the PEPRA Normal Cost calculation methodology. Each non-pooled plan is stable with a sufficiently large demographic representation of active employees. It is preferable to determine normal cost using a large active population ongoing so that this rate remains relatively stable. The total PEPRA normal cost will be calculated using all active members within a non-pooled plan until the number of members covered under the PEPRA formula meets either:

1. 50 percent of the active population, or
2. 25 percent of the active population and 100 or more PEPRA members

Once either of the conditions above is met for a non-pooled plan, the total PEPRA normal cost will be based on the active PEPRA population in the plan.

Accordingly, the total normal cost will be funded equally between employer and employee based on the demographics of the employees of that employer.

Appendix E

Glossary of Actuarial Terms

Glossary of Actuarial Terms

Accrued Liability *(also called Actuarial Accrued Liability or Entry Age Normal Accrued Liability)*
The total dollars needed as of the valuation date to fund all benefits earned in the past for *current* members.

Actuarial Assumptions
Assumptions made about certain events that will affect pension costs. Assumptions generally can be broken down into two categories: demographic and economic. Demographic assumptions include such things as mortality, disability and retirement rates. Economic assumptions include discount rate, salary growth and inflation.

Actuarial Methods
Procedures employed by actuaries to achieve certain funding goals of a pension plan. Actuarial methods include funding method, setting the length of time to fund the Accrued Liability and determining the Value of Assets.

Actuarial Valuation
The determination, as of a valuation date of the Normal Cost, Accrued liability, and related actuarial present values for a pension plan. These valuations are performed annually or when an employer is contemplating a change to their plan provisions.

Amortization Bases
Separate payment schedules for different portions of the Unfunded Liability. The total Unfunded Liability of a Risk Pool or non-pooled plan can be segregated by "cause," creating "bases" and each such base will be separately amortized and paid for over a specific period of time. However, all bases are amortized using investment and payroll assumptions from the current valuation. This can be likened to a home having a first mortgage of 24 years remaining payments and a second mortgage that has 10 years remaining payments. Each base or each mortgage note has its own terms (payment period, principal, etc.)

Generally, in an actuarial valuation, the separate bases consist of changes in unfunded liability due to contract amendments, actuarial assumption changes, actuarial methodology changes, and/or gains and losses. Payment periods are determined by Board policy and vary based on the cause of the change.

Amortization Period
The number of years required to pay off an Amortization Base.

Classic Member (under PEPRA)
A classic member is a member who joined CalPERS prior to January 1, 2013 and who is not defined as a new member under PEPRA. (See definition of new member below)

Discount Rate Assumption
The actuarial assumption that was called "investment return" in earlier CalPERS reports or "actuarial interest rate" in Section 20014 of the California Public Employees' Retirement Law (PERL).

Entry Age
The earliest age at which a plan member begins to accrue benefits under a defined benefit pension plan. In most cases, this is the age of the member on their date of hire.

Entry Age Normal Cost Method
An actuarial cost method designed to fund a member's total plan benefit over the course of his or her career. This method is designed to yield a rate expressed as a level percentage of payroll.
(The assumed retirement age less the entry age is the amount of time required to fund a member's total benefit. Generally, the older a member on the date of hire, the greater the entry age normal cost. This is mainly because there is less time to earn investment income to fund the future benefits.)

Fresh Start

A Fresh Start is when multiple amortization bases are collapsed to one base and amortized together over a new funding period.

Funded Status

A measure of how well funded, or how "on track" a plan or risk pool is with respect to assets versus accrued liabilities. A ratio greater than 100 percent means the plan or risk pool has more assets than liabilities and a ratio less than 100 percent means liabilities are greater than assets.

GASB 68

Statement No. 68 of the Governmental Accounting Standards Board. The accounting standard governing a state or local governmental employer's accounting and financial reporting for pensions. GASB 68 replaces GASB 27 effective the first fiscal year beginning after June 15, 2014.

New Member (under PEPRA)

A new member includes an individual who becomes a member of a public retirement system for the first time on or after January 1, 2013, and who was not a member of another public retirement system prior to that date, and who is not subject to reciprocity with another public retirement system.

Normal Cost

The annual cost of service accrual for the upcoming fiscal year for active employees. The normal cost should be viewed as the long-term contribution rate.

Pension Actuary

A business professional that is authorized by the Society of Actuaries, and the American Academy of Actuaries to perform the calculations necessary to properly fund a pension plan.

PEPRA

The California Public Employees' Pension Reform Act of 2013

Prepayment Contribution

A payment made by the employer to reduce or eliminate the year's required employer contribution towards the UAL.

Present Value of Benefits (PVB)

The total dollars needed as of the valuation date to fund all benefits earned in the past or expected to be earned in the future for *current* members.

Unfunded Accrued Liability (UAL)

When a plan or pool's Value of Assets is less than its Accrued Liability, the difference is the plan or pool's Unfunded Accrued Liability (or unfunded liability). If the unfunded liability is positive, the plan or pool will have to pay contributions exceeding the Normal Cost.

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CONTINUING DISCLOSURE (SUBMISSION STATUS: PUBLISHED)

FINANCIAL/OPERATING FILING (CUSIP-9 BASED)

Rule 15c2-12 Disclosure

Annual Financial Information and Operating Data: Supplement to Annual Continuing Disclosure Reports - Fiscal Years 2015/16, 2016/17, & 2017/18, for the year ended 06/30/2018

Documents

Financial Operating Filing

FY16-18 - Supplement to Annual Continuing Disclosure Report - 2015 Lease Revenue (G1C) Taxable .pdf posted 04/26/2019

The following issuers are associated with this continuing disclosure submission:

CUSIP-6	State	Issuer Name
78605Q	CA	SACRAMENTO CALIF PUB FING AUTH LEASE REV

The following 6 securities have been published with this continuing disclosure submission:

CUSIP-9	Maturity Date
78605QAD9	04/01/2019
78605QAE7	04/01/2020
78605QAF4	04/01/2021
78605QAG2	04/01/2022
78605QAH0	04/01/2023

78605QAJ6	04/01/2050

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