SUBMITTAL TO THE BOARD OF SUPERVISORS
COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

ITEM: 3.3
(ID # 14460)
MEETING DATE:
Tuesday, February 09, 2021

FROM : EXECUTIVE OFFICE:

SUBJECT: EXECUTIVE OFFICE: 2021 Pension Advisory Review Committee (PARC) Annual Report, All Districts. [$0]

RECOMMENDED MOTION: That the Board of Supervisors:

1. Receive and file the 2021 PARC Annual Report.

2. Direct staff and PARC to report back with any additional updates or recommendations on the County's pension plans, Other Post-Employment Benefits (OPEB), any other item as noted in Board Policy B-25 including pension debt reduction strategies, and, any legislative changes that could be incorporated in the County's Legislative Platform.

3. Direct staff to review the annual CalPERS unfunded liability pre-payment for FY21/22 and to have such recommendations presented in conjunction with either the approval of the annual Tax and Revenue Anticipation Notes (TRANs) cash flow financing, or, with the FY 21/22 budget.

ACTION:Policy

Don R. Kent, Assistant CEO-County Finance Officer 2/2/2021

MINUTES OF THE BOARD OF SUPERVISORS

On motion of Supervisor Jeffries, seconded by Supervisor Hewitt and duly carried by unanimous vote, IT WAS ORDERED that the above matter is approved as recommended.

Ayes: Jeffries, Spiegel, Washington, Perez, and Hewitt
Nays: None
Absent: None
Date: February 9, 2021
xc: E.O.

Kecia R. Harper
Clerk of the Board
By: ______
Deputy

SUBMITTAL TO THE BOARD OF SUPERVISORS COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

FINANCIAL DATA	Current Fiscal Year:	Next Fiscal Year:	Total Cost:	Ongoing Cost
COST	$0	$0	$0	$0
NET COUNTY COST	$0	$0	$0	$0
SOURCE OF FUNDS: N/A			Budget Adjustment No	
			For Fiscal Year: 20/21	

C.E.O. RECOMMENDATION: Approve

BACKGROUND:

Summary

Established in 2003 to guide policy decisions about the County's defined benefit pension plans and make recommendations to the Board, PARC is a Brown Act committee which consists of the Assistant County Executive Officer/County Finance Officer (Chair), Treasurer-Tax Collector, Assistant County Executive Officer/Human Resources Director, County Auditor-Controller, and, a local safety member department representative.

Board Policy B-25, Pension Management and Other Post-Employment Benefits (OPEB), requires PARC to file an annual report informing the Board of Supervisors and general public about the status of the County's defined benefit pension plans with CalPERS, OPEB, the Temporary and Part-Time Employees' Retirement Plan, the County's Section 115 Pension Trust, and other key items as noted in the Executive Summary of the report. In addition, PARC reviews the annual CalPERS unfunded liability pre-payment for which the County receives a discount if it pays a lump sum at the beginning of the fiscal year.

A key responsibility of PARC is to report to the Board and the public on important developments, analyze any proposed changes to benefits, and provide information about funded status and projected cost increases. This report includes information from the most recent actuarial reports prepared for the County by Bartel Associates, LLC, CalPERS' Annual Valuation Reports for both the Miscellaneous and Safety Plans, and AON Actuarial Valuation Reports for OPEB, and, the Part-Time and Temporary Employees' Retirement Plan.

A few highlights of the report are summarized below.

Budgetary Impact - The total year-over-year rate increase for FY 21/22 (including CalPERS, pension obligation bonds (POBs) debt service and OPEB) as a percentage of payroll for the Miscellaneous Plan is approximately 2.2%, while the Safety Plan increase is 1.62%. These increases have a direct impact on the budgets of County departments.

Funded Status of the County's Miscellaneous and Safety Plans - For the annual valuation report period ended June 30, 2019, the total actuarial accrued liability (AAL) was $12.4 billion (an increase of $618 million), the market value of assets (MVA) was $8.8 billion (an increase of $510 million), and, the unfunded actuarial accrued liability (UAAL) was $3.6 billion (an increase of $108 million). CalPERS' annual rate of return was 6.7%.

The June 30, 2021 projected net funded ratio of both Plans combined, including the Series 2020 POBs deposit of proceeds with CalPERS, and outstanding amounts owed on the POBs is 71% (an increase of 1.2% from prior year).

Examining the direct impact of the Series 2020 POB proceeds of $716 million invested with CalPERS in May 2020 (not including POB debt service), for the period 6/30/19 - 6/30/20, shows the Miscellaneous Plan increased from 71% to 75% while the Safety Plan increased from 71% to 79%. This action taken by the Board accelerated the projected funded status by one and eight years respectively for the Plans compared to last years' report. As a result, the County is moving closer to the 80% minimum funding level as specified in Board Policy B-25, section II, E.

Employer Contribution Rate Outlook - The FY 21/22 employer contribution rate as a percent of pay, including POBs debt service, for the Miscellaneous Plan is 27.6% (an increase of 1.3% from prior year) and the Safety Plan is 46.2% (an increase of 2.8%).

OPEB - As of June 30, 2020, the OPEB Trust with CERBT had a balance of $53 million (an increase of $8 million over the prior year), and an annual net rate of return of 5.48%. The annualized net rate of return since inception in 2007 is 6.31%. The UAAL is $87 million (an increase of $29 million over the prior year), which represents a funded ratio of 38% (a decrease of 5.6% from 43.6% prior year), excluding implicit subsidy. A major distinction from the CalPERS defined benefit pension plans is that no interest is charged on the OPEB UAAL.

Plan liabilities and annual costs are considerably higher than the prior valuation, primarily due to a change to provide the SEIU bargaining group access to CalPERS health plans, which have higher costs and participation rates that results in an increase in liability.

In keeping with Board Policy, County staff requested a review from AON of a multi-year plan to achieve an 80% funded status for the retiree benefit portion of the OPEB liability. The current actuarial schedule projects the Board Policy's 80% minimum funding level, excluding implicit subsidy, would be reached in 2027 with $16.9 million to be charged to departments annually beginning in FY 21/22, (an increase of $7.9 million from the current $9 million required in FY 20/21). As a percentage of payroll, the $16.9 million represents approximately 1.1% (an increase of 0.47% from the 0.63% charged in FY 20/21).

Investment Strategy - In consideration of the longer-term investment horizon of the OPEB Trust, and to mitigate some of the pending rate increases due to more employees coming into the CalPERS health plans, PARC has reviewed and approved at its January 13, 2021 meeting the recommended change from CERBT's Strategy 2 (assumed return 6.15%) to Strategy 1 (assumed return 7.30%). The difference between the two strategies is the mix of allocations amongst the various asset classes that makeup the portfolios (equity, fixed income, real estate, commodities, and cash). The funds will be dollar-cost averaged over an extended period in an effort to reduce market risk.

Temporary and Part-Time Employees' Retirement Plan (TAP) - On July 1, 2020 the total AAL was $58.5 million (an increase of $2.9 million from prior year). As of June 30, 2020, the Plan had a balance of $45.4 million (an increase of $1.9 million from the prior year), an annual rate of return of 3.72%, and, an annualized rate of return since inception in 2010 of 6.02%. The UAAL is $13 million (an increase of $53,000 over the prior year), which represents a funded status of 77.7% (an increase of 1.1% from prior year). A major distinction from the CalPERS defined benefit pension plans is that no interest is charged on the TAP Plan UAAL.

AON projects a 79.8% funded status by June 30, 2021 (with only a $93,000 shortfall from the 80% level). The rate as a percentage of payroll will be going from 4.02% in FY 20/21 to 5.58% in FY 21/22 (an increase of 1.56%). Staff will continue to target the 80% level with next year's annual valuation report and provide an update at that time.

Annual Pre-Payment - For FY 21/22, CalPERS will offer an early payment discount of 3.3% on the unfunded liability portion (required payment is $195 million) in lieu of the periodic payments that coincide with payroll disbursements, thereby reducing the total amount by over $6.4 million. PARC first recommended seizing this opportunity in 2004 and expects to continue to do so if market conditions for our annual Tax and Revenue Anticipation Note borrowing in June prove to be favorable in funding the pre-payment.

Section 115 Pension Trust - As of June 30, 2020, the balance in the 2016 Trust account was $29.9 million, (an increase of $1.2 million from prior year) with an annual net rate of return of 4.27%. The annualized net rate of return since November 2016 inception is 5.98%. Over time this will become more significant as assets accumulate in the account and cannot be used for any other purposes except for making additional discretionary payments directly to CalPERS to pay down a portion of the unfunded liability, or for reimbursing the County for CalPERS contributions.

Within five years there will be in excess of $100 million in contributions made to the 2016 and 2020 Trust accounts combined, and within ten years, in excess of $175 million. The balances and rate of return for the second account established to capture the Series 2020 POBs savings (the 2020 Section 115 Pension Trust), will be reported in the 2022 PARC Annual Report as a full fiscal year cycle will have occurred.

Impact on Citizens and Businesses:

Pension and related costs have budgetary impacts across all the departments, and, as a result, have impacts on the costs of services that are provided to citizens and residents of the County. Since PARC's inception, recommendations to the Board have resulted in a substantial amount of savings that likely would not have otherwise materialized.

Lisa O Brandl 2/2/2021

2021

Pension Advisory Review Committee

Annual Report

February 9, 2021

Table of Contents

Executive Summary

In accordance with Board Policy B-25, this annual report contains detailed information about the County's Miscellaneous and Safety defined benefit pension plans administered by CalPERS, with analysis prepared by its actuarial consultant, Bartel Associates, LLC (Attachment 1). It provides the funded status and projects increasing employer contribution rates that will continue to have an impact on the County's budget for the foreseeable future. Included are the most recent CalPERS Annual Valuation Reports as of June 30, 2019 (Attachments 2 & 3).

It also addresses other areas including: a status on the Series 2005 A and Series 2020 Pension Obligation Bonds (POBs), the Section 115 Pension Trust, the annual pre-payment program, Other Post-Employment Benefits (OPEB), which also projects increasing employer contribution rates having a budgetary impact (Attachment 4), and, the Part-Time and Temporary Employees' Retirement Plan (Attachment 5). In addition, this report provides some background information and funded status of the special district plans of the Riverside County Regional Park and Open-Space District, Riverside County Flood Control and Water Conservation District, and, the Riverside County Waste Resources Management District.

Budgetary Impact - **The total year-over-year rate increase for FY 21/22** (including CalPERS, POBs debt service and OPEB) **as a percentage of payroll for the Miscellaneous Plan is approximately 2.2%, while the Safety Plan increase is 1.62%.** These increases have a direct impact on the budgets of County departments.

County's Response - The County has taken several steps to address the management of its pension liabilities over the last two decades. In 2003 the Pension Advisory Review Committee (PARC) was formed to guide policy decisions regarding retirement benefits. In 2004 PARC first recommended taking advantage of CalPERS' early payment discount in lieu of periodic payments. In 2005 the County issued POBs reducing interest costs, increased its funding ratio and created the Liability Management Fund (LMF). During the last decade, a new, lower rate tier of pension benefits was negotiated (Tier II as shown in Table 4), employees began to pay their own member contributions, and, the first Section 115 Pension Trust account was established.

Most recently, in addressing the February 2020 Board of Supervisors agenda Item 3.15, Pension Debt Reduction Strategies, two actions have occurred since that time:

In April 2020, the Board of Supervisors authorized a second POB issuance of $720 million, reducing the all-in true interest cost to 3.53%, vs. the 7% that would have been paid to CalPERS on the unfunded liability portion. This results in payment reductions (savings) of nearly $231 million through 2038. To capture the savings through the eighteen-year life of the POBs, a dedicated Section 115 Pension Trust account was established.

On December 8, 2020, the Board of Supervisors approved agenda Item 3.1, amending and restating the agreement for services between the Western Riverside County Regional Conservation Authority (RCA) and the County of Riverside. Effective January 1, 2021, the Riverside County Transportation Commission began to provide the staffing and management agency role for RCA. As a result, a lump sum payment of $3.9 million was received from RCA as a pro-rata share of their unfunded pension liability obligation as well as any amounts owed for OPEB and the Replacement Benefit Plan. The payoff of $2.6 million for the unfunded liability portion was made to CalPERS on January 20, 2021.

AB 2967 - This past year there have not been any significant updates on the pension reform front beyond that of any CalPERS changes discussed herein and in previous reports. In September 2020, however, the Governor signed into law Assembly Bill 2967 which prevents cities and counties from excluding groups of employees from CalPERS defined benefit pension plans when they are offered for other groups, thereby effectively blocking the ability to offer a hybrid style or deferred compensation only plan.

Funded Status of the County's Miscellaneous and Safety Plans

For the annual valuation report period ended June 30, 2019:

Total actuarial accrued liability (AAL)	**$12.4 billion**	(+$618 M YoY) *
Total market value of assets (MVA)	**$8.8 billion**	(+$510 M YoY) *
Total unfunded actuarial accrued liability (UAAL)	**$3.6 billion**	(+$108 M YoY) *

*Year-over-Year increase in $ millions

The UAAL was comprised of:

Miscellaneous Plan	$2.5 billion	(+$83 M YoY) *
Safety Plan	$1.1 billion	(+$25 M YoY) *
Total	$3.6 billion	(+$108 M YoY) *

* Year-over-Year increase in $ millions

The increase in the UAAL was anticipated and is largely attributable to the planned reduction by CalPERS in the assumed rate of return from 7.25% to 7%. The initial impact of the rate reduction began in FY 19/20 (as reported in the CalPERS annual valuation reports for the period ended June 30, 2017) and will continue until full impact in FY 23/24. CalPERS' annual rate of return was 6.7%.

The June 30, 2021 projected net funded ratio of both Plans combined, including the Series 2020 POBs deposit of proceeds with CalPERS, and outstanding amounts owed on the POBs is 71% (an increase of 1.2% from prior year).

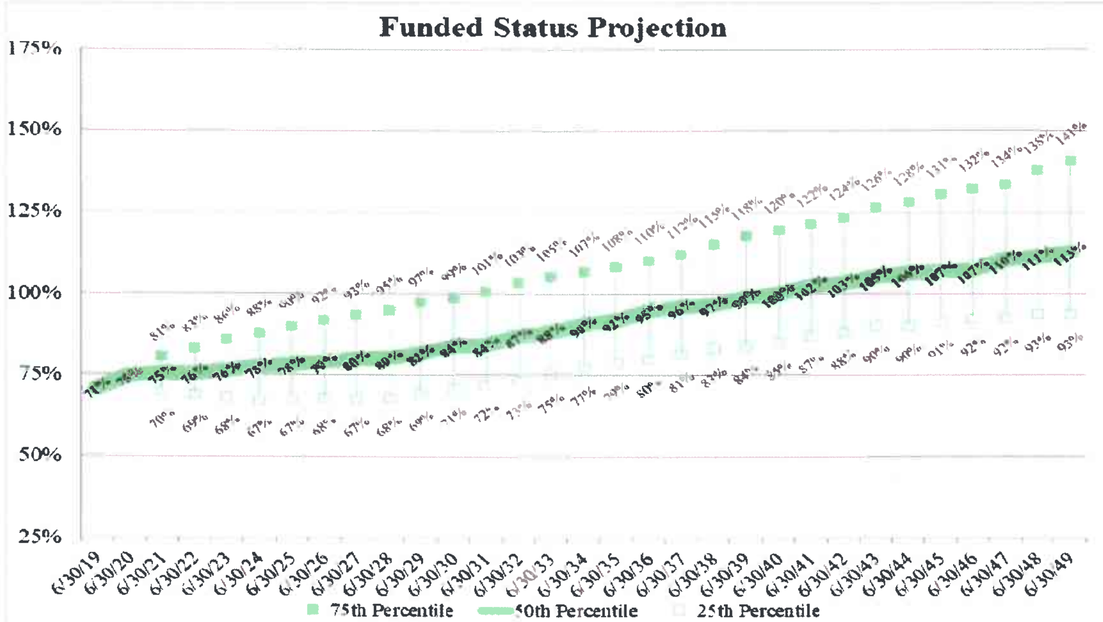
See slides 69-71 of the Bartel report (Attachment 1) regarding the AAL, MVA, UAAL and net funded ratios of the Miscellaneous, Safety and combined Plans.

Examining the direct impact of the Series 2020 POB proceeds of $716 million invested with CalPERS in May 2020 (not including POB debt service), for the period 6/30/19 - 6/30/20, shows the Miscellaneous Plan increased from 71% to 75% while the Safety Plan increased from 71% to 79%.** This action taken by the Board accelerated the projected funded status by one and eight years respectively for the Plans compared to last years' report.** As a result, the County is moving closer to the 80% minimum funding level as specified in Board Policy B-25, section II, E. **The Miscellaneous Plan is projected to be at an 80% funded status in 2027, while the Safety Plan is in 2021.** Actual results may vary depending upon various factors such as the investment performance of CalPERS and/or any new, additional actuarial assumption changes.

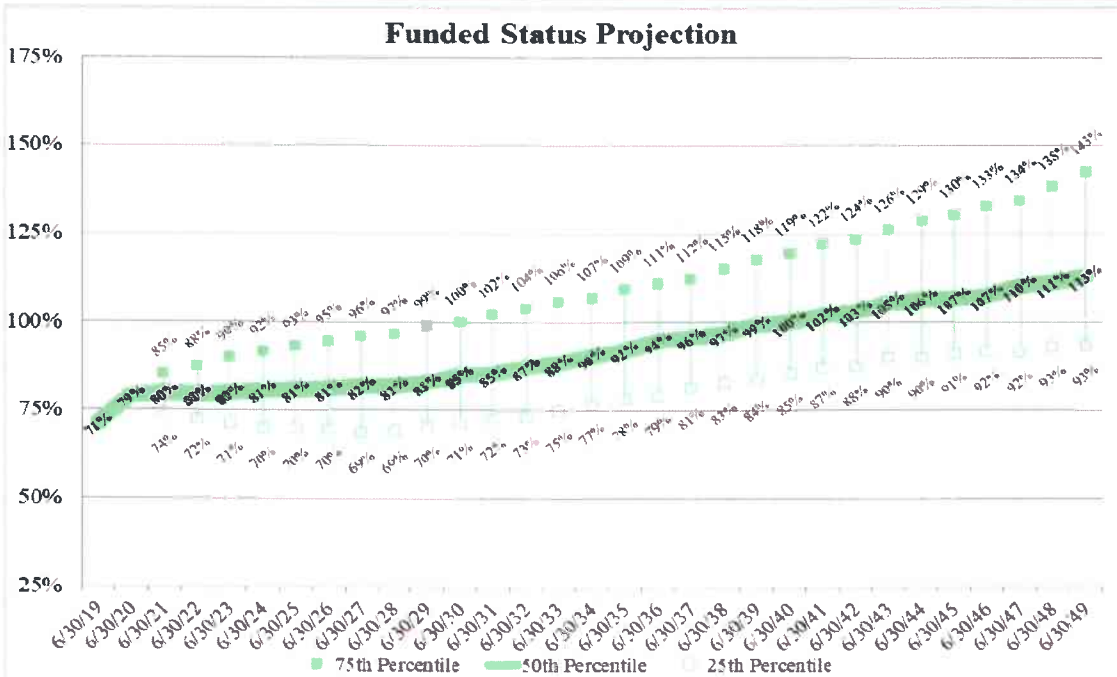
See slides 33 & 55 of the Bartel report below for the long-term projections.

** 50th percentile assumes CalPERS 7% rate of return.

Funded Status - Miscellaneous



Funded Status - Safety



Source: Slide 33 & 55 - Bartel Associates, LLC - CalPERS Actuarial Issues - 6/30/19 Report, December 23, 2020.
Note: POB debt service not included.

Employer Contribution Rate Outlook

The FY 21/22 employer contribution rate as a percent of pay for the Miscellaneous Plan is 27.6% (an increase of 1.3% from prior year), while Safety is 46.2% (an increase of 2.8% from prior year).

The year over year increases have a direct impact as an additional payroll expense to the budgets of County departments and is not projected to peak until the early 2030's. See Table 1 below and the longer-term projections that follow on the next two pages.

Table 1
Projected Employer Contribution Rates
(From Slides 29 and 51 of the Bartel Report)

	Miscellaneous Plan			Safety Plan		
FY	Rate[1]	Change from prior FY (+/-)	Difference from 2020 PARC Report	Rate[2]	Change from prior FY (+/-)	Difference from 2020 PARC Report
17/18	19.4%[3]	0.3%	N/A	30.3%[3]	1.5%	N/A
18/19	21.2%[3]	1.8%	N/A	33.7%[3]	3.4%	N/A
19/20	23.9%[3]	2.7%	N/A	39.7%[3]	6.0%	0.0%
20/21	26.3%[3,4]	2.4%	-0.6%	43.4%[3,4]	3.7%	-2.1%
21/22	27.6%[3]	1.3%	-0.7%	46.2%[3]	2.8%	-1.6%
22/23	29.0%	1.4%	-1.0%	48.5%	2.8%	-1.8%
23/24	30.1%	1.1%	-0.9%	50.2%	1.7%	-1.6%
24/25	30.3%	0.2%	-0.8%	51.3%	1.1%	-1.2%
25/26	30.1%	-0.2%	-0.5%	51.9%	0.6%	-0.6%
26/27	30.9%	0.8%	-0.1%	53.5%	1.6%	0.2%
27/28	31.4%	0.5%	-0.4%	54.4%	0.9%	-0.2%
28/29	31.8%	0.4%	-0.2%	54.9%	0.5%	0.0%
29/30	32.5%	0.7%	0.0%	56.3%	1.4%	0.2%
30/31	33.2%	0.7%	0.4%	57.5%	1.2%	1.1%
31/32	32.8%	-0.4%	N/A	57.4%	-0.1%	N/A

1. Includes Miscellaneous Plan POB debt service, which ranges from 4.5% to 5.1% of the total rate through FY 2023/24; 4.1% in FY 2024/25; 3% from FY 2025/26 through FY 2030/31 and gradually decreases to 0% in FY 2038/39.
2. Includes Safety Plan POB debt service which ranges from 9.5% to 11% of the total rate through FY 2023/24; 10.1% in FY 2024/25; 9% from FY 2025/26 through FY 2030/31 and gradually decreases to 0% in FY 2038/39.
3. Actual rates shown for FY 17/18 through FY 21/22.
4. For FY 20/21, as compared to the 2020 PARC Report, there was a 0.6% decrease in the actual rate for the Miscellaneous Plan, and, a 2.1% decrease in the Safety Plan as a result of the Series 2020 POBs proceeds being deposited with CalPERS in May 2020.

Table 2A and 2B charts below show the projected employer contribution rates with the three components that comprise the total amount, over the next decade. Table 3A and 3B that follow on page 7 illustrate the total rate over the next thirty years.

Table 2A – Miscellaneous Plan

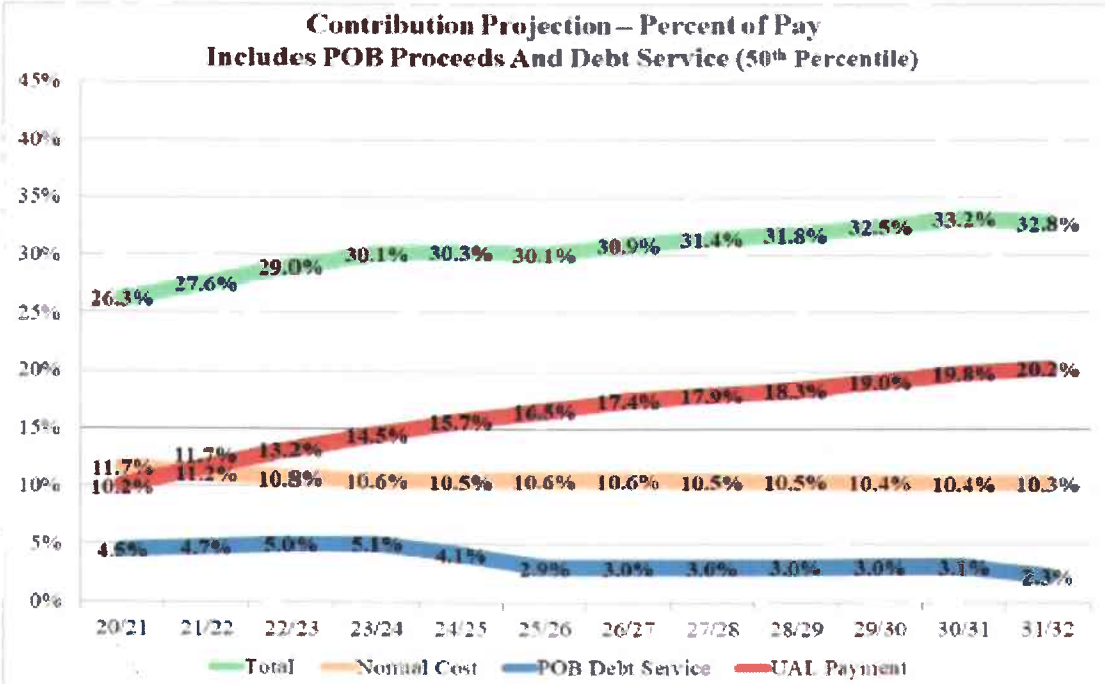
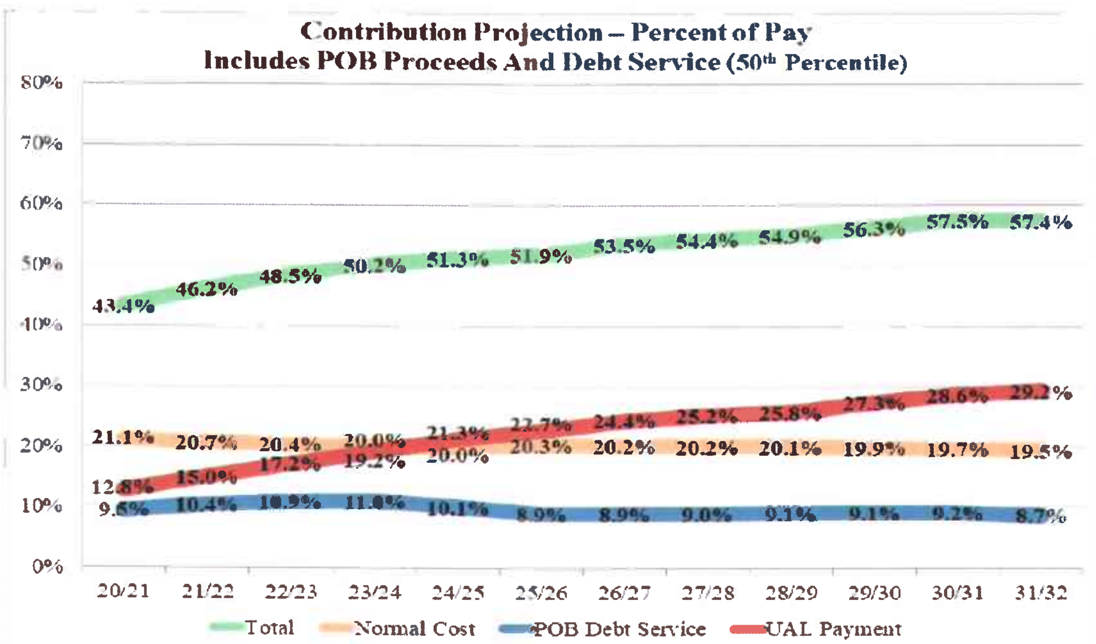


Table 2B – Safety Plan



Source: Slide 31 & 53 - Bartel Associates, LLC - CalPERS Actuarial Issues - 6/30/19 Report, December 23, 2020.
Note: Normal cost and POB debt service remains relatively flat and the UAL payment continues to move higher.

Table 3A - Miscellaneous Plan

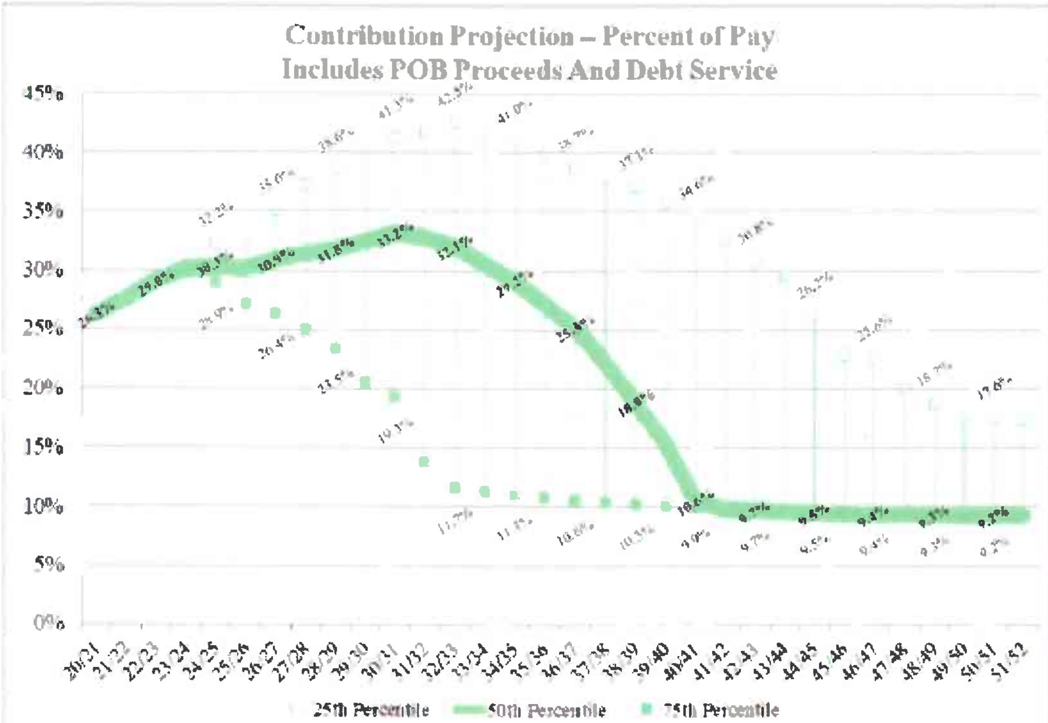
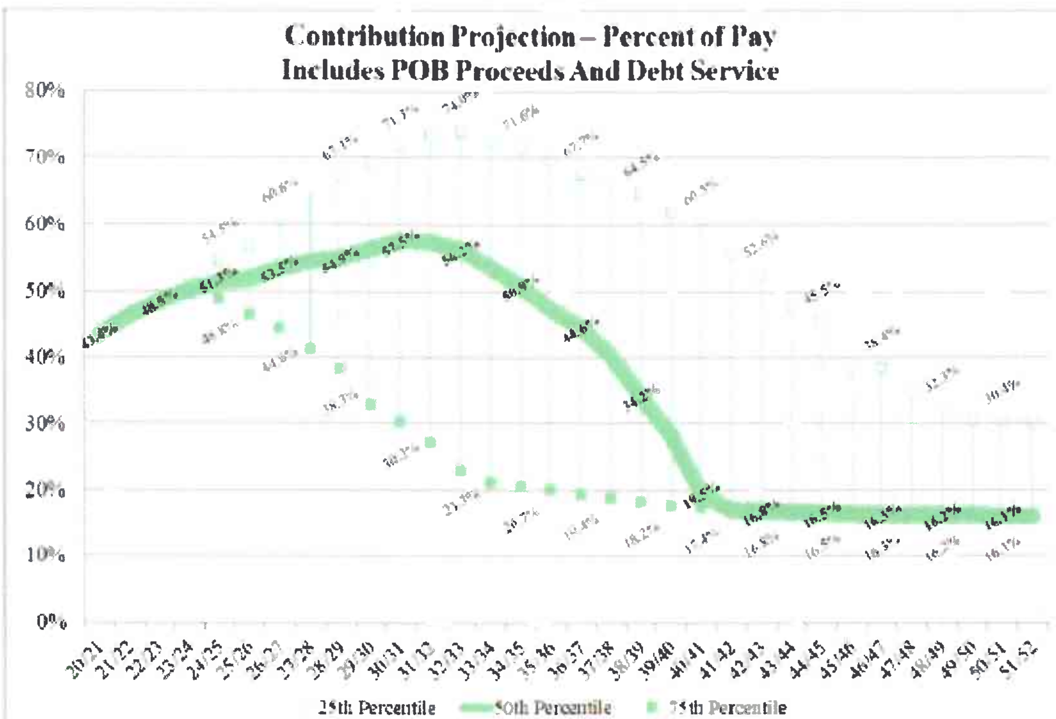


Table 3B - Safety Plan



Source: Slide 30 & 52 - Bartel Associates, LLC - CalPERS Actuarial Issues - 6/30/19 Report, December 23, 2020.

Rates are expected to increase as various CalPERS' actuarial assumption changes are absorbed and the impact on the discount rate is being phased in. Note, that even with very poor investment returns (represented in the 75th percentile on Tables 3A & 3B), the projected rates exhibit a long-term decline which begins in the early 2030's.

The fact that all scenarios show a decline is due to CalPERS' amortization policy to pay off the unfunded liability over a fixed period and reflects the increasing impact of the changes to the benefit formulas, as more of the employee population become subject to Tier III – Public Employees' Pension Reform Act (PEPRA).

Pension Reform

Pension reform had become a topic of concern almost immediately following the move to higher benefit formulas across California, including the County of Riverside. After internal discussion, the County took the lead in initiating pension reform with its bargaining units in advance of any action by the state. As a result of collective bargaining, employees agreed to pay their own member contributions eliminating the Employer Paid Member Contribution (EPMC). Additionally, Tier II was implemented with a lower benefit formula, which became effective on August 24, 2012.

The passage of Assembly Bill 340 on September 12, 2012 created the PEPRA, implementing a new lower retirement benefit formula (Tier III). Employee contribution rates for Tier III vary based on PEPRA rules. **The total number of actives in the Tier III Plans is approximately 38% (an increase of 3% from prior year) of the total number of employees and is expected to increase every year.** See Table 4 below.

Table 4

County of Riverside Pension Plan Tiers

County Plan		Retirement Formula	Employee Contribution	Earliest Retirement Age	Number of Actives	Payroll as of 06/30/2019	PEPRA Compensation Limits (1)	Final Compensation Period	Effective Date
Tier I	Miscellaneous	3% at 60	8%	50	9,409	$ 728,205,960	N/A	12 months	7/11/2002
	Safety	3% at 50	9%	50	2,300	$ 240,283,963	N/A	12 months	6/28/2001
Tier II	Miscellaneous	2% at 60	7%	50	674	$ 47,567,559	N/A	36 months	8/24/2012
	Safety	2% at 50	9%	50	128	$ 10,103,057	N/A	36 months	8/24/2012
Tier III - PEPRA	Miscellaneous	2% at 62	7.25%	52	6,941	$ 369,805,575	$128,059	36 months	1/1/2013
	Safety	2.7% at 57	12.50%	50	837	$ 54,345,862	$153,671	36 months	1/1/2013

[1] 2021 Compensation Limits are indexed annually

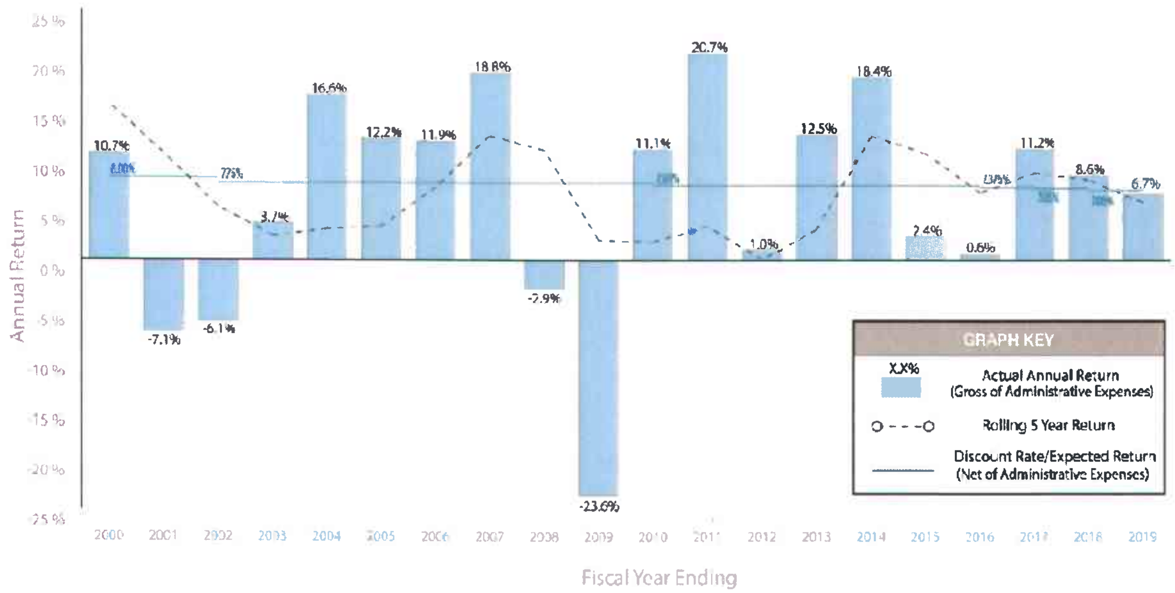
As mentioned in the Executive Summary, there has not been any significant updates on the pension *reform* front worthy of note at this point beyond the CalPERS changes discussed herein and in previous reports. **In September 2020, however, the Governor signed into law Assembly Bill 2967 which prevents cities and counties from excluding groups of employees from CalPERS defined benefit pension plans when they are offered for other groups, thereby effectively blocking the ability to offer a hybrid style or deferred compensation only plan.** Staff and PARC continue to monitor any developments in this area and will bring any items of significance that would lead to cost reduction to the Board of Supervisors attention on a timely basis.

Investment Returns

The primary driver of the rate formula is CalPERS' investment performance. Actuarial and demographic assumptions impact the rate, but far less than performance. Poor investment performance following the 2008-2009 financial crisis significantly increased the County's unfunded liability, driving up the required payments. Table 5 below illustrates the 20-year historical annual returns each fiscal year ending June 30.

Table 5

History of Investment Returns (2000 - 2019)



Source: CalPERS Annual Valuation Report as of June 30, 2019.

Pension Obligation Bonds (POBs)

Series 2005 A - **In February 2005, the County issued its Series 2005 A POBs in the principal amount of $400 million to lock in an all-in borrowing cost of 4.91%, refinancing its prior unfunded liability, which was then carrying a 7.5% rate (a spread of 2.59%).** At the same time, the County converted its repayment schedule from a rolling 30-year amortization to a fixed amortization of 30 and 25 years for the Miscellaneous and Safety Plans, respectively, further reducing interest cost. Upon deposit of the bond proceeds with CalPERS, the County's rate was reduced and replaced by the lower amount of the bond's debt service.

The POBs still maintain a relatively low break-even rate of 4.91% versus CalPERS' current rate of 7%, (a spread of 2.09%). Even if CalPERS were to earn a rate slightly below the POBs rate for the remaining term to maturity of 2035, and well below a projected long-term expected return of 6%, the County can still expect to show net estimated gains.

Bartel Associates analysis is projecting that **as of February 15, 2021 there will be $146.6 million in net estimated gains** as a result of the sale of the bonds, with an outstanding balance owed of $191.1 million. It is worth noting that the bulk of the bonds will be repaid by 2025 as seen in Table 2A and 2B.

There will be a reduction of $16.1 million from FY 24/25 to FY 25/26 for the Miscellaneous Plan, and for Safety, a reduction of $4.5 million for the same period.

Liability Management Fund (LMF) - The LMF was established as part of the Series 2005 A POB documents and incorporated into the Board's Pension Management Policy B-25. A portion of the projected annual savings from the POB issuance is collected from departments for the purpose of reducing long-term pension costs and accelerating the repayment of pension liabilities. The amount collected is set aside in the LMF, held by the County's bond trustee, and PARC had recommended whether the funds should be used to pay down the CalPERS unfunded liability or to pay down the POBs. To date, some of the excess has been sent to CalPERS to reduce the unfunded liability. The current practice has been to send any excess to the Section 115 Pension Trust (discussed below) and will continue.

Series 2020 - In April 2020, the efforts to reduce interest cost on a portion of the unfunded liability continued with the Board of Supervisors authorizing a second POB issuance in the amount of $720 million. The bond proceeds ($716 million, net of the cost of issuance) were used to refund up to approximately 20% of the total unfunded liability, split between the Miscellaneous and Safety Plans. The County prepaid $371.5 million to CalPERS for deposit to the Miscellaneous Plan, and, $344.2 million for the Safety Plan which reflected a discount for prepayment of the selected bases. These bond proceeds served as a one-time additional discretionary payment into the plans. To be clear, the $716 million that was owed to CalPERS is now owed to bondholders, albeit at a much-reduced rate, generating the savings which per Board direction is now flowing into the 2020 Section 115 Pension Trust (discussed below).

This series of POBs has an even lower break-even rate of 3.53% vs. CalPERS' interest cost on the unfunded liability of 7% (a spread of 3.47%). This results in payment reductions (savings) of nearly $231 million through 2038. To capture the savings through the eighteen-year life of the POBs, a dedicated Section 115 Pension Trust account was established. The balances and rate of return for this second account will be reported in the 2022 PARC Annual Report as a full fiscal year cycle will have occurred. Bartel Associates analysis is projecting that **as of February 15, 2021 there will be $13.5 million in net estimated gains** as a result of the sale of the bonds, with an outstanding balance owed of $690.5 million.

Section 115 Pension Trust

The first Section 115 Pension Trust was established in 2016 (Board Resolution No. 2016-214) to help the County independently mitigate CalPERS' contribution rate volatility and act as a buffer in the future for budgeting purposes as funds accumulate.

Excess funds from the LMF and the Other Post-Employment Benefits (OPEB) Trust were placed in the Section 115 Pension Trust to fund the initial deposit. Additionally, funds collected as a result of the difference between CalPERS' multi-year projected payroll, based on actuarial assumptions, and, the County's actual payroll, are restricted and invested in the County Treasurer's Pooled Investment Fund (TPIF). Funds are then dollar-cost averaged from the TPIF and placed into the Trust.

The Trust is administered by Public Agency Retirement Services (PARS), with HighMark Capital Management serving as investment manager. The current investment strategy is Moderate Index PLUS (Active). Unlike assets in the CalPERS defined benefit plans, funds in the Trust are managed in a manner consistent with the County's risk profile in a combination of cash, fixed income and equity investments.

As of June 30, 2020, the balance in the Trust was $29.9 million, (an increase of $1.2 million from prior year) **with an annual net rate of return of 4.27%. The annualized net rate of return since November 2016 inception is 5.98%. Over time this will become more significant as assets accumulate in the account and cannot be used for any other purposes except for making additional discretionary payments directly to CalPERS to pay down a portion of the unfunded liability, or for reimbursing the County for CalPERS contributions. Within five years there will be in excess of $100 million in contributions made to the 2016 and 2020 Trust accounts combined, and within ten years, in excess of $175 million.**

Annual Pre-Payment

For FY 21/22, CalPERS will offer an early payment discount of 3.3% on the unfunded liability portion (required payment is $195 million) in lieu of the periodic payments that coincide with payroll disbursements, thereby reducing the total amount by over $6.4 million. In order to fund the initial payment, the County typically includes a substantial portion of the pre-payment amount as part of the annual Tax and Revenue Anticipation Notes (TRANs) borrowing. The other alternative would be to borrow internally by drawing down General Fund cash. A final recommendation regarding the pre-payment will be made in conjunction with the FY 21/22 TRANs.

Other Post-Employment Benefits (OPEB)

Background - OPEB are benefits other than pensions provided to retired employees. In the County's case, this is a monthly contribution to retirees for health care. The Governmental Accounting Standards Board (GASB) Statement No. 45, released in 2004, substantially modified the reporting requirements for OPEB provided by state and local governments. In summary, GASB 45 dictated that the present value of these benefits should be quantified and reported in the Supplementary Information section of County's Comprehensive Annual Financial Report (CAFR). This reporting requirement did not trigger a funding requirement. Per GASB 45, the County's liability is comprised of two components; the present value of the amount payable to retirees and the amount attributable to the "implicit subsidy." The implicit subsidy is defined as the difference between the true cost of coverage for the retiree medical plan and the actual rate paid. Such a difference arises if retirees and active employees are in the same rate class.

The County's Response - The initial calculation of the County's retirement health liability was $390 million as of January 1, 2005. Upon the recommendation of PARC, the County took two steps to reduce this liability over time. The first step was to establish an OPEB Trust in 2007 which reduced the actual and nominal liability. The account was established with the California Public Employers' Retirement Benefit Trust (CERBT) with CalPERS serving as the administrator and investment manager. The second step was to virtually eliminate the implicit subsidy by revamping the County's healthcare rate structure to separate pre-Medicare retirees from active employees.

GASB 75 - In June 2015, GASB released Statement No. 75, which was initially effective for the fiscal year ending June 30, 2018. GASB 75 addresses accounting and financial reporting issues by government employers, previously covered by GASB 45. Per GASB 75, employers are now required to disclose the total OPEB liability on the balance sheet (Statement of Net Position) alongside its other long-term liabilities (i.e., bond debt, lease obligations, pension liabilities, etc.). This change now highlights the liability.

The Move to CalPERS - In 2019 the County embarked upon a multi-year process to restructure its health care offerings with an eye towards controlling costs and providing a fuller range of plan options for employees and retirees alike. The OPEB impacts of the move to CalPERS include a return of the implicit subsidy which did not exist under the County's own rate structure as an increase of the actual benefit paid to certain retirees, and, a greater number of retirees now purchasing their insurance through the County since the offerings are more attractive.

Under CalPERS health plans, retirees receive the benefit of the implicit subsidy prior to age 65 by paying premiums that are developed by blending active and retiree costs. For example, in 2021 under the Blue Shield Access Plus, the estimated true cost for an age 60 retiree is $1,227 per month, while the required premium is only $835 per month. This had the effect of bringing the implicit subsidy back into the equation. Ironically, the GASB rules fail to recognize cases such as the County's in which an implicit subsidy is created while the actual cost to employees decreases.

Another example would be the cost of an individual employee for Kaiser coverage under the County's offering is $1,081 per month, whereas the cost under CalPERS is $670 per month. In aggregate those savings would largely offset the implicit subsidy. Based on the AON - County of Riverside Actuarial Valuation Report Postretirement Benefits Plan as of June 30, 2020 (Attachment 4), the value of that benefit to employees is $95 million (the actuarial accrued liability, or, AAL).

Nevertheless, inclusion of implicit subsidy in the total net OPEB liability without any offset is specifically required. However, many employers have chosen not to fund this portion of their liability since it is not owed to retirees unlike the monthly benefit payment.

Another financial implication of moving to the CalPERS health plans is the requirement under the Public Employees' Medical and Hospital Care Act (PEMHCA) to provide a $143 minimum monthly contribution for retiree health premiums. That has an effect of increasing the monthly benefit and the cost to the County for those employees whose negotiated or Board approved benefit (for non-represented employees) is less than $143 (the current range is from $25 to $256 per month). This increase in the monthly cost to provide the benefit is currently paid by departments on a pay-as-you-go basis and increases the OPEB liability.

In addition to the PEMHCA effect, the County is expecting higher participation rates in its plans by retirees which will increase the expected and actual payout for those enrolled in a health plan. To the extent retirees have better options, such as paid spousal coverage from another employer, they receive no monthly benefit from the County and no liability is recorded.

Total OPEB Liability - On July 1, 2020 the retiree health care liability (total AAL) was $235 million (an increase of $132 million from prior year) which is comprised of the retiree benefit amount of $140 million (an increase of $81 million) and an implicit subsidy amount of $95 million (an increase of $51 million).

Funding Status - In contrast to the CalPERS defined benefit pension plan liability, there is no direct connection between the implicit subsidy portion of the OPEB liability and the County's cost of providing the retiree healthcare benefit. Recognizing this, the Board adopted Policy B-25, Section III (A) Other Post-Employment Benefits (OPEB) which states, "the County seeks to maintain a minimum funding level of 80% in its OPEB plan, excluding any implicit subsidy liability." There could be some advantages to taking steps to funding a portion of the implicit subsidy in the future; staff and PARC will monitor the issue and bring any recommendations to the Board.

As of June 30, 2020, the OPEB Trust with CERBT had a balance of $53 million (an increase of $8 million over the prior year), and an annual net rate of return of 5.48%. The annualized net rate of return since inception in 2007 is 6.31%. The unfunded actuarial accrued liability (UAAL) is $87 million (an increase of $29 million over the prior year), which represents a funded ratio of 38% (a decrease of 5.6% from 43.6% prior year), excluding implicit subsidy. A major distinction from the CalPERS defined benefit pension plans is that no interest is charged on the OPEB UAAL.

Note, the 2020 PARC Report had stated in error "the funded ratio without the implicit subsidy as of June 30, 2019 is 81.5%," when it should have stated "the projected funded status, without the implicit subsidy as of June 30, 2020 is 81.5%." The total amount to be charged to departments, however, was increased pursuant to the actuarial schedule from AON to $9 million (an increase of $5 million, or, 0.33% as a percentage of payroll from the prior year).

The major difference between the two UAAL ratios is cited in the AON Report below:

Plan liabilities and annual costs are considerably higher than the prior valuation, primarily due to a change to provide the SEIU bargaining group access to CalPERS health plans, which have higher costs and participation rates that results in an increase in liability.

After consideration of the items above, the UAAL and costs are higher than expected based on a projection from the prior valuation, as a net result of the following factors: expected return on assets was reduced by CalPERS in the CERBT Strategy 2 assumed return of 7.01% to 6.15%, reflecting lower expectations. As a result, the discount rate similarly decreased, resulting in an increase in liability. Deferred retirees eligible for CalPERS health plans elected coverage higher than previously assumed, resulting in a liability loss. Investment return was lower than expected, resulting in an asset loss. Details can be found in the AON Report, Attachment 4, page iv.

In keeping with Board Policy, County staff requested a review from AON of a multi-year plan to achieve an 80% funded status for the retiree benefit portion of the OPEB liability. **The current actuarial schedule projects the Board Policy's 80% minimum funding level, excluding implicit subsidy, would be reached in 2027 with $16.9 million to be charged to departments annually beginning in FY 21/22, (an increase of $7.9 million from the current $9 million required in FY 20/21). As a percentage of payroll, the $16.9 million represents approximately 1.1% (an increase of 0.47% from the 0.63% charged in FY 20/21).** See the AON report, Attachment 4, page v.

For now, the plan is to follow the schedule to meet the 80% in 2027. However, per the terms of the Laborers' International Union of North America (LIUNA), Local 777 Memorandum of Understanding (MOU), the transition to the CalPERS health plans for all employees will be effective April 1, 2021. With this addition of employees coming into the CalPERS health plans, the rate will likely increase to 2.25%, or more. Staff and PARC will continue to monitor the funded status of the OPEB Trust with next years' annual valuation report and adjust rates upward again in accordance with the actuarial schedule to achieve the 80% funded status.

Investment Strategy - Separately, in consideration of the longer-term investment horizon of the OPEB Trust, and to mitigate some of the pending rate increases due to more employees coming into the CalPERS health plans, **PARC has reviewed and approved at its January 13, 2021 meeting the recommended change from CERBT's Strategy 2 (assumed return 6.15%) to Strategy 1 (assumed return 7.30%).** The difference between the two strategies is the mix of allocations amongst the various asset classes that makeup the portfolios (equity, fixed income, real estate, commodities and cash). The funds will be dollar-cost averaged over an extended period in an effort to reduce market risk.

Summary - In short, the County's actual and projected costs for retiree health benefits will be going up and the OPEB liability will reflect the increase. That will be offset by a reduction in the actual cost of the insurance plans for most participants. **A significant portion of the recorded (implicit) liability overstates the budgetary impact of the County's OPEB obligations. The County has a plan to achieve the minimum funding level of 80% in its OPEB plan, excluding any implicit subsidy liability, in a reasonable period of time.**

Part-Time and Temporary Employees' Retirement Plan

The County of Riverside established the Part-Time and Temporary Employees' Retirement Plan (TAP), April 1, 1999, to provide retirement benefits to eligible employees as a substitute for benefits under Social Security, as allowed under Omnibus Budget Reconciliation Act of 1990 (OBRA '90). The Plan is an IRS Section 401(a) defined benefit plan.

The Plan actuary calculates the minimum recommended employer contribution rate through preparation of an actuarial valuation report. Participants are required to contribute 3.75% of their compensation to the Plan. As of September 1, 2010, the investments have been managed by US Bank serving as investment manager in a Balanced Account strategy with an expected rate of return of 6%.

Overall, the plan's funded status and net pension liability remained fairly stable from the prior valuation with the following offsetting factors: demographic experience was different than expected, primarily due to fewer terminations than expected, which resulted in a liability loss.

Assets were lower than expected due to unfavorable return on plan assets (3.72% vs 6% assumed), and, mortality assumptions were updated to reflect the recent public mortality table. The funding contribution increased in magnitude compared to the prior year due to a small liability loss. The contribution as a percentage of compensation increase was magnified further when compared to prior year by the lower overall compensation base, as a result of fewer active participants. See the AON report, Attachment 5, page ii).

Total TAP Liability - On July 1, 2020 the total AAL was $58.5 million (an increase of $2.9 million from prior year). **As of June 30, 2020, the Plan had a balance of $45.4 million (an increase of $1.9 million from the prior year), an annual rate of return of 3.72%, and, an annualized rate of return since inception in 2010 of 6.02%. The unfunded actuarial accrued liability (UAAL) is $13 million (an increase of $53,000 over the prior year), which represents a funded ratio of 77.7% (an increase of 1.1% from prior year). A major distinction from the CalPERS defined benefit pension plans is that no interest is charged on the TAP Plan UAAL.**

AON projects a 79.8% funded status by June 30, 2021 (with only a $93,000 shortfall from the 80% level). The rate as a percentage of payroll will be going from 4.02% in FY 20/21 to 5.58% in FY 21/22 (an increase of 1.56%). Staff will continue to target the 80% level with next year's annual valuation report and provide an update at that time. See the AON report, Attachment 5, page iii.

<u>Special District Plans</u>

The County's Special Districts (not including Flood) participate in what CalPERS refers to as the Risk Pool, designed to accommodate smaller employers whose size is not enough to develop individual actuarial assumptions with participation occurring if a rate plan has less than 100 active members on any valuation date. The process involves combining assets and liabilities across employers to produce large, risk sharing pools that reduce or eliminate large fluctuations in an employer's retirement contribution rate caused by unexpected demographic events.

Although the desired 80% minimum funding level for the Special Districts are not specifically mentioned in Board Policy B-25 as is the case with the County's defined benefit pension plans, see below additional information for each District. Similar to the County's Miscellaneous and Safety Plans, additional discretionary payments would be required to increase the funding level, thereby having budgetary impacts on the Districts (Parks and Flood), as well as the Department of Waste Resources, that may, or may not be feasible at this time due economic uncertainty caused by the COVID-19 pandemic.

The Riverside County Regional Park and Open-Space District has three rate plans. As of the annual valuation report(s) for June 30, 2019, **the funded status of Tier I was 73.5%** (a decrease of 0.5% from 74.0%, prior year) and has an accrued liability of $46.9 million, a market value of assets of $34.5 million, and, an unfunded liability of $12.4 million. **Tier II's funded status is at 89.9%** (no change from prior year) and has an accrued liability of $398,743, a market value of assets of $358,502, and, an unfunded liability of $40,241. **Tier III's funded status is at 90.0%** (an increase of 0.9% from 89.1%, prior year) and has an accrued liability of $1.4 million, a market value of assets of $1.3 million, and, an unfunded liability of $142,515.

The District's plan to address its Tier I status below 80% this fiscal year has been placed on hold due to financial implications caused by the COVID-19 pandemic.

To date, the District has had to temporarily close 8 park sites, close campgrounds for overnight camping, transferred 3 park sites to alternate operators, experienced over $500,000 in loss of revenue, and, has laid off 7 employees resulting in leave payouts. The District will revisit the potential of additional discretionary payments at a later time when their financial outlook has stabilized.

The Riverside County Flood Control and Water Conservation District's annual valuation report for June 30, 2019, **shows a funded status of 63.7%** (a decrease of 0.20% from 63.9%, prior year). The District has an accrued liability of $213.9 million, a market value of assets of $136.3 million, and, an unfunded liability $77.6 million. **The District has developed a long-term plan that includes making additional discretionary payments to CalPERS in an effort to bring the funded status at or above 80% by fiscal year 2027, assuming all other factors remain constant. An additional $6.7 million was paid in FY 19/20, and, $6.1 million in FY 20/21.** According to CalPERS, these payments will be reflected starting in the next years' valuation report when the District is projected to reach a funded status of 67.6%. The District intends to continue making additional discretionary payments based on its ongoing assessment of its fiscal outlook for future years.

The Riverside County Waste Resources Management District was dissolved in 1998, with the exception of existing employees at that time electing to maintain their District status. All new hires or transfers are designated as County employees; no new District employees have been added since 1998.

The District's annual valuation report for June 30, 2019 shows a **funded status of 70.1%** (a decrease of 0.70% from 70.8%, prior year). The District has an accrued liability of $53.4 million, a market value of assets of $37.5 million, and an unfunded liability $15.9 million. **In order to reach the 80% funded status, the Department of Waste Resources has doubled the minimum required payments as calculated by CalPERS to $2.2 million in FY 20/21, and $2.8 million in FY 21/22.** Current projections indicate that under this revised payment schedule, the 80% level will be reached in FY 21/22. The additional payments are voluntary and will allow the department the flexibility to adjust as budgets allow, leaving room for unforeseen events, mandates or regulatory changes.

Recommendations

1. Receive and file the 2021 PARC Annual Report.
2. Direct staff and PARC to report back with any additional updates or recommendations on the County's pension plans, Other Post-Employment Benefits (OPEB), any other item as noted in Board Policy B-25 including pension debt reduction strategies, and, any legislative changes that could be incorporated in the County's Legislative Platform.
3. Direct staff to review the annual CalPERS unfunded liability pre-payment for FY21/22 and to have such recommendations presented in conjunction with either the approval of the annual Tax and Revenue Anticipation Notes (TRANs) cash flow financing, or, with the FY 21/22 budget.

Attachments

1. Bartel Associates LLC - CalPERS Actuarial Issues – 6/30/19 Valuation December 23, 2020
2. CalPERS - Miscellaneous Plan - County of Riverside Annual Valuation Report as of June 30, 2019
3. CalPERS - Safety Plan - County of Riverside Annual Valuation Report as of June 30, 2019
4. AON - County of Riverside Actuarial Valuation Report Postretirement Benefits Plan June 30, 2020
5. AON - County of Riverside Actuarial Valuation Report Part-Time and Temporary Employees' Retirement Plan July 1, 2020

COUNTY OF RIVERSIDE
MISCELLANEOUS AND SAFETY PLANS

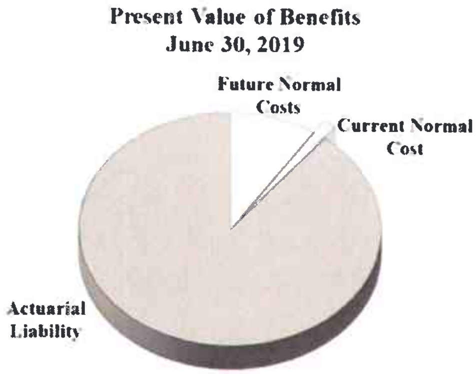
CalPERS Actuarial Issues – 6/30/19 Valuation

Mary Elizabeth Redding
Bianca Lin, Assistant Vice President
Matthew Childs, Actuarial Analyst
Bartel Associates, LLC

December 23, 2020

Contents

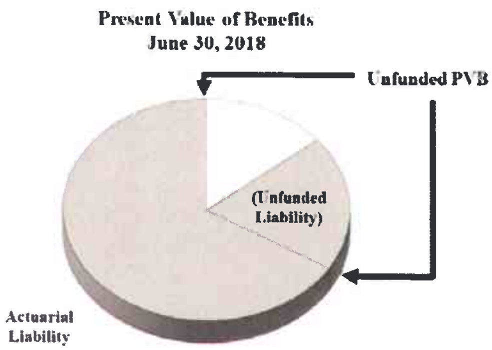
DEFINITIONS

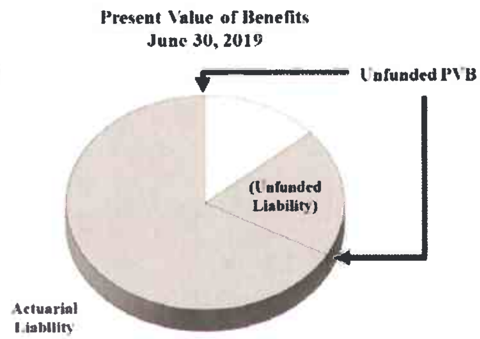


- **PVB - Present Value of all Projected Benefits:**
  - The value now of amounts due to be paid in the future
  - Discounted value (at valuation date - 6/30/19), of all future expected benefit payments based on various (actuarial) assumptions

- **Current Normal Cost (NC):**
  - Portion of PVB allocated to (or "earned" during) current year
  - Value of employee and employer current service benefit
- **Actuarial Liability (AAL):**
  - Discounted value (at valuation date) of benefits earned through valuation date [value of past service benefit]
  - Portion of PVB "earned" at measurement

DEFINITIONS



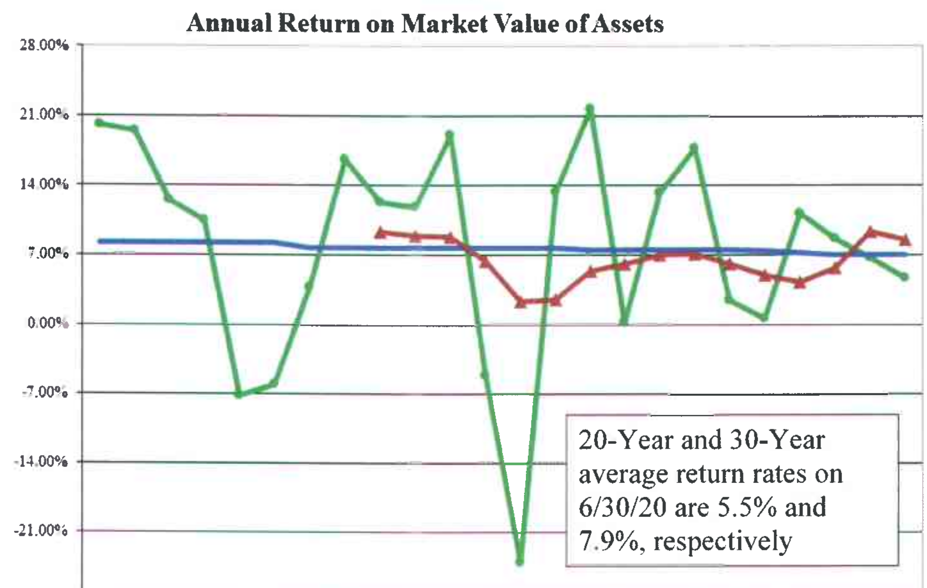


- **Target-** Have money in the bank to cover Actuarial Liability (past service)
- **Unfunded Liability (UAAL or UAL) -** Money short of target at valuation date
  - If all actuarial assumptions were always exactly met, then the plan assets would always equal AAL
  - Any difference is the unfunded (or overfunded) AAL
  - Every year, the actuary calculates the difference between the expected UAAL and Actual UAAL. This is a new layer or amortization base
  - Each new layer gets amortized (paid off) over a period of time as part of the contribution [rate]

How We Got Here

- Investment Losses
- CalPERS Contribution Policy
- Enhanced Benefits
- Demographics

How We Got Here – Investment Return



	97	98	99	00	01	02	03	04	05	06	07	08
MVA	[illegible]	[illegible]	12.5%	[illegible]	-7.2%	-6.1%	[illegible]	16.6%	[illegible]	[illegible]	19.1%	-5.1%
Discount Rate	8.25%	8.25%	8.25%	8.25%	8.25%	8.25%	7.75%	7.75%	7.75%	7.75%	7.75%	7.75%
10-Year Rolling Average									9.3%	9.0%	[illegible]	6.4%

	09	10	11	12	13	14	15	16	17	18	19	20
MVA	-24.0%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.4%	0.6%	11.2%	8.6%	6.70%	4.70%
Discount Rate	7.75%	7.75%	7.50%	7.50%	7.50%	7.50%	7.50%	7.375%	7.25%	7.00%	7.00%	7.00%
10-Year Rolling Average	2.3%	2.5%	5.4%	6.1%	[illegible]	7.1%	6.1%	5.0%	4.3%	5.7%	9.3%	8.5%

Returns (after 2001) shown are gross returns, unreduced for administrative expenses. The discount rate is based on expected returns net of administrative expenses.

How We Got Here – Old Contribution Policy

- Effective with 2003 valuations:
  - Slow (15 year) recognition of investment losses into funded status
  - Rolling 30 year amortization of all (primarily investment) losses

- Designed to:
  - First smooth rates and
  - Second pay off UAL

- Mitigated contribution volatility

How We Got Here – Enhanced Benefits

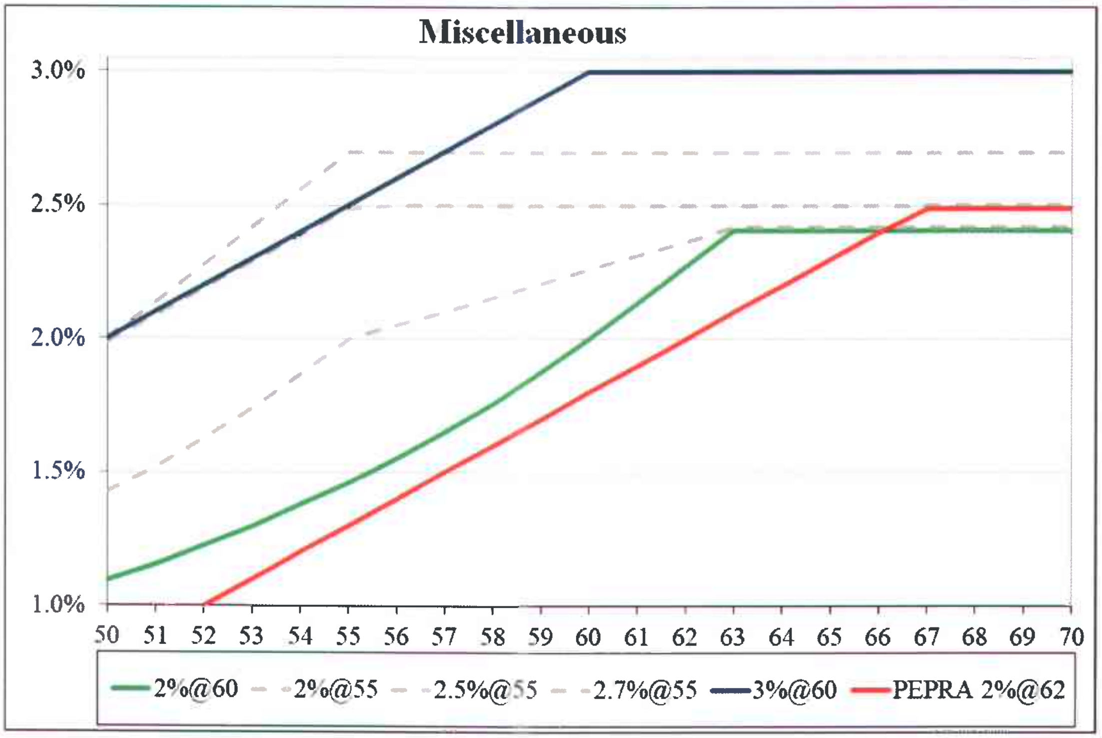
- At CalPERS, Enhanced Benefits implemented using all (future & prior) service
- Typically not negotiated with cost sharing
- County of Riverside

	Tier 1	Tier 2	PEPRA
● Miscellaneous	3%@60 FAE1	2%@60 FAE3	2%@62 FAE3
● Safety[1]	3%@50 FAE1	2%@50 FAE3	2.7%@57 FAE3

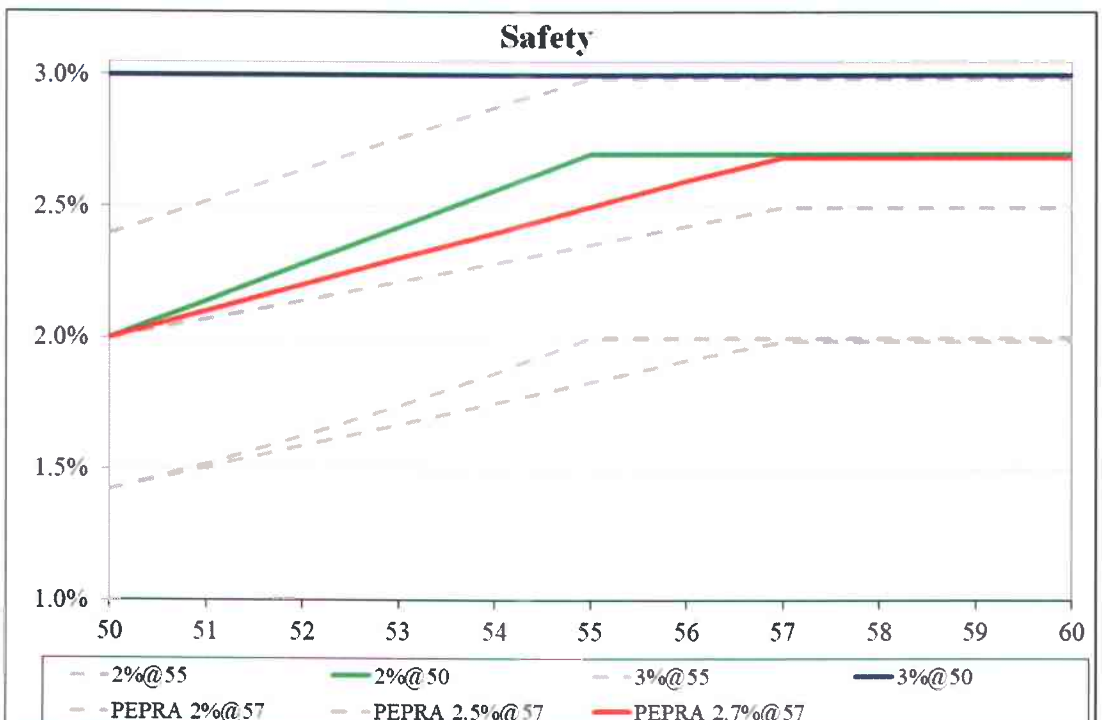
  - Note:
    - FAE1 is highest one year (typically final) average earnings
    - FAE3 is highest three years (typically final three) average earnings
- PEPRA tier implemented for new employees hired after 1/1/13
  - Employee pays half of total normal cost
  - 2020 Compensation limit
    - Social Security participants: $126,291
    - Non-Social Security participants: $151,549

[1] Fire and Peace Officer members are combined in this group.

How We Got Here – Enhanced Benefits



How We Got Here – Enhanced Benefits



How We Got Here – Demographic

- Around the State
  - Large retiree liability compared to actives
    - State average: 56% for Miscellaneous, 65% for Safety
  - Declining active population and increasing number of retirees
  - Higher percentage of retiree liability increases contribution volatility

- County of Riverside percentage of liability belonging to retirees:
  - Miscellaneous 49%
  - Safety 56%

CalPERS Changes

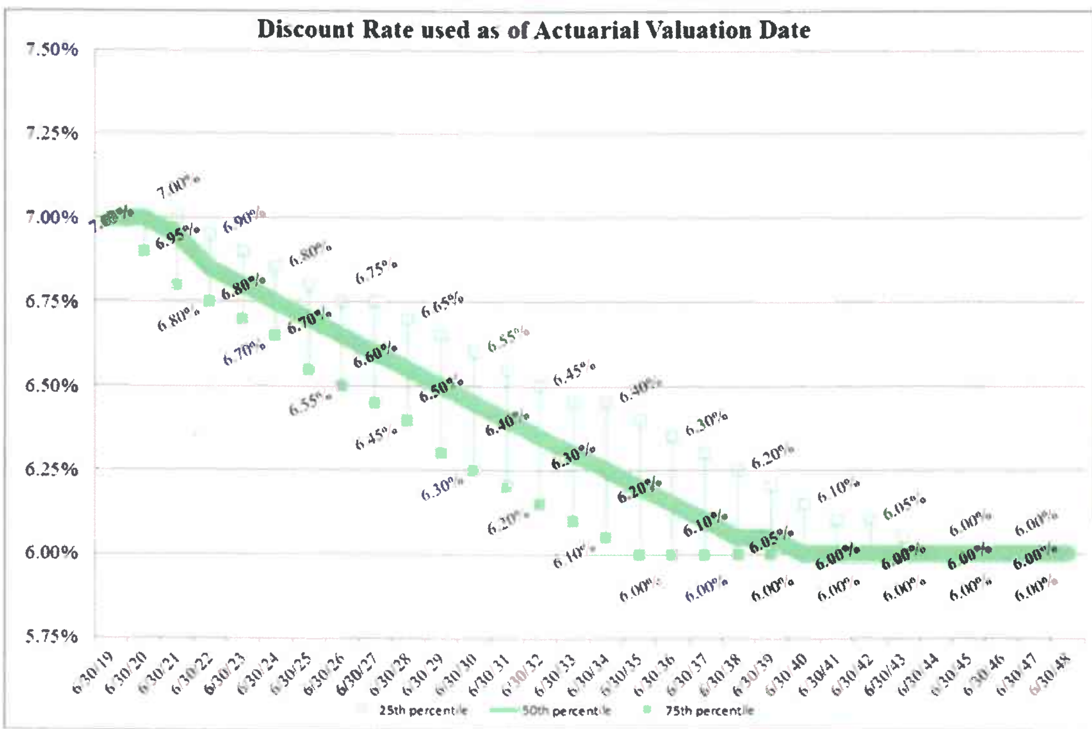
- Recent contribution policy changes:
  - No asset smoothing
  - No rolling amortization
  - 5-year ramp up
- February 2018: CalPERS adopted new amortization policy
  - Applies only to newly established amortization bases
    - Fixed dollar amortization rather than % pay
    - Amortize gains/losses over 20 rather than 30 years
    - 5-year ramp up (not down) for investment gains and losses
    - No ramp up/down for other amortization bases
  - Minimizes total interest paid over time and pays off UAL faster
  - Effective June 30, 2019 valuation for 2021/22 contributions
- CalPERS Board changed the discount rate:

	Rate	Initial Impact	Full Impact
6/30/16 valuation	7.375%	18/19	22/23
6/30/17 valuation	7.25%	19/20	23/24
6/30/18 valuation	7.00%	20/21	24/25

CalPERS Changes

- Risk Mitigation Strategy
  - Move to more conservative investments over time to reduce volatility
  - Only when investment return is better than expected
  - Lower discount rate in concert
  - Essentially use ≈50% of investment gains to pay for cost increases
  - Likely get to 6.0% discount rate over 20+ years
  - Risk mitigation suspended from 6/30/16 to 6/30/18 valuation
  - Did not trigger for 6/30/20 valuation

CalPERS Changes

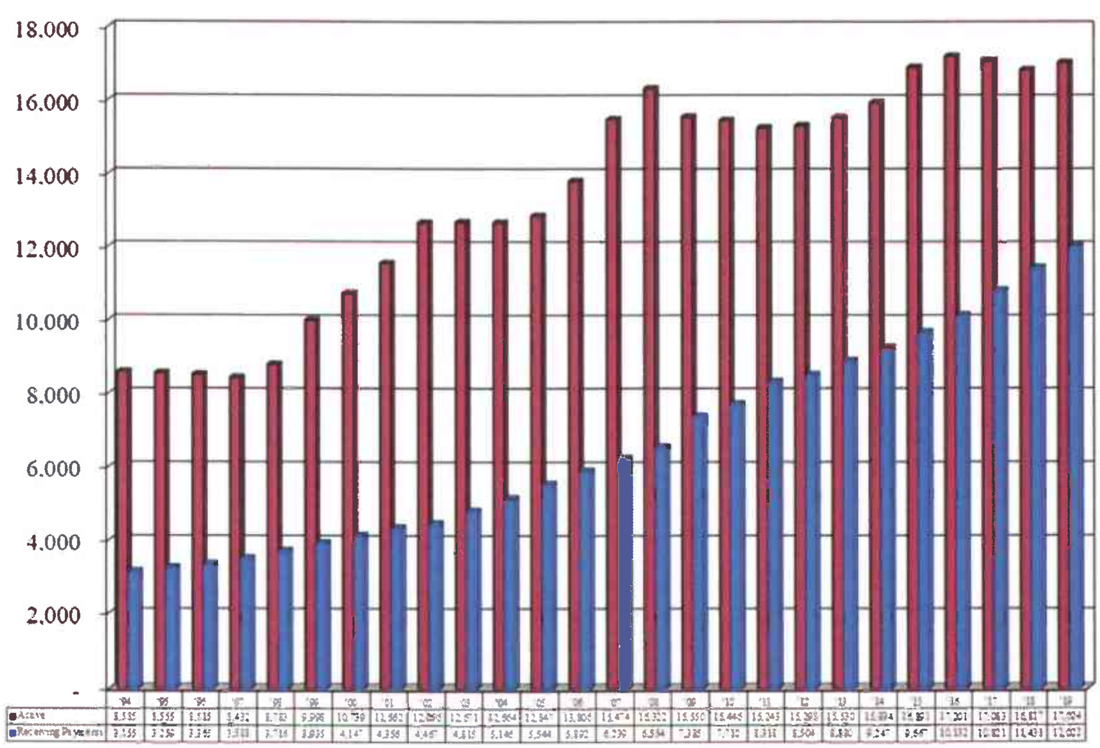


SUMMARY OF DEMOGRAPHIC INFORMATION - MISCELLANEOUS

	1999	2009	2018	2019
Actives				
■ Counts	9,998	15,550	16,817	17,024
■ Average				
• Age	43	43	44	44
• County Service	9	8	10	10
• PERSable Wages	$ 36,700	$ 54,100	$ 66,500	$ 67,300
■ Total PERSable Wages	366,500,000	841,100,000	1,118,700,000	1,145,600,000
Inactive Members				
■ Counts				
• Transferred	2,256	3,548	3,905	4,012
• Separated	1,603	6,082	9,554	9,990
• Retired				
☐ Service		6,043	9,793	10,324
☐ Disability		585	661	674
☐ Beneficiaries		757	984	1,024
☐ Total	3,935	7,385	11,438	12,022
■ Average Annual County Provided Benefit for Service Retirees[2]		19,800	28,428	29,700

[2] Average County-provided pensions are based on County service & County benefit formula, and are not representative of benefits for long-service employees.

SUMMARY OF DEMOGRAPHIC INFORMATION - MISCELLANEOUS

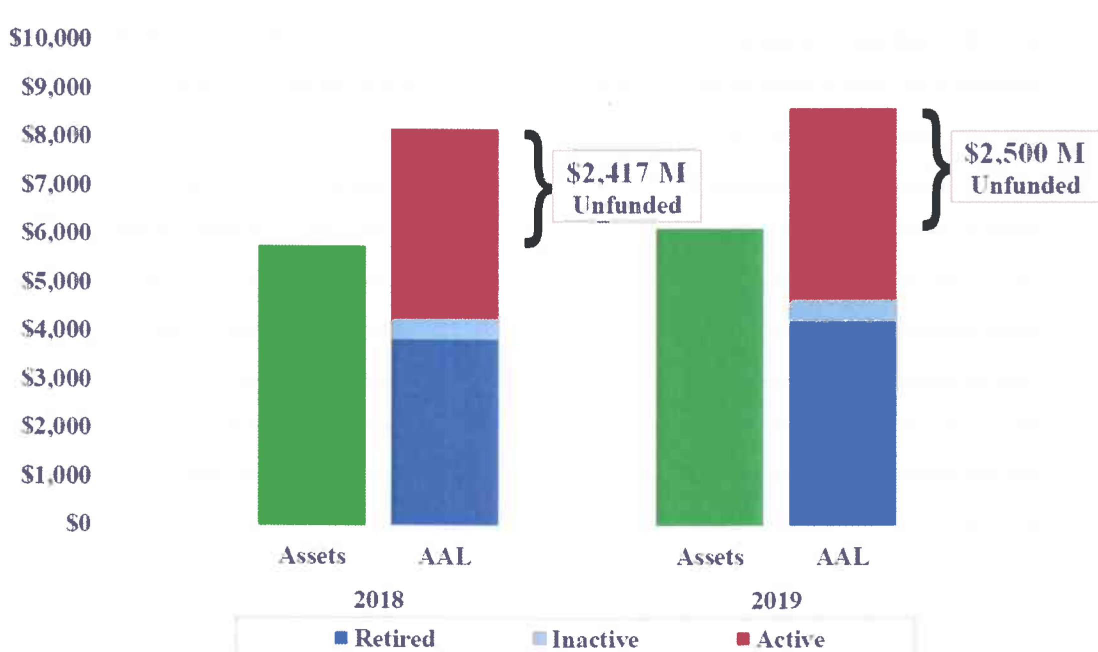


Plan Funded Status - Miscellaneous

	June 30, 2018	June 30, 2019
■ **Actuarial Accrued Liability**		
● Active	$3,900,100,000	$3,951,700,000
● Retiree	3,832,800,000	4,199,900,000
● Inactive	432,900,000	451,300,000
● Total	8,165,800,000	8,602,900,000
■ **Assets**	5,748,800,000	6,103,200,000
■ **Unfunded Liability**	2,417,000,000	2,499,700,000
■ **Funded Ratio**	70.4%	70.9%
■ **Average funded ratio for CalPERS Public Agency Miscellaneous Plans**	71.8%	72.2%

Plan Funded Status - Miscellaneous

County CalPERS Assets and Actuarial Liability ($Millions)



Discount Rate Sensitivity

June 30, 2019

	Discount Rate		
	7.00%	**6.50%[3]**	**6.00%**
AAL	$8,602,900,000	$9,225,900,000	$9,848,900,000
Assets	6,103,200,000	6,103,200,000	6,103,200,000
Unfunded Liability	2,499,700,000	3,122,700,000	3,745,700,000
Funded Ratio	70.9%	66.2%	62.0%

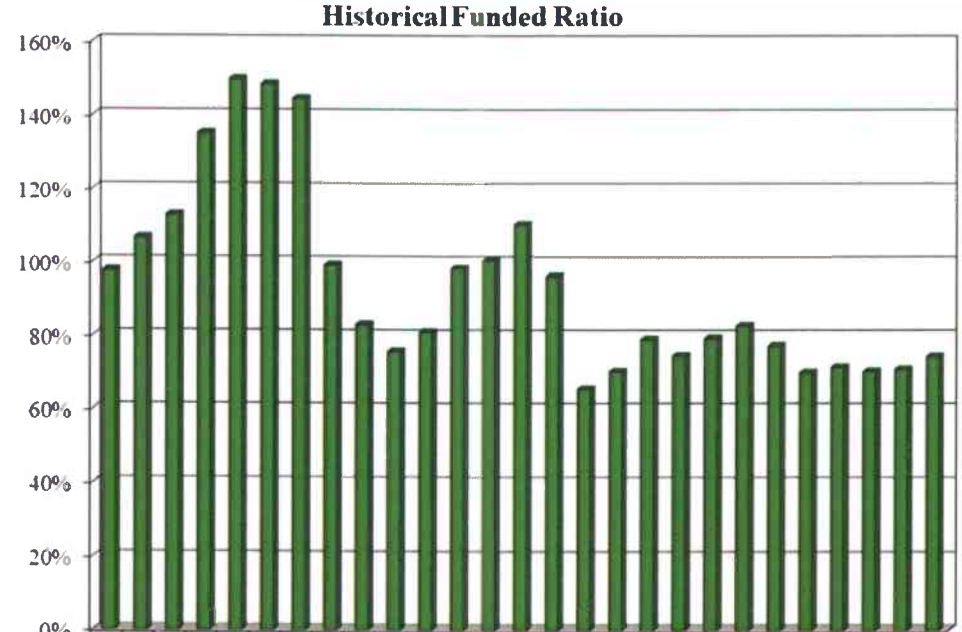
[3] Estimated by Bartel Associates.

Unfunded Accrued Liability Changes

■ **Unfunded Accrued Liability on 6/30/18**		$2,417,000,000
■ **Expected 6/30/19 Unfunded Accrued Liability**		2,501,700,000
■ **Other Changes**		
• Asset Loss (Gain) (6.6% return for FY 2019)	29,600,000	
• Contribution & Experience Loss (Gain)	(31,600,000)	
• Total		(2,000,000)
■ **Unfunded Accrued Liability on 6/30/19**		2,499,700,000
■ **Projected Unfunded Accrued Liability on 6/30/20[4]**		2,317,100,000

[4] Reflects $371.6 million POB proceeds transferred to CalPERS in May 2020.

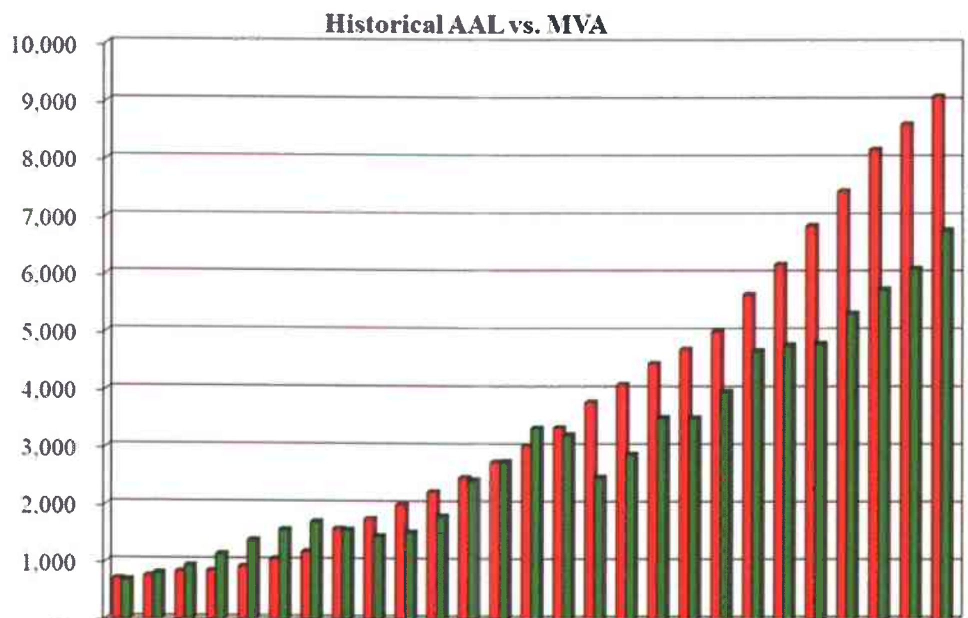
Funded Ratio - Miscellaneous



	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20
MVA	98%	107	113	135	150	149	144	99%	83%	76%	81%	98%	100	110	96%	65%	70%	79%	75%	79%	83%	77%	70%	72%	70%	71%	75%

6/30/20 funded status estimated

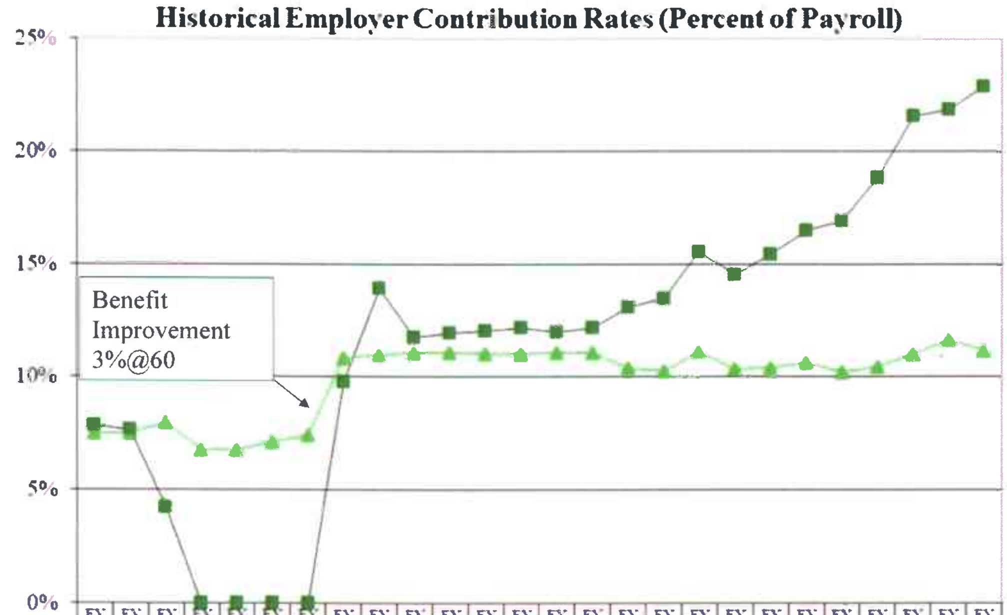
Funded Status (Millions) - Miscellaneous



	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20
AAL	704	757	831	844	920	1,053	1,178	1,577	1,750	1,999	2,232	2,472	2,742	3,029	3,350	3,790	4,097	4,462	4,709	5,009	5,656	6,174	6,850	7,441	8,166	8,609	9,090
Assets	683	805	939	1,140	1,379	1,564	1,702	1,564	1,454	1,517	1,807	2,429	[illegible]	3,342	3,223	2,482	2,882	3,526	3,520	3,974	4,683	4,775	4,800	5,326	5,749	6,103	6,773

6/30/20 funded status estimated

Contribution Rates - Miscellaneous



	FY 97	FY 98	FY 99	FY 00	FY 01	FY 02	FY 03	FY 04	FY 05	FY 06	FY 07	FY 08	FY 09
Normal Cost	7.5%	7.5%	8.0%	6.8%	6.8%	7.1%	7.4%	10.8	11.0	11.1	11.1	11.0	11.0
Total Rate	7.8%	7.6%	4.2%	0.0%	0.0%	0.0%	0.0%	9.8%	13.9	11.8	11.9	12.1	12.2

	FY 10	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22
Normal Cost	11.1	11.1	10.4	10.2	11.1	10.3	10.4	10.7	10.2	10.5	11.0	11.7	11.2
Total Rate	12.0	12.2	13.1	13.5	15.6	14.5	15.4	16.5	16.9	18.9	21.6	21.8	22.9

Contribution Rates - Miscellaneous

	6/30/18 2020/2021	6/30/19 2021/2022
■ Total Normal Cost	19.1%	18.8%
■ Employee Normal Cost	7.4%	7.6%
■ Employer Normal Cost	11.7%	11.2%
■ Amortization Payments	10.2%[5]	11.7%[6]
■ Total Employer Contribution Rate	21.8%	22.9%

■ 2020/21 Employer Contribution Rate	21.8%
● Payroll Change	0.0%
● 6/30/17 Discount Rate & Inflation (3rd Year)	0.2%
● 6/30/18 Discount Rate change (2nd Year)	0.4%
● Other (Gains)/Losses	0.5%
■ 2021/22 Employer Contribution Rate	22.9%

5 Reflected $371.6 million POB proceeds transferred to CalPERS in May 2020.

6 Equivalent to 6.6% of UAL. One year, 7% interest on the UAL is 12.4% of payroll. $3.5M additional payment in 2021/22 needed to avoid negative amortization.

CONTRIBUTION PROJECTIONS - MISCELLANEOUS

- Market Value Investment Return:
  - June 30, 2020 — 4.7%[7]
  - Future returns based on stochastic analysis using 1,000 trials

Single Year Returns at[8]	25th Percentile	50th Percentile	75th Percentile
Current Investment Mix	**0.1%**	**7.0%**	**14.8%**
Ultimate Investment Mix	**0.8%**	**6.0%**	**11.4%**

  - Assumes investment returns will, generally be 6.5% (as compared to 7.0%) over the next 8 years and higher beyond that.
- Discount Rate projected to decrease due to Risk Mitigation policy
- No Other: Gains/Losses, Method/Assumption Changes, Benefit Improvements
- Different from CalPERS projection

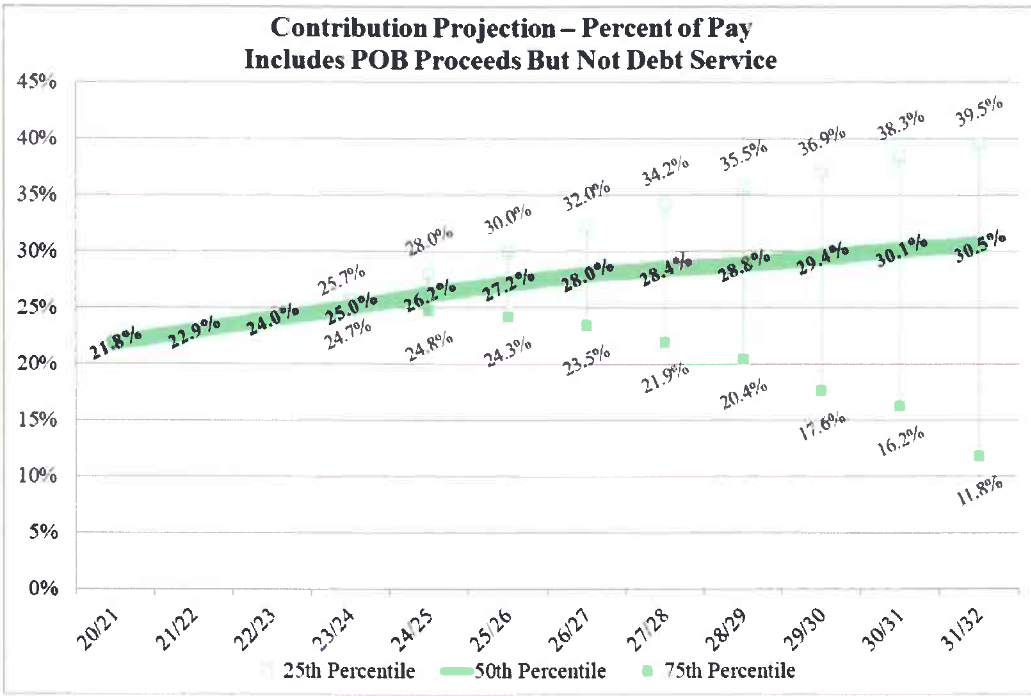
[7] Gross return based on July 2020 CalPERS press release
[8] Nth percentile means N percentage of our trials result in returns lower than the indicated rates.

CONTRIBUTION PROJECTIONS - MISCELLANEOUS

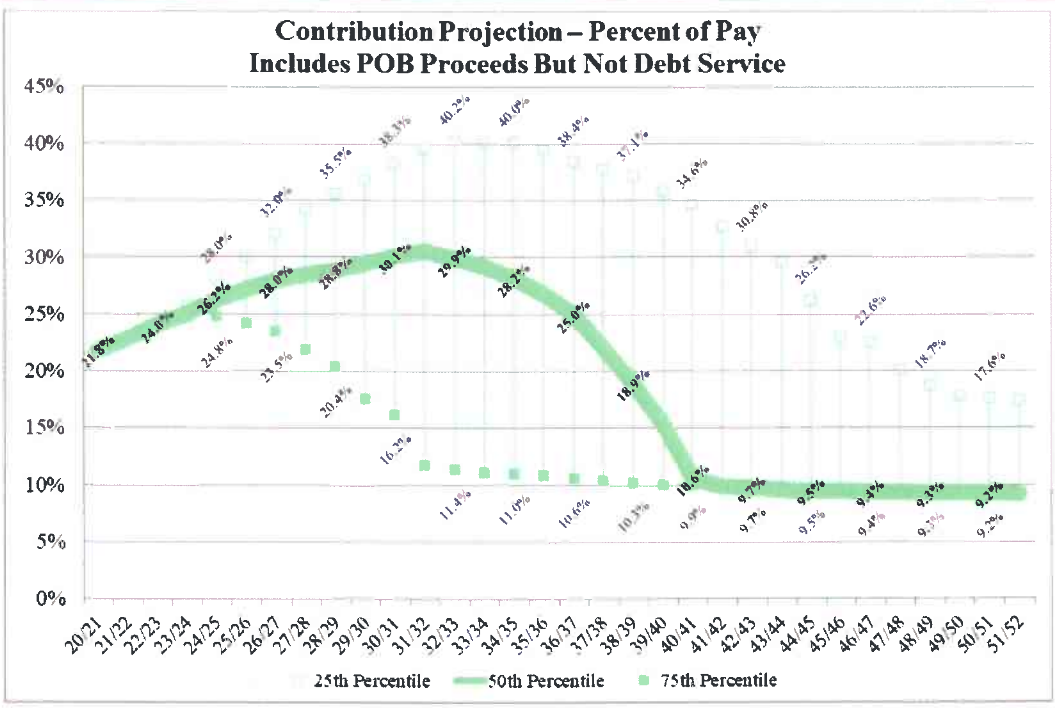
- New hire assumptions:
  - 95% of 2020/21 new hires are PEPRA members and 5% are Classic members
  - Percentage of PEPRA member future hires to increase from 95% to 100% over 2 years
- 6/30/19 employee distribution:

Benefit Tier	Count	6/30/19 Payroll
• 3%@60 FAE1	9,409	$728,206,000
• 2%@60 FAE3	674	47,567,600
• 2%@62 FAE3 (PEPRA)	6,941	369,805,600

CONTRIBUTION PROJECTIONS - MISCELLANEOUS

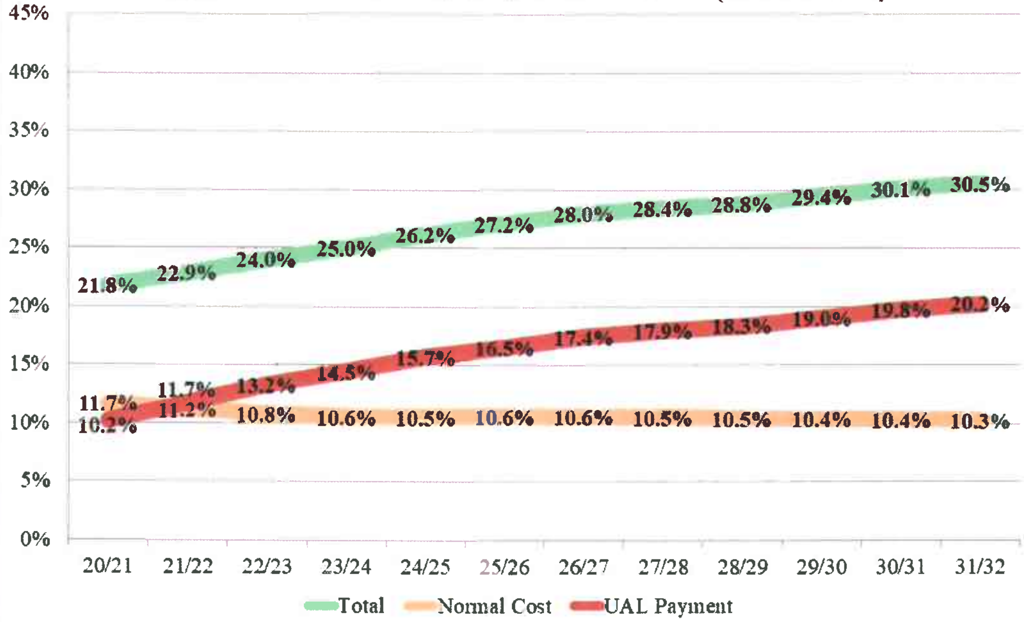


CONTRIBUTION PROJECTIONS - MISCELLANEOUS



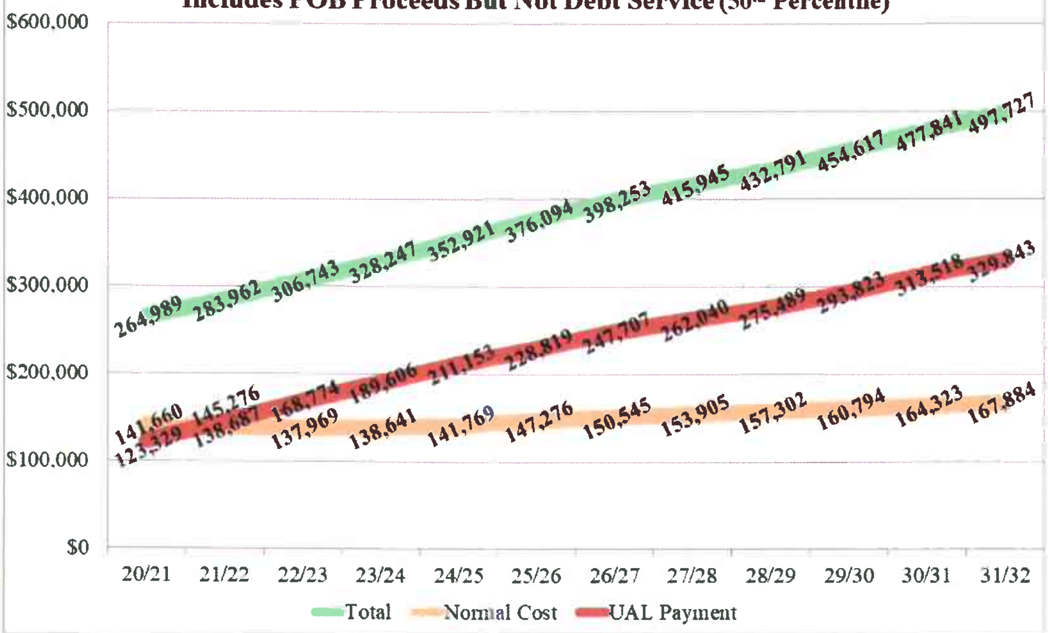
CONTRIBUTION PROJECTIONS - MISCELLANEOUS

Contribution Projection – Percent of Pay
Includes POB Proceeds But Not Debt Service (50th Percentile)

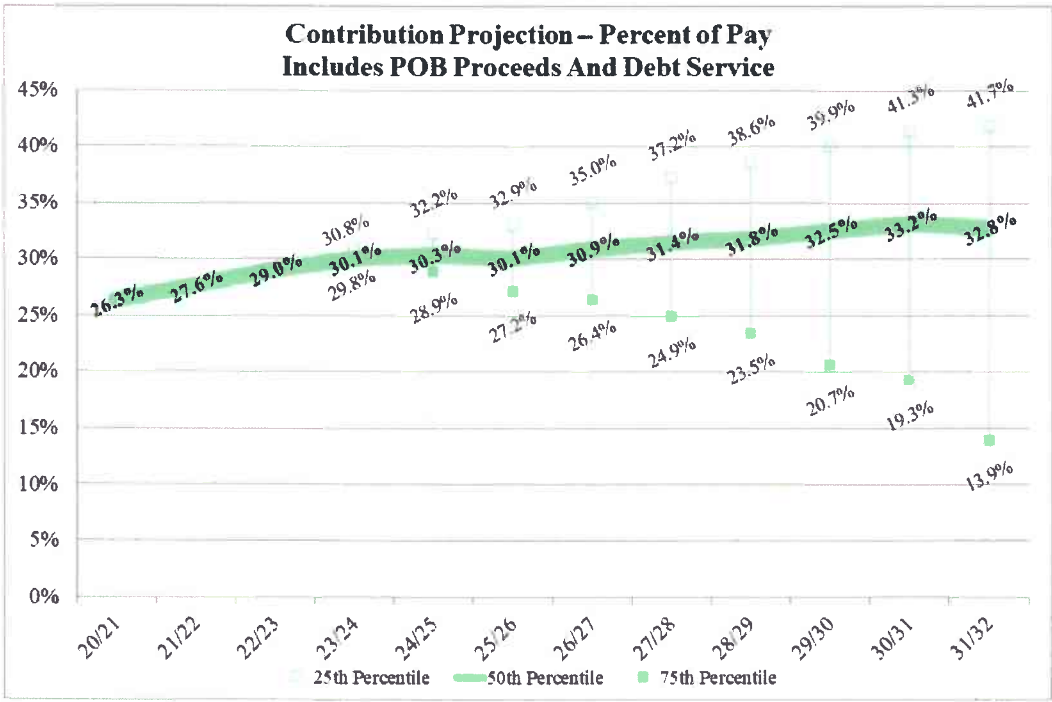


CONTRIBUTION PROJECTIONS - MISCELLANEOUS

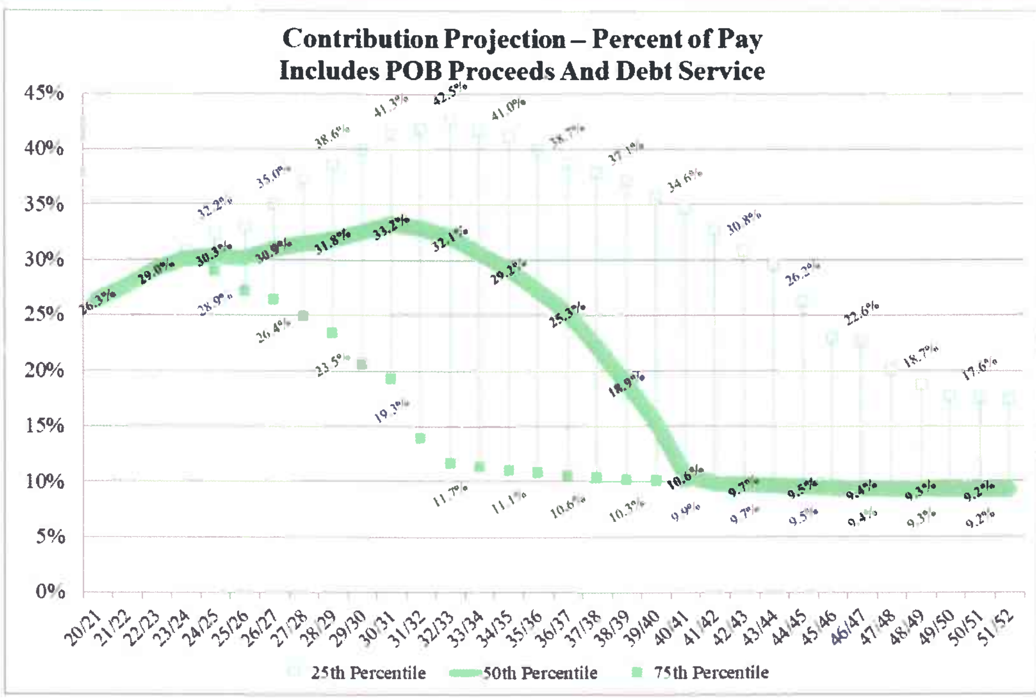
Contribution Projection - $000s
Includes POB Proceeds But Not Debt Service (50th Percentile)



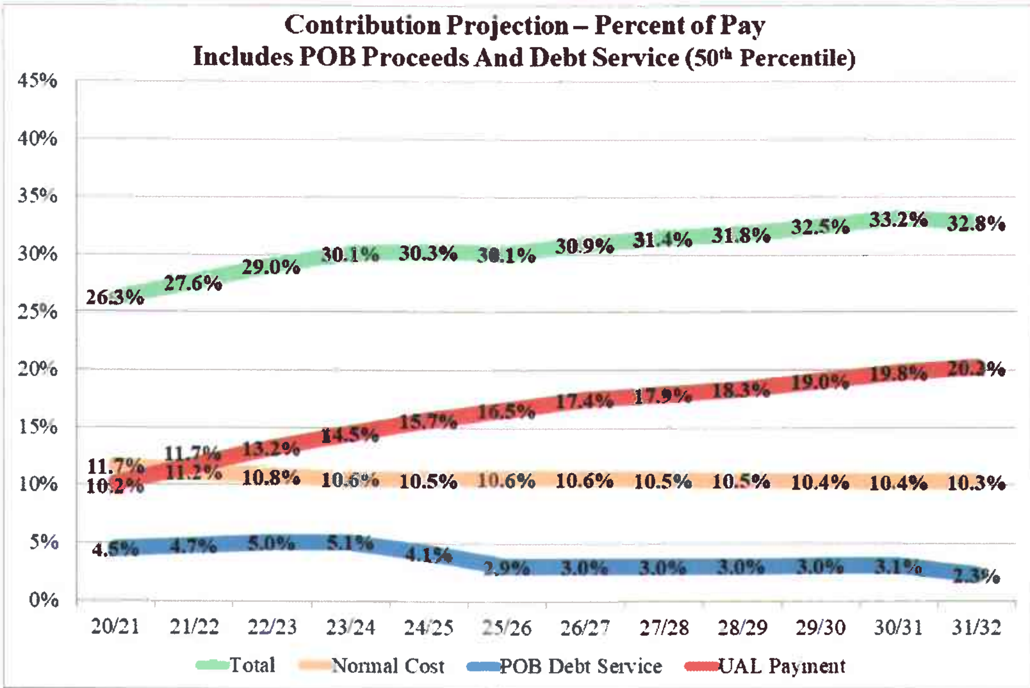
Contribution Projections - Miscellaneous



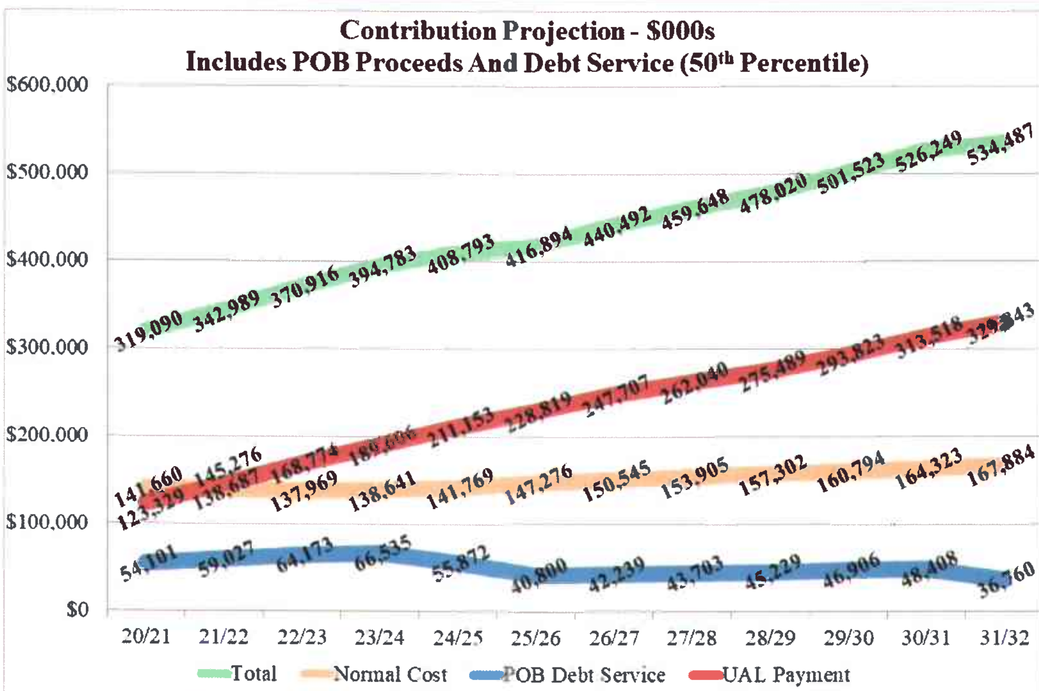
Contribution Projections - Miscellaneous



Contribution Projections - Miscellaneous

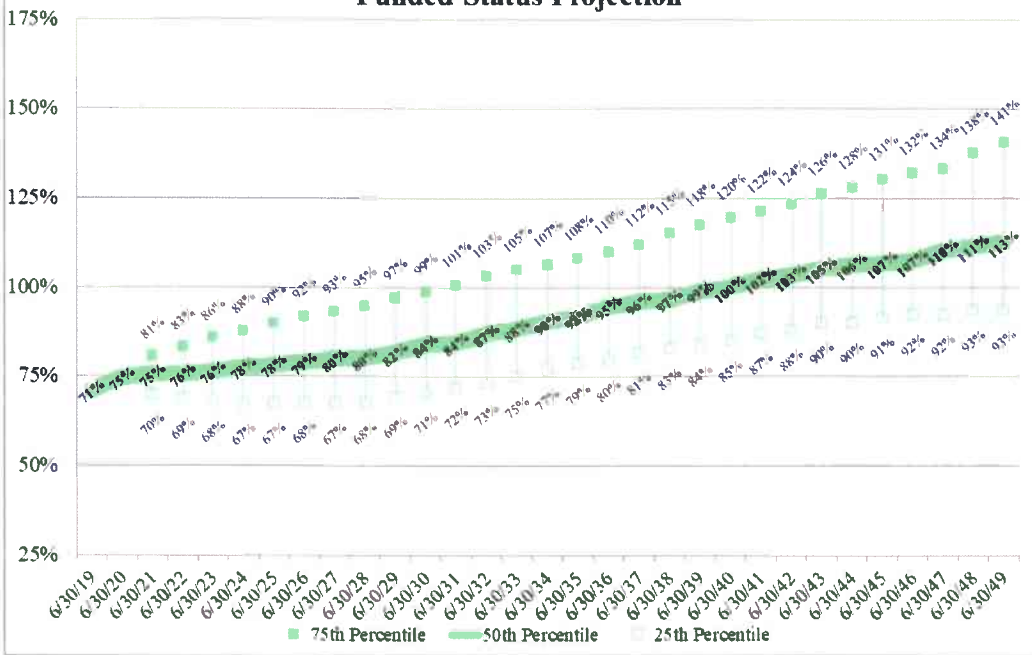


Contribution Projections - Miscellaneous



FUNDED STATUS - MISCELLANEOUS

Funded Status Projection



FUNDED STATUS - MISCELLANEOUS

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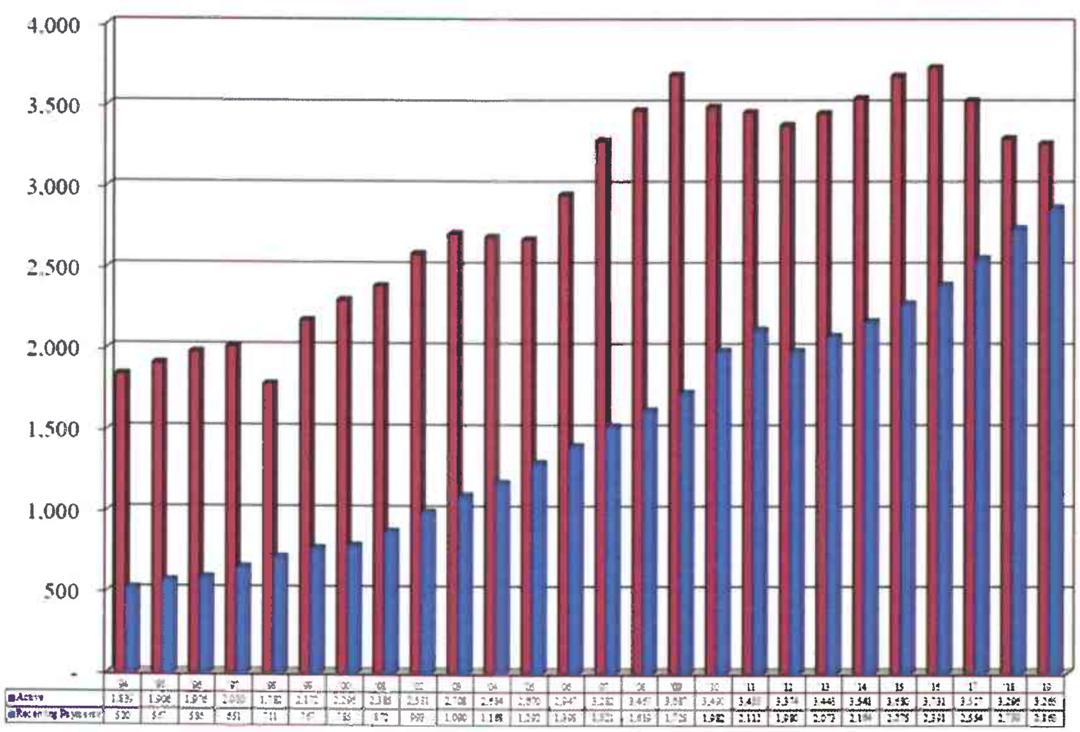
Summary of Demographic Information - Safety

	1999	2009	2018	2019
Actives				
■ Counts	2,172	3,687	3,296	3,265
■ Average				
• Age	39	38	40	40
• County Service	9	8	11	11
• PERSable Wages	$ 48,800	$ 71,900	$ 94,000	$ 93,300
■ Total PERSable Wages	106,000,000	265,200,000	309,700,000	304,700,000
Inactive Members				
■ Counts				
• Transferred	636	577	664	694
• Separated	189	537	649	673
• Retired				
☐ Service		1,073	1,864	1,969
☐ Disability		505	623	627
☐ Beneficiaries		150	252	272
☐ Total	767	1,728	2,739	2,868
■ Average Annual County Provided Benefit for Service Retirees[9]		35,700	59,200	61,300

[9] Average County-provided pensions are based on County service & County benefit formula, and are not representative of benefits for long-service employees.

Summary of Demographic Information - Safety

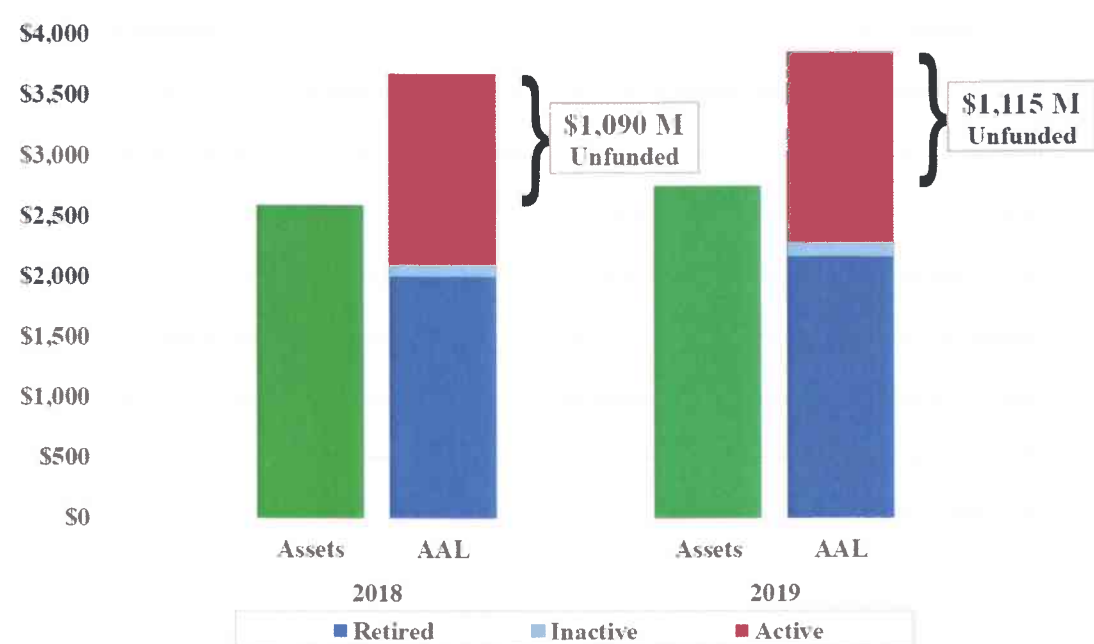


PLAN FUNDED STATUS - SAFETY

	June 30, 2018	June 30, 2019
■ **Actuarial Accrued Liability**		
● Active	$1,577,500,000	$1,575,900,000
● Retiree	1,996,300,000	2,161,300,000
● Inactive	102,800,000	120,600,000
● Total	3,676,600,000	3,857,800,000
■ **Assets**	2,586,900,000	2,742,700,000
■ **Unfunded Liability**	1,089,700,000	1,115,100,000
■ **Funded Ratio**	70.4%	71.1%
■ **Average funded ratio for CalPERS Public Agency Safety Plans**	68.3%	68.6%

PLAN FUNDED STATUS - SAFETY

County CalPERS Assets and Actuarial Liability ($Millions)



Discount Rate Sensitivity
June 30, 2019

	Discount Rate		
	7.00%	**6.50%**[10]	**6.00%**
AAL	$3,857,800,000	$4,151,200,000	$4,444,600,000
Assets	2,742,700,000	2,742,700,000	2,742,700,000
Unfunded Liability	1,115,100,000	1,408,500,000	1,701,900,000
Funded Ratio	71.1%	66.1%	61.7%

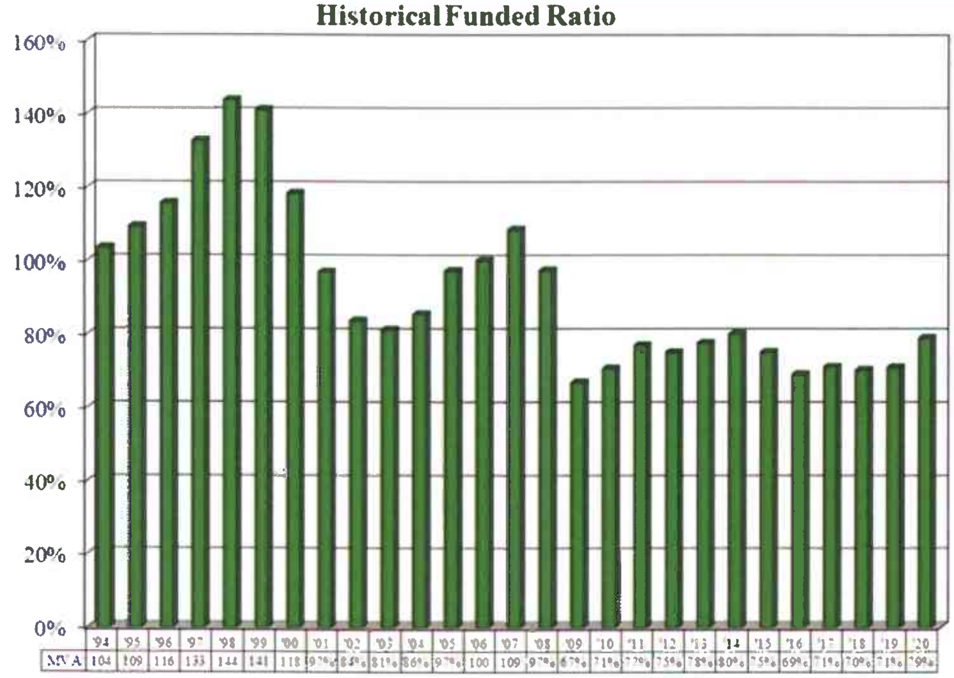
[10] Estimated by Bartel Associates.

Unfunded Accrued Liability Changes

■ **Unfunded Accrued Liability on 6/30/18**		$1,089,700,000
■ **Expected 6/30/19 Unfunded Accrued Liability**		1,125,800,000
■ **Other Changes**		
• Asset Loss (Gain) (6.6% return for FY 2019)	13,400,000	
• Contribution & Experience Loss (Gain)	(24,100,000)	
• Total		(10,700,000)
■ **Unfunded Accrued Liability on 6/30/19**		1,115,100,000
■ **Projected Unfunded Accrued Liability on 6/30/20**[11]		853,200,000

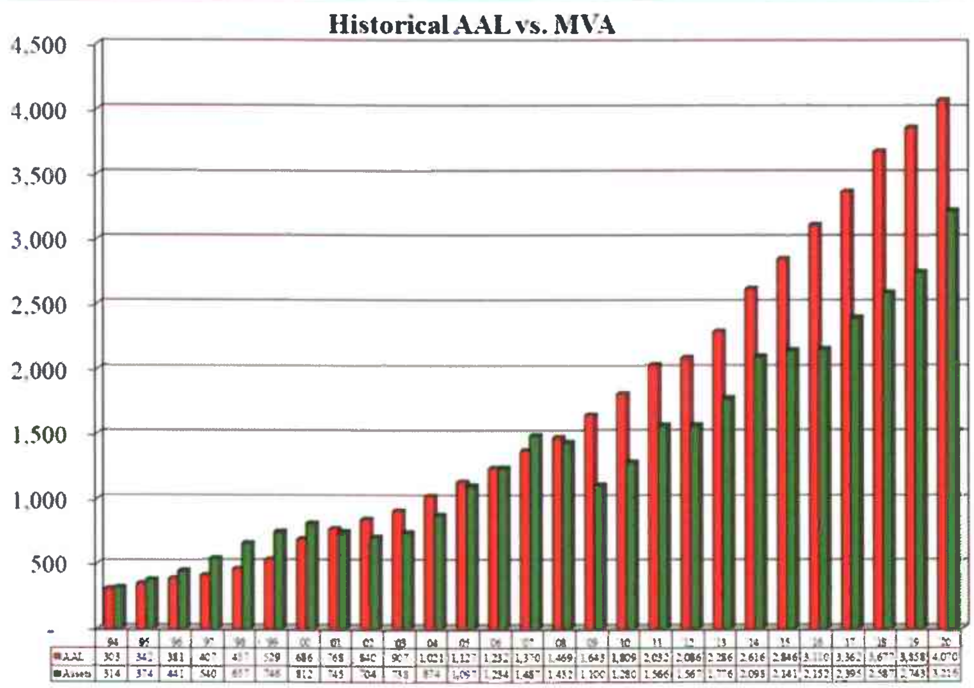
[11] Reflects $344.3 million POB proceeds transferred to CalPERS in May 2020.

FUNDED RATIO - SAFETY



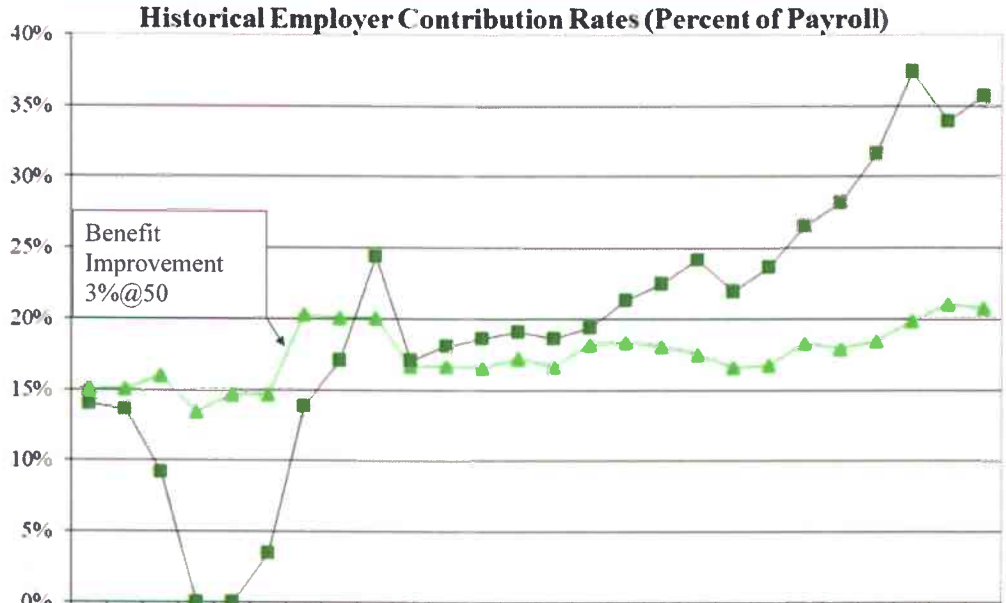
6/30/20 funded status estimated

FUNDED STATUS (MILLIONS) - SAFETY



6/30/20 funded status estimated

Contribution Rates - Safety



	FY 97	FY 98	FY 99	FY 00	FY 01	FY 02	FY 03	FY 04	FY 05	FY 06	FY 07	FY 08	FY 09
Normal Cost	15.0	15.0	16.0	13.4	14.7	14.7	20.3	20.1	20.1	16.7	16.7	16.6	17.2
Total Rate	14.0	13.6	9.1%	0.0%	0.0%	3.4%	13.8	17.0	24.4	17.0	18.0	18.6	19.0

	FY 10	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22
Normal Cost	16.6	18.2	18.4	18.1	17.5	16.6	16.7	18.3	17.9	18.5	19.9	21.1	20.7
Total Rate	18.6	19.3	21.3	22.5	24.1	21.9	23.6	26.6	28.2	31.6	37.4	33.9	35.8

Contribution Rates - Safety

	6/30/18 2020/2021	6/30/19 2021/2022
■ Total Normal Cost	30.5%	30.4%
■ Employee Normal Cost	9.4%	9.6%
■ Employer Normal Cost	21.1%	20.7%
■ Amortization Payments	12.8%[12]	15.0%[13]
■ Total Employer Contribution Rate	33.9%	35.8%

■ 2020/21 Employer Contribution Rate	33.9%
● Payroll < Expected	0.9%
● 6/30/17 Discount Rate & Inflation (3rd Year)	0.4%
● 6/30/18 Discount Rate change (2nd Year)	0.8%
● Other (Gains)/Losses	(0.2%)
■ 2021/22 Employer Contribution Rate	35.8%

12 Reflected $344.3 million POB proceeds transferred to CalPERS in May 2020.

13 Equivalent to 6.2% of UAL. One year, 7% interest on the UAL is 16.8% of payroll. $4.1M additional payment in 2021/22 needed to avoid negative amortization.

Contribution Projections - Safety

- Market Value Investment Return:
  - June 30, 2020 4.7%[14]
  - Future returns based on stochastic analysis using 1,000 trials

Single Year Returns at[15]	25th Percentile	50th Percentile	75th Percentile
Current Investment Mix	**0.1%**	**7.0%**	**14.8%**
Ultimate Investment Mix	**0.8%**	**6.0%**	**11.4%**

  - Assumes investment returns will, generally be 6.5% (as compared to 7.0%) over the next 8 years and higher beyond that.
- Discount Rate projected to decrease due to Risk Mitigation policy
- No Other: Gains/Losses, Method/Assumption Changes, Benefit Improvements
- Different from CalPERS projection

[14] Gross return based on July 2020 CalPERS press release

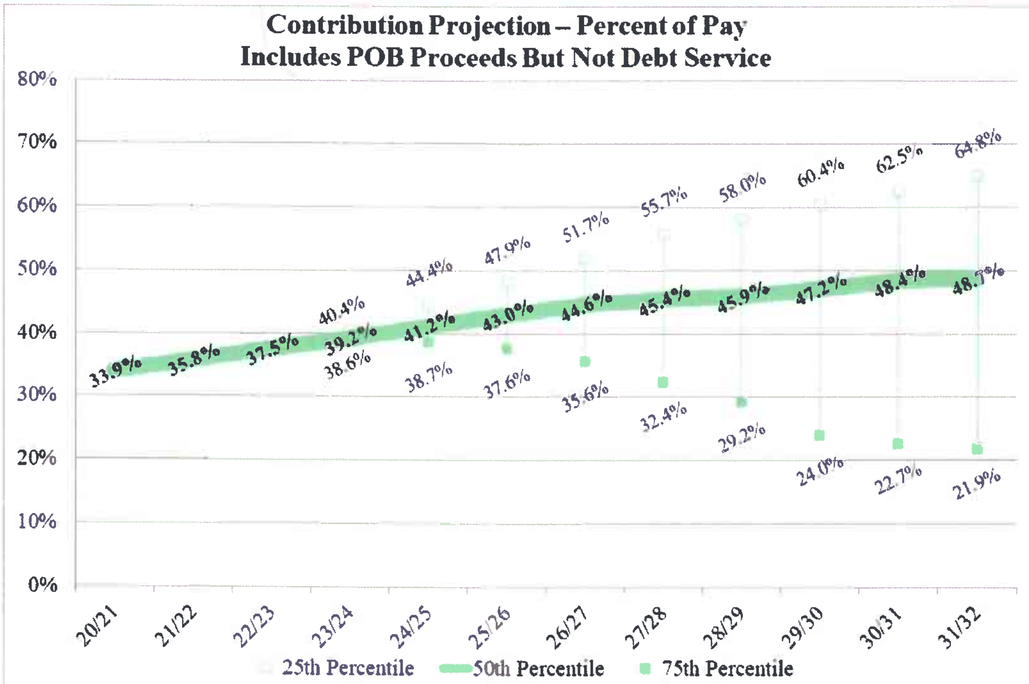
[15] N^{th} percentile means N percentage of our trials result in returns lower than the indicated rates.

Contribution Projections - Safety

- New hire assumptions:
  - 95% of 2020/21 new hires are PEPRA members and 5% are Classic members
  - Percentage of PEPRA member future hires to increase from 95% to 100% over 2 years
- 6/30/19 employee distribution:

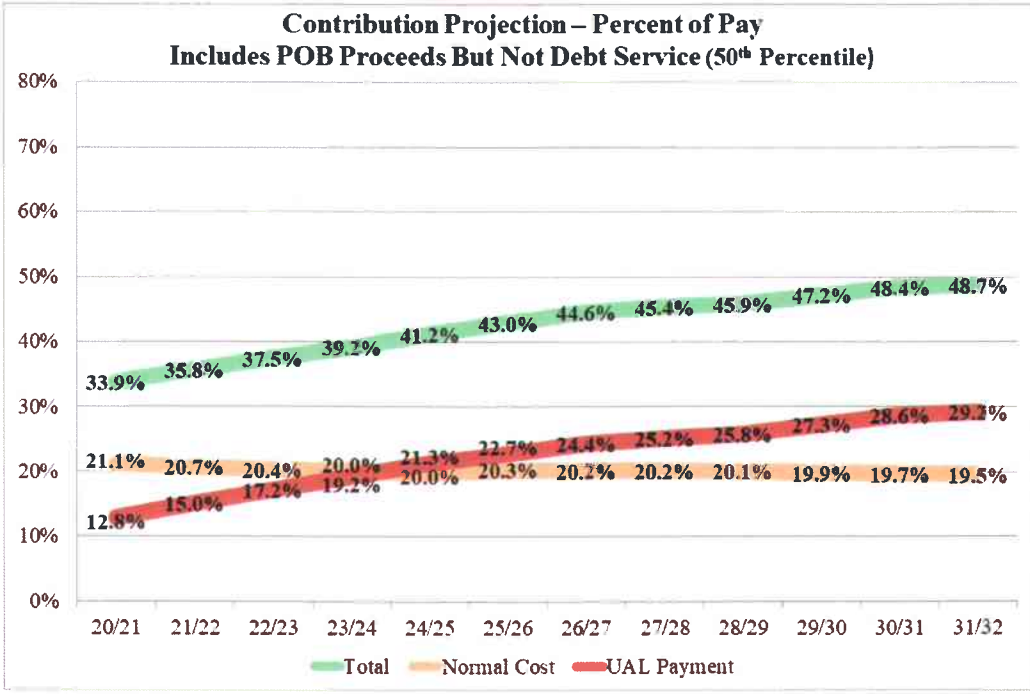
Benefit Tier	Count	6/30/19 Payroll
• 3%@50 FAE1	2,300	$240,284,000
• 2%@50 FAE3	128	10,103,100
• 2.7%@57 FAE3 (PEPRA)	837	54,345,900

CONTRIBUTION PROJECTIONS - SAFETY

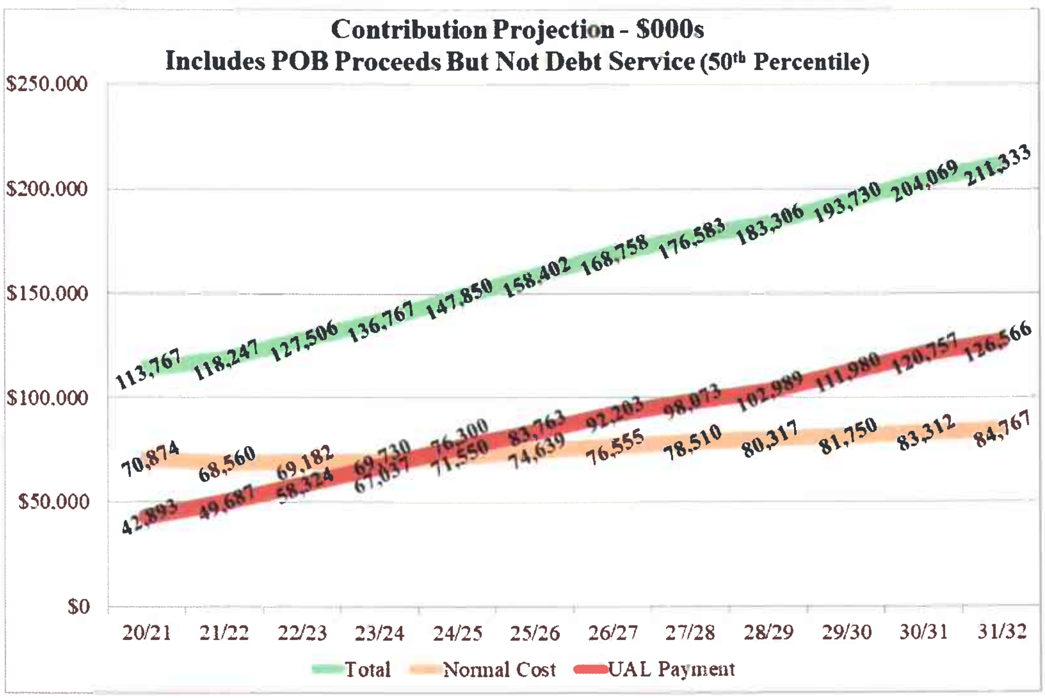


CONTRIBUTION PROJECTIONS - SAFETY

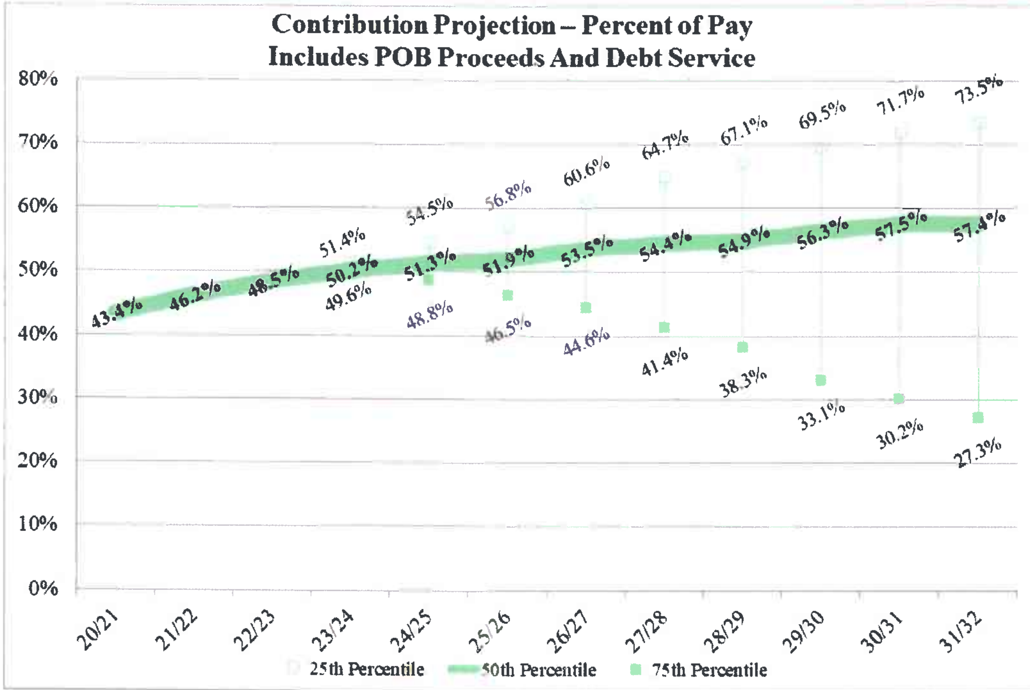
CONTRIBUTION PROJECTIONS - SAFETY



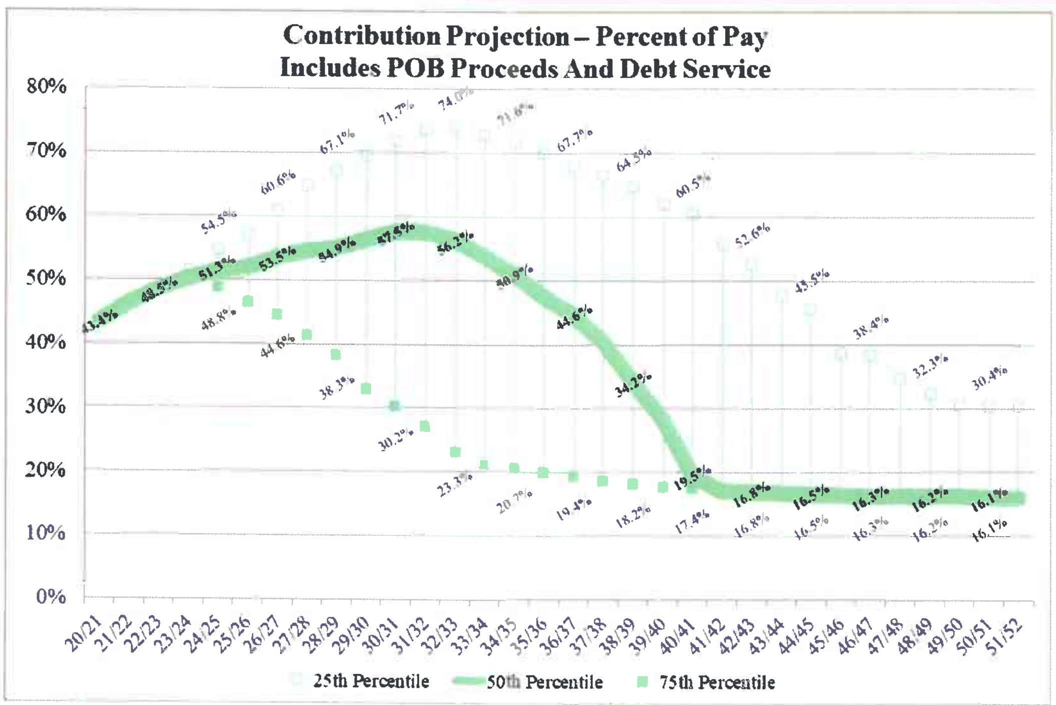
CONTRIBUTION PROJECTIONS - SAFETY



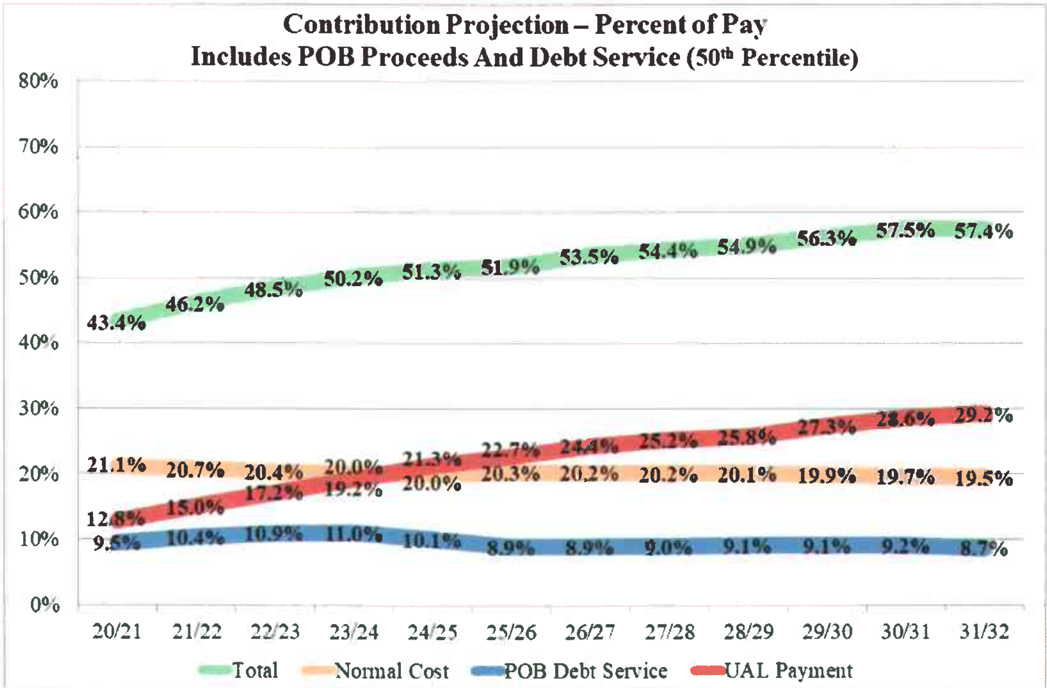
Contribution Projections - Safety



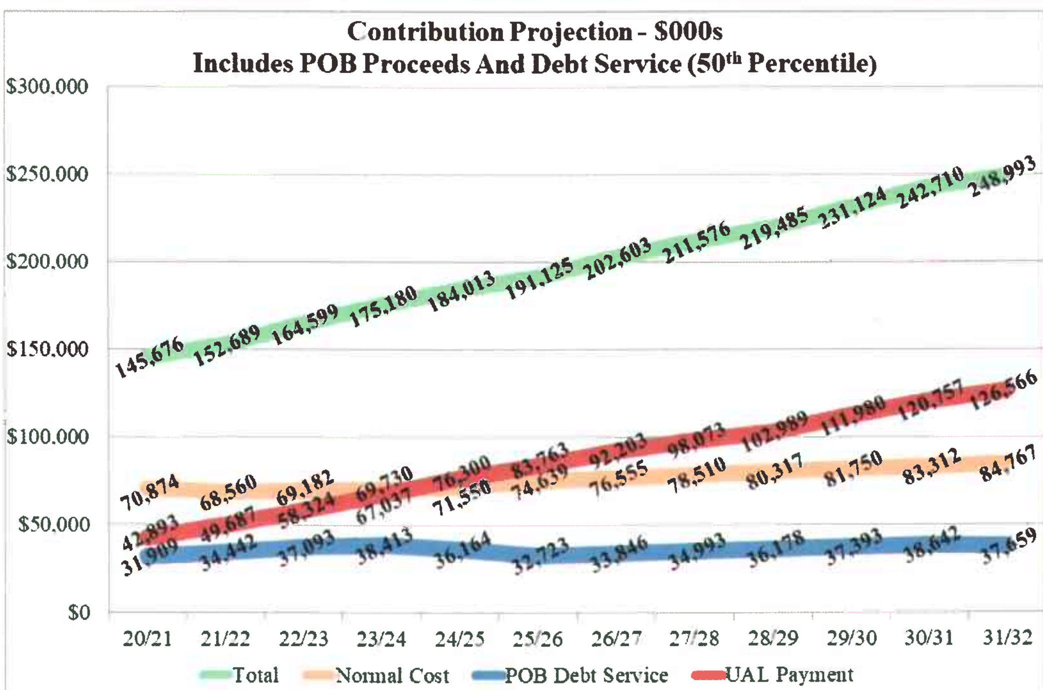
Contribution Projections - Safety



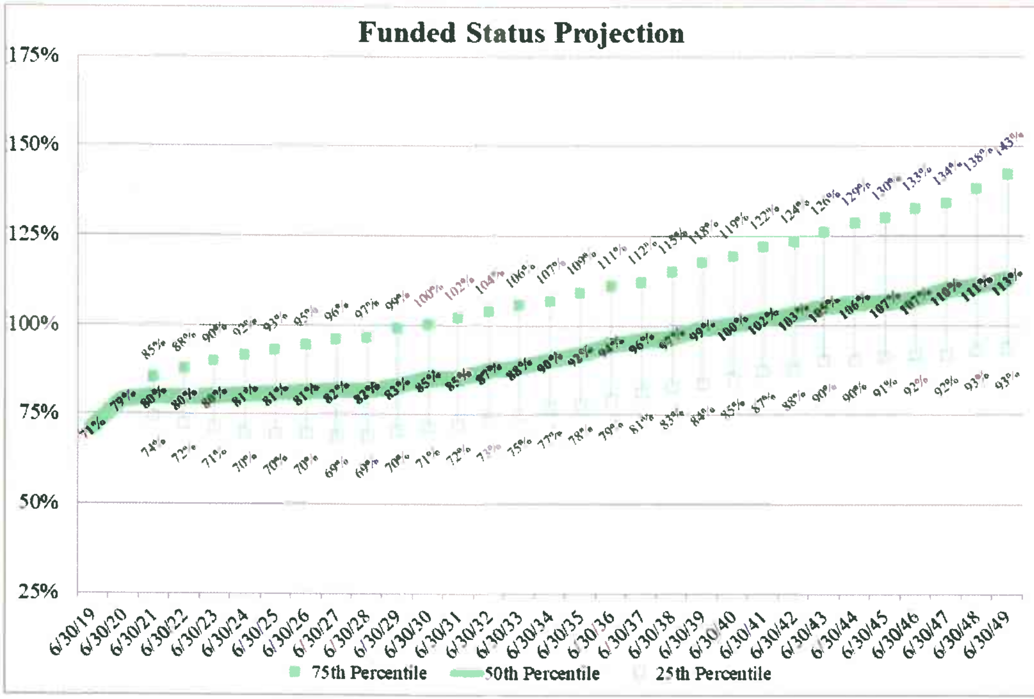
Contribution Projections - Safety



Contribution Projections - Safety



FUNDED STATUS - SAFETY



FUNDED STATUS - SAFETY

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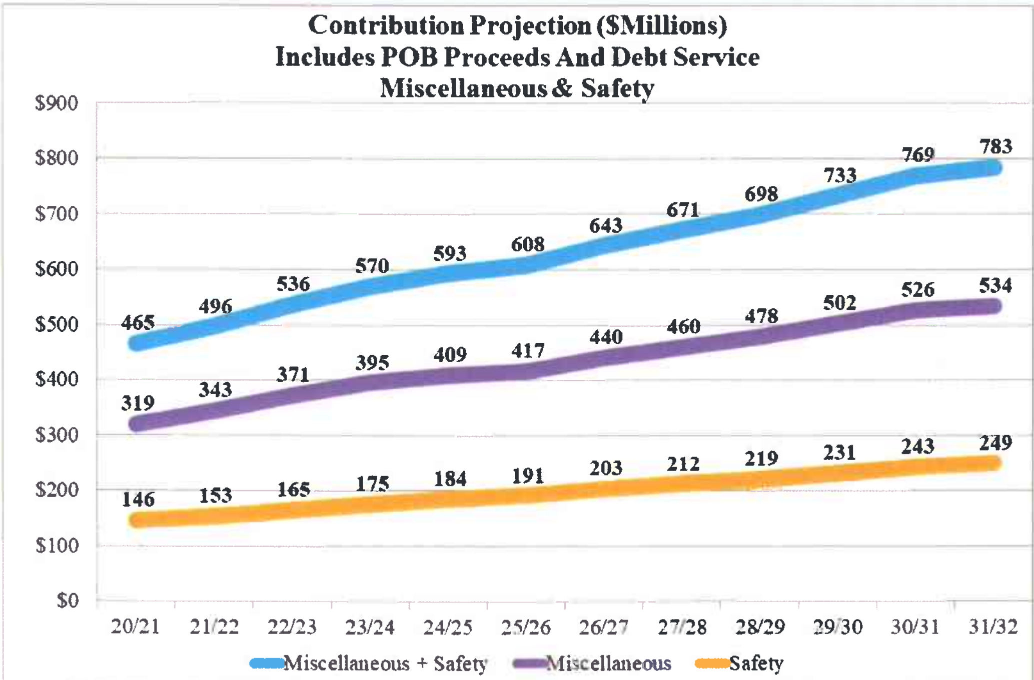
Combined Miscellaneous and Safety



Combined Miscellaneous and Safety

Funded Status Summary on June 30, 2019
(Amounts in $Millions)

	Miscellaneous	Safety	Total
■ AAL	$ 8,603	$ 3,858	$ 12,461
■ Assets	6,103	2,743	8,846
■ Unfunded AAL	2,500	1,115	3,615
■ Funded Ratio	70.9%	71.1%	71.0%

Payroll Projections
($000s)

FY	20/21	21/22	22/23	23/24	24/25
Miscellaneous	$1,213,566	$1,242,712	$1,276,887	$1,312,001	$1,348,081
Safety	335,974	330,571	339,662	349,002	358,600
Total	1,549,540	1,573,283	1,616,549	1,661,003	1,706,681

FY	25/26	26/27	27/28	28/29	29/30
Miscellaneous	$1,385,153	$1,423,245	$1,462,384	$1,502,600	$1,543,922
Safety	368,462	378,594	389,006	399,703	410,695
Total	1,753,615	1,801,839	1,851,390	1,902,303	1,954,617

FY	30/31	31/32
Miscellaneous	$1,586,379	$1,630,005
Safety	421,989	433,594
Total	2,008,368	2,063,599

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LEAVING CALPERS

- Participation in CalPERS is governed by State law and CalPERS rules
- The following are considered "withdrawing" from CalPERS:
  - Exclude new hires from CalPERS & giving them a different pension
  - Stop accruing benefits for current employees
- "Withdrawal" from CalPERS:
  - Treated as plan termination
  - Liability increased for conservative investments
  - Liability increased for future demographic fluctuations
  - Liability must be funded immediately by withdrawing agency
  - Otherwise, retiree benefits are cut

LEAVING CALPERS

CalPERS Termination Estimates on June 30, 2019 (Amounts in Millions)

Discount Rate	Ongoing Plan 7.00%	Termination Basis 1.75%	Termination Basis 3.25%
Miscellaneous			
Actuarial Accrued Liability	$ 8,603	$ 17,512	$ 13,723
Assets	6,103	6,103	6,103
Unfunded AAL (UAAL)	2,500	11,409	7,620
Safety			
Actuarial Accrued Liability	3,858	8,288	6,386
Assets	2,743	2,743	2,743
Unfunded AAL (UAAL)	1,115	5,545	3,643
Total			
Unfunded AAL (UAAL)	3,615	16,954	11,263
Funded Ratio	71.0%	34.3%	44.0%

2005 POB Proceeds Balance (Millions)

	Safety	Misc.	Total
■ POB @ **2/16/05**	**$ 85.7**	**$ 311.2**	**$ 396.9**
■ Accumulated earnings through 6/30/20	84.8	307.9	392.8
■ Accumulated amortization payments through 6/30/20	(80.5)	(292.3)	(372.9)
■ **Balance @ 6/30/20**	**90.0**	**326.8**	**416.8**
■ Earnings 7/1/20 - 2/15/21[16]	3.9	14.1	18.0
■ Amortization payment through 2/15/21[17]	(3.8)	(13.9)	(17.7)
■ **Balance @ 2/15/21**	**90.1**	**327.0**	**417.1**

[16] Based on assumed return from 7/1/20 to 2/15/2021.
[17] Based on a 23 year closed amortization.

2005 POB Outstanding Balance (Millions)

	Payments			
	Principal	Interest	Total	Balance
■ 2/17/05	n/a	n/a	n/a	$400.0
■ 8/15/05	n/a	$9.4	$9.4	400.0
. . . . .				
■ 2/15/2020	$25.0	6.0	31.1	218.8
■ 8/15/2020	0.0	5.4	5.4	218.8
■ 2/15/2021	27.7	5.4	33.1	191.1

2005 POB Net Estimated Gains (Millions)

- Estimated Gains through February 15, 2021:

A.	CalPERS Estimated Balance of Bond Proceeds (slide 63)	$ 417.1
B.	Outstanding Bond Balance (slide 64)	(191.1)
C.	Cash Flow Savings/(Deficit) [Payments that would have been paid to CalPERS less POB debt service]	(79.4)
D.	**Net [(A) + (B) + (C)]**	**146.6**

- Estimated Gains through February 15, 2021:

E.	CalPERS Investment Earnings[18]	$ 410.8
F.	POB Interest Payments	(261.1)
G.	Cost of Issuance	(3.1)
H.	**Net [(E) + (F) + (G)]**	**146.6**

- Above estimates based on market rate of return.

[18] Accumulated earnings since issuance based on actual CalPERS investment return for each year

2020 POB Proceeds Balance (Millions)

	Safety	Misc.	Total
Total issued	**$ 346.3**	**$ 373.7**	**$ 720.0**
Cost of issuance	2.0	2.1	4.1
POB Deposited with CalPERS@ 5/6/20	**$ 344.3**	**$ 371.6**	**$ 715.9**
Earnings 5/6/20 to 6/30/20[19]	2.3	2.5	4.8
Amortization payment through 6/30/20	(4.6)	(5.0)	(9.6)
Balance @ 6/30/20	**342.0**	**369.1**	**711.1**
Earning 7/1/20 - 2/15/21[20]	14.8	15.9	30.7
Amortization payment through 2/15/21[21]	(19.5)	(21.1)	(40.6)
Balance @ 2/15/21	**337.3**	**364.0**	**701.2**

[19] Based on actual 19/20 earnings of 4.55% and prorated for the period from 5/6/20 to 6/30/20
[20] Based on assumed return from 7/1/20 to 2/15/2021.
[21] Based on a 20 year closed level dollar amortization.

2020 POB OUTSTANDING BALANCE (MILLIONS)

	Payments			
	Principal	Interest	Total	Balance
5/6/20	n/a	n/a	n/a	$720.0
8/15/20	n/a	$ 6.4	$ 6.4	720.0
2/15/21	$29.5	11.6	41.1	690.5

2020 POB NET ESTIMATED GAINS (MILLIONS)

- Estimated Gains through February 15, 2021:

A.	CalPERS Estimated Balance (slide 66)	$701.2
B.	Bond Proceeds Balance (slide 67)	(690.5)
C.	Cash Flow Savings/(Deficit) [Payments that would have been paid to CalPERS less POB debt service]	2.8
D.	**Net [(A) + (B) + (C)]**	**13.5**

- Estimated Gains through February 15, 2021:

E.	CalPERS Investment Earnings	$35.6
F.	POB Interest Payments	(17.9)
G.	Cost of Issuance	(4.1)
H.	**Net [(E) + (F) + (G)]**	**13.5**

- Above estimates based on market rate of return.

NET FUNDED RATIO (MILLIONS)

		Safety			
		6/30/18	6/30/19	Proj. 6/30/20	Proj. 6/30/21[22]
(1)	AAL	$3,677	$3,858	$4,070	$4,290
(2)	MVA	2,587	2,743	3,216	3,455
(3)	UAAL [(1) - (2)]	1,090	1,115	853	835
(4)	Funding Ratio [(2)/(1)]	70.4%	71.1%	79.0%	80.5%
(5)	POB Balance	$58	$53	$394	$373
(6)	Net MVA [(2) - (5)]	2,529	2,690	2,823	3,082
(7)	Net Funding Ratio [(6)/(1)]	68.8%	69.7%	69.4%	71.8%

22 Projected 6/30/21 MVA based on assumed returns for 2020/21.

NET FUNDED RATIO (MILLIONS)

		Miscellaneous			
		6/30/18	6/30/19	Proj. 6/30/20	Proj. 6/30/21[23]
(1)	AAL	$8,166	$8,603	$9,090	$9,596
(2)	MVA	5,749	6,103	6,773	7,292
(3)	UAAL [(1) - (2)]	2,417	2,500	2,317	2,304
(4)	Funding Ratio [(2)/(1)]	70.4%	70.9%	74.5%	76.0%
(5)	POB Balance	$209	$191	$545	$508
(6)	Net MVA [(2) - (5)]	5,540	5,912	6,227	6,784
(7)	Net Funding Ratio [(6)/(1)]	67.8%	68.7%	68.5%	70.7%

23 Projected 6/30/21 MVA based on assumed returns for 2020/21.

Net Funded Ratio (Millions)

		Total			
		6/30/18	6/30/19	Proj. 6/30/20	Proj. 6/30/21[24]
(1)	AAL	$11,842	$12,461	$13,159	$13,887
(2)	MVA	8,336	8,846	9,989	10,748
(3)	UAAL [(1) - (2)]	3,507	3,615	3,170	3,139
(4)	Funding Ratio [(2)/(1)]	70.4%	71.0%	75.9%	77.4%
(5)	POB Balance	$266	$244	$939	$882
(6)	Net MVA [(2) - (5)]	8,069	8,602	9,050	9,866
(7)	Net Funding Ratio [(6)/(1)]	68.1%	69.0%	68.8%	71.0%

[24] Projected 6/30/21 MVA based on assumed returns for 2020/21.

Net Funded Ratio (Millions)

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PEPRA COST SHARING

- Target of 50% of total normal cost paid by all employees
- *PEPRA members* must pay greater of 50% of total normal cost or bargained amount if higher
- Employer cannot pay any part of *PEPRA member* required employee contributions
- Employer may impose current employees pay 50% of total normal cost (limited to 8% of pay for Miscellaneous and 12% for Safety) if not agreed through collective bargaining
- Miscellaneous Plan 2021/22:

	Classic Members		New Members
	Tier 1 3%@60 FAE1	Tier 2 2%@60 FAE3	PEPRA 2%@62 FAE3
Employer Normal Cost	12.9%	10.2%	7.50%
Member Normal Cost	8.0%	7.0%	7.25%
Total Normal Cost	20.9%	17.2%	14.75%
50% Target	10.5%	8.6%	7.38%

PEPRA COST SHARING

- Safety Plan 2020/21:

	Classic Members		New Members
	Tier 1 3%@50 FAE1	Tier 2 3%@55 FAE3	PEPRA 2.7%@57 FAE3
Employer Normal Cost	22.5%	19.6%	13.37%
Member Normal Cost	9.0%	9.0%	12.50%
Total Normal Cost	31.5%	28.6%	25.87%
50% Target	15.8%	14.3%	12.94%

- PEPRA Member Contributions:

	2020/21		2021/22			
Group	Total NC (Basis)	Member Rate	Total Normal Cost	Change	Member Rate	Method
Miscellaneous	14.67%	7.25%	14.75%	0.08%	7.25%	PEPRA Members
Safety	24.96%	12.50%	25.87%	0.91%	12.50%	PEPRA Members

Paying Down the Unfunded Liability & Rate Stabilization

- Where do you get the money from?
- How do you use the money?

Where Do You Get the Money From?

- POB:
  - Usually thought of as interest arbitrage between expected earnings and rate paid on POB
  - No guaranteed savings
  - PEPRA prevents contributions from dropping below normal cost
    - ☐ Savings offset when investment return is good
  - GFOA Advisory
- Borrow from General Fund similar to State
- One time payments
  - Governing body resolution to use a portion of one time money, e.g.
    - ☐ 1/3 to one time projects
    - ☐ 1/3 to replenish reserves and
    - ☐ 1/3 to pay down unfunded liability

How Do You Use the Money?

- Internal Service Fund
  - Typically used for rate stabilization
  - Restricted investments:
    - Likely low (0.5%-1.0%) investment returns
    - Short term/high quality, designed for preservation of principal
  - Assets can be used by governing body for other purposes
  - Does not reduce Unfunded Liability

How Do You Use the Money?

- Make payments directly to CalPERS:
  - Likely best long-term investment return
  - Must be considered an irrevocable decision
    - Extra payments cannot be used as future "credit"
    - PEPRA prevents contributions from dropping below normal cost
  - Option #1: Request shorter amortization period (Fresh Start):
    - Higher short term payments
    - Less interest and lower long term payments
    - Likely cannot revert to old amortization schedule
      - Savings offset when investment return is good (PEPRA)

- Make payments directly to CalPERS (continued):
  - Option #2: Target specific amortization bases:
    - Extra contribution's impact muted by reduced future contributions
      - CalPERS can't track the "would have been" contribution
    - No guaranteed savings
      - Larger asset pool means larger loss (or gain) opportunity
    - Paying off shorter amortization bases: larger contribution savings over shorter period:
      - e.g. 10 year base reduces contribution 11.9¢ for $1
      - Less interest savings vs paying off longer amortization bases
    - Paying off longer amortization bases: smaller contribution savings over longer period:
      - e.g. 25 year base reduces contribution 6.2¢ for $1
      - More interest savings vs paying off shorter amortization bases

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IRREVOCABLE SUPPLEMENTAL (§115) PENSION TRUST

- Can only be used to:
  - Reimburse County for CalPERS contributions
  - Make payments directly to CalPERS
- Investments significantly less restricted than County investment funds
  - Fiduciary rules govern Trust investments
  - Usually, designed for long term returns
- Assets don't count for GASB accounting
  - Are considered Employer assets
- Over 100 trusts established, mostly since 2015
  - Trust providers: PARS, PFM, Keenan
  - California Employers' Pension Prefunding Trust (CEPPT) effective July 2019
    - ☐ Strategy 1: 48% stocks / 52% bonds
    - ☐ Strategy 2: 22% stocks / 78% bonds

IRREVOCABLE SUPPLEMENTAL (§115) PENSION TRUST

- More flexibility than paying CalPERS directly
  - County decides if and when and how much money to put into Trust
  - County decides if and when and how much to withdraw to pay CalPERS or reimburse Agency
- Funding strategies typically focus on
  - Reducing the unfunded liability
    - ☐ Fund enough to make total CalPERS UAL = 0
    - ☐ Make PEPRA required payments from Trust when overfunded
  - Stabilizing contribution rates
    - ☐ Mitigate expected contribution rates to better manage budget
  - Combination
    - ☐ Use funds for rate stabilization/budget predictability
    - ☐ Target increasing fund balance to pay off UAL sooner

Irrevocable Supplemental (§115) Pension Trust

- Consider:
  - How much can you put into Trust?
    - Initial seed money?
    - Additional amounts in future years?
  - When do you take money out?
    - Target budget rate?
    - Year target budget rate kicks in?
      - Before or after CalPERS rate exceeds budgeted rate?

Comparison of Options

- **Supplemental Trust**
  - Flexible
  - Likely lower long-term return
  - Investment strategy choice
  - Does not reduce net pension liability for GASB reporting
  - More visible
- **CalPERS**
  - Locked In
  - Likely higher long-term return
  - No investment choice
  - Reduces net pension liability for GASB reporting
  - More restricted

ACTUARIAL CERTIFICATION

This report presents analysis of the County of Riverside's CalPERS pension plans. The purpose of this report is to provide the County:

- Historical perspective on the plan investment returns, assets, funded status and contributions.
- Projections of likely future contributions and the impact of investment volatility

The calculations and projections in this report are based on information contained in the County's June 30, 2019 and earlier CalPERS actuarial valuation reports. We reviewed this information for reasonableness, but do not make any representation on the accuracy of the CalPERS reports.

Future investment returns and volatility are based on Bartel Associates Capital Market model which results in long term returns summarized on pages 23 and 45.

Future results may differ from our projections due to differences in actual experience as well as changes in plan provisions, CalPERS actuarial assumptions or methodology. Other than variations in investment return, this study does not analyze these.

To the best of our knowledge, this report is complete and accurate and has been conducted using generally accepted actuarial principles and practices. As members of the American Academy of Actuaries meeting the Academy Qualification Standards, we certify the actuarial results and opinions herein.

Respectfully submitted,

Mary Elizabeth Redding, FSA, EA, MAAA
Vice President
Bartel Associates, LLC
December 23, 2020

Bianca Lin, FSA, EA, MAAA
Assistant Vice President
Bartel Associates, LLC
December 23, 2020

ACTUARIAL CERTIFICATION

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CalPERS

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July 2020

Miscellaneous Plan of the County of Riverside (CalPERS ID: 5982690295)
Annual Valuation Report as of June 30, 2019

Dear Employer,

Attached to this letter, you will find the June 30, 2019 actuarial valuation report of your CalPERS pension plan. **Provided in this report is the determination of the minimum required employer contributions for fiscal year 2021-22**. In addition, the report also contains important information regarding the current financial status of the plan as well as projections and risk measures to aid in planning for the future.

Actuarial valuations are based on assumptions regarding future plan experience including investment return and payroll growth, eligibility for the types of benefits provided, and longevity among retirees. The CalPERS Board of Administration adopts these assumptions after considering the advice of CalPERS actuarial and investment teams and other professionals. Each actuarial valuation reflects all prior differences between actual and assumed experience and adjusts the contribution rates as needed. This valuation is based on an investment return assumption of 7.0 percent, which was adopted by the board in December 2016. Other assumptions used in this report are those recommended in the CalPERS Experience Study and Review of Actuarial Assumptions report from December 2017.

Required Contributions

The table below shows the minimum required employer contributions and the Employee PEPRA Rate for fiscal year 2021-22 along with an estimate of the required contribution for fiscal year 2022-23. Employee 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
2021-22	11.16%	$145,275,743	7.25%
Projected Results			
2022-23	*10.9%*	*$165,031,000*	*TBD*

The actual investment return for fiscal year 2019-20 was not known at the time this report was prepared. The projections above assume the investment return for that year would be 7.0 percent. ***To the extent the actual investment return for fiscal year 2019-20 differs from 7.0 percent, the actual contribution requirements for fiscal year 2022-23 will differ from those shown above.*** 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. This section also contains projected required contributions through fiscal year 2026-27.

Changes from Previous Year's Valuations

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 as a level dollar amount. In addition, the new policy does not utilize a 5-year ramp-up and ramp-down on UAL bases attributable to assumption and method changes and non-investment gains/losses. The new policy does not utilize a 5-year ramp-down on investment gains/losses. These changes apply only to new UAL bases established on or after June 30, 2019.

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.

Questions

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, 2020 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

CalPERS

Actuarial Valuation as of June 30, 2019

for the Miscellaneous Plan of the County of Riverside

(CalPERS ID: 5982690295)
(Valuation Rate Plan ID: 62)

Required Contributions for Fiscal Year July 1, 2021 – June 30, 2022

Table of Contents

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 County of Riverside. This valuation is based on the member and financial data as of June 30, 2019 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.

Kurt Schneider

KURT SCHNEIDER, MPA, ASA, EA, MAAA
Supervising Pension Actuary, CalPERS

Highlights and Executive Summary

- **Introduction**
- **Purpose of the Report**
- **Required Contributions**
- **Additional Discretionary Employer 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, 2019 actuarial valuation of the Miscellaneous Plan of the County of Riverside of the California Public Employees' Retirement System (CalPERS). This actuarial valuation sets the minimum required employer contributions for fiscal year 2021-22.

Purpose of the Report

The actuarial valuation was prepared by the CalPERS Actuarial Office using data as of June 30, 2019. The purpose of the report is to:

- Set forth the assets and accrued liabilities of this plan as of June 30, 2019;
- Determine the minimum required employer contributions for the fiscal year July 1, 2021 through June 30, 2022;
- Provide actuarial information as of June 30, 2019 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.

Assessment and Disclosure of Risk

This report includes the following risk disclosures consistent with the recommendations of Actuarial Standards of Practice No. 51 and recommended by the California Actuarial Advisory Panel (CAAP) in the Model Disclosure Elements document:

- A "Scenario Test," projecting future results under different investment income returns.
- A "Sensitivity Analysis," showing the impact on current valuation results using alternative discount rates of 6.0 percent and 8.0 percent.
- A "Sensitivity Analysis," showing the impact on current valuation results assuming rates of mortality are 10 percent lower or 10 percent higher than our current mortality assumptions adopted in 2017.
- Plan maturity measures indicating how sensitive a plan may be to the risks noted above.

Required Contributions

	Fiscal Year
Required Employer Contribution	**2021-22**
Employer Normal Cost Rate	**11.16%**
Plus, Either	
1) Monthly Employer Dollar UAL Payment	**$12,106,312**
Or	
2) Annual UAL Prepayment Option*	**$140,443,362**
Required PEPRA Member Contribution Rate	**7.25%**

*The total minimum required employer contribution is the **sum** of the Plan's Employer Normal Cost Rate (expressed as a percentage of payroll) and 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)**. Any prepayment totaling over $5 million requires a 72-hour notice email to FCSD_public_agency_wires@calpers.ca.gov. 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 "PEPRA Member Contribution Rates" in the "Liabilities and Contributions" section. Required member contributions for Classic members can be found in Appendix B.

	Fiscal Year 2020-21	Fiscal Year 2021-22
Normal Cost Contribution as a Percentage of Payroll		
Total Normal Cost	19.091%	18.76%
Employee Contribution[1]	7.418%	7.60%
Employer Normal Cost[2]	11.673%	11.16%
Projected Annual Payroll for Contribution Year	$1,213,566,060	$1,242,712,226
Estimated Employer Contributions Based On Projected Payroll		
Total Normal Cost	$231,681,895	$233,132,814
Employee Contribution[1]	90,022,330	94,446,129
Employer Normal Cost[2]	141,659,565	138,686,685
Unfunded Liability Contribution	155,375,654	145,275,743
% of Projected Payroll (illustrative only)	12.803%	11.69%
Estimated Total Employer Contribution	$297,035,219	$283,962,428
% of Projected Payroll (illustrative only)	24.476%	22.85%

[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 the "Liabilities and Contributions" section. 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. For a breakout of normal cost by benefit group, see "Normal Cost by Benefit Group" in the "Liabilities and Contributions" section.

Additional Discretionary Employer Contributions

The minimum required employer contribution towards the Unfunded Accrued Liability (UAL) for this rate plan for the 2021-22 fiscal year is $145,275,743. CalPERS allows employers to make additional discretionary payments (ADPs) at any time and in any amount. These optional payments serve to reduce the UAL and future required contributions and can result in significant long-term savings. Employers can also use ADPs to stabilize annual contributions as a fixed dollar amount, percent of payroll or percent of revenue.

Provided below are select ADP options for consideration. Making such an ADP during fiscal year 2021-22 does not require an ADP be made in any future year, nor does it change the remaining amortization period of any portion of unfunded liability. For information on permanent changes to amortization periods, see the "Amortization Schedule and Alternatives" section of the report.

If you are considering making an ADP, please contact your actuary for additional information.

Minimum Required Employer Contribution for Fiscal Year 2021-22

Estimated Normal Cost	Minimum UAL Payment	ADP	Total UAL Contribution	Estimated Total Contribution
$138,686,685	$145,275,743	$0	$145,275,743	$283,962,428

The minimum required contribution above is less than interest on the UAL. With no ADP the UAL is projected to increase over the following year. If the minimum UAL payment were split between interest and principal, the principal portion would be negative. This situation is referred to as "negative amortization."

Fiscal Year 2021-22 Employer Contribution Necessary to Avoid Negative Amortization

Estimated Normal Cost	Minimum UAL Payment	ADP[1]	Total UAL Contribution	Estimated Total Contribution
$138,686,685	$145,275,743	$3,517,864	$148,793,607	$287,480,292

Alternative Fiscal Year 2021-22 Employer Contributions for Greater UAL Reduction

Funding Target	Estimated Normal Cost	Minimum UAL Payment	ADP[1]	Total UAL Contribution	Estimated Total Contribution
20 years	$138,686,685	$145,275,743	$55,368,026	$200,643,769	$339,330,454
15 years	$138,686,685	$145,275,743	$88,106,231	$233,381,974	$372,068,659
10 years	$138,686,685	$145,275,743	$157,365,144	$302,640,887	$441,327,572
5 years	$138,686,685	$145,275,743	$373,143,915	$518,419,658	$657,106,343

[1] The ADP amounts are assumed to be made in the middle of the fiscal year. A payment made earlier or later in the fiscal year would have to be less or more than the amount shown to have the same effect on the UAL amortization.

Note that the calculations above are based on the projected Unfunded Accrued Liability as of June 30, 2021 as determined in the June 30, 2019 actuarial valuation. New unfunded liabilities can emerge in future years due to assumption or method changes, changes in plan provisions and actuarial experience different than assumed. Making an ADP illustrated above for the indicated number of years will not result in a plan that is exactly 100 percent funded in the indicated number of years. Valuation results will vary from one year to the next and can diverge significantly from projections over a period of several years.

Plan's Funded Status

	June 30, 2018	June 30, 2019
1. Present Value of Projected Benefits	$9,894,050,693	$10,345,888,989
2. Entry Age Normal Accrued Liability	8,165,793,889	8,602,935,143
3. Market Value of Assets (MVA)	5,748,832,217	6,103,248,893
4. Unfunded Accrued Liability (UAL) [(2) – (3)]	$2,416,961,672	$2,499,686,250
5. Funded Ratio [(3) / (2)]	70.4%	70.9%

This measure of funded status is an assessment of the need for future employer contributions based on the 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. The projection assumes that all actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur during the projection period. As of the preparation date of this report, the year to date return for the 2019-20 fiscal year was well below the 7 percent assumed return. Actual contribution rates during this projection period could be significantly higher than the projection shown below. The projected normal cost percentages in the projections below reflect that the normal cost will continue to decline over time as new employees are hired into PEPRA or other lower cost benefit tiers.

	Required Contribution	**Projected Future Employer Contributions (Assumes 7.00% Return for Fiscal Year 2019-20)**				
Fiscal Year	**2021-22**	**2022-23**	**2023-24**	**2024-25**	**2025-26**	**2026-27**
Normal Cost %	11.16%	10.9%	10.6%	10.3%	10.1%	9.8%
UAL Payment	$145,275,743	$165,031,000	$176,990,000	$188,512,000	$194,447,000	$199,783,000
*Total as a % of Payroll**	*22.85%*	*23.8%*	*24.1%*	*24.3%*	*24.1%*	*23.8%*
Projected Payroll	*$1,242,712,226*	*$1,276,886,812*	*$1,312,001,199*	*$1,348,081,233*	*$1,385,153,467*	*$1,423,245,187*

*Illustrative only and based on the projected payroll shown.

For some sources of UAL, the change in UAL is 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 the change in UAL over a 5-year period in order to reduce 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 when 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.

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

Cost

Actuarial Determination of Pension Plan Cost

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 Amortization 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 (e.g., mortality rates, retirement rates, employment termination rates, disability rates)
- Economic assumptions (e.g., future investment earnings, inflation, salary growth rates)

These assumptions reflect CalPERS' best estimate of future experience of the plan and are long term in nature. We recognize that all assumptions will not be realized in any given year. For example, the investment earnings at CalPERS have averaged 5.8 percent over the 20 years ending June 30, 2019, yet individual fiscal year returns have ranged from -23.6 percent to +20.7 percent. In addition, CalPERS reviews all actuarial assumptions 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

The CalPERS Board of Administration adopted a new amortization policy effective with this 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 as a level dollar amount. In addition, the new policy does not utilize a 5-year ramp-up and ramp-down on UAL bases attributable to assumption and method changes and non-investment gains/losses. The new policy also does not utilize a 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.

Subsequent Events

The contribution requirements determined in this actuarial valuation report are based on demographic and financial information as of June 30, 2019. Changes in the value of assets subsequent to that date are not reflected. Investment returns below the assumed rate of return will increase future required contributions while investment returns above the assumed rate of return will decrease future required contributions.

The projected employer contributions on Page 6 are calculated under the assumption that the discount rate remains at 7.0 percent going forward and that the realized rate of return on assets for fiscal year 2019-20 is 7.0 percent.

This actuarial valuation report reflects statutory changes, regulatory changes and CalPERS Board actions through January 2020. 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 6/30/18 including Receivables	$5,748,832,217
2.	Change in Receivables for Service Buybacks	(453,878)
3.	Employer Contributions	217,095,376
4.	Employee Contributions	85,058,326
5.	Benefit Payments to Retirees and Beneficiaries	(313,562,604)
6.	Refunds	(8,744,947)
7.	Transfers	206,800
8.	Service Credit Purchase (SCP) Payments and Interest	3,541,665
9.	Administrative Expenses	(6,465,296)
10.	Miscellaneous Adjustments	13,312
11.	Investment Return (Net of Investment Expenses)	377,727,923
12.	Market Value of Assets as of 6/30/19 including Receivables	$6,103,248,893

Asset Allocation

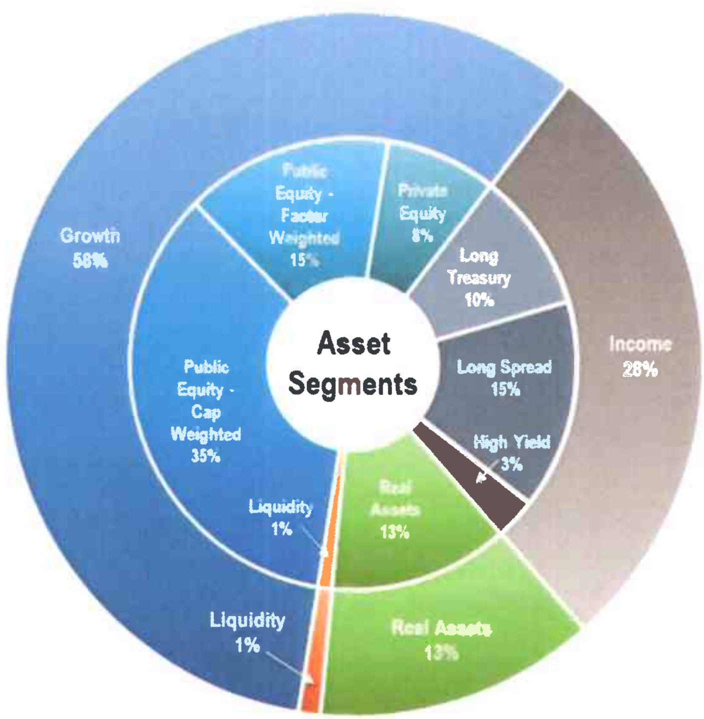
CalPERS adheres to an Asset Allocation Strategy which establishes asset class allocation policy targets and ranges and manages those asset class allocations within their policy ranges. CalPERS Investment Belief No. 6 recognizes that strategic asset allocation is the dominant determinant of portfolio 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 shown below reflect the allocation of the Public Employees' Retirement Fund (PERF) in its entirety as of June 30, 2019. The assets for County of Riverside Miscellaneous Plan are part of the PERF and are invested accordingly.

Asset Class	Actual Allocation	Policy Target Allocation
Public Equity	50.2%	50.0%
Private Equity	7.1%	8.0%
Global Fixed Income	28.7%	28.0%
Real Assets	11.0%	13.0%
Liquidity	1.0%	1.0%
Inflation Sensitive Assets	0.0%	0.0%
Trust Level[1]	2.0%	0.0%
Total Fund	**100.0%**	**100.0%**

[1] Trust Level includes Multi-Asset Class, Completion Overlay, Risk Mitigation, Absolute Return Strategies, Plan Level Transition and other Total Fund level portfolios.

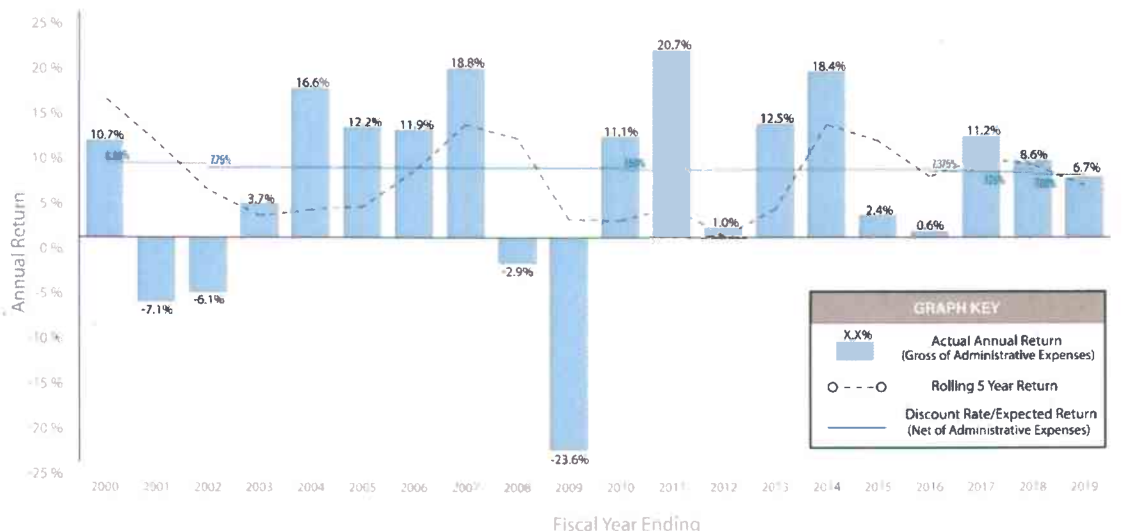
Strategic Asset Allocation Policy Targets



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 administrative expenses.

History of Investment Returns (2000 - 2019)



The table below shows historical compound annual returns of the Public Employees Retirement Fund for various time periods ending on June 30, 2019 (figures are reported as gross of fees). The compound annual return is the average rate per year compounded over the indicated number of years. 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 Compound Annual Rates of Return and Volatilities

	1 year	5 year	10 year	20 year	30 year
Compound Annual Return	6.7%	5.8%	9.1%	5.8%	8.1%
Volatility	–	4.4%	6.9%	10.7%	9.8%

Liabilities and Contributions

- **Development of Accrued and Unfunded Liabilities**
- **(Gain) / Loss Analysis 06/30/18 - 06/30/19**
- **Schedule of Amortization Bases**
- **Amortization Schedule and Alternatives**
- **Reconciliation of Required Employer Contributions**
- **Employer Contribution History**
- **Funding History**
- **Normal Cost by Benefit Group**
- **PEPRA Member Contribution Rates**

Development of Accrued and Unfunded Liabilities

	June 30, 2018	June 30, 2019
1. Present Value of Projected Benefits		
a) Active Members	$5,628,389,751	$5,694,707,271
b) Transferred Members	225,232,835	222,155,350
c) Terminated Members	207,677,521	229,100,940
d) Members and Beneficiaries Receiving Payments	3,832,750,586	4,199,925,428
e) Total	$9,894,050,693	$10,345,888,989
2. Present Value of Future Employer Normal Costs	$1,017,274,198	$989,635,314
3. Present Value of Future Employee Contributions	$710,982,606	$753,318,532
4. Entry Age Normal Accrued Liability		
a) Active Members [(1a) - (2) - (3)]	$3,900,132,947	$3,951,753,425
b) Transferred Members (1b)	225,232,835	222,155,350
c) Terminated Members (1c)	207,677,521	229,100,940
d) Members and Beneficiaries Receiving Payments (1d)	3,832,750,586	4,199,925,428
e) Total	$8,165,793,889	$8,602,935,143
5. Market Value of Assets (MVA)	$5,748,832,217	$6,103,248,893
6. Unfunded Accrued Liability (UAL) [(4e) - (5)]	$2,416,961,672	$2,499,686,250
7. Funded Ratio [(5) / (4e)]	70.4%	70.9%

(Gain)/Loss Analysis 6/30/18 – 6/30/19

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 6/30/18	$2,416,961,672
b) Expected Payment on the UAL during 2018-19	81,675,418
c) Interest through 6/30/19 [.07 x (1a) - ((1.07)^{½} - 1) x (1b)]	166,377,026
d) Expected UAL before all other changes [(1a) - (1b) + (1c)]	2,501,663,280
e) Change due to plan changes	0
f) Change due to assumption change	0
g) Change due to method change	0
h) Expected UAL after all other changes [(1d) + (1e) + (1f) + (1g)]	2,501,663,280
i) Actual UAL as of 6/30/19	2,499,686,250
j) Total (Gain)/Loss for 2018-19 [(1i) - (1h)]	($1,977,030)
2. Contribution (Gain)/Loss for the Year	
a) Expected Contribution (Employer and Employee)	$306,251,955
b) Interest on Expected Contributions	10,537,531
c) Actual Contributions	302,153,702
d) Interest on Actual Contributions	10,396,518
e) Expected Contributions with Interest [(2a) + (2b)]	316,789,486
f) Actual Contributions with Interest [(2c) + (2d)]	312,550,220
g) Contribution (Gain)/Loss [(2e) - (2f)]	$4,239,266
3. Investment (Gain)/Loss for the Year	
a) Market Value of Assets as of 6/30/18	$5,748,832,217
b) Prior Fiscal Year Receivables	(13,906,752)
c) Current Fiscal Year Receivables	13,452,874
d) Contributions Received	302,153,702
e) Benefits and Refunds Paid	(322,307,551)
f) Transfers, SCP Payments and Interest, and Miscellaneous Adjustments	3,761,778
g) Expected Int. [.07 x (3a + 3b) + ((1.07)^{½} - 1) x ((3d) + (3e) + (3f))]	400,880,763
h) Expected Assets as of 6/30/19 [(3a) + (3b) + (3c) + (3d) + (3e) + (3f) + (3g)]	6,132,867,030
i) Market Value of Assets as of 6/30/19	6,103,248,893
j) Investment (Gain)/Loss [(3h) - (3i)]	$29,618,137
4. Liability (Gain)/Loss for the Year	
a) Total (Gain)/Loss (1j)	($1,977,030)
b) Contribution (Gain)/Loss (2g)	4,239,266
c) Investment (Gain)/Loss (3j)	29,618,137
d) Liability (Gain)/Loss [(4a) - (4b) - (4c)]	($35,834,433)
5. Non-Investment (Gain)/Loss for the Year	
a) Contribution (Gain)/Loss (2g)	$4,239,266
b) Liability (Gain)/Loss (4d)	(35,834,433)
c) Non-Investment (Gain)/Loss [(5a) + (5b)]	($31,595,167)

Schedule of Amortization Bases

Below is the schedule of the plan's amortization bases. Note that 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, 2019.
- The required employer contributions determined by the valuation are for the fiscal year beginning two years after the valuation date: fiscal year 2021-22.

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 Est.	Ramp Level 2021-22	Ramp Shape	Escala-tion Rate	Amort. Period	Balance 6/30/19	Expected Payment 2019-20	Balance 6/30/20	Expected Payment 2020-21	Balance 6/30/21	Minimum Required Payment 2021-22
FS 30-Year Amortization	6/30/08		No Ramp	2.75%	19	(10,300,246)	(748,219)	(10,247,299)	(758,043)	(10,180,484)	(778,889)
Assumption Change	6/30/09		No Ramp	2.75%	10	75,624,080	78,226,157	0	0	0	0
Special (Gain)/Loss	6/30/09		No Ramp	2.75%	20	118,000,108	8,328,576	117,644,970	8,434,601	117,155,299	8,666,553
Golden Handshake	6/30/09		No Ramp	2.75%	10	29,664,035	30,684,717	0	0	0	0
Golden Handshake	6/30/10		No Ramp	2.75%	11	1,068,026	108,185	1,030,880	109,973	989,285	112,998
Special (Gain)/Loss	6/30/10		No Ramp	2.75%	21	83,372,418	5,728,702	83,282,672	5,799,374	83,113,540	5,958,857
Assumption Change	6/30/11		No Ramp	2.75%	12	94,888,965	98,153,908	0	0	0	0
Golden Handshake	6/30/11		No Ramp	2.75%	12	30,314,882	31,357,958	0	0	0	0
Special (Gain)/Loss	6/30/11		No Ramp	2.75%	22	(46,202,006)	(3,096,007)	(46,233,612)	(3,133,002)	(46,229,162)	(3,219,160)
Payment (Gain)/Loss	6/30/12		No Ramp	2.75%	23	(70,802,169)	(4,634,361)	(70,964,501)	(4,687,974)	(71,082,738)	(4,816,893)
(Gain)/Loss	6/30/12		No Ramp	2.75%	23	224,242,423	14,677,804	224,756,554	14,847,604	225,131,032	15,255,913
(Gain)/Loss	6/30/13	100%	Up/Down	2.75%	24	650,879,070	43,658,994	651,279,390	44,180,831	651,167,940	45,395,804
Assumption Change	6/30/14	100%	Up/Down	2.75%	15	383,129,842	28,495,007	380,473,467	36,178,919	369,682,845	37,173,839
(Gain)/Loss	6/30/14	100%	Up/Down	2.75%	25	(510,856,768)	(27,117,366)	(518,566,320)	(34,291,177)	(519,394,893)	(35,234,184)
(Gain)/Loss	6/30/15	100%	Up/Down	2.75%	26	475,076,931	18,959,569	488,720,385	25,562,072	496,489,199	32,831,286
Assumption Change	6/30/16	80%	Up/Down	2.75%	17	148,167,524	153,265,679	0	0	0	0
(Gain)/Loss	6/30/16	80%	Up/Down	2.75%	27	589,551,350	15,926,622	614,345,319	24,142,947	632,375,833	33,075,838
Assumption Change	6/30/17	60%	Up/Down	2.75%	18	151,827,486	2,867,754	159,488,982	5,815,832	164,637,267	8,963,651
(Gain)/Loss	6/30/17	60%	Up/Down	2.75%	28	(147,950,336)	(2,055,496)	(156,180,638)	(4,151,542)	(162,818,894)	(6,398,564)
Method Change	6/30/18	40%	Up/Down	2.75%	19	64,965,087	507,867	68,987,301	1,286,243	72,485,912	2,643,229

Schedule of Amortization Bases (continued)

Reason for Base	Date Est.	Ramp Level 2021-22	Ramp Shape	Escala-tion Rate	Amort. Period	Balance 6/30/19	Expected Payment 2019-20	Balance 6/30/20	Expected Payment 2020-21	Balance 6/30/21	Minimum Required Payment 2021-22
Assumption Change	6/30/18	40%	Up/Down	2.75%	19	256,821,226	(9,425,068)	284,548,078	5,305,294	298,978,605	10,902,379
(Gain)/Loss	6/30/18	40%	Up/Down	2.75%	29	(89,818,648)	0	(96,105,953)	(1,312,599)	(101,475,607)	(2,697,391)
Non-Investment (Gain)/Loss	6/30/19	No Ramp		0.00%	20	(31,595,167)	0	(33,806,829)	0	(36,173,307)	(3,300,926)
Investment (Gain)/Loss	6/30/19	20%	Up Only	0.00%	20	29,618,137	0	31,691,407	0	33,909,805	741,403
Total						**2,499,686,251**	**483,870,982**	**2,174,144,253**	**123,329,353**	**2,198,761,477**	**145,275,743**

Amortization Schedule and Alternatives

The amortization schedule on the previous page shows the minimum contributions required according to the CalPERS amortization policy. Many agencies have expressed interest in paying off the unfunded accrued liabilities more quickly than required. As such, we have provided alternative amortization schedules to help analyze the current amortization schedule and illustrate the potential savings 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) alternative "fresh start" amortization schedules using two sample periods that would both result in interest savings relative to the current amortization schedule.

The Current Amortization Schedule typically contains both positive and negative bases. Positive bases result from plan changes, assumption changes, method changes or plan experience that increase unfunded liability. Negative bases result from plan changes, assumption changes, method changes, or plan experience that decrease 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:

- When a negative payment would be required on a positive unfunded actuarial liability; or
- When the payment would completely amortize the total unfunded liability in a very short time period, and results in a large change in the employer contribution requirement.

In any year when 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		Alternative Schedules: 20 Year Amortization		Alternative Schedules: 15 Year Amortization	
Date	**Balance**	**Payment**	**Balance**	**Payment**	**Balance**	**Payment**
6/30/2021	2,198,761,477	145,275,743	2,198,761,477	200,643,769	2,198,761,477	233,381,974
6/30/2022	2,202,400,383	165,030,785	2,145,127,252	200,643,769	2,111,262,589	233,381,974
6/30/2023	2,185,859,240	176,989,771	2,087,738,631	200,643,769	2,017,638,779	233,381,974
6/30/2024	2,155,789,746	188,512,018	2,026,332,807	200,643,769	1,917,461,302	233,381,974
6/30/2025	2,111,696,681	194,446,722	1,960,628,575	200,643,770	1,810,271,402	233,381,974
6/30/2026	2,058,378,196	199,782,841	1,890,325,046	200,643,769	1,695,578,209	233,381,974
6/30/2027	1,995,807,694	205,265,702	1,815,100,271	200,643,770	1,572,856,493	233,381,974
6/30/2028	1,923,185,736	210,899,341	1,734,609,760	200,643,769	1,441,544,256	233,381,974
6/30/2029	1,839,652,765	216,687,905	1,648,484,915	200,643,770	1,301,040,163	233,381,974
6/30/2030	1,744,284,749	222,635,657	1,556,331,330	200,643,770	1,150,700,783	233,381,974
6/30/2031	1,636,088,567	228,746,969	1,457,726,994	200,643,770	989,837,647	233,381,974
6/30/2032	1,513,997,063	224,854,058	1,352,220,354	200,643,769	817,714,091	233,381,974
6/30/2033	1,387,386,012	220,730,830	1,239,328,250	200,643,770	633,541,886	233,381,974
6/30/2034	1,256,177,286	216,211,090	1,118,533,698	200,643,769	436,477,627	233,381,974
6/30/2035	1,120,459,204	206,907,874	989,283,528	200,643,769	225,618,870	233,381,974
6/30/2036	984,864,180	186,755,674	850,985,846	200,643,769		
6/30/2037	860,623,103	176,814,576	703,007,327	200,643,770		
6/30/2038	737,968,300	166,185,784	544,670,310	200,643,769		
6/30/2039	617,722,168	154,839,006	375,249,703	200,643,769		
6/30/2040	500,796,007	149,049,802	193,969,654	200,643,770		
6/30/2041	381,673,412	122,201,184				
6/30/2042	281,984,662	111,435,386				
6/30/2043	186,453,928	104,728,932				
6/30/2044	91,173,253	56,646,665				
6/30/2045	38,959,615	29,948,831				
6/30/2046	10,707,477	11,075,900				
6/30/2047						
6/30/2048						
6/30/2049						
6/30/2050						
Total		**4,292,659,046**		**4,012,875,388**		**3,500,729,610**
Interest Paid		**2,093,897,569**		**1,814,113,911**		**1,301,968,133**
Estimated Savings				**279,783,658**		**791,929,436**

Reconciliation of Required Employer Contributions

Normal Cost (% of Payroll)

1. For Period 7/1/20 – 6/30/21	
a) Employer Normal Cost	11.673%
b) Employee Contribution	7.418%
c) Total Normal Cost	19.091%
2. Changes since the prior year annual valuation	
a) Effect of demographic experience	(0.331%)
b) Effect of plan changes	0.000%
c) Effect of assumption changes	0.000%
d) Effect of method changes	0.000%
e) Net effect of the changes above [sum of (a) through (d)]	(0.331%)
3. For Period 7/1/21 – 6/30/22	
a) Employer Normal Cost	11.16%
b) Employee Contribution	7.60%
c) Total Normal Cost	18.76%
Employer Normal Cost Change [(3a) – (1a)]	(0.513%)
Employee Contribution Change [(3b) – (1b)]	0.182%

Unfunded Liability Contribution ($)

1. For Period 7/1/20 – 6/30/21	155,375,654
2. Changes since the prior year annual valuation	
a) Effect of adjustments to prior year's amortization schedule	(35,778,423)
b) Effect of investment (gain)/loss during prior year[1]	741,403
c) Effect of non-investment (gain)/loss during prior year	(3,300,926)
d) Effect of plan changes	0
e) Effect of assumption changes	0
f) Changes to prior year amortization payments[2]	28,238,035
g) Effect of changes due to Fresh Start	0
h) Effect of elimination of amortization base	0
i) Effect of method change	0
j) Net effect of the changes above [sum of (a) through (i)]	(10,099,911)
3. For Period 7/1/21 – 6/30/22 [(1) + (2j)]	145,275,743

The amounts shown for the period 7/1/20 – 6/30/21 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.

[1] The unfunded liability contribution for the investment (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 f) in future years.

[2] Includes scheduled escalation in individual amortization base payments due to the 5-year ramp and payroll growth assumption used in the pre-2019 amortization policy.

Employer Contribution History

The table below provides a recent history of the required employer contributions for the plan for fiscal years prior to 2019-20. The amounts are based on the actuarial valuation from two years prior and does not account for prepayments or benefit changes made during a fiscal year. Additional discretionary payments before July 1, 2018 or after June 30, 2020 are not included.

Fiscal Year	Employer Normal Cost	Unfunded Rate	Unfunded Liability Payment ($)	Additional Discretionary Payments
2013 - 14	11.099%	3.902%	N/A	N/A
2014 - 15	10.341%	4.186%	N/A	N/A
2015 - 16	10.376%	5.053%	N/A	N/A
2016 - 17	10.650%	5.826%	N/A	N/A
2017 - 18	10.192%	N/A	73,598,564	N/A
2018 - 19	10.458%	N/A	100,265,926	0
2019 - 20	10.998%	N/A	129,905,894	371,563,461
2020 - 21	11.673%	N/A	155,375,654	
2021 - 22	11.16%	N/A	145,275,743	

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	$4,461,553,672	$3,525,640,733	$935,912,939	79.0%	$812,362,628
06/30/12	4,708,881,750	3,520,189,846	1,188,691,904	74.8%	836,418,298
06/30/13	5,008,806,968	3,974,442,195	1,034,364,773	79.3%	856,593,282
06/30/14	5,656,121,103	4,682,894,962	973,226,141	82.8%	897,506,714
06/30/15	6,174,498,346	4,775,099,013	1,399,399,333	77.3%	1,000,223,148
06/30/16	6,850,143,825	4,799,576,566	2,050,567,259	70.1%	1,090,295,411
06/30/17	7,441,270,302	5,325,794,759	2,115,475,543	71.6%	1,128,397,500
06/30/18	8,165,793,889	5,748,832,217	2,416,961,672	70.4%	1,118,711,056
06/30/19	8,602,935,143	6,103,248,893	2,499,686,250	70.9%	1,145,579,094

Normal Cost by Benefit Group

The table below displays the Total Normal Cost broken out by benefit group for Fiscal Year 2021-22. 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 2021-22	Number of Actives	Payroll on 6/30/2019
62	Miscellaneous First Level	17.79%	650	$55,126,553
26035	Miscellaneous PEPRA Level	14.75%	6,941	$369,805,575
30192	Miscellaneous Second Level	21.17%	8,759	$673,079,407
30193	Miscellaneous Third Level	17.16%	674	$47,567,559
	Plan Total	**18.76%**	**17,024**	**$1,145,579,094**

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 Second Level Benefit Group amended to the same benefit formula as a First Level Benefit Group, their Normal Costs may be dissimilar due to demographic or other population differences. If you have questions in these situations, please consult with your plan actuary.

PEPRA Member Contribution Rates

The California Public Employees' Pension Reform Act of 2013 ("PEPRA") established new benefit formulas, final compensation period, and contribution requirements for "new" employees (generally those first hired into a CalPERS-covered position on or after January 1, 2013). In accordance with Government Code Section 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 members' entry age into the plan. Should the total normal cost of the plan change by more than one percent 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.

The table below shows the determination of the PEPRA member contribution rates effective July 1, 2021, based on 50 percent of the Total Normal Cost for each respective plan as of the June 30, 2019 valuation.

		Basis for Current Rate		Rates Effective July 1, 2021			
Rate Plan Identifier	**Benefit Group Name**	**Total Normal Cost**	**Member Rate**	**Total Normal Cost**	**Change**	**Change Needed**	**Member Rate**
26035	Miscellaneous PEPRA Level	14.672%	7.25%	14.75%	0.078%	No	7.25%

For purposes of setting member rates, it is preferable to determine total normal cost using a large active population so that the rate remains relatively stable. While each CalPERS non-pooled plan has a sufficiently large active population for this purpose, the PEPRA active population by itself may not be sufficiently large. The total PEPRA normal cost will be determined based on the plan's PEPRA membership only if 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

Until one of these conditions is met, the plan's total PEPRA normal cost will be determined using the entire active plan population (both PEPRA and Classic) based on the PEPRA benefit provisions. For this reason, the PEPRA member contribution rate determined in the table above may not equal 50 percent of the total normal cost of the PEPRA group shown on the "Total Normal Cost by Group" page.

Risk Analysis

- **Future Investment Return Scenarios**
- **Discount Rate Sensitivity**
- **Mortality Rate Sensitivity**
- **Maturity Measures**
- **Maturity Measures History**
- **Hypothetical Termination Liability**

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 (2019-20, 2020-21, 2021-22 and 2022-23). 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.

For fiscal years 2019-20, 2020-21, 2021-22, and 2022-23 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.

These alternate investment returns were chosen based on stochastic analysis of possible future investment returns over the four-year period ending June 30, 2023. 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 four-year outcomes generated in the stochastic analysis, approximately 25 percent 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 a four-year period, the likelihood 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 2019-20 through 2022-23	**Projected Employer Contributions**			
	2022-23	**2023-24**	**2024-25**	**2025-26**
1.0%				
Normal Cost	10.9%	10.6%	10.3%	10.1%
UAL Contribution	$174,455,000	$205,683,000	$246,477,000	$291,848,000
4.0%				
Normal Cost	10.9%	10.6%	10.3%	10.1%
UAL Contribution	$169,742,000	$191,476,000	$218,069,000	$244,611,000
7.0%				
Normal Cost	10.9%	10.6%	10.3%	10.1%
UAL Contribution	$165,031,000	$176,990,000	$188,512,000	$194,447,000
9.0%				
Normal Cost	11.2%	11.2%	11.2%	11.3%
UAL Contribution	$162,738,000	$170,526,000	$175,750,000	$173,079,000
12.0%				
Normal Cost	11.2%	11.2%	11.2%	11.3%
UAL Contribution	$158,054,000	$155,724,000	$144,678,000	$118,768,000

These projections reflect recent changes to the amortization policy effective with the June 30, 2019 valuation as well as the impact of the CalPERS risk mitigation policy (which reduces the discount rate when investment returns exceed specified trigger points). The projected normal cost percentages reflect that normal cost will continue to decline over time as new employees are hired into PEPRA or other lower-cost benefit tiers.

Discount Rate Sensitivity

The discount rate assumption is calculated as the sum of the assumed real rate of return and the assumed annual price inflation, currently 4.50 percent and 2.50 percent, respectively. Changing either the price inflation assumption or the real rate of return assumption will change the discount rate. The sensitivity of the valuation results to the discount rate assumption depends on which component of the discount rate is changed. Shown below are various valuation results as of June 30, 2019 assuming alternate discount rates by changing the two components independently. Results are shown using the current discount rate of 7.0 percent as well as alternate discount rates of 6.0 percent and 8.0 percent. The rates of 6.0 percent and 8.0 percent were selected since they illustrate the impact of a 1.0 percent increase or decrease to the 7.0 percent assumption.

Sensitivity to the Real Rate of Return Assumption

As of June 30, 2019	1% Lower Real Return Rate	Current Assumptions	1% Higher Real Return Rate
Discount Rate	**6.0%**	**7.0%**	**8.0%**
Inflation	2.5%	2.5%	2.5%
Real Rate of Return	**3.5%**	**4.5%**	**5.5%**
a) Total Normal Cost	23.77%	18.76%	14.98%
b) Accrued Liability	$9,848,939,526	$8,602,935,143	$7,581,178,946
c) Market Value of Assets	$6,103,248,893	$6,103,248,893	$6,103,248,893
d) Unfunded Liability/(Surplus) [(b) - (c)]	$3,745,690,633	$2,499,686,250	$1,477,930,053
e) Funded Status	62.0%	70.9%	80.5%

Sensitivity to the Price Inflation Assumption

As of June 30, 2019	1% Lower Inflation Rate	Current Assumptions	1% Higher Inflation Rate
Discount Rate	**6.0%**	**7.0%**	**8.0%**
Inflation	**1.5%**	**2.5%**	**3.5%**
Real Rate of Return	4.5%	4.5%	4.5%
a) Total Normal Cost	20.10%	18.76%	17.21%
b) Accrued Liability	$9,073,998,858	$8,602,935,143	$7,987,406,079
c) Market Value of Assets	$6,103,248,893	$6,103,248,893	$6,103,248,893
d) Unfunded Liability/(Surplus) [(b) - (c)]	$2,970,749,965	$2,499,686,250	$1,884,157,186
e) Funded Status	67.3%	70.9%	76.4%

Mortality Rate Sensitivity

The following table looks at the change in the June 30, 2019 plan costs and funded ratio under two different longevity scenarios, namely assuming rates of mortality are 10 percent lower or 10 percent higher than our current mortality assumptions. This type of analysis highlights the impact on the plan of improving or worsening mortality over the long-term.

As of June 30, 2019	10% Lower Mortality Rates	Current Assumptions	10% Higher Mortality Rates
a) Total Normal Cost	19.05%	18.76%	18.48%
b) Accrued Liability	$8,766,018,248	$8,602,935,143	$8,452,277,783
c) Market Value of Assets	$6,103,248,893	$6,103,248,893	$6,103,248,893
d) Unfunded Liability/(Surplus) [(b) - (c)]	$2,662,769,355	$2,499,686,250	$2,349,028,890
e) Funded Status	69.6%	70.9%	72.2%

Maturity Measures

As pension plans mature they become more sensitive to risks. Understanding plan maturity and how it affects the ability of a pension plan to tolerate risk is important in understanding how the plan is impacted by investment return volatility, other economic variables and changes in longevity or other demographic assumptions. One way to look at the maturity level of CalPERS and its plans is to look at the ratio of a plan's retiree liability to its total liability. A pension plan in its infancy will have a very low ratio of retiree liability to total liability. As the plan matures, the ratio increases. A mature plan will often have a ratio above 60-65 percent.

Ratio of Retiree Accrued Liability to Total Accrued Liability	**June 30, 2018**	**June 30, 2019**
1. Retiree Accrued Liability	3,832,750,586	4,199,925,428
2. Total Accrued Liability	8,165,793,889	8,602,935,143
3. Ratio of Retiree AL to Total AL [(1) / (2)]	47%	49%

Another measure of the maturity level of CalPERS and its plans is the ratio of actives to retirees, also called Support Ratio. A pension plan in its infancy will have a very high ratio of active to retired members. As the plan matures, and members retire, the ratio declines. A mature plan will often have a ratio near or below one. The average support ratio for CalPERS public agency plans is 1.25.

Support Ratio	**June 30, 2018**	**June 30, 2019**
1. Number of Actives	16,817	17,024
2. Number of Retirees	11,438	12,022
3. Support Ratio [(1) / (2)]	1.47	1.42

The actuarial calculations supplied in this communication are based on various assumptions about long-term demographic and economic behavior. Unless these assumptions (e.g., terminations, deaths, disabilities, retirements, salary growth, 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

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

Liability Volatility Ratio

Also shown in the table below is the liability volatility ratio (LVR), which is the ratio of accrued liability to payroll. Plans that have a higher LVR experience more volatile employer contributions (as a percentage of payroll) due to changes in liability. For example, a plan with LVR of 8 is expected to have twice the contribution volatility of a plan with LVR of 4 when there is a change in accrued liability, such as when there is a change in actuarial assumptions. It should be noted that this ratio indicates a longer-term potential for contribution volatility, since the AVR, described above, will tend to move closer to the LVR as the funded status approaches 100 percent.

Maturity Measures (continued)

Contribution Volatility	June 30, 2018	June 30, 2019
1. Market Value of Assets without Receivables	$5,734,925,465	$6,089,796,020
2. Payroll	1,118,711,056	1,145,579,094
3. Asset Volatility Ratio (AVR) [(1) / (2)]	5.1	5.3
4. Accrued Liability	$8,165,793,889	$8,602,935,143
5. Liability Volatility Ratio (LVR) [(4) / (2)]	7.3	7.5

Maturity Measures History

Valuation Date	Ratio of Retiree Accrued Liability to Total Accrued Liability	Support Ratio	Asset Volatility Ratio	Liability Volatility Ratio
06/30/17	45%	1.58	4.7	6.6
06/30/18	47%	1.47	5.1	7.3
06/30/19	49%	1.42	5.3	7.5

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, 2019. 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 19-month period from 12 months before the valuation date to 7 months after.

Market Value of Assets (MVA)	Hypothetical Termination Liability[1,2] @ 1.75%	Funded Status	Unfunded Termination Liability @ 1.75%	Hypothetical Termination Liability[1,2] @ 3.25%	Funded Status	Unfunded Termination Liability @ 3.25%
$6,103,248,893	$17,512,167,074	34.9%	$11,408,918,181	$13,723,146,676	44.5%	$7,619,897,783

[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 2.31 percent on June 30, 2019, and was 1.83 percent on January 31, 2020.

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 Appendix B.

	Benefit Group						
Member Category	Misc	Misc	Misc	Misc	Misc	Misc	Misc
Demographics							
Actives	No	No	Yes	No	Yes	Yes	Yes
Transfers/Separated	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Receiving	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Benefit Provision							
Benefit Formula	2% @ 55	2% @ 55	3% @ 60	2% @ 55	3% @ 60	2% @ 62	2% @ 60
Social Security Coverage	Yes	No	Yes	Yes	Yes	Yes	Yes
Full/Modified	Modified	Full	Modified	Modified	Modified	Full	Modified
Employee Contribution Rate			8.00%		8.00%	7.25%	7.00%
Final Average Compensation Period	One Year	One Year	One Year	One Year	One Year	Three Year	Three Year
Sick Leave Credit	No	No	No	No	No	No	No
Non-Industrial Disability	Standard	Standard	Standard	Standard	Standard	Standard	Standard
Industrial Disability	No	No	No	No	No	No	No
Pre-Retirement Death Benefits							
Optional Settlement 2	No	No	No	No	No	No	No
1959 Survivor Benefit Level	No	Indexed	No	No	No	No	No
Special	No	No	No	No	No	No	No
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 Appendix B.

	Benefit Group						
Member Category	Misc	Misc	Misc	Misc	Misc	Misc	Misc
Demographics							
Actives	Yes	Yes	No	No	No	No	No
Transfers/Separated	Yes	Yes	Yes	No	No	No	No
Receiving	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Benefit Provision							
Benefit Formula	3% @ 60	3% @ 60	3% @ 60				
Social Security Coverage	Yes	Yes	No				
Full/Modified	Modified	Modified	Full				
Employee Contribution Rate	8.00%	8.00%					
Final Average Compensation Period	One Year	One Year	One Year				
Sick Leave Credit	No	No	No				
Non-Industrial Disability	Standard	Standard	Standard				
Industrial Disability	No	No	No				
Pre-Retirement Death Benefits							
Optional Settlement 2	No	No	No				
1959 Survivor Benefit Level	No	No	Indexed				
Special	No	No	No				
Alternate (firefighters)	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 Appendix B.

	Benefit Group			
Member Category	Misc	Misc	Misc	
Demographics				
Actives	No	No	No	
Transfers/Separated	No	No	No	
Receiving	Yes	Yes	Yes	
Benefit Provision				
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	
Survivor Allowance (PRSA)	Yes	Yes	Yes	
COLA	2%	2%	2%	

Appendices

- **Appendix A – Actuarial Methods and Assumptions**
- **Appendix B – Principal Plan Provisions**
- **Appendix C – Participant Data**
- **Appendix D – 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 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 Actuarial 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 a payment toward the UAL. The UAL payment is equal to the sum of individual amortization payments, each representing a different source of UAL for a given measurement period.

Amortization payments are determined according to the CalPERS amortization policy. The CalPERS Board adopted a new policy effective for the June 30, 2019 actuarial valuation. The new policy applies prospectively only; amortization bases (sources of UAL) established prior to the June 30, 2019 valuation will continue to be amortized according to the prior policy.

Prior Policy (Bases Established prior to June 30, 2019)

Amortization payments are determined as a level percentage of payroll whereby the payment increases each year at an escalation rate. 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. Bases established prior to June 30, 2013 may be amortized differently. A summary is provided in the following table:

Driver	Source				
	(Gain)/Loss		Assumption/Method Change	Benefit Change	Golden Handshake
	Investment	Non-investment			
Amortization Period	30 Years	30 Years	20 Years	20 Years	5 Years
Escalation Rate - Active Plans - Inactive Plans	 2.75% 0%	 2.75% 0%	 2.75% 0%	 2.75% 0%	 2.75% 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.

Current Policy (Bases Established on or after June 30, 2019)

Amortization payments are determined as a level dollar amount. Investment gains or losses are amortized over a fixed 20-year period with a 5-year ramp up at the beginning of the amortization period. Non-investment gains or losses are amortized over a fixed 20-year period with no ramps. All changes in liability due to plan amendments (other than golden handshakes) are amortized over a 20-year period with no ramps. Changes in actuarial assumptions or changes in actuarial methodology are amortized over a 20-year period with no ramps. Changes in unfunded accrued liability due to a Golden Handshake are amortized over a period of five years. A summary is provided in the table below:

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

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 negative payment would be required on a positive unfunded actuarial liability; or
- When the payment would completely amortize the total unfunded liability in a very short time period, and results in a large change in the employer contribution requirement.

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 20 years.

Exceptions for Plans in Surplus

If a surplus exists (i.e. the Market Value of Assets exceeds the plan's accrued liability) any prior amortization layers shall be considered fully amortized, and the surplus shall not be amortized.

In the event of any subsequent unfunded liability, a Fresh Start shall be used with an amortization period of 20 years or less.

Exceptions for Small Amounts

Where small unfunded liabilities are identified in annual valuations which result in small payment amounts, the actuary may shorten the remaining period for these bases.

- When the balance of a single amortization base has an absolute value less than $250, the amortization period is reduced to one year.
- When the entire unfunded liability is a small amount the actuary may perform a Fresh Start and use an appropriate amortization period.

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.

Exceptions for Inactive Agencies

For a public agency with no active members in any CalPERS rate plan, the unfunded liability shall be amortized over a closed amortization period of no more than 15 years.

Asset Valuation Method

The Actuarial Value of Assets is set equal to the Market value of assets. Asset values include accounts receivable.

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.

For purposes of setting member rates, it is preferable to determine total normal cost using a large active population so that the rate remains relatively stable. While each CalPERS non-pooled plan has a sufficiently large active population for this purpose, the PEPRA active population by itself may not be sufficiently large. The total PEPRA normal cost will be determined based on the plan's PEPRA membership only if 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

Until one of these conditions is met, the plan's total PEPRA normal cost will be determined using the entire active plan population (both PEPRA and Classic) based on the PEPRA benefit provisions.

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.

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 2021-22 determined in this valuation were calculated using a discount rate of 7.00 percent. 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 7.00 percent compounded annually (net of investment and administrative expenses) as of June 30, 2019.

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 19-month period from 12 months before the valuation date to 7 months after. 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 2.31 percent on June 30, 2019.

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 (2.75% for 2019) 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

2.75 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

2.50 percent compounded annually.

Non-valued Potential Additional Liabilities

The potential liability loss for a cost-of-living increase exceeding the 2.50 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.

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

Age	Duration of Service 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

Age	Duration of Service 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

Age	Duration of Service 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

Age	Duration of Service 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

Age	Duration of Service					
	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

Age	Duration of Service					
	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. The Section 415(b) dollar limit for the 2019 calendar year is $225,000.

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 2019 calendar year is $280,000.

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 $124,180 for 2019 and for those employees that do not participate in Social Security the cap for 2019 is $149,016. 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 credited annually at the greater of 6 percent or the prevailing discount rate through the date of death, 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, 2018	June 30, 2019
1. **Active Members**		
a) Counts	16,817	17,024
b) Average Attained Age	44.21	44.22
c) Average Entry Age to Rate Plan	34.28	34.31
d) Average Years of Credited Service	9.72	9.69
e) Average Annual Covered Pay	$66,523	$67,292
f) Annual Covered Payroll	1,118,711,056	1,145,579,094
g) Projected Annual Payroll for Contribution Year	1,213,566,060	1,242,712,226
h) Present Value of Future Payroll	9,672,105,080	9,945,114,096
2. **Transferred Members**		
a) Counts	3,905	4,012
b) Average Attained Age	43.99	43.94
c) Average Years of Credited Service	2.59	2.58
d) Average Annual Covered Pay	$84,623	$80,702
3. **Terminated Members**		
a) Counts	9,554	9,990
b) Average Attained Age	44.63	45.07
c) Average Years of Credited Service	2.22	2.26
d) Average Annual Covered Pay	$44,554	$45,359
4. **Retired Members and Beneficiaries**		
a) Counts	11,438	12,022
b) Average Attained Age	68.7	68.79
c) Average Annual Benefits	$26,075	$27,297
5. **Active to Retired Ratio** [(1a) / (4a)]	1.47	1.42

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**	**20-24**	**25+**	**Total**
15-24	259	1	0	0	0	0	260
25-29	1,202	225	5	0	0	0	1,432
30-34	1,314	668	307	1	1	0	2,291
35-39	987	673	807	171	6	0	2,644
40-44	751	496	717	401	119	4	2,488
45-49	634	404	653	458	303	99	2,551
50-54	445	300	479	364	270	243	2,101
55-59	358	265	453	349	201	289	1,915
60-64	157	156	256	212	110	104	995
65 and Over	69	53	101	59	32	33	347
All Ages	**6,176**	**3,241**	**3,778**	**2,015**	**1,042**	**772**	**17,024**

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**	**20-24**	**25+**	**Average Salary**
15-24	$38,032	$33,559	$0	$0	$0	$0	$38,015
25-29	44,755	47,339	54,956	0	0	0	45,196
30-34	49,653	58,030	58,557	70,169	54,475	0	53,299
35-39	52,823	63,088	77,292	69,492	74,751	0	64,032
40-44	59,937	68,990	82,217	78,626	77,194	97,764	72,061
45-49	59,354	72,501	79,265	82,591	82,473	81,572	74,313
50-54	61,676	72,559	78,589	80,386	87,097	82,144	75,962
55-59	66,057	71,903	75,060	81,196	82,021	90,360	77,098
60-64	67,690	78,099	78,669	76,874	79,821	77,704	76,491
65 and Over	73,644	79,597	76,236	76,222	85,335	94,834	78,840
Average	**$53,509**	**$65,609**	**$76,978**	**$79,256**	**$82,718**	**$85,172**	**$67,292**

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**	**20-24**	**25+**	**Total**	**Average Salary**
15-24	18	0	0	0	0	0	18	$59,814
25-29	233	1	1	0	0	0	235	63,341
30-34	500	41	7	0	0	0	548	69,022
35-39	652	71	28	4	0	0	755	79,007
40-44	639	77	25	9	1	0	751	86,440
45-49	500	59	24	11	4	0	598	89,032
50-54	392	71	27	14	4	2	510	85,516
55-59	224	62	20	16	5	1	328	82,252
60-64	137	36	18	6	1	0	198	77,196
65 and Over	56	10	2	3	0	0	71	88,811
All Ages	**3,351**	**428**	**152**	**63**	**15**	**3**	**4,012**	**$80,702**

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**	**20-24**	**25+**	**Total**	**Average Salary**
15-24	82	0	0	0	0	0	82	$31,906
25-29	612	14	0	0	0	0	626	35,391
30-34	1,235	119	15	0	0	0	1,369	39,840
35-39	1,429	195	41	5	0	0	1,670	44,184
40-44	1,281	193	60	23	3	0	1,560	48,019
45-49	1,137	188	60	32	9	3	1,429	52,443
50-54	915	143	54	17	5	4	1,138	49,264
55-59	808	117	40	15	3	3	986	46,211
60-64	612	54	17	6	0	0	689	43,091
65 and Over	412	18	7	3	0	1	441	42,785
All Ages	**8,523**	**1,041**	**294**	**101**	**20**	**11**	**9,990**	**$45,359**

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	18	18
30-34	0	0	5	0	0	8	13
35-39	0	10	14	0	1	10	35
40-44	0	13	19	1	0	12	45
45-49	0	30	27	1	1	22	81
50-54	359	55	22	3	1	24	464
55-59	1,072	75	29	2	0	54	1,232
60-64	2,054	43	26	12	0	85	2,220
65-69	2,588	74	30	11	0	121	2,824
70-74	2,064	70	26	7	0	154	2,321
75-79	1,145	43	8	1	0	139	1,336
80-84	572	29	7	3	0	129	740
85 and Over	470	15	4	2	0	202	693
All Ages	**10,324**	**457**	**217**	**43**	**3**	**978**	**12,022**

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	$4,143	$4,143
30-34	0	0	221	0	0	3,179	2,041
35-39	0	15,745	215	0	164	3,599	5,618
40-44	0	11,866	304	8,915	0	9,020	6,160
45-49	0	12,782	431	8,349	134	11,321	8,057
50-54	23,100	11,940	2,869	7,507	913	8,452	19,912
55-59	31,200	12,922	1,505	26,793	0	12,968	28,582
60-64	35,013	14,763	3,137	8,933	0	16,105	33,383
65-69	32,104	11,995	2,216	15,347	0	17,944	30,588
70-74	29,253	14,548	2,576	8,623	0	18,229	27,717
75-79	26,611	12,831	1,472	35,312	0	18,280	25,157
80-84	20,229	13,511	735	5,671	0	14,602	18,741
85 and Over	16,434	10,994	807	10,727	0	11,268	14,704
All Ages	**$29,725**	**$13,064**	**$1,675**	**$11,710**	**$404**	**$14,770**	**$27,297**

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	3,444	80	68	11	0	365	3,968
5-9	2,410	69	38	12	1	255	2,785
10-14	2,377	54	24	8	1	166	2,630
15-19	1,102	99	31	7	1	101	1,341
20-24	572	92	18	2	0	53	737
25-29	251	35	16	1	0	19	322
30 and Over	168	28	22	2	0	19	239
All Years	**10,324**	**457**	**217**	**43**	**3**	**978**	**12,022**

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	$35,109	$14,609	$1,268	$9,552	$0	$15,988	$32,286
5-9	27,921	12,703	2,537	17,765	913	14,043	25,874
10-14	31,869	13,527	3,620	7,065	164	16,012	30,146
15-19	25,160	15,125	1,799	8,133	134	14,287	22,952
20-24	17,659	11,174	728	22,713	0	10,900	15,964
25-29	14,499	11,723	989	4,940	0	9,439	13,197
30 and Over	8,701	9,249	420	10,727	0	8,962	8,040
All Years	**$29,725**	**$13,064**	**$1,675**	**$11,710**	**$404**	**$14,770**	**$27,297**

* 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

Glossary of Actuarial Terms

Glossary of Actuarial Terms

Accrued Liability *(also called Actuarial Accrued Liability or Entry Age Actuarial 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, method changes, and/or gains and losses.

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
The assumed long-term rate of return on plan assets. This is the rate at which projected cash flows are discounted to the valuation date to determine Accrued Liability. This assumption is called "investment return" in earlier CalPERS reports and "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 Actuarial 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

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.

CalPERS

California Public Employees' Retirement System
Actuarial Office
400 Q Street, Sacramento, CA 95811 | Phone: (916) 795-3000 | Fax: (916) 795-2744
888 CalPERS (or **888**-225-7377) | TTY: (877) 249-7442 | www.calpers.ca.gov

July 2020

Safety Plan of the County of Riverside (CalPERS ID: 5982690295)
Annual Valuation Report as of June 30, 2019

Dear Employer,

Attached to this letter, you will find the June 30, 2019 actuarial valuation report of your CalPERS pension plan. **Provided in this report is the determination of the minimum required employer contributions for fiscal year 2021-22**. In addition, the report also contains important information regarding the current financial status of the plan as well as projections and risk measures to aid in planning for the future.

Actuarial valuations are based on assumptions regarding future plan experience including investment return and payroll growth, eligibility for the types of benefits provided, and longevity among retirees. The CalPERS Board of Administration adopts these assumptions after considering the advice of CalPERS actuarial and investment teams and other professionals. Each actuarial valuation reflects all prior differences between actual and assumed experience and adjusts the contribution rates as needed. This valuation is based on an investment return assumption of 7.0 percent, which was adopted by the board in December 2016. Other assumptions used in this report are those recommended in the CalPERS Experience Study and Review of Actuarial Assumptions report from December 2017.

Required Contributions

The table below shows the minimum required employer contributions and the Employee PEPRA Rate for fiscal year 2021-22 along with an estimate of the required contribution for fiscal year 2022-23. Employee 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
2021-22	20.74%	$49,686,992	12.50%
Projected Results			
2022-23	*20.5%*	*$56,642,000*	*TBD*

The actual investment return for fiscal year 2019-20 was not known at the time this report was prepared. The projections above assume the investment return for that year would be 7.0 percent. ***To the extent the actual investment return for fiscal year 2019-20 differs from 7.0 percent, the actual contribution requirements for fiscal year 2022-23 will differ from those shown above.*** 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. This section also contains projected required contributions through fiscal year 2026-27.

Changes from Previous Year's Valuations

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 as a level dollar amount. In addition, the new policy does not utilize a 5-year ramp-up and ramp-down on UAL bases attributable to assumption and method changes and non-investment gains/losses. The new policy does not utilize a 5-year ramp-down on investment gains/losses. These changes apply only to new UAL bases established on or after June 30, 2019.

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.

Questions

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, 2020 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

CalPERS

Actuarial Valuation as of June 30, 2019

for the Safety Plan of the County of Riverside

(CalPERS ID: 5982690295)
(Valuation Rate Plan ID: 63)

Required Contributions for Fiscal Year July 1, 2021 – June 30, 2022

Table of Contents

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 County of Riverside. This valuation is based on the member and financial data as of June 30, 2019 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.

Kurt Schneider

KURT SCHNEIDER, MPA, ASA, EA, MAAA
Supervising Pension Actuary, CalPERS

Highlights and Executive Summary

- **Introduction**
- **Purpose of the Report**
- **Required Contributions**
- **Additional Discretionary Employer 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, 2019 actuarial valuation of the Safety Plan of the County of Riverside of the California Public Employees' Retirement System (CalPERS). This actuarial valuation sets the minimum required employer contributions for fiscal year 2021-22.

Purpose of the Report

The actuarial valuation was prepared by the CalPERS Actuarial Office using data as of June 30, 2019. The purpose of the report is to:

- Set forth the assets and accrued liabilities of this plan as of June 30, 2019;
- Determine the minimum required employer contributions for the fiscal year July 1, 2021 through June 30, 2022;
- Provide actuarial information as of June 30, 2019 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.

Assessment and Disclosure of Risk

This report includes the following risk disclosures consistent with the recommendations of Actuarial Standards of Practice No. 51 and recommended by the California Actuarial Advisory Panel (CAAP) in the Model Disclosure Elements document:

- A "Scenario Test," projecting future results under different investment income returns.
- A "Sensitivity Analysis," showing the impact on current valuation results using alternative discount rates of 6.0 percent and 8.0 percent.
- A "Sensitivity Analysis," showing the impact on current valuation results assuming rates of mortality are 10 percent lower or 10 percent higher than our current mortality assumptions adopted in 2017.
- Plan maturity measures indicating how sensitive a plan may be to the risks noted above.

Required Contributions

	Fiscal Year
Required Employer Contribution	**2021-22**
Employer Normal Cost Rate	**20.74%**
Plus, Either	
1) Monthly Employer Dollar UAL Payment	**$4,140,583**
Or	
2) Annual UAL Prepayment Option*	**$48,034,228**
Required PEPRA Member Contribution Rate	**12.50%**

*The total minimum required employer contribution is the **sum** of the Plan's Employer Normal Cost Rate (expressed as a percentage of payroll) and 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)**. Any prepayment totaling over $5 million requires a 72-hour notice email to FCSD_public_agency_wires@calpers.ca.gov. 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 "PEPRA Member Contribution Rates" in the "Liabilities and Contributions" section. Required member contributions for Classic members can be found in Appendix B.

	Fiscal Year 2020-21	Fiscal Year 2021-22
Normal Cost Contribution as a Percentage of Payroll		
Total Normal Cost	30.527%	30.38%
Employee Contribution[1]	9.432%	9.64%
Employer Normal Cost[2]	21.095%	20.74%
Projected Annual Payroll for Contribution Year	$335,974,322	$330,571,045
Estimated Employer Contributions Based On Projected Payroll		
Total Normal Cost	$102,562,882	$100,427,483
Employee Contribution[1]	31,689,098	31,867,049
Employer Normal Cost[2]	70,873,784	68,560,434
Unfunded Liability Contribution	73,668,397	49,686,992
% of Projected Payroll (illustrative only)	21.927%	15.03%
Estimated Total Employer Contribution	$144,542,181	$118,247,426
% of Projected Payroll (illustrative only)	43.022%	35.77%

[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 the "Liabilities and Contributions" section. 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. For a breakout of normal cost by benefit group, see "Normal Cost by Benefit Group" in the "Liabilities and Contributions" section.

Additional Discretionary Employer Contributions

The minimum required employer contribution towards the Unfunded Accrued Liability (UAL) for this rate plan for the 2021-22 fiscal year is $49,686,992. CalPERS allows employers to make additional discretionary payments (ADPs) at any time and in any amount. These optional payments serve to reduce the UAL and future required contributions and can result in significant long-term savings. Employers can also use ADPs to stabilize annual contributions as a fixed dollar amount, percent of payroll or percent of revenue.

Provided below are select ADP options for consideration. Making such an ADP during fiscal year 2021-22 does not require an ADP be made in any future year, nor does it change the remaining amortization period of any portion of unfunded liability. For information on permanent changes to amortization periods, see the "Amortization Schedule and Alternatives" section of the report.

If you are considering making an ADP, please contact your actuary for additional information.

Minimum Required Employer Contribution for Fiscal Year 2021-22

Estimated Normal Cost	Minimum UAL Payment	ADP	Total UAL Contribution	Estimated Total Contribution
$68,560,434	$49,686,992	$0	$49,686,992	$118,247,426

The minimum required contribution above is less than interest on the UAL. With no ADP the UAL is projected to increase over the following year. If the minimum UAL payment were split between interest and principal, the principal portion would be negative. This situation is referred to as "negative amortization."

Fiscal Year 2021-22 Employer Contribution Necessary to Avoid Negative Amortization

Estimated Normal Cost	Minimum UAL Payment	ADP[1]	Total UAL Contribution	Estimated Total Contribution
$68,560,434	$49,686,992	$4,147,757	$53,834,749	$122,395,183

Alternative Fiscal Year 2021-22 Employer Contributions for Greater UAL Reduction

Funding Target	Estimated Normal Cost	Minimum UAL Payment	ADP[1]	Total UAL Contribution	Estimated Total Contribution
20 years	$68,560,434	$49,686,992	$22,907,571	$72,594,563	$141,154,997
15 years	$68,560,434	$49,686,992	$34,752,523	$84,439,515	$152,999,949
10 years	$68,560,434	$49,686,992	$59,810,966	$109,497,958	$178,058,392
5 years	$68,560,434	$49,686,992	$137,881,497	$187,568,489	$256,128,923

[1] The ADP amounts are assumed to be made in the middle of the fiscal year. A payment made earlier or later in the fiscal year would have to be less or more than the amount shown to have the same effect on the UAL amortization.

Note that the calculations above are based on the projected Unfunded Accrued Liability as of June 30, 2021 as determined in the June 30, 2019 actuarial valuation. New unfunded liabilities can emerge in future years due to assumption or method changes, changes in plan provisions and actuarial experience different than assumed. Making an ADP illustrated above for the indicated number of years will not result in a plan that is exactly 100 percent funded in the indicated number of years. Valuation results will vary from one year to the next and can diverge significantly from projections over a period of several years.

Plan's Funded Status

	June 30, 2018	June 30, 2019
1. Present Value of Projected Benefits	$4,552,329,305	$4,704,942,010
2. Entry Age Normal Accrued Liability	3,676,571,381	3,857,810,725
3. Market Value of Assets (MVA)	2,586,874,850	2,742,688,693
4. Unfunded Accrued Liability (UAL) [(2) – (3)]	$1,089,696,531	$1,115,122,032
5. Funded Ratio [(3) / (2)]	70.4%	71.1%

This measure of funded status is an assessment of the need for future employer contributions based on the 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. The projection assumes that all actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur during the projection period. As of the preparation date of this report, the year to date return for the 2019-20 fiscal year was well below the 7 percent assumed return. Actual contribution rates during this projection period could be significantly higher than the projection shown below. The projected normal cost percentages in the projections below reflect that the normal cost will continue to decline over time as new employees are hired into PEPRA or other lower cost benefit tiers.

	Required Contribution	**Projected Future Employer Contributions (Assumes 7.00% Return for Fiscal Year 2019-20)**				
Fiscal Year	**2021-22**	**2022-23**	**2023-24**	**2024-25**	**2025-26**	**2026-27**
Normal Cost %	20.74%	20.5%	20.2%	20.0%	19.7%	19.5%
UAL Payment	$49,686,992	$56,642,000	$60,968,000	$65,453,000	$67,621,000	$69,504,000
*Total as a % of Payroll**	*35.77%*	*37.2%*	*37.7%*	*38.2%*	*38.1%*	*37.8%*
Projected Payroll	*$330,571,045*	*$339,661,748*	*$349,002,447*	*$358,600,014*	*$368,461,515*	*$378,594,206*

*Illustrative only and based on the projected payroll shown.

For some sources of UAL, the change in UAL is 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 the change in UAL over a 5-year period in order to reduce 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 when 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.

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

Cost

Actuarial Determination of Pension Plan Cost

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 Amortization 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 (e.g., mortality rates, retirement rates, employment termination rates, disability rates)
- Economic assumptions (e.g., future investment earnings, inflation, salary growth rates)

These assumptions reflect CalPERS' best estimate of future experience of the plan and are long term in nature. We recognize that all assumptions will not be realized in any given year. For example, the investment earnings at CalPERS have averaged 5.8 percent over the 20 years ending June 30, 2019, yet individual fiscal year returns have ranged from -23.6 percent to +20.7 percent. In addition, CalPERS reviews all actuarial assumptions 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

The CalPERS Board of Administration adopted a new amortization policy effective with this 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 as a level dollar amount. In addition, the new policy does not utilize a 5-year ramp-up and ramp-down on UAL bases attributable to assumption and method changes and non-investment gains/losses. The new policy also does not utilize a 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.

Subsequent Events

The contribution requirements determined in this actuarial valuation report are based on demographic and financial information as of June 30, 2019. Changes in the value of assets subsequent to that date are not reflected. Investment returns below the assumed rate of return will increase future required contributions while investment returns above the assumed rate of return will decrease future required contributions.

The projected employer contributions on Page 6 are calculated under the assumption that the discount rate remains at 7.0 percent going forward and that the realized rate of return on assets for fiscal year 2019-20 is 7.0 percent.

This actuarial valuation report reflects statutory changes, regulatory changes and CalPERS Board actions through January 2020. 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 6/30/18 including Receivables	$2,586,874,850
2.	Change in Receivables for Service Buybacks	(418,258)
3.	Employer Contributions	104,161,365
4.	Employee Contributions	28,975,820
5.	Benefit Payments to Retirees and Beneficiaries	(143,484,803)
6.	Refunds	(1,610,773)
7.	Transfers	(206,800)
8.	Service Credit Purchase (SCP) Payments and Interest	1,471,309
9.	Administrative Expenses	(2,909,273)
10.	Miscellaneous Adjustments	5,996
11.	Investment Return (Net of Investment Expenses)	169,829,260
12.	Market Value of Assets as of 6/30/19 including Receivables	$2,742,688,693

Asset Allocation

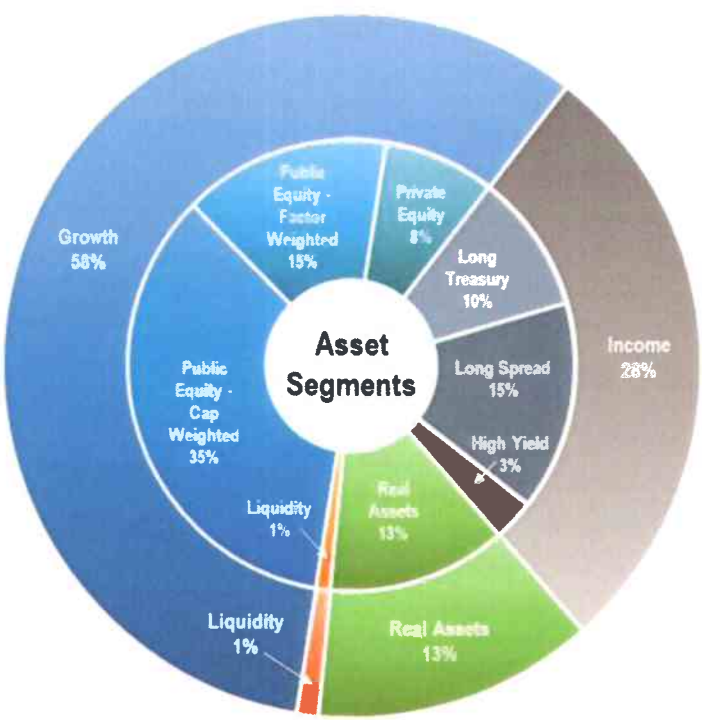
CalPERS adheres to an Asset Allocation Strategy which establishes asset class allocation policy targets and ranges and manages those asset class allocations within their policy ranges. CalPERS Investment Belief No. 6 recognizes that strategic asset allocation is the dominant determinant of portfolio 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 shown below reflect the allocation of the Public Employees' Retirement Fund (PERF) in its entirety as of June 30, 2019. The assets for County of Riverside Safety Plan are part of the PERF and are invested accordingly.

Asset Class	Actual Allocation	Policy Target Allocation
Public Equity	50.2%	50.0%
Private Equity	7.1%	8.0%
Global Fixed Income	28.7%	28.0%
Real Assets	11.0%	13.0%
Liquidity	1.0%	1.0%
Inflation Sensitive Assets	0.0%	0.0%
Trust Level[1]	2.0%	0.0%
Total Fund	**100.0%**	**100.0%**

[1] Trust Level includes Multi-Asset Class, Completion Overlay, Risk Mitigation, Absolute Return Strategies, Plan Level Transition and other Total Fund level portfolios.

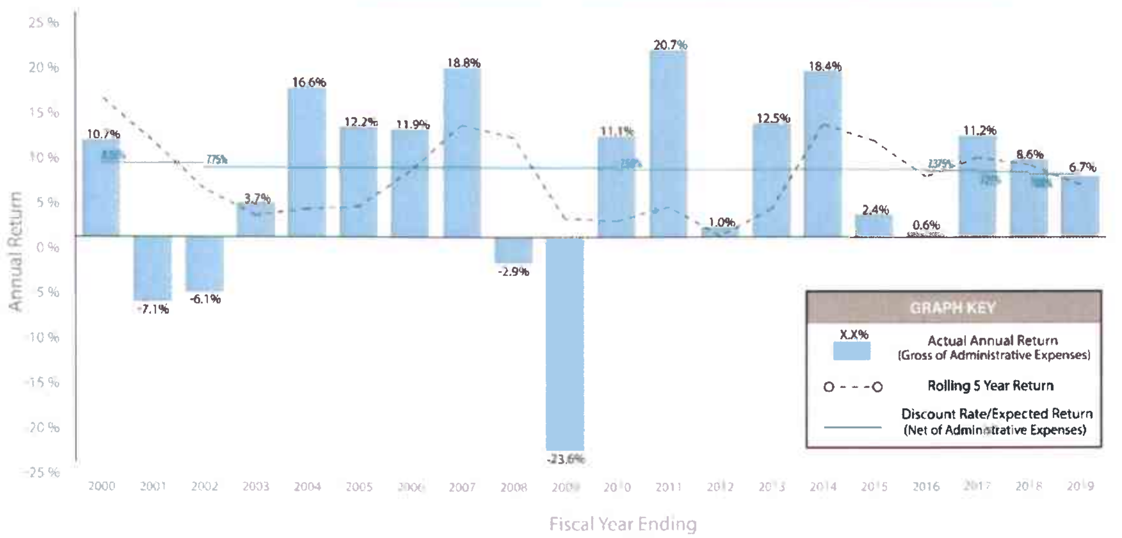
Strategic Asset Allocation Policy Targets



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 administrative expenses.

History of Investment Returns (2000 - 2019)



The table below shows historical compound annual returns of the Public Employees Retirement Fund for various time periods ending on June 30, 2019 (figures are reported as gross of fees). The compound annual return is the average rate per year compounded over the indicated number of years. 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 Compound Annual Rates of Return and Volatilities					
	1 year	**5 year**	**10 year**	**20 year**	**30 year**
Compound Annual Return	6.7%	5.8%	9.1%	5.8%	8.1%
Volatility	–	4.4%	6.9%	10.7%	9.8%

Liabilities and Contributions

- **Development of Accrued and Unfunded Liabilities**
- **(Gain) / Loss Analysis 06/30/18 - 06/30/19**
- **Schedule of Amortization Bases**
- **Amortization Schedule and Alternatives**
- **Reconciliation of Required Employer Contributions**
- **Employer Contribution History**
- **Funding History**
- **Normal Cost by Benefit Group**
- **PEPRA Member Contribution Rates**

Development of Accrued and Unfunded Liabilities

	June 30, 2018	June 30, 2019
1. Present Value of Projected Benefits		
a) Active Members	$2,453,204,950	$2,423,043,342
b) Transferred Members	67,082,057	73,933,907
c) Terminated Members	35,749,019	46,633,097
d) Members and Beneficiaries Receiving Payments	1,996,293,279	2,161,331,664
e) Total	$4,552,329,305	$4,704,942,010
2. Present Value of Future Employer Normal Costs	$589,070,344	$558,844,173
3. Present Value of Future Employee Contributions	$286,687,580	$288,287,112
4. Entry Age Normal Accrued Liability		
a) Active Members [(1a) - (2) - (3)]	$1,577,447,026	$1,575,912,057
b) Transferred Members (1b)	67,082,057	73,933,907
c) Terminated Members (1c)	35,749,019	46,633,097
d) Members and Beneficiaries Receiving Payments (1d)	1,996,293,279	2,161,331,664
e) Total	$3,676,571,381	$3,857,810,725
5. Market Value of Assets (MVA)	$2,586,874,850	$2,742,688,693
6. Unfunded Accrued Liability (UAL) [(4e) - (5)]	$1,089,696,531	$1,115,122,032
7. Funded Ratio [(5) / (4e)]	70.4%	71.1%

(Gain)/Loss Analysis 6/30/18 – 6/30/19

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 6/30/18	$1,089,696,531
b) Expected Payment on the UAL during 2018-19	38,813,491
c) Interest through 6/30/19 [.07 x (1a) - ((1.07)^{½} - 1) x (1b)]	74,943,261
d) Expected UAL before all other changes [(1a) - (1b) + (1c)]	1,125,826,301
e) Change due to plan changes	0
f) Change due to assumption change	0
g) Change due to method change	0
h) Expected UAL after all other changes [(1d) + (1e) + (1f) + (1g)]	1,125,826,301
i) Actual UAL as of 6/30/19	1,115,122,032
j) Total (Gain)/Loss for 2018-19 [(1i) - (1h)]	($10,704,269)
2. Contribution (Gain)/Loss for the Year	
a) Expected Contribution (Employer and Employee)	$137,242,333
b) Interest on Expected Contributions	4,722,240
c) Actual Contributions	133,137,186
d) Interest on Actual Contributions	4,580,990
e) Expected Contributions with Interest [(2a) + (2b)]	141,964,573
f) Actual Contributions with Interest [(2c) + (2d)]	137,718,176
g) Contribution (Gain)/Loss [(2e) - (2f)]	$4,246,397
3. Investment (Gain)/Loss for the Year	
a) Market Value of Assets as of 6/30/18	$2,586,874,850
b) Prior Fiscal Year Receivables	(5,298,449)
c) Current Fiscal Year Receivables	4,880,191
d) Contributions Received	133,137,186
e) Benefits and Refunds Paid	(145,095,576)
f) Transfers, SCP Payments and Interest, and Miscellaneous Adjustments	1,270,504
g) Expected Int. [.07 x (3a + 3b) + ((1.07)^{½} - 1) x ((3d) + (3e) + (3f))]	180,342,599
h) Expected Assets as of 6/30/19 [(3a) + (3b) + (3c) + (3d) + (3e) + (3f) + (3g)]	2,756,111,305
i) Market Value of Assets as of 6/30/19	2,742,688,693
j) Investment (Gain)/Loss [(3h) - (3i)]	$13,422,612
4. Liability (Gain)/Loss for the Year	
a) Total (Gain)/Loss (1j)	($10,704,269)
b) Contribution (Gain)/Loss (2g)	4,246,397
c) Investment (Gain)/Loss (3j)	13,422,612
d) Liability (Gain)/Loss [(4a) - (4b) - (4c)]	($28,373,278)
5. Non-Investment (Gain)/Loss for the Year	
a) Contribution (Gain)/Loss (2g)	$4,246,397
b) Liability (Gain)/Loss (4d)	(28,373,278)
c) Non-Investment (Gain)/Loss [(5a) + (5b)]	($24,126,881)

Schedule of Amortization Bases

Below is the schedule of the plan's amortization bases. Note that 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, 2019.
- The required employer contributions determined by the valuation are for the fiscal year beginning two years after the valuation date: fiscal year 2021-22.

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 Est.	Ramp Level 2021-22	Ramp Shape	Escala-tion Rate	Amort. Period	Balance 6/30/19	Expected Payment 2019-20	Balance 6/30/20	Expected Payment 2020-21	Balance 6/30/21	Minimum Required Payment 2021-22
Fresh Start	6/30/08		No Ramp	2.75%	19	(5,097,879)	(370,314)	(5,071,675)	(375,177)	(5,038,606)	(385,494)
Assumption Change	6/30/09		No Ramp	2.75%	10	18,050,822	18,671,916	0	0	0	0
Special (Gain)/Loss	6/30/09		No Ramp	2.75%	20	72,525,364	5,118,919	72,307,088	5,184,084	72,006,126	5,326,647
Golden Handshake	6/30/10		No Ramp	2.75%	11	11,685,636	12,087,716	0	0	0	0
Special (Gain)/Loss	6/30/10		No Ramp	2.75%	21	57,840,283	3,974,333	57,778,021	4,023,362	57,660,684	4,134,005
Assumption Change	6/30/11		No Ramp	2.75%	12	42,212,747	43,665,205	0	0	0	0
Special (Gain)/Loss	6/30/11		No Ramp	2.75%	22	63,423,809	4,250,044	63,467,196	4,300,829	63,461,088	4,419,102
Payment (Gain)/Loss	6/30/12		No Ramp	2.75%	23	(36,425,963)	(2,384,264)	(36,509,479)	(2,411,846)	(36,570,310)	(2,478,172)
(Gain)/Loss	6/30/12		No Ramp	2.75%	23	(5,198,966)	(340,299)	(5,210,886)	(344,235)	(5,219,569)	(353,702)
(Gain)/Loss	6/30/13	100%	Up/Down	2.75%	24	380,639,509	25,532,144	380,873,620	25,837,318	380,808,444	26,547,845
Assumption Change	6/30/14	100%	Up/Down	2.75%	15	206,496,119	213,601,247	0	0	0	0
(Gain)/Loss	6/30/14	100%	Up/Down	2.75%	25	(214,334,621)	(11,377,339)	(217,569,233)	(14,387,176)	(217,916,869)	(14,782,824)
(Gain)/Loss	6/30/15	100%	Up/Down	2.75%	26	198,653,491	7,927,946	204,358,504	10,688,784	207,607,035	13,728,407
Assumption Change	6/30/16	80%	Up/Down	2.75%	17	70,931,233	73,371,838	0	0	0	0
(Gain)/Loss	6/30/16	80%	Up/Down	2.75%	27	199,431,607	5,387,608	207,818,834	8,167,002	213,918,140	11,188,792
Assumption Change	6/30/17	60%	Up/Down	2.75%	18	75,556,750	1,427,118	79,369,500	2,894,242	81,931,538	4,460,750
(Gain)/Loss	6/30/17	60%	Up/Down	2.75%	28	(102,092,535)	(1,418,387)	(107,771,822)	(2,864,755)	(112,352,524)	(4,415,304)
Method Change	6/30/18	40%	Up/Down	2.75%	19	19,008,847	(107,904)	20,451,083	381,303	21,488,236	783,577
Assumption Change	6/30/18	40%	Up/Down	2.75%	19	122,844,350	(4,368,484)	135,962,249	2,534,966	142,857,417	5,209,355
(Gain)/Loss	6/30/18	40%	Up/Down	2.75%	29	(50,324,302)	0	(53,847,003)	(735,433)	(56,855,555)	(1,511,316)

Schedule of Amortization Bases (continued)

Reason for Base	Date Est.	Ramp Level 2021-22	Ramp Shape	Escala-tion Rate	Amort. Period	Balance 6/30/19	Expected Payment 2019-20	Balance 6/30/20	Expected Payment 2020-21	Balance 6/30/21	Minimum Required Payment 2021-22
Non-Investment (Gain)/Loss	6/30/19	No Ramp		0.00%	20	(24,126,881)	0	(25,815,763)	0	(27,622,866)	(2,520,672)
Investment (Gain)/Loss	6/30/19	20%	Up Only	0.00%	20	13,422,612	0	14,362,195	0	15,367,549	335,996
Total						**1,115,122,032**	**394,649,043**	**784,952,429**	**42,893,268**	**795,529,958**	**49,686,992**

Amortization Schedule and Alternatives

The amortization schedule on the previous page shows the minimum contributions required according to the CalPERS amortization policy. Many agencies have expressed interest in paying off the unfunded accrued liabilities more quickly than required. As such, we have provided alternative amortization schedules to help analyze the current amortization schedule and illustrate the potential savings 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) alternative "fresh start" amortization schedules using two sample periods that would both result in interest savings relative to the current amortization schedule.

The Current Amortization Schedule typically contains both positive and negative bases. Positive bases result from plan changes, assumption changes, method changes or plan experience that increase unfunded liability. Negative bases result from plan changes, assumption changes, method changes, or plan experience that decrease 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:

- When a negative payment would be required on a positive unfunded actuarial liability; or
- When the payment would completely amortize the total unfunded liability in a very short time period, and results in a large change in the employer contribution requirement.

In any year when 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		Alternative Schedules			
			20 Year Amortization		15 Year Amortization	
Date	**Balance**	**Payment**	**Balance**	**Payment**	**Balance**	**Payment**
6/30/2021	795,529,958	49,686,992	795,529,958	72,594,563	795,529,958	84,439,515
6/30/2022	799,820,430	56,641,576	776,124,655	72,594,563	763,872,142	84,439,515
6/30/2023	797,217,358	60,967,793	755,360,981	72,594,563	729,998,278	84,439,515
6/30/2024	789,956,999	65,452,811	733,143,850	72,594,563	693,753,244	84,439,515
6/30/2025	777,549,076	67,621,116	709,371,520	72,594,564	654,971,058	84,439,515
6/30/2026	762,029,684	69,503,816	683,935,126	72,594,564	613,474,119	84,439,515
6/30/2027	743,476,455	71,438,291	656,718,184	72,594,564	569,072,394	84,439,515
6/30/2028	721,623,463	73,425,961	627,596,056	72,594,564	521,562,548	84,439,514
6/30/2029	696,184,701	75,468,294	596,435,379	72,594,563	470,727,014	84,439,515
6/30/2030	666,852,618	77,566,793	563,093,456	72,594,564	416,332,991	84,439,514
6/30/2031	633,296,589	79,723,000	527,417,597	72,594,563	358,131,388	84,439,514
6/30/2032	595,161,237	81,938,501	489,244,429	72,594,564	295,855,673	84,439,515
6/30/2033	552,064,680	84,214,930	448,399,138	72,594,563	229,220,657	84,439,515
6/30/2034	503,596,606	86,553,960	404,694,678	72,594,564	157,921,190	84,439,515
6/30/2035	449,316,255	86,783,449	357,930,905	72,594,564	81,630,760	84,439,515
6/30/2036	390,998,897	82,458,177	307,893,667	72,594,563		
6/30/2037	333,073,419	77,828,755	254,353,824	72,594,564		
6/30/2038	275,881,868	72,881,714	197,066,191	72,594,563		
6/30/2039	219,804,166	67,603,096	135,768,425	72,594,564		
6/30/2040	165,261,272	65,113,532	70,179,814	72,594,564		
6/30/2041	109,475,600	49,469,120				
6/30/2042	65,967,637	39,362,173				
6/30/2043	29,868,824	23,156,972				
6/30/2044	8,005,884	8,281,351				
6/30/2045						
6/30/2046						
6/30/2047						
6/30/2048						
6/30/2049						
6/30/2050						
Total		**1,573,142,173**		**1,451,891,271**		**1,266,592,722**
Interest Paid		**777,612,215**		**656,361,313**		**471,062,764**
Estimated Savings				**121,250,902**		**306,549,451**

Reconciliation of Required Employer Contributions

Normal Cost (% of Payroll)

1. For Period 7/1/20 – 6/30/21	
a) Employer Normal Cost	21.095%
b) Employee Contribution	9.432%
c) Total Normal Cost	30.527%
2. Changes since the prior year annual valuation	
a) Effect of demographic experience	(0.147%)
b) Effect of plan changes	0.000%
c) Effect of assumption changes	0.000%
d) Effect of method changes	0.000%
e) Net effect of the changes above [sum of (a) through (d)]	(0.147%)
3. For Period 7/1/21 – 6/30/22	
a) Employer Normal Cost	20.74%
b) Employee Contribution	9.64%
c) Total Normal Cost	30.38%
Employer Normal Cost Change [(3a) – (1a)]	(0.355%)
Employee Contribution Change [(3b) – (1b)]	0.208%

Unfunded Liability Contribution ($)

1. For Period 7/1/20 – 6/30/21	73,668,397
2. Changes since the prior year annual valuation	
a) Effect of adjustments to prior year's amortization schedule	(32,986,210)
b) Effect of investment (gain)/loss during prior year[1]	335,996
c) Effect of non-investment (gain)/loss during prior year	(2,520,672)
d) Effect of plan changes	0
e) Effect of assumption changes	0
f) Changes to prior year amortization payments[2]	11,189,481
g) Effect of changes due to Fresh Start	0
h) Effect of elimination of amortization base	0
i) Effect of method change	0
j) Net effect of the changes above [sum of (a) through (i)]	(23,981,405)
3. For Period 7/1/21 – 6/30/22 [(1) + (2j)]	49,686,992

The amounts shown for the period 7/1/20 – 6/30/21 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.

[1] The unfunded liability contribution for the investment (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 f) in future years.

[2] Includes scheduled escalation in individual amortization base payments due to the 5-year ramp and payroll growth assumption used in the pre-2019 amortization policy.

Employer Contribution History

The table below provides a recent history of the required employer contributions for the plan for fiscal years prior to 2019-20. The amounts are based on the actuarial valuation from two years prior and does not account for prepayments or benefit changes made during a fiscal year. Additional discretionary payments before July 1, 2018 or after June 30, 2020 are not included.

Fiscal Year	Employer Normal Cost	Unfunded Rate	Unfunded Liability Payment ($)	Additional Discretionary Payments
2013 - 14	17.504%	5.864%	N/A	N/A
2014 - 15	16.564%	5.335%	N/A	N/A
2015 - 16	16.729%	6.856%	N/A	N/A
2016 - 17	18.321%	8.249%	N/A	N/A
2017 - 18	17.912%	N/A	35,778,888	N/A
2018 - 19	18.464%	N/A	48,790,038	0
2019 - 20	19.853%	N/A	62,876,977	344,292,468
2020 - 21	21.095%	N/A	73,668,397	
2021 - 22	20.74%	N/A	49,686,992	

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	$2,032,001,280	$1,565,799,198	$466,202,082	77.1%	$273,169,605
06/30/12	2,086,406,405	1,567,404,726	519,001,679	75.1%	261,703,717
06/30/13	2,285,586,497	1,776,122,369	509,464,128	77.7%	271,367,032
06/30/14	2,615,686,777	2,098,296,808	517,389,969	80.2%	295,171,068
06/30/15	2,846,014,858	2,140,637,485	705,377,373	75.2%	319,499,129
06/30/16	3,110,254,402	2,151,981,845	958,272,557	69.2%	338,809,025
06/30/17	3,361,565,098	2,394,890,161	966,674,937	71.2%	328,400,573
06/30/18	3,676,571,381	2,586,874,850	1,089,696,531	70.4%	309,713,827
06/30/19	3,857,810,725	2,742,688,693	1,115,122,032	71.1%	304,732,882

Normal Cost by Benefit Group

The table below displays the Total Normal Cost broken out by benefit group for Fiscal Year 2021-22. 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 2021-22	Number of Actives	Payroll on 6/30/2019
63	Safety County Peace Officer First Level	31.52%	2,300	$240,283,963
25051	Safety County Peace Officer PEPRA Level	25.87%	837	$54,345,862
30194	Safety Fire First Level	N/A	0	$0
30195	Safety County Peace Officer Second Level	28.55%	128	$10,103,057
	Plan Total	**30.38%**	**3,265**	**$304,732,882**

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 Second Level Benefit Group amended to the same benefit formula as a First Level Benefit Group, their Normal Costs may be dissimilar due to demographic or other population differences. If you have questions in these situations, please consult with your plan actuary.

PEPRA Member Contribution Rates

The California Public Employees' Pension Reform Act of 2013 ("PEPRA") established new benefit formulas, final compensation period, and contribution requirements for "new" employees (generally those first hired into a CalPERS-covered position on or after January 1, 2013). In accordance with Government Code Section 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 members' entry age into the plan. Should the total normal cost of the plan change by more than one percent 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.

The table below shows the determination of the PEPRA member contribution rates effective July 1, 2021, based on 50 percent of the Total Normal Cost for each respective plan as of the June 30, 2019 valuation.

		Basis for Current Rate		Rates Effective July 1, 2021			
Rate Plan Identifier	**Benefit Group Name**	**Total Normal Cost**	**Member Rate**	**Total Normal Cost**	**Change**	**Change Needed**	**Member Rate**
25051	Safety County Peace Officer PEPRA Level	24.961%	12.50%	25.87%	0.909%	No	12.50%

For purposes of setting member rates, it is preferable to determine total normal cost using a large active population so that the rate remains relatively stable. While each CalPERS non-pooled plan has a sufficiently large active population for this purpose, the PEPRA active population by itself may not be sufficiently large. The total PEPRA normal cost will be determined based on the plan's PEPRA membership only if 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

Until one of these conditions is met, the plan's total PEPRA normal cost will be determined using the entire active plan population (both PEPRA and Classic) based on the PEPRA benefit provisions. For this reason, the PEPRA member contribution rate determined in the table above may not equal 50 percent of the total normal cost of the PEPRA group shown on the "Total Normal Cost by Group" page.

Risk Analysis

- **Future Investment Return Scenarios**
- **Discount Rate Sensitivity**
- **Mortality Rate Sensitivity**
- **Maturity Measures**
- **Maturity Measures History**
- **Hypothetical Termination Liability**

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 (2019-20, 2020-21, 2021-22 and 2022-23). 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.

For fiscal years 2019-20, 2020-21, 2021-22, and 2022-23 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.

These alternate investment returns were chosen based on stochastic analysis of possible future investment returns over the four-year period ending June 30, 2023. 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 four-year outcomes generated in the stochastic analysis, approximately 25 percent 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 a four-year period, the likelihood 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 2019-20 through 2022-23	Projected Employer Contributions			
	2022-23	2023-24	2024-25	2025-26
1.0%				
Normal Cost	20.5%	20.2%	20.0%	19.7%
UAL Contribution	$61,006,000	$74,382,000	$92,661,000	$113,415,000
4.0%				
Normal Cost	20.5%	20.2%	20.0%	19.7%
UAL Contribution	$58,823,000	$67,738,000	$79,323,000	$91,202,000
7.0%				
Normal Cost	20.5%	20.2%	20.0%	19.7%
UAL Contribution	$56,642,000	$60,968,000	$65,453,000	$67,621,000
9.0%				
Normal Cost	20.9%	21.1%	21.3%	21.5%
UAL Contribution	$55,673,000	$58,132,000	$59,718,000	$57,858,000
12.0%				
Normal Cost	20.9%	21.1%	21.3%	21.5%
UAL Contribution	$53,506,000	$51,219,000	$45,147,000	$32,345,000

These projections reflect recent changes to the amortization policy effective with the June 30, 2019 valuation as well as the impact of the CalPERS risk mitigation policy (which reduces the discount rate when investment returns exceed specified trigger points). The projected normal cost percentages reflect that normal cost will continue to decline over time as new employees are hired into PEPRA or other lower-cost benefit tiers.

Discount Rate Sensitivity

The discount rate assumption is calculated as the sum of the assumed real rate of return and the assumed annual price inflation, currently 4.50 percent and 2.50 percent, respectively. Changing either the price inflation assumption or the real rate of return assumption will change the discount rate. The sensitivity of the valuation results to the discount rate assumption depends on which component of the discount rate is changed. Shown below are various valuation results as of June 30, 2019 assuming alternate discount rates by changing the two components independently. Results are shown using the current discount rate of 7.0 percent as well as alternate discount rates of 6.0 percent and 8.0 percent. The rates of 6.0 percent and 8.0 percent were selected since they illustrate the impact of a 1.0 percent increase or decrease to the 7.0 percent assumption.

Sensitivity to the Real Rate of Return Assumption

As of June 30, 2019	1% Lower Real Return Rate	Current Assumptions	1% Higher Real Return Rate
Discount Rate	**6.0%**	**7.0%**	**8.0%**
Inflation	2.5%	2.5%	2.5%
Real Rate of Return	**3.5%**	**4.5%**	**5.5%**
a) Total Normal Cost	38.80%	30.38%	24.06%
b) Accrued Liability	$4,444,603,810	$3,857,810,725	$3,381,713,774
c) Market Value of Assets	$2,742,688,693	$2,742,688,693	$2,742,688,693
d) Unfunded Liability/(Surplus) [(b) - (c)]	$1,701,915,117	$1,115,122,032	$639,025,081
e) Funded Status	61.7%	71.1%	81.1%

Sensitivity to the Price Inflation Assumption

As of June 30, 2019	1% Lower Inflation Rate	Current Assumptions	1% Higher Inflation Rate
Discount Rate	**6.0%**	**7.0%**	**8.0%**
Inflation	**1.5%**	**2.5%**	**3.5%**
Real Rate of Return	4.5%	4.5%	4.5%
a) Total Normal Cost	32.68%	30.38%	27.92%
b) Accrued Liability	$4,090,282,110	$3,857,810,725	$3,582,373,357
c) Market Value of Assets	$2,742,688,693	$2,742,688,693	$2,742,688,693
d) Unfunded Liability/(Surplus) [(b) - (c)]	$1,347,593,417	$1,115,122,032	$839,684,664
e) Funded Status	67.1%	71.1%	76.6%

Mortality Rate Sensitivity

The following table looks at the change in the June 30, 2019 plan costs and funded ratio under two different longevity scenarios, namely assuming rates of mortality are 10 percent lower or 10 percent higher than our current mortality assumptions. This type of analysis highlights the impact on the plan of improving or worsening mortality over the long-term.

As of June 30, 2019	10% Lower Mortality Rates	Current Assumptions	10% Higher Mortality Rates
a) Total Normal Cost	30.75%	30.38%	30.04%
b) Accrued Liability	$3,915,201,794	$3,857,810,725	$3,804,450,216
c) Market Value of Assets	$2,742,688,693	$2,742,688,693	$2,742,688,693
d) Unfunded Liability/(Surplus) [(b) - (c)]	$1,172,513,101	$1,115,122,032	$1,061,761,523
e) Funded Status	70.1%	71.1%	72.1%

Maturity Measures

As pension plans mature they become more sensitive to risks. Understanding plan maturity and how it affects the ability of a pension plan to tolerate risk is important in understanding how the plan is impacted by investment return volatility, other economic variables and changes in longevity or other demographic assumptions. One way to look at the maturity level of CalPERS and its plans is to look at the ratio of a plan's retiree liability to its total liability. A pension plan in its infancy will have a very low ratio of retiree liability to total liability. As the plan matures, the ratio increases. A mature plan will often have a ratio above 60-65 percent.

Ratio of Retiree Accrued Liability to Total Accrued Liability	**June 30, 2018**	**June 30, 2019**
1. Retiree Accrued Liability	1,996,293,279	2,161,331,664
2. Total Accrued Liability	3,676,571,381	3,857,810,725
3. Ratio of Retiree AL to Total AL [(1) / (2)]	54%	56%

Another measure of the maturity level of CalPERS and its plans is the ratio of actives to retirees, also called Support Ratio. A pension plan in its infancy will have a very high ratio of active to retired members. As the plan matures, and members retire, the ratio declines. A mature plan will often have a ratio near or below one. The average support ratio for CalPERS public agency plans is 1.25.

Support Ratio	**June 30, 2018**	**June 30, 2019**
1. Number of Actives	3,296	3,265
2. Number of Retirees	2,739	2,868
3. Support Ratio [(1) / (2)]	1.20	1.14

The actuarial calculations supplied in this communication are based on various assumptions about long-term demographic and economic behavior. Unless these assumptions (e.g., terminations, deaths, disabilities, retirements, salary growth, 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

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

Liability Volatility Ratio

Also shown in the table below is the liability volatility ratio (LVR), which is the ratio of accrued liability to payroll. Plans that have a higher LVR experience more volatile employer contributions (as a percentage of payroll) due to changes in liability. For example, a plan with LVR of 8 is expected to have twice the contribution volatility of a plan with LVR of 4 when there is a change in accrued liability, such as when there is a change in actuarial assumptions. It should be noted that this ratio indicates a longer-term potential for contribution volatility, since the AVR, described above, will tend to move closer to the LVR as the funded status approaches 100 percent.

Maturity Measures (continued)

Contribution Volatility	June 30, 2018	June 30, 2019
1. Market Value of Assets without Receivables	$2,581,576,401	$2,737,808,502
2. Payroll	309,713,827	304,732,882
3. Asset Volatility Ratio (AVR) [(1) / (2)]	8.3	9.0
4. Accrued Liability	$3,676,571,381	$3,857,810,725
5. Liability Volatility Ratio (LVR) [(4) / (2)]	11.9	12.7

Maturity Measures History

Valuation Date	Ratio of Retiree Accrued Liability to Total Accrued Liability	Support Ratio	Asset Volatility Ratio	Liability Volatility Ratio
06/30/17	51%	1.38	7.3	10.2
06/30/18	54%	1.20	8.3	11.9
06/30/19	56%	1.14	9.0	12.7

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, 2019. 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 19-month period from 12 months before the valuation date to 7 months after.

Market Value of Assets (MVA)	Hypothetical Termination Liability[1,2] @ 1.75%	Funded Status	Unfunded Termination Liability @ 1.75%	Hypothetical Termination Liability[1,2] @ 3.25%	Funded Status	Unfunded Termination Liability @ 3.25%
$2,742,688,693	$8,288,344,296	33.1%	$5,545,655,603	$6,385,605,633	43.0%	$3,642,916,940

[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 2.31 percent on June 30, 2019, and was 1.83 percent on January 31, 2020.

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 Appendix B.

	Benefit Group						
Member Category	Peace	Fire	Peace	Peace	Peace	Peace	Fire
Demographics							
Actives	Yes	No	No	Yes	Yes	Yes	No
Transfers/Separated	Yes	Yes	No	Yes	Yes	Yes	No
Receiving	Yes	Yes	Yes	Yes	No	Yes	Yes
Benefit Provision							
Benefit Formula	3% @ 50	3% @ 50		3% @ 50	2.7% @ 57	2% @ 50	
Social Security Coverage	No	No		No	No	No	
Full/Modified	Full	Full		Full	Full	Full	
Employee Contribution Rate	9.00%			9.00%	12.50%	9.00%	
Final Average Compensation Period	One Year	Three Year		One Year	Three Year	Three Year	
Sick Leave Credit	No	No		No	No	No	
Non-Industrial Disability	Standard	Standard		Standard	Standard	Standard	
Industrial Disability	Standard	Standard		Standard	Standard	Standard	
Pre-Retirement Death Benefits							
Optional Settlement 2	Yes	Yes		Yes	Yes	Yes	
1959 Survivor Benefit Level	Indexed	Indexed		Indexed	Indexed	Indexed	
Special	Yes	Yes		Yes	Yes	Yes	
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%

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 Appendix B.

	Benefit Group		
Member Category	Peace	Peace	
Demographics			
Actives	No	No	
Transfers/Separated	No	No	
Receiving	Yes	Yes	
Benefit Provision			
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	
Survivor Allowance (PRSA)	Yes	Yes	
COLA	2%	2%	

Appendices

- **Appendix A – Actuarial Methods and Assumptions**
- **Appendix B – Principal Plan Provisions**
- **Appendix C – Participant Data**
- **Appendix D – 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 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 Actuarial 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 a payment toward the UAL. The UAL payment is equal to the sum of individual amortization payments, each representing a different source of UAL for a given measurement period.

Amortization payments are determined according to the CalPERS amortization policy. The CalPERS Board adopted a new policy effective for the June 30, 2019 actuarial valuation. The new policy applies prospectively only; amortization bases (sources of UAL) established prior to the June 30, 2019 valuation will continue to be amortized according to the prior policy.

Prior Policy (Bases Established prior to June 30, 2019)

Amortization payments are determined as a level percentage of payroll whereby the payment increases each year at an escalation rate. 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. Bases established prior to June 30, 2013 may be amortized differently. A summary is provided in the following table:

Driver	Source (Gain)/Loss 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	2.75% 0%	2.75% 0%	2.75% 0%	2.75% 0%	2.75% 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.

Current Policy (Bases Established on or after June 30, 2019)

Amortization payments are determined as a level dollar amount. Investment gains or losses are amortized over a fixed 20-year period with a 5-year ramp up at the beginning of the amortization period. Non-investment gains or losses are amortized over a fixed 20-year period with no ramps. All changes in liability due to plan amendments (other than golden handshakes) are amortized over a 20-year period with no ramps. Changes in actuarial assumptions or changes in actuarial methodology are amortized over a 20-year period with no ramps. Changes in unfunded accrued liability due to a Golden Handshake are amortized over a period of five years. A summary is provided in the table below:

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

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 negative payment would be required on a positive unfunded actuarial liability; or
- When the payment would completely amortize the total unfunded liability in a very short time period, and results in a large change in the employer contribution requirement.

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 20 years.

Exceptions for Plans in Surplus

If a surplus exists (i.e. the Market Value of Assets exceeds the plan's accrued liability) any prior amortization layers shall be considered fully amortized, and the surplus shall not be amortized.

In the event of any subsequent unfunded liability, a Fresh Start shall be used with an amortization period of 20 years or less.

Exceptions for Small Amounts

Where small unfunded liabilities are identified in annual valuations which result in small payment amounts, the actuary may shorten the remaining period for these bases.

- When the balance of a single amortization base has an absolute value less than $250, the amortization period is reduced to one year.
- When the entire unfunded liability is a small amount the actuary may perform a Fresh Start and use an appropriate amortization period.

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.

Exceptions for Inactive Agencies

For a public agency with no active members in any CalPERS rate plan, the unfunded liability shall be amortized over a closed amortization period of no more than 15 years.

Asset Valuation Method

The Actuarial Value of Assets is set equal to the Market value of assets. Asset values include accounts receivable.

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.

For purposes of setting member rates, it is preferable to determine total normal cost using a large active population so that the rate remains relatively stable. While each CalPERS non-pooled plan has a sufficiently large active population for this purpose, the PEPRA active population by itself may not be sufficiently large. The total PEPRA normal cost will be determined based on the plan's PEPRA membership only if 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

Until one of these conditions is met, the plan's total PEPRA normal cost will be determined using the entire active plan population (both PEPRA and Classic) based on the PEPRA benefit provisions.

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.

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 2021-22 determined in this valuation were calculated using a discount rate of 7.00 percent. 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 7.00 percent compounded annually (net of investment and administrative expenses) as of June 30, 2019.

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 19-month period from 12 months before the valuation date to 7 months after. 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 2.31 percent on June 30, 2019.

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 (2.75% for 2019) 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

2.75 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

2.50 percent compounded annually.

Non-valued Potential Additional Liabilities

The potential liability loss for a cost-of-living increase exceeding the 2.50 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.

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

Age	Duration of Service					
	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

Age	Duration of Service					
	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. The Section 415(b) dollar limit for the 2019 calendar year is $225,000.

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 2019 calendar year is $280,000.

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 $124,180 for 2019 and for those employees that do not participate in Social Security the cap for 2019 is $149,016. 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 credited annually at the greater of 6 percent or the prevailing discount rate through the date of death, 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, 2018	June 30, 2019
1. **Active Members**		
a) Counts	3,296	3,265
b) Average Attained Age	40.25	40.36
c) Average Entry Age to Rate Plan	28.66	28.62
d) Average Years of Credited Service	11.63	11.75
e) Average Annual Covered Pay	$93,967	$93,333
f) Annual Covered Payroll	309,713,827	304,732,882
g) Projected Annual Payroll for Contribution Year	335,974,322	330,571,045
h) Present Value of Future Payroll	2,973,850,922	2,898,262,882
2. **Transferred Members**		
a) Counts	664	694
b) Average Attained Age	40.58	40.71
c) Average Years of Credited Service	3.54	3.68
d) Average Annual Covered Pay	$87,939	$89,160
3. **Terminated Members**		
a) Counts	649	673
b) Average Attained Age	41.97	41.82
c) Average Years of Credited Service	3.37	3.50
d) Average Annual Covered Pay	$52,806	$53,806
4. **Retired Members and Beneficiaries**		
a) Counts	2,739	2,868
b) Average Attained Age	63.24	63.52
c) Average Annual Benefits	$49,981	$51,980
5. **Active to Retired Ratio** [(1a) / (4a)]	1.20	1.14

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	20-24	25+	Total
15-24	95	4	0	0	0	0	99
25-29	225	96	9	0	0	0	330
30-34	177	203	183	1	0	0	564
35-39	93	90	366	53	0	0	602
40-44	33	40	279	230	56	0	638
45-49	21	26	168	189	141	30	575
50-54	17	10	90	62	70	43	292
55-59	12	7	31	29	19	20	118
60-64	2	1	18	10	6	3	40
65 and Over	0	1	1	4	0	1	7
All Ages	**675**	**478**	**1,145**	**578**	**292**	**97**	**3,265**

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	20-24	25+	Average Salary
15-24	$49,471	$68,671	$0	$0	$0	$0	$50,247
25-29	60,230	72,421	84,781	0	0	0	64,446
30-34	64,319	77,146	90,086	109,714	0	0	77,377
35-39	67,061	75,512	98,923	110,156	0	0	91,490
40-44	77,006	86,225	98,582	105,292	122,477	0	101,207
45-49	76,317	76,814	103,282	107,319	127,203	142,996	110,365
50-54	94,079	71,092	105,793	110,662	131,169	151,500	117,770
55-59	96,161	96,914	86,918	94,905	113,701	158,644	106,883
60-64	109,424	72,944	115,005	83,678	113,093	126,964	106,453
65 and Over	0	68,045	84,060	77,325	0	22,954	69,194
Average	**$63,687**	**$76,695**	**$98,411**	**$105,896**	**$126,079**	**$148,259**	**$93,333**

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**	**20-24**	**25+**	**Total**	**Average Salary**
15-24	1	0	0	0	0	0	1	$75,387
25-29	83	1	0	0	0	0	84	75,384
30-34	115	18	4	0	0	0	137	85,994
35-39	92	29	9	1	0	0	131	88,555
40-44	89	18	7	4	0	0	118	94,737
45-49	83	17	8	6	1	0	115	99,188
50-54	47	4	6	3	0	0	60	92,445
55-59	20	7	4	0	0	0	31	94,046
60-64	10	1	1	0	0	0	12	64,116
65 and Over	5	0	0	0	0	0	5	54,034
All Ages	**545**	**95**	**39**	**14**	**1**	**0**	**694**	**$89,160**

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**	**20-24**	**25+**	**Total**	**Average Salary**
15-24	13	0	0	0	0	0	13	$43,223
25-29	53	2	0	0	0	0	55	45,668
30-34	87	20	6	0	0	0	113	55,520
35-39	102	35	9	0	0	0	146	55,154
40-44	65	19	14	6	0	0	104	56,586
45-49	64	22	6	7	4	4	107	68,850
50-54	52	10	3	0	0	0	65	45,228
55-59	32	6	3	0	0	0	41	39,124
60-64	17	1	0	0	0	0	18	36,286
65 and Over	11	0	0	0	0	0	11	32,987
All Ages	**496**	**115**	**41**	**13**	**4**	**4**	**673**	**$53,806**

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	4	9	13
30-34	0	1	6	0	0	4	11
35-39	0	0	20	0	1	2	23
40-44	0	4	34	0	0	1	39
45-49	0	10	44	0	1	3	58
50-54	315	4	61	1	3	9	393
55-59	403	3	95	0	7	25	533
60-64	454	3	88	2	5	20	572
65-69	353	4	97	3	3	28	488
70-74	265	4	71	3	1	48	392
75-79	108	1	47	2	0	29	187
80-84	45	0	18	0	1	25	89
85 and Over	26	0	12	0	1	31	70
All Ages	**1,969**	**34**	**593**	**11**	**27**	**234**	**2,868**

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	$23,146	$6,885	$11,889
30-34	0	27,903	27,929	0	0	10,781	21,691
35-39	0	0	32,517	0	58,529	24,671	32,966
40-44	0	6,249	32,423	0	0	20,448	29,431
45-49	0	18,347	34,713	0	48,613	29,517	31,862
50-54	77,552	16,232	35,773	8,012	38,635	33,996	68,971
55-59	66,638	23,833	33,771	0	51,161	36,332	58,914
60-64	60,098	21,361	33,105	10,078	44,577	36,193	54,596
65-69	54,934	8,790	28,886	53,215	39,458	40,149	48,424
70-74	56,682	14,755	28,679	28,259	23,429	32,945	47,973
75-79	45,968	24,369	37,603	34,743	0	29,812	41,125
80-84	40,784	0	26,738	0	27,697	26,705	33,842
85 and Over	33,099	0	34,689	0	36,869	23,947	29,373
All Ages	**$61,270**	**$16,336**	**$32,469**	**$31,098**	**$40,852**	**$30,691**	**$51,980**

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	662	8	105	1	3	95	874
5-9	553	10	83	2	1	64	713
10-14	407	3	57	2	6	35	510
15-19	220	6	80	5	12	15	338
20-24	87	5	94	0	0	14	200
25-29	29	2	62	1	1	6	101
30 and Over	11	0	112	0	4	5	132
All Years	**1,969**	**34**	**593**	**11**	**27**	**234**	**2,868**

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	$69,229	$18,556	$44,429	$8,012	$33,982	$33,583	$61,720
5-9	63,751	17,366	29,683	41,538	64,169	33,033	56,316
10-14	55,660	14,031	42,403	66,495	34,714	28,346	51,855
15-19	52,443	13,090	35,225	19,368	48,880	24,175	45,799
20-24	40,989	14,934	29,712	0	0	24,266	33,867
25-29	46,079	19,017	25,502	21,156	32,929	25,066	31,286
30 and Over	42,207	0	22,468	0	27,280	6,461	23,653
All Years	**$61,270**	**$16,336**	**$32,469**	**$31,098**	**$40,852**	**$30,691**	**$51,980**

* 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

Glossary of Actuarial Terms

Glossary of Actuarial Terms

Accrued Liability *(also called Actuarial Accrued Liability or Entry Age Actuarial 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, method changes, and/or gains and losses.

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
The assumed long-term rate of return on plan assets. This is the rate at which projected cash flows are discounted to the valuation date to determine Accrued Liability. This assumption is called "investment return" in earlier CalPERS reports and "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 Actuarial 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

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.

Proprietary & Confidential

Actuarial Valuation Report

County of Riverside

County of Riverside Postretirement Benefits Plan

As of June 30, 2020 (REVISED January 22, 2021)

Empower Results®

Executive Summary

Background

The County of Riverside provides retiree medical benefits for eligible retirees enrolled in County sponsored plans. The benefits are provided in the form of:

- Monthly County contributions toward the retiree's premium,
- Access to CalPERS health plan coverage at subsidized premium levels, and
- $25 per month to the RSA Trust for RSA law enforcement retirees.

County Contributions

The County of Riverside makes contributions to eligible retirees for their medical plan premiums when the retiree enrolls in a County sponsored health plan. The current monthly amount paid by the County ranges from $25 – $256, depending on the retiree's bargaining unit at retirement. The County provided amounts are detailed in the Summary of Principal Plan Provisions and outlined as follows:

- **CalPERS Health Benefits program retirees** (Law Enforcement Management, Deputy District Attorneys Association (Deputy DAs), RSA Public Safety members, Confidential, Law Enforcement Executive Staff, Management, Unrepresented, and SEIU) are eligible for the greater of the stated Public Employees' Medical and Hospital Care Act (PEMHCA) amounts and the bargaining unit's negotiated amount. The PEMHCA monthly amounts are $139.00 and $143.00 in 2020 and 2021, respectively, and increase annually thereafter by Medical CPI. These are the only groups that have inflation-indexed benefits.
- **All other retirees** are eligible for their bargaining unit negotiated amount (i.e., $25). These amounts do not increase in future years to account for inflation.

  Note: The County contributes $25.00 per month to the RSA Benefit Trust for RSA Law Enforcement retirees, and this cost is included in Plan liabilities.

As described above, the majority of participants are eligible to receive CalPERS health benefits. Retirees receiving the PEMHCA benefits are eligible for inflation-indexed benefits. The long-term benefit under PEMHCA could be more than 10 times greater than certain fixed benefit amounts in 16 years, as illustrated in Appendix A.

Implicit Subsidy

Under CalPERS health plans, retirees receive benefits prior to age 65 by paying premiums that are developed by blending active and retiree costs. Since retirees are older and generally cost more than actives, the premium paid by the retiree is less than the "true cost" of coverage for retirees. For example, under the Blue Shield Access Plus, the estimated "true cost" for an age 60 retiree is $1,227.28 per month, while the required premium is only $834.88 per month in 2021. Subsidization can also occur for post 65 benefits due to demographic differences between the County retirees and the CalPERS population used to develop premiums. This implicit subsidy is considered an employer obligation under the Actuarial Standards of Practice (ASOP) No. 6 requirements (see below) and is included in this valuation.

ASOP 6

The Actuarial Standards Board (ASB) amended Actuarial Standards of Practice (ASOP) No. 6 – Measuring Retiree Group Benefit Obligations, effective for measurement dates after March 31, 2015. This amendment requires plans to recognize certain additional healthcare costs (i.e. implicit subsidy) for pooled health plans. Since CalPERS plans are considered pooled health plans, the implicit subsidy is reflected in this actuarial valuation.

GASB 75

In June 2015, GASB released Statement 75, which was initially effective for the FYE June 30, 2018. This July 1, 2020 valuation is based on census data provided as of July 1, 2020 for the purpose of providing GASB 75 financial statement information, including final expense, for FYE June 30, 2021.

The measurement date for results shown in this valuation report is June 30, 2020.

It is important to note that only current active and retired participants are valued in this actuarial study. Future new entrants or any projected growth in the County's employee population are not considered.

Summary of Results

Liabilities

There are a few terms to understand related to the Plan's liabilities. The Present Value of Benefits (PVB) represents the actuarial present value of all future benefits expected to be paid to current employees and retirees. The Actuarial Accrued Liability (AAL) is the portion of the PVB attributable to past service. The Normal Cost is the portion of the PVB that is allocated to the current plan year for active employees.

Each liability is a present value calculated by using a selected discount rate. Results in this report are shown using a 6.15% discount rate. The table below summarizes the liability results as of July 1, 2020:

	County Contribution	Implicit Subsidy	Total Liability
Present Value of Benefits (PVB)	$192,812,836	$137,115,672	$329,928,508
Actuarial Accrued Liability (AAL)	$139,891,747	$95,451,524	$235,343,271
Normal Cost	$6,005,425	$4,516,400	$10,521,825

Discount Rate

The discount rate can have a considerable impact on the magnitude of the liabilities, with lower discount rates resulting in higher liabilities. GASB 75 prescribes the discount rate methodology to be used. Based on the County's current funding policy, projected cash flows, and the assumed asset return, the plan assets are not projected to be depleted, and the discount rate for GASB disclosures can be based entirely on the assumed asset return. For funding purposes, the discount rate is based on the assumed asset return of 6.15%.

Development of Funding Contribution[1]

The funding contribution is developed on a projected basis using prior year valuation results. For example, the funding contribution for Fiscal Year Ending (FYE) 2021 is $9,061,596 and was developed based on the 2019 valuation.

Beginning with this 2020 valuation, the funding contribution development is determined using liabilities **excluding the implicit subsidy**. This valuation develops the funding contribution for FYE 2022, which is $16,339,607 and is based on a projection of the normal cost, amortization of the 2017 initial Unfunded Actuarial Accrued Liability (UAAL) over the period ending June 30, 2037, and amortization of the subsequent unanticipated changes in liability (i.e., actuarial gains / losses and changes in assumptions) over 15-year periods and unanticipated changes in assets over 5-year periods.

The table below shows the contributions for Safety and Miscellaneous for FYE 2021, 2022 and an estimate for FYE 2023.

	2020-2021	2021-2022	2022-2023[2]
Contribution for Safety	$3,569,137	$2,373,792	$2,439,071
Contribution for Miscellaneous	5,492,459	13,965,815	14,349,875
Total Funding Contribution[3]	**$9,061,596**	**$16,339,607**	**$16,788,946**

The large increase in the funding contribution for FYE 2022, despite the exclusion of implicit subsidy funding, is primarily due to a change to provide the SEIU bargaining group access to CalPERS health plans. The projected FYE 2023 contribution has been developed based on the same eligibility basis used for all groups as of June 30, 2020.

GASB 75 Expense

The OPEB expense for FYE June 30, 2021 is $24,495,618 and is developed using the valuation results in this report, including a Valuation Date of July 1, 2020, Measurement Period of July 1, 2019 to June 30, 2020, and a Measurement Date of June 30, 2020. The large increase in the expense for FYE 2021 is primarily due to a change to provide the SEIU bargaining group access to CalPERS health plans. Additional increases due to those factors will also be reflected in the expense for FYE 2022.

[1] Funding contributions are in addition to Pay-as-you-go
[2] Estimated assuming funding policy discussed in the report.
[3] Funding contribution for FYE2022 and FYE2023 are developed excluding the implicit subsidy. Funding contribution for FYE2021 is developed including the implicit subsidy.

Comparison to Prior Valuation

The following table summarizes the prior valuation results using a 7.01% discount rate and the current valuation using a 6.15% discount rate:

	July 1, 2019	July 1, 2020
Discount Rate	7.01%	6.15%
Present Value of Benefits (PVB)	$127,878,481	$329,928,508
Actuarial Accrued Liability (AAL)	103,122,741	235,343,271
Normal Cost	2,966,332	10,521,825
Market Value of Assets	44,911,158	53,014,172
Funding Contribution[1]		
AAL excluding implicit subsidy	N/A	139,891,747
Smoothed Value of Assets	44,500,184	53,464,694
Unfunded AAL	58,622,557	86,427,053
Funded Status	43.2%	38.2%
Funding Contribution for FYE 2021 / 2022	9,061,596	16,339,607
% of pay	0.63%	1.10%
GASB 75 Accounting		
Net OPEB Liability	$58,211,583	$182,329,099
Plan Fiduciary Net Position as a percentage of the OPEB Liability	43.6%	22.5%
GASB Annual Expense for FYE 2020 / 2021	$8,675,880	$24,495,618
GASB Annual Expense for FYE 2022 (Estimate)	N/A	$39,474,000

Plan liabilities and annual costs are considerably higher than the prior valuation, primarily due to a change to provide the SEIU bargaining group access to CalPERS health plans, which have higher costs and participation rates that results in an increase in liability.

After consideration of the items above, the unfunded AAL and costs are higher than expected based on a projection from the prior valuation, as a net result of the following factors:

- Expected return on assets was changed from CalPERS CERBT assumed return of 7.01% to 6.15%, reflecting lower expectations. As a result, the discount rate similarly decreased. Both changes resulted in an increase in liability.
- Healthcare cost increases were lower than projected from the prior year, resulting in a decrease in liabilities.
- Deferred retirees eligible for CalPERS health plans elected coverage higher than previously assumed, resulting in a liability loss.
- A change in future health plan elections for participants eligible for CalPERS health plans to reflect that some participants will elect CalPERS health plans and some will elect the County health plan.
- Mortality assumptions were updated to reflect the improvement scale MP-2020, resulting in a decrease in liabilities.
- Investment return was lower than expected, resulting in an asset loss.

It should be noted that employee groups from Special Districts (Waste, Parks, Flood and RCA) and active Court members were not included in the valuation results presented in this report.

[1] FYE2022 is developed excluding the implicit subsidy. FYE2021 is developed including the implicit subsidy.

Projected Funding Status

All valuation and projection results on the following pages are based on the assumptions and plan provisions stated in the appendices. Specifically, they only include health plan eligibility (i.e., CalPERS or County plans) for bargaining groups as specified as of June 30, 2020. Changes to such eligibility or associated plan participation assumptions may result in higher liabilities, funding costs, and accounting expense than shown in this report.

80% Funded Status (excluding implicit subsidy)

The County requested a review of maintaining an 80% funded status for the OPEB Plan excluding the implicit subsidy liability. The valuation shows the plan is under 80% funded for such County Contribution liability as of June 30, 2021.

Projected Actuarial Accrued Liability (AAL), 6/30/2021	$ 150,445,570
Projected Smoothed Value of Assets, 6/30/2021	66,085,481
Projected Shortfall, 6/30/2021	84,360,089
Projected Funded Status, 6/30/2021	43.9%
Shortfall to achieve 80% as of 6/30/2021	54,270,975
Additional funding in FYE 2021 to achieve 80% as of 6/30/2021[1]	$ 52,675,373

[1] Assumes funding on 1/1/2021 and is in addition to the proposed FYE 2021 contribution of $9,061,596.

The table below summarizes the estimated additional annual contribution projected to attain a funded status of 80% at various future dates. The total contribution % shown below includes the Actuarially Determined Contribution (ADC) as developed in this report plus the additional amount to attain 80% funded status by the target funding date.

	Additional Payment to Fund 80% by Target Date		Total Contribution to Fund 80% by Target Date	
80% Target Funding Date	Annual Payment in FYE 2022[1]	% of Pay	Annual Payment in FYE 2022[1,2]	% of pay[2]
6/30/2022	$ 45,240,817	3.05%	$ 61,580,424	4.15%
6/30/2023	18,353,242	1.24%	34,692,848	2.34%
6/30/2024	9,234,855	0.62%	25,574,462	1.72%
6/30/2025	4,710,556	0.32%	21,050,162	1.42%
6/30/2026	2,013,612	0.14%	18,353,219	1.24%
6/30/2027	261,660	0.02%	16,601,267	1.12%
6/30/2028	0	0.00%	16,339,607	1.10%

[1] Contributions shown for FYE 2022 are assumed to be made throughout the year based on a level percent of pay and are therefore assumed to increase at 2.75% per year from FYE 2022 to the target funding date.

[2] Includes current FYE 2022 contribution of $16,339,607 (1.10% of pay).

For example, to attain 80% funded (excluding implicit subsidy) by FYE 2023, the County would need to contribute approximately $18.4M in FYE 2022 and $18.9 in FYE 2023 in addition to the current ADC contributions of $16.3M in FYE 2022 and $16.8M in FYE 2023.

Note: The breakdown of results between Safety and Miscellaneous funded status may vary from above.

80% Funded Status (including implicit subsidy)

For illustrative purposes of comparing a contribution policy utilizing total liability (i.e., including the implicit subsidy), we also performed a review of maintaining an 80% funded status for the OPEB Plan, including the implicit subsidy liability. The valuation shows the plan continues to be under 80% funded as of June 30, 2021, as shown below:

Projected Actuarial Accrued Liability (AAL), 6/30/2021	$ 253,401,004
Projected Smoothed Value of Assets, 6/30/2021	66,085,481
Projected Shortfall, 6/30/2021	187,315,523
Projected Funded Status, 6/30/2021	26.1%
Shortfall to achieve 80% as of 6/30/2021	136,635,322
Additional funding in FYE 2021 to achieve 80% as of 6/30/2021[1]	$ 132,618,156

[1] Assumes funding on 1/1/2021 and is in addition to the proposed FYE 2021 contribution of $9,061,596.

Effect of Asset Allocation Strategy Selection and the Discount Rate Impact

CalPERS offers three asset allocation strategies for selection by employers who contract to pre-fund their future OPEB costs through CERBT.

The asset allocation and associated expected asset return, and thus the assumed discount rate, have a considerable impact on valuation results and the magnitude of liabilities. CalPERS periodically reviews the expected asset returns and the rates shown below are based on CalPERS revised guidance adopted in October 2018.

A recent review of the long-term expected return rates, based on Aon's 2020 Q3 Capital Market Assumptions and the CERBT target asset allocation for each strategy, resulted in a range of reasonable return assumptions below the published CERBT expected return assumptions. More details of the expected return assumption are included in the assumption rationale document "20210122_2016240_2020 COR Postretirement Benefits Plan Assumption Rationale.pdf" dated January 2021.

The County used CERBT's expected asset returns in the past, although selected a 6.15% long term expected return assumption for Strategy 2 for purposes of this valuation. The following table summarizes financial characteristics of the three strategies:

	Strategy 1	Strategy 2	Strategy 3
CERBT Expected Return Rate	7.59%	7.01%	6.22%
CERBT Standard Deviation of Expected Returns	11.83%	9.24%	7.28%
Aon's Reasonable Range of Expected Returns	5.61%-7.33%	4.79%-6.17%	3.90%-4.99%
Hypothetical Expected Return Assumptions	7.30%	6.15%	4.95%

All three asset allocation strategies invest to some extent in each of the five asset classes (Global Equity, Domestic Fixed Income, U.S. Inflation Linked Bonds, Global Public Real Estate and Commodities). The portion of assets allocated to each asset class varies among the strategies, and thus, the long term expected rate of return and level of risk of each asset allocation is different for each strategy.

Effective July 1, 2017, the County switched from Asset Strategy 1 to Asset Strategy 2, although it should continue to monitor the return versus risk balance and maintain an asset allocation strategy appropriate for the County's funding and overall financial policies.

In order to understand the impact of strategy selection, we compared valuation results under each Asset Allocation Strategy:

	Asset Allocation Strategy 1 **7.30%**	Asset Allocation Strategy 2 **6.15%**	Asset Allocation Strategy 3 **4.95%**
Liabilities			
Present Value of Benefits (PVB)	$265,699,887	$329,928,508	$424,822,246
Actuarial Accrued Liability (AAL)	$199,448,715	$235,343,271	$284,223,718
Normal Cost	$8,028,552	$10,521,825	$14,193,443

Under GASB 75, the expected return will be considered along with the municipal bond index to determine a blended discount rate.

* * *

The following report shows the details of results by participant status and benefits provided, based on a 6.15% discount rate.

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Actuarial Valuation Certificate

This report documents the results of the July 1, 2020 actuarial valuation for the County of Riverside Postretirement Medical Benefits. The information provided in this report is intended strictly for documenting:

- Disclosure items under Governmental Accounting Standards Board (GASB) Statement 75 for Fiscal Year Ending June 30, 2021.
- Funding contribution amounts and the Actuarial Determined Contribution (ADC) for Fiscal Year Ending June 30, 2022.

Determinations for purposes other than the financial accounting requirements may be significantly different from the results in this report. Thus, the use of this report for purposes other than those expressed here may not be appropriate.

This valuation has been conducted in accordance with generally accepted actuarial principles and practices, including the applicable Actuarial Standards of Practice as issued by the Actuarial Standards Board. In addition, the valuation results are based on our understanding of the financial accounting and reporting requirements under U.S. Generally Accepted Accounting Principles as set forth in Government Accounting Standards Board Statement 75 (GASB 75) including any guidance or interpretations provided by the Company and/or its audit partners prior to the issuance of this report. The information in this report is not intended to supersede or supplant the advice and interpretations of the County of Riverside's auditors. Additional disclosures may be required under GASB 74.

A valuation model was used to develop the liabilities for the June 30, 2020 valuation. The valuation model relies on ProVal software, which was developed by Winklevoss Technologies, LLC. Experts within Aon selected this software and determined it is appropriate for performing valuations. We coded and reviewed the software for the provisions, assumptions, methods, and data of the Postretirement Health Benefits.

A model was used to develop the appropriate GASB discount rate. The undersigned relied on experts within Aon for the development of the capital market assumptions and the model underlying the expected rate of return.

The valuation model outputs various cost scenarios. The "1% increase" and "1% decrease" interest rate scenarios vary only the discount rate assumption, in order to illustrate the impact of a change in that assumption in isolation. In practice, certain other assumptions, such as the expected or realized asset returns, would also be expected to vary when the discount rate changes. Therefore, the output from these scenarios should be used solely for assessing the impact of the discount rate in isolation and may not represent a realistic set of results for other purposes.

The "1% increase" and "1% decrease" healthcare cost trend scenarios vary only the healthcare cost trend assumption, in order to illustrate the impact of a change in that assumption in isolation. Therefore, the output from these scenarios should be used solely for assessing the impact of the healthcare cost trend in isolation and may not represent a realistic set of results for other purposes.

Future actuarial measurements may differ significantly from the current measurements presented in this report due (but not limited to) to such factors as the following:

- Plan experience differing from that anticipated by the economic or demographic assumptions;
- Changes in actuarial methods or in economic or demographic assumptions;
- Increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period); and
- Changes in plan provisions or applicable law.

Due to the limited scope of our assignment, we did not perform an analysis of the potential range of such future measurements.

Funded status measurements shown in this report are determined based on various measures of plan assets and liabilities. For entity and plan disclosure and reporting purposes, funded status is determined using plan assets measured at market value. Plan liabilities are measured based on the interest rates and other assumptions summarized in the Actuarial Assumptions and Methods section of this report.

These funded status measurements may not be appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations, and funded status measurements for County of Riverside and plan disclosure and reporting purposes may not be appropriate for assessing the need for or the amount of future contributions. In conducting the valuation, we have relied on personnel, plan design, health care claim cost, and asset information supplied by County of Riverside as of the valuation date. While we cannot verify the accuracy of all the information, the supplied information was reviewed for consistency and reasonableness. As a result of this review, we have no reason to doubt the substantial accuracy or completeness of the information and believe that it has produced appropriate results.

The actuarial assumptions and methods used in this valuation are described in the Actuarial Assumptions and Methods section of this report. County of Riverside selected the economic and demographic assumptions and prescribed them for use for purposes of compliance with GASB 75. Aon provided guidance with respect to these assumptions, and it is our belief that the assumptions represent reasonable expectations of anticipated plan experience.

The undersigned are familiar with the near-term and long-term aspects of OPEB valuations and collectively meet the Qualification Standards of the American Academy of Actuaries necessary to render the actuarial opinions contained herein. The information provided in this report is dependent upon various factors as documented throughout this report, which may be subject to change. Each section of this report is considered to be an integral part of the actuarial opinions.

To our knowledge, no colleague of Aon providing services to County of Riverside has any material direct or indirect financial interest in County of Riverside. Thus, we believe there is no relationship existing that might affect our capacity to prepare and certify this actuarial report for County of Riverside.

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January 26, 2021

Plan Liabilities

The liabilities shown in this exhibit were calculated using a 6.15% discount rate.

The **Present Value of Benefits (PVB)** represents the actuarial present value of all benefits ever to be paid to current employees and retirees. The PVB is as follows:

	Safety Employees	Miscellaneous Employees	Total
PVB			
County Contribution			
Retirees	$16,403,086	$39,141,721	$55,544,807
Actives	$20,776,063	$116,491,966	$137,268,029
Subtotal	$37,179,149	$155,633,687	$192,812,836
Implicit Subsidy			
Retirees	$11,124,192	$15,064,396	$26,188,588
Actives	$17,729,112	$93,197,972	$110,927,084
Subtotal	$28,853,304	$108,262,368	$137,115,672
All Benefits			
Retirees	$27,527,278	$54,206,117	$81,733,395
Actives	$38,505,175	$209,689,938	$248,195,113
Total PVB	**$66,032,453**	**$263,896,055**	**$329,928,508**
Number of Retirees as of 7/1/2020	822	1,700	2,522
Number of Actives as of 7/1/2020	3,419	16,057	19,476
PVB Per Retiree	$33,488	$31,886	$32,408
PVB Per Active	$11,262	$13,059	$12,744

The **Actuarial Accrued Liability (AAL)** is a portion of the PVB attributable to past service. For retirees and fully eligible active employees, the AAL is equal to the PVB. For other active employees, the AAL is the portion of the PVB deemed to be accrued to date. The **Normal Cost** is the portion of the PVB that is allocated to the current plan year for only active employees.

The AAL in this report is based on the Entry Age Normal cost method and has been developed by spreading costs as a level percentage of payrolls.

	Safety Employees	Miscellaneous Employees	Total
AAL			
County Contribution			
Retirees	$16,403,086	$39,141,721	$55,544,807
Actives	$13,836,175	$70,510,765	$84,346,940
Subtotal	$30,239,261	$109,652,486	$139,891,747
Implicit Subsidy			
Retirees	$11,124,192	$15,064,396	$26,188,588
Actives	$12,513,780	$56,749,156	$69,262,936
Subtotal	$23,637,972	$71,813,552	$95,451,524
All Benefits			
Retirees	$27,527,278	$54,206,117	$81,733,395
Actives	$26,349,955	$127,259,921	$153,609,876
Total AAL	**$53,877,233**	**$181,466,038**	**$235,343,271**
Number of Retirees as of 7/1/2020	822	1,700	2,522
Number of Actives as of 7/1/2020	3,419	16,057	19,476
AAL Per Retiree	$33,488	$31,886	$32,408
AAL Per Active	$7,707	$7,926	$7,887
Normal Cost			
County Contribution	$748,621	$5,256,804	$6,005,425
Implicit Subsidy	$545,979	$3,970,421	$4,516,400
Total Normal Cost	**$1,294,600**	**$9,227,225**	**$10,521,825**
Normal Cost per Active	$379	$575	$540

Plan Assets

The County of Riverside participates in CalPERS' CERBT trust fund. The following table shows the development of assets since the prior valuation.

Reconciliation of Plan Assets	July 1, 2019 to June 30, 2020
Market Value of Assets, Beginning of Year	$44,911,158
Contributions	
Retiree Premiums	$3,137,325
Reimbursement from CERBT	$0
Implicit Subsidy	$1,332,996
Pre-Funding	$5,600,000
Total Contributions	$10,070,321
Investment Earnings	$2,526,296
Administrative Expense	($23,282)
Benefit Payments	
Retiree Premiums	($3,137,325)
Implicit Subsidy	($1,332,996)
Total Benefit Payments	($4,470,321)
Market Value of Assets at Valuation Date	$53,014,172
Return on Assets	5.30%
Development of (Gain)/Loss	
Expected Investment Earnings (assumed 7.01%)	$3,339,596
Actual Investment Earnings	$2,526,296
(Gain)/Loss on Assets	$813,300
Smoothed Value of Assets at Valuation Date	
Market Value of Assets at Valuation Date	$53,014,172
Unrecognized (Gain)/Loss[1]	$450,522
Preliminary Smoothed Value of Assets at Valuation Date	$53,464,694
Lower Corridor (80% of Market Value)	$42,411,338
Upper Corridor (120% of Market Value)	$63,617,006
Smoothed Value of Assets	$53,464,694

[1] Schedule of the Current and Prior Asset (Gain)/Losses as of June 30, 2020.

Date Established	Original (Gain)/Loss	Years Remaining As of 6/30/2020	Amount Recognized	Total Amount Unrecognized
6/30/2017	($1,163,768)	1	($931,014)	($232,754)
6/30/2018	$165,275	2	$99,165	$66,110
6/30/2019	($55,790)	3	($22,316)	($33,474)
6/30/2020	$813,300	4	$162,660	$650,640
Total			($691,505)	$450,522

Development of Funding Contribution[1]

Effective July 1, 2020 (contributions developed for FYE June 30, 2022)[2], the County's funding policy ignores implicit subsidy liabilities and determines amounts on a level percentage of pay based on the sum of:

a) Normal Cost with interest, plus
b) Amortization of July 1, 2017 Unfunded Actuarial Accrued Liability (UAAL) over the period ending June 30, 2037, plus
c) Amortization of subsequent unanticipated liability changes (i.e., actuarial gains / losses and changes in assumptions) over 15-year period, plus
d) Amortization of subsequent unanticipated asset changes (i.e., unexpected gains / losses on assets) over 5-year period.

Amortization amounts are calculated based on the discount rate and payroll increase assumption appropriate for the valuation date.

The following table shows the development of the funding contribution as a level percentage of pay, assuming middle of year payment, for FYE June 30, 2022:

	Safety	Miscellaneous	Total
Funding Contribution, FYE June 30, 2022[3]			
Normal Cost, plus interest	$792,508	$5,564,980	$6,357,488
Amortization of UAAL, plus interest[4]	1,581,284	8,400,835	9,982,119
Funding Contribution	$2,373,792	$13,965,815	$16,339,607
% of Pay			1.10%

The following table shows the development of the liability gain / loss as of June 30, 2020[1]

	Safety	Miscellaneous	Total
Liability as of June 30, 2019	$25,945,217	$ 33,414,357	$ 59,359,574
Service Cost	627,103	1,075,271	1,702,374
Interest on Liability	1,824,806	2,347,536	4,172,342
Plan Change	-	-	-
Assumption Changes	**3,388,315**	**70,675,023**	**74,063,338**
Benefit Payments	(1,100,357)	(2,036,968)	(3,137,325)
Expected Liability as of June 30, 2020	30,685,084	105,475,219	136,160,303
Actual Liability as of June 30, 2020	30,239,261	109,652,486	139,891,747
Liability (Gain)/Loss	**$(445,823)**	**$4,177,267**	**$3,731,444**

The following table shows the development of the asset gain / loss as of June 30, 2020

	Safety	Miscellaneous	Total
Market Value of Assets (MVA) as of June 30, 2019	$27,235,126	$17,676,032	$ 44,911,158
Total Contributions	3,966,449	6,103,873	10,070,321
Investment Earnings	1,496,205	1,030,091	2,526,296
Administrative Expense	(14,119)	(9,163)	(23,282)
Benefit Payments	(1,938,922)	(2,531,399)	(4,470,321)
Expected MVA as of June 30, 2020	30,744,739	22,269,433	53,014,172
Expected Investment Earnings	1,978,054	1,361,542	3,339,596
Asset (Gain)/Loss	**481,849**	**$331,451**	**813,300**

[1] Funding contributions are in addition to Pay-as-you-go
[2] Prior to July 1, 2020, funding was based on liabilities including the implicit subsidy.
[3] Excludes the implicit subsidy liability/service cost
[4] Amortization allocation shown on next page

Amortization Schedule

The following table shows the amortization of Unfunded Actuarial Accrued Liability excluding the implicit subsidy as of July 1, 2021. Amortization of bases is first recognized in the fiscal year subsequent to the date established.

Date Established	Type of Base	Original Period	Remaining Period as of June 30, 2021	Original Balance	Balance Remaining as of June 30, 2021	Total Amortization Recognized in FYE June 30, 2022	Safety Amortization Recognized in FYE June 30, 2022[1]	Miscellaneous Amortization Recognized in FYE June 30, 2022[1]
6/30/2017	7/1/2017 UAAL[2]	20	16	$ 11,733,484	11,261,388	888,442	$ 545,745	$ 342,697
6/30/2018	Liability (Gain)/Loss	15	13	2,657,510	2,686,737	249,398	153,198	96,200
6/30/2018	Assets (Gain)Loss	5	3	165,275	115,956	39,917	24,520	15,397
6/30/2018	Assumptions	15	13	5,348,501	5,407,324	501,939	308,327	193,612
6/30/2019	Liability (Gain)/Loss	15	14	115,351	120,566	10,550	10,671	(121)
6/30/2019	Assets (Gain)Loss	5	4	(55,790)	(50,051)	(13,130)	(8,013)	(5,117)
6/30/2019	Assumptions	15	14	10,726,730	11,211,676	981,087	132,328	848,759
6/30/2020	Liability (Gain)/Loss	15	15	3,731,444	3,960,928	328,387	(39,235)	367,622
6/30/2020	Assets (Gain)/Loss	5	5	813,300	863,318	184,084	109,063	75,021
6/30/2020	Assumptions	15	15	74,063,338	78,618,233	6,517,964	298,190	6,219,774
	Total Charges			$ 109,299,143	$ 114,196,075	$ 9,688,638	$ 1,534,794	$ 8,153,844

[1] Amortization allocation by classification is based on proportionate share of AAL prior to 7/1/2018 and estimated safety/miscellaneous gain/loss since 7/1/2018.
[2] Includes Asset (Gain)/Loss as of 6/30/2017

Projected Benefit Payments

The following table shows the estimated projected net County benefit payments based on the current plan provisions, current plan participants, and the valuation assumptions used in this report. The County Contributions would be equivalent to funding the liabilities on a pay-as-you-go basis.

Fiscal Year Ending June 30	Safety		Miscellaneous		Total
	County Contribution	Implicit Subsidy	County Contribution	Implicit Subsidy	
2021	$974,894	$952,098	$3,319,306	$2,115,499	$7,361,798
2022	$1,043,100	$872,637	$3,655,429	$2,092,752	$7,663,918
2023	$1,120,823	$964,098	$4,016,193	$2,567,420	$8,668,534
2024	$1,205,503	$1,116,095	$4,385,415	$2,919,696	$9,626,709
2025	$1,297,191	$1,198,221	$4,776,334	$3,320,462	$10,592,208
2026	$1,400,856	$1,269,797	$5,186,485	$3,774,571	$11,631,709
2027	$1,509,066	$1,404,852	$5,610,014	$4,125,665	$12,649,596
2028	$1,623,717	$1,552,131	$6,050,351	$4,607,652	$13,833,852
2029	$1,744,843	$1,685,299	$6,508,479	$5,085,798	$15,024,420
2030	$1,865,037	$1,777,800	$6,975,714	$5,548,214	$16,166,766
2031	$1,990,934	$2,012,729	$7,460,286	$6,002,793	$17,466,741
2032	$2,118,472	$2,024,036	$7,958,790	$6,607,891	$18,709,189
2033	$2,243,783	$2,133,347	$8,467,429	$7,113,901	$19,958,460
2034	$2,366,078	$2,233,944	$8,984,163	$7,598,585	$21,182,770
2035	$2,488,691	$2,270,421	$9,508,822	$8,094,904	$22,362,838
2036	$2,612,879	$2,381,112	$10,039,320	$8,409,124	$23,442,435
2037	$2,732,189	$2,402,708	$10,651,267	$8,707,923	$24,494,087
2038	$2,845,853	$2,485,825	$11,309,069	$8,960,778	$25,601,525
2039	$2,954,363	$2,447,972	$11,972,403	$9,410,694	$26,785,431
2040	$3,057,769	$2,507,452	$12,635,869	$9,913,592	$28,114,682
2041	$3,158,096	$2,467,792	$13,296,559	$10,196,011	$29,118,458
2042	$3,257,937	$2,386,514	$13,949,380	$10,649,900	$30,243,731
2043	$3,355,725	$2,402,668	$14,589,104	$11,006,210	$31,353,706
2044	$3,454,214	$2,399,528	$15,211,933	$11,223,057	$32,288,732
2045	$3,548,729	$2,367,647	$15,815,908	$11,288,131	$33,020,415
2046	$3,641,223	$2,382,056	$16,400,546	$11,096,171	$33,519,996
2047	$3,730,869	$2,446,117	$16,959,191	$11,065,254	$34,201,432
2048	$3,816,390	$2,404,115	$17,489,517	$10,883,747	$34,593,770
2049	$3,890,418	$2,470,489	$17,985,943	$10,818,475	$35,165,324
2050	$3,953,285	$2,479,268	$18,443,029	$10,962,088	$35,837,671

GASB 75 Reporting and Disclosure Information for Fiscal Year Ending June 30, 2021

Calculation Details

The following table illustrates the Net OPEB Liability under GASB 75.

	Fiscal Year Ending 6/30/2020	Fiscal Year Ending 6/30/2021
(1) OPEB Liability		
(a) Retired Participants and Beneficiaries Receiving Payment	$ 48,961,909	$ 81,733,395
(b) Active Participants	54,160,832	153,609,876
(c) Total	$ 103,122,741	$ 235,343,271
(2) Plan Fiduciary Net Position	44,911,158	53,014,172
(3) Net OPEB Liability	$ 58,211,583	$ 182,329,099
(4) Plan Fiduciary Net Position as a Percentage of the Total OPEB Liability	43.55%	22.53%
(5) Deferred Outflow of Resources for Contributions Made After Measurement Date	$ 10,070,321	TBD

Expense

The following table illustrates the OPEB expense under GASB 75.

	Fiscal Year Ending 6/30/2020	Fiscal Year Ending 6/30/2021
(1) Service Cost	$ 1,433,883	$ 2,966,332
(2) Interest Cost	4,583,381	7,282,813
(3) Expected Investment Return	(2,764,966)	(3,339,596)
(4) Employee Contributions	0	0
(5) Administrative Expense	19,822	23,282
(6) Plan Changes	0	0
(7) Amortization of Unrecognized		
(a) Liability (Gain)/Loss	1,284,419	575,931
(b) Asset (Gain)/Loss	(210,857)	(48,197)
(c) Assumption Change (Gain)/Loss	4,330,198	17,035,053
(8) Total Expense	$ 8,675,880	$ 24,495,618

Shown below are details regarding the calculation of Service, Interest Cost and Expected Investment Return components of the Expense.

	Fiscal Year Ending 6/30/2020	Fiscal Year Ending 6/30/2021
(1) Development of Service Cost:		
(a) Normal Cost at Beginning of Measurement Period	$ 1,433,883	$ 2,966,332
(2) Development of Interest Cost:		
(a) Total OPEB Liability at Beginning of Measurement Period	$ 68,391,694	$ 103,122,741
(b) Normal Cost at Beginning of Measurement Period	1,433,883	2,966,332
(c) Actual Benefit Payments	(3,500,687)	(4,470,321)
(d) Discount Rate	6.73%	7.01%
(e) Interest Cost	$ 4,583,381	$ 7,282,813
(3) Development of Expected Investment Return:		
(a) Plan Fiduciary Net Position at Beginning of Measurement Period	$ 40,110,224	$ 44,911,158
(b) Actual Contributions—Employer	5,500,687	10,070,321
(c) Actual Contributions—Employee	0	0
(d) Actual Benefit Payments	(3,500,687)	(4,470,321)
(e) Administrative Expenses	(19,822)	(23,282)
(f) Other	0	0
(g) Expected Return on Assets	6.73%	7.01%
(h) Expected Return	$ 2,764,966	$ 3,339,596

Reconciliation of Net OPEB Liability

Shown below are details regarding the Total OPEB Liability, Plan Fiduciary Net Position, and Net OPEB Liability for the Measurement Period from June 30, 2019 to June 30, 2020:

	Increase (Decrease)		
	Total OPEB Liability (a)	Plan Fiduciary Net Position (b)	Net OPEB Liability (c) = (a) − (b)
Balance Recognized at 6/30/2020 (Based on 6/30/2019 Measurement Date)	$ 103,122,741	$ 44,911,158	$ 58,211,583
Changes Recognized for the Fiscal Year:			
Service Cost	$ 2,966,332	N/A	$ 2,966,332
Interest on the Total OPEB Liability	7,282,813	N/A	7,282,813
Changes of Benefit Terms	0	N/A	0
Differences Between Expected and Actual Experience	(7,467,464)	N/A	(7,467,464)
Changes of Assumptions	133,909,170	N/A	133,909,170
Benefit Payments	(4,470,321)	(4,470,321)	0
Contributions From the Employer	N/A	10,070,321	(10,070,321)
Contributions From the Employee	N/A	0	0
Net Investment Income	N/A	2,526,296	(2,526,296)
Administrative Expense	N/A	(23,282)	23,282
Net Changes	$ 132,220,530	8,103,014	$ 124,117,516
Balance Recognized at 6/30/2021 (Based on 6/30/2020 Measurement Date)	$ 235,343,271	$ 53,014,172	$ 182,329,099

Liability (Gain)/Loss

The following table illustrates the liability gain/loss under GASB 75.

		Fiscal Year Ending 6/30/2020	Fiscal Year Ending 6/30/2021
(1)	OPEB Liability at Beginning of Measurement Period	$ 68,391,694	$ 103,122,741
(2)	Service Cost	1,433,883	2,966,332
(3)	Interest on the Total OPEB Liability	4,583,381	7,282,813
(4)	Changes of Benefit Terms	0	0
(5)	Changes of Assumptions	29,685,609	133,909,170
(6)	Benefit Payments	(3,500,687)	(4,470,321)
(7)	Expected OPEB Liability at End of Measurement Period	$ 100,593,880	$ 242,810,735
(8)	Actual OPEB Liability at End of Measurement Period	103,122,741	235,343,271
(9)	OPEB Liability (Gain)/Loss	$ 2,528,861	$ (7,467,464)
(10)	Average Future Working Life Expectancy	10.63	10.54
(11)	OPEB Liability (Gain)/Loss Amortization	$ 237,898	$ (708,488)

Asset (Gain)/Loss

The following table illustrates the asset gain/loss under GASB 75.

		Fiscal Year Ending 6/30/2020	Fiscal Year Ending 6/30/2021
(1)	OPEB Asset at Beginning of Measurement Period	$ 40,110,224	$ 44,911,158
(2)	Contributions—Employer	5,500,687	10,070,321
(3)	Contributions—Employee	0	0
(4)	Expected Investment Income	2,764,966	3,339,596
(5)	Benefit Payments	(3,500,687)	(4,470,321)
(6)	Administrative Expense	(19,822)	(23,282)
(7)	Other	0	0
(8)	Expected OPEB Asset at End of Measurement Period	$ 44,855,368	$ 53,827,472
(9)	Actual OPEB Asset at End of Measurement Period	44,911,158	53,014,172
(10)	OPEB Asset (Gain)/Loss	$ (55,790)	$ 813,300
(11)	Amortization Factor	5.00	5.00
(12)	OPEB Asset (Gain)/Loss Amortization	$ (11,158)	$ 162,660

Deferred Outflows/Inflows

The following table illustrates the Deferred Inflows and Outflows as of June 30, 2021 under GASB 75.

	Deferred Outflows	Deferred Inflows
(1) Difference Between Actual and Expected Experience	$ 8,174,143	$ 6,758,976
(2) Net Difference Between Expected and Actual Earnings on OPEB Plan Investments	450,524	0
(3) Assumption Changes	154,877,320	0
(4) Sub Total	$ 163,501,987	$ 6,758,976
(5) Contributions Made in Fiscal Year Ending 6/30/2021 After Measurement Date	TBD	N/A
(6) Total	$ TBD	$ 6,758,976

Amortization of Deferred Inflows/Outflows

The table below lists the amortization bases included in the deferred inflows/outflows as of June 30, 2021.

Date		Period		Balance		Annual
Established	Type of Base	Original	Remaining	Original	Remaining	Payment
6/30/2020	Liability (Gain)/Loss	10.54	9.54	($7,467,464)	($6,758,976)	(708,488)
6/30/2020	Asset (Gain)/Loss	5.00	4.00	813,300	650,640	162,660
6/30/2020	Assumptions	10.54	9.54	133,909,170	121,204,315	12,704,855
6/30/2019	Liability (Gain)/Loss	10.63	8.63	2,528,861	2,053,065	237,898
6/30/2019	Asset (Gain)/Loss	5.00	3.00	(55,790)	(33,474)	(11,158)
6/30/2019	Assumptions	10.63	8.63	29,685,609	24,100,359	2,792,625
6/30/2018	Liability (Gain)/Loss	9.45	6.45	4,062,300	2,772,681	429,873
6/30/2018	Asset (Gain)/Loss	5.00	2.00	165,275	66,110	33,055
6/30/2018	Assumptions	9.45	6.45	11,336,502	7,737,612	1,199,630
6/30/2017	Liability (Gain)/Loss	9.43	5.43	5,814,989	3,348,397	616,648
6/30/2017	Asset (Gain)/Loss	5.00	1.00	(1,163,768)	(232,752)	(232,754)
6/30/2017	Assumptions	9.43	5.43	3,186,806	1,835,034	337,943
	Total Charges				156,743,011	17,562,787

Amounts Recognized in the deferred outflows of resources and deferred inflows of resources related to OPEB will be recognized in the OPEB expense as follows:

Year End June 30:

2022	$ 17,562,789
2023	$ 17,795,541
2024	$ 17,762,486
2025	$ 17,773,644
2026	$ 17,610,984
Total Thereafter	$ 68,237,567

Plan Fiduciary Net Position Projection

The following table illustrates the projection of the fiduciary net position for use in the calculation of the discount rate as of June 30, 2021.

($ in thousands)

Year Ending June 30[2]	Beginning Fiduciary Net Position (a)	Total Contributions (b)	Benefit Payments (c)	Administrative Expenses (d)	Investment Earnings (e)	Ending Fiduciary Net Position[1] (f)
2021	$53,014	$16,423	$7,362	$24	$3,542	$65,594
2022	65,594	24,064	7,664	26	4,541	86,509
2023	86,509	24,168	8,669	28	5,800	107,781
2024	107,781	25,148	9,627	30	7,109	130,381
2025	130,381	26,116	10,592	33	8,500	154,372
2026	154,372	27,229	11,632	35	9,978	179,911
2027	179,911	28,110	12,650	38	11,545	206,878
2028	206,878	29,367	13,834	41	13,206	235,576
2029	235,576	30,629	15,024	44	14,973	266,109
2030	266,109	31,864	16,167	47	16,854	298,614
2031	298,614	33,266	17,467	50	18,857	333,220
2032	333,220	34,618	18,709	54	20,989	370,064
2033	370,064	35,988	19,958	57	23,259	409,295
2034	409,295	37,347	21,183	60	25,677	451,076
2035	451,076	37,607	22,363	64	28,218	494,475
2036	494,475	37,371	23,442	67	30,847	539,183
2037	539,183	26,913	24,494	70	33,243	574,775
2038	574,775	27,825	25,602	74	35,427	612,352
2039	612,352	28,819	26,785	77	37,732	652,041
2040	652,041	29,968	28,115	80	40,168	693,981
2041	693,981	30,800	29,118	83	42,742	738,322
2042	738,322	31,760	30,244	85	45,465	785,218
2043	785,218	32,711	31,354	88	48,344	834,832
2044	834,832	33,495	32,289	90	51,391	887,340
2045	887,340	34,085	33,020	92	54,616	942,929
2046	942,929	34,450	33,520	94	58,031	1,001,795
2047	1,001,795	35,004	34,201	96	61,648	1,064,149
2048	1,064,149	35,277	34,594	98	65,479	1,130,213
2049	1,130,213	35,737	35,165	99	69,539	1,200,224
2050	1,200,224	36,310	35,838	101	73,842	1,274,437

1 (f)=(a) + (b) − (c) − (d) + (e).
2 Years later than 2049 were omitted from this table.

Plan Fiduciary Net Position

The last year in which projected benefit payments are due from the Plan is 2118.

The Plan's projected fiduciary net position is not projected to reach $0.

As such, the Plan's fiduciary net position was projected to be available to make all projected future benefit payments for current Plan members. In other words, there is no projected "depletion date" when projected benefits are not covered by projected assets. Therefore, the long-term expected rate of return on Plan investments of 6.15% per annum was applied to all periods of projected benefit payments to determine the total OPEB liability as of June 30, 2021.

In projecting the Plan's fiduciary net position, the following assumptions were made:

1. Interest rate for discounting was 6.15% per annum.

2. Projected total contributions are Actuarially Determined Contribution (ADC) and pay-as-you-go. Contributions are assumed to be paid mid-year.

3. Assumed contributions are based on the County of Riverside continuing to follow the current funding policy of normal cost plus 20-year closed period amortization of the 2017 unfunded liability and amortization of subsequent unanticipated changes in actuarial accrued liability over the 15-year period from date established and 5-years for any unexpected asset gains/losses. For funding purposes, implicit subsidy liability and normal cost are not considered.

4. The County has a history of contributing more than the Actuarially Determined Contribution (ADC). We have not recognized contributions in excess of the ADC in the above projection. Allowance for any such contributions would not result in a different discount rate.

5. Projected benefit payments have been determined in accordance with Paragraphs 30-35 of GASB Statement No. 75, and are based on the closed group of active, retired members and beneficiaries as of June 30, 2021. Benefit payments are assumed to be paid mid-year.

6. Administrative expenses are $26,000 for 2021 and are projected with 2.50% inflation. Expenses are assumed to be paid mid-year.

7. Projected investment earnings are based on the assumed investment rate of return of 6.15% per annum. The first year's earnings have been adjusted to account for the actual return through June 30, 2021

Discount Rate Sensitivity

The following table illustrates the impact of interest rate sensitivity on the Net OPEB Liability for fiscal year ending June 30, 2020:

	1% Decrease (6.01%)	Current Rate (7.01%)	1% Increase (8.01%)
(1) Total OPEB Liability	$ 118,489,910	$ 103,122,741	$ 90,695,514
(2) Plan Fiduciary Net Position	44,911,158	44,911,158	44,911,158
(3) Net OPEB Liability	$ 73,578,752	$ 58,211,583	$ 45,784,356

The following table illustrates the impact of interest rate sensitivity on the Net OPEB Liability for fiscal year ending June 30, 2021:

	1% Decrease (5.15%)	Current Rate (6.15%)	1% Increase (7.15%)
(1) Total OPEB Liability	$ 275,091,495	$ 235,343,271	$ 203,637,568
(2) Plan Fiduciary Net Position	53,014,172	53,014,172	53,014,172
(3) Net OPEB Liability	$ 222,077,323	$ 182,329,099	$ 150,623,396

Healthcare Cost Trend Sensitivity

The following table illustrates the impact of healthcare cost trend sensitivity on the Net OPEB Liability for fiscal year ending June 30, 2020:

	1% Decrease	Trend Rate	1% Increase
(1) Total OPEB Liability	$ 89,964,433	$ 103,122,741	$ 119,711,402
(2) Plan Fiduciary Net Position	44,911,158	44,911,158	44,911,158
(3) Net OPEB Liability	$ 45,053,275	$ 58,211,583	$ 74,800,244

The following table illustrates the impact of healthcare cost trend sensitivity on the Net OPEB Liability for fiscal year ending June 30, 2021:

	1% Decrease	Trend Rate	1% Increase
(1) Total OPEB Liability	$ 199,764,092	$ 235,343,271	$ 281,129,356
(2) Plan Fiduciary Net Position	53,014,172	53,014,172	53,014,172
(3) Net OPEB Liability	$ 146,749,920	$ 182,329,099	$ 228,115,184

Disclosure—Changes in the Net OPEB Liability and Related Ratios

Changes in the Net OPEB Liability and Related Ratios[1]

	Fiscal Year Ending			
	2018	2019	2020	2021
Total OPEB Liability				
Service Cost	$ 700,296	$ 882,148	$ 1,433,883	$ 2,966,332
Interest Cost	3,011,073	3,446,096	4,583,381	7,282,813
Changes of Benefit Terms	0	0	0	0
Differences Between Expected and Actual Experiences	5,814,989	4,062,300	2,528,861	(7,467,464)
Changes of Assumptions	3,186,806	11,336,502	29,685,609	133,909,170
Benefit Payments	(2,841,778)	(3,263,258)	(3,500,687)	(4,470,321)
Net Change in Total OPEB Liability	$ 9,871,386	$ 16,463,788	$ 34,731,047	$ 132,220,530
Total OPEB Liability (Beginning)	42,056,520	51,927,906	68,391,694	103,122,741
Total OPEB Liability (Ending)	$ 51,927,906	$ 68,391,694	$ 103,122,741	$ 235,343,271
Plan Fiduciary Net Position				
Contributions—Employer	$ 1,909,771	$ 4,263,258	$ 5,500,687	$ 10,070,321
Contributions—Member	0	0	0	0
Net Investment Income	3,613,278	2,342,895	2,820,756	2,526,296
Benefit Payments	(2,841,778)	(3,263,258)	(3,500,687)	(4,470,321)
Administrative Expense	(17,481)	(18,325)	(19,822)	(23,282)
Other	0	0	0	0
Net Change in Plan Fiduciary Net Position	$ 2,663,790	$ 3,324,570	$ 4,800,934	$ 8,103,014
Plan Fiduciary Net Position (Beginning)	34,121,863	36,785,654	40,110,224	44,911,158
Plan Fiduciary Net Position (Ending)	$ 36,785,654	$ 40,110,224	$ 44,911,158	$ 53,014,172
Net OPEB Liability (Ending)	$ 15,142,252	$ 28,281,470	$ 58,211,583	$ 182,329,099
Net Position as a Percentage of OPEB Liability	1	58.65%	43.55%	22.53%
Covered-Employee Payroll	$ 1,382,304,129	$ 1,374,752,875	$ 1,399,892,784	$ 1,445,184,896
Net OPEB Liability as a Percentage of Payroll	1.10%	2.06%	4.16%	12.62%

[1] GASB 75 was effective first for employer fiscal years beginning after June 15, 2017.

Disclosure—Contribution Schedule

Contributions

	2018	2019	2020	2021
Actuarially Determined Contribution	$ 1,288,000	$ 2,141,196	$ 4,254,133	$ 9,061,596[1]
Contributions Made in Relation to the Actuarially Determined Contribution	4,263,258	5,500,687	10,070,321	TBD
Contribution Deficiency (Excess)	$ (2,978,258)	$ (3,246,554)	$ (5,816,188)	TBD
Covered-Employee Payroll	$ 1,374,752,875	$ 1,399,892,784	$ 1,445,184,896	TBD
Contributions as a Percentage of Payroll	0.31%	0.39%	0.63%	TBD

Notes to Schedule:

Valuation Date: Actuarially Determined Contribution rates are calculated as of June 30, one year prior to the beginning of the fiscal year in which contributions are reported.

Methods and assumptions used to determine contribution rates:

Actuarial Cost Method	Entry Age Normal with amortization of 7/1/2017 unfunded liability over a period ending 6/30/2037 and amortization of subsequent unanticipated changes in liability over 15-year periods and any asset gain/loss over 5-year periods. For funding purposes, implicit subsidy liability and normal cost are not considered.
Asset Valuation Method	Market Value
Salary Increases	2.75%
Investment Rate of Return	6.15%, net of OPEB plan investment expense, including inflation.
Retirement Age	Retirement rates developed in the 2017 CalPERS Experience Study
Mortality	Pub-2010 Headcount-Weighted Public Retirement Plans Mortality Tables using Scale MP-2020

[1] This was developed based on the prior year valuation.

Participant Information

These exhibit summaries contain participant demographic information.

Active Employee Age/Service Distribution

	Years of Service								
Age	0-4	5-9	10-14	15-19	20-24	25-29	30-34	>35	Total
<25	426	6	0	0	0	0	0	0	432
25-29	1,309	361	4	0	0	0	0	0	1,674
30-34	1,271	1,042	357	10	0	0	0	0	2,680
35-39	1,001	892	1,019	239	6	0	0	0	3,157
40-44	741	633	902	595	186	2	0	0	3,059
45-49	612	471	721	579	487	100	7	0	2,977
50-54	413	380	506	431	363	151	75	1	2,320
55-59	308	312	395	360	216	128	102	30	1,851
60-64	134	190	247	186	134	55	32	14	992
>65	51	71	83	69	29	12	8	11	334
Total	6,266	4,358	4,234	2,469	1,421	448	224	56	19,476

Participant Statistics

	Safety Employees	Miscellaneous Employees	Total
Retirees			
Number of retirees	822	1,700	2,522
Average age	64.2	70.9	66.4
Number of retiree spouses	437	407	844
Actives			
Number of actives	3,419	16,057	19,476
Average age	40.0	44.2	43.4
Average past service (years)	11.6	9.7	10.0

Development of GASB 75 Amortization Period for Changes in Liability

Status	July 1, 2019 2019 Count	 Average Future Working Life	July 1, 2020 2020 Count	 Average Future Working Life[1]
Actives	18,910	11.81	19,476	11.84
Retirees	2,282	0.00	2,522	0.00
Total/Weighted Average	21,192	10.54	21,998	10.48

Active Participant Benefit Summary

The table below summarizes the number of participants by bargaining units and the benefits valued. As described in the plan summary and actuarial assumptions sections, certain groups are eligible for PEMHCA benefits not shown in this summary.

Union Code	Description	Bargaining Unit (used to determine contribution)	# Records	2020 Monthly County Contribution*	Health Plan**	CalPERS Retirement Program
CNF	Confidential	Confidential	248	$ 256.00	CalPERS	Misc
LEM	Law Enforcement Management	LEMU	432	$ 139.00	CalPERS	Safety
MGT	Management (General)	Management	1,004	$ 256.00	CalPERS	Misc
MLX	Law Enforcement Exec Staff	LE Exec Staff	15	$ 256.00	CalPERS	Safety
PD7	Public Defender, Prosecution (District Attorney's)	DDAA	392	$ 256.00	CalPERS	Misc
RSA	RSA Law Enforcement	RSA	2,406	$ 25.00	RSA	Safety
RSP	RSA Public Safety	RSA Public Safety	566	$ 139.00	CalPERS	Safety
SE2	SEIU Professional	SEIU	3,272	$ 139.00	CalPERS	Misc
SE8	SEIU Registered Nurses	SEIU	1,287	$ 139.00	CalPERS	Misc
SE9	SEIU Para Professional	SEIU	1,073	$ 139.00	CalPERS	Misc
SES	SEIU Supervisory	SEIU	1,566	$ 139.00	CalPERS	Misc
UNC	Unrepresented Confidential	Confidential	176	$ 256.00	CalPERS	Misc
UNR	Unrepresented Management	Management	9	$ 256.00	CalPERS	Misc
UP4	LIUNA Inspection and Technical	LIUNA	1,418	$ 25.00	County only	Misc
UP5	LIUNA Trades, Crafts and Labor	LIUNA	936	$ 25.00	County only	Misc
UP6	LIUNA Supporting Services	LIUNA	4,676	$ 25.00	County only	Misc
		County Total	19,476			

* Confidential, Law Enforcement Management (LEMU), Management (General), Law Enforcement Executive Staff, Prosecution (DDAA), RSA Public Safety, Unrepresented Confidential, Unrepresented management, and SEIU members are eligible to receive the greater of the PEMHCA amount or the bargained amount. Currently, Confidential, DDAA, Management (General), Law Enforcement Executive Staff, Unrepresented Confidential, and Unrepresented management are above the PEMHCA amount, LEMU, RSA Public Safety, and SEIU are at the PEMHCA amount.

** CalPERS designated groups are also eligible to participate in County plans.

Special District (Waste, Parks, Flood and RCA) employees are not included in this valuation.

[1] Based on demographic assumptions set out in the Actuarial Assumption and Methods section of this report.

Retired Participant Benefit Summary

The table below summarizes the number of current retirees receiving various monthly County contribution amounts:

Age	$25.00	$139.00	$256.00	Total
<40	6	0	1	7
40-44	7	1	0	8
45-49	7	3	0	10
50-54	38	62	12	112
55-59	79	138	58	275
60-64	122	242	108	472
65-69	149	233	183	565
70-74	128	227	145	500
75-79	84	148	75	307
80-84	41	72	29	142
85-89	38	31	14	83
90-95	8	13	14	35
>95	1	3	2	6
Total	708	1,173	641	2,522

Summary of Principal Plan Provisions

The following plan provisions are the basis for the calculations in this actuarial valuation.

1. **Benefit Eligibility**
   All employees who retire from active employment within 120 days of separation are eligible for participation. Participants are eligible for service retirement at or after age 50, or disability retirement at an age younger than 50, with at least 5 years of service. Former employees who become eligible for CalPERS pension benefits more than 120 days after separation are not eligible for retiree health benefits.

2. **Benefits / Plans Covered**
   The County contributes a portion of an eligible retiree's medical plan premium under a County sponsored health plan (either at retirement or during a subsequent annual enrollment) for the retiree's lifetime. Contributions are based on the employee's bargaining unit at the time of retirement, as follows:

Bargaining Unit at Retirement	Monthly Contribution 2017	2018	2019	2020	2021
Confidential**	$256.00	$256.00	$256.00	$256.00	$256.00
LEMU (Management)*	$128.00	$133.12	$136.00	$139.00	$143.00
MLX (Executive Staff)**	$256.00	$256.00	$256.00	$256.00	$256.00
LIUNA	$25.00	$25.00	$25.00	$25.00	$25.00
Management**	$256.00	$256.00	$256.00	$256.00	$256.00
District Attorneys (DDAA)*	$256.00	$256.00	$256.00	$256.00	$256.00
RSA Law Enforcement	$25.00	$25.00	$25.00	$25.00	$25.00
RSA Public Safety*	$128.00	$133.12	$136.00	$139.00	$143.00
SEIU	$25.00	$25.00	$25.00	$139.00	$143.00
Unrepresented**	$256.00	$256.00	$256.00	$256.00	$256.00

* Confidential, Law Enforcement Management (LEMU), MLX (Executive Staff), Management, Prosecution (Deputy DAs), RSA Public Safety, Unrepresented members, and SEIU are eligible to receive the greater of the PEMHCA amount or the bargained amount. Currently, Confidential, MLX (Executive Staff), Management, Prosecution (Deputy DAs), and Unrepresented are above the PEMHCA amount. LEMU, RSA Public Safety, and SEIU are at the PEMHCA amount.

** Confidential, MLX (Executive Staff), Management and Unrepresented retired before 11/1/2005 receive a monthly contribution of $128 and after 11/1/2005 receive a monthly contribution of $256.

Future PEMHCA amounts increase at the same rate as Medical CPI. See Appendix A for a projection of the monthly PEMHCA contribution amounts.

RSA – The County contributes $25.00 per month to the RSA Benefit Trust for RSA Law Enforcement retirees. Although the Trust is responsible for providing a benefit with a much larger premium, the County is responsible for the $25.00 monthly contribution and this benefit is included in Plan liabilities.

Implicit Subsidy – Under CalPERS plans, retirees can receive coverage at premium rates that are subsidized due to demographic differences between those receiving benefits and the population used to develop premiums (e.g., blended active and retiree premiums.)

3. **Survivor Coverage Benefits**
   Upon the death of the retiree, the eligible surviving spouse receives the same monthly benefit amount for their lifetime.

Actuarial Assumptions and Methods

1. Actuarial Cost Method

The costs shown in the report were developed using the Entry Age Normal cost method.

The Entry Age Normal (EAN) cost method spreads plan costs for each participant from entry date (assuming the plan existed on the employee's hire date) to the expected retirement date. Under the EAN cost method, the plan's normal cost is developed as a level percentage of pay spread over the participants' working lifetime. For this purpose, pay is assumed to increase 2.75% per annum. The AAL is the cumulative value, on the valuation date, of prior service costs. For retirees, the AAL is the present value of all projected benefits.

The Plan costs are derived by making certain specific assumptions as to the rates of interest, mortality, turnover and other demographic events, which are assumed to hold for many years into the future. Actual experience may differ somewhat from the assumptions and the effect of such differences is spread over all periods. Due to these differences, the costs determined by the valuation must be regarded as estimates of the true Plan costs.

2. Funding Policy and Actuarially Determined Contribution (ADC)

The County's funding policy is to contribute the normal cost plus the amortization of unfunded liability based on the following:

- Amortization of the 2017 unfunded liability over the period ending June 30, 2037, plus
- 15-year amortization of subsequent unanticipated changes in liability (i.e., actuarial gains/losses and assumption changes), plus
- 5-year amortization of subsequent unanticipated changes in assets (i.e., asset gains/losses).

The amortization is calculated based on a level percentage of future payroll amounts

Effective July 1, 2020 (ADC for Fiscal Year Ending June 30, 2022), the County elected to exclude the implicit subsidy liability in the funding contribution development.

3. Discount Rate

7.01% - as of 7/1/2019
6.15% - as of 7/1/2020

Under GASB 75, the discount rate is based on a single equivalent rate that reflects a blend of:

- Expected return on assets during the period such that assets are projected to be sufficient to pay benefits of current participants; and
- 20-year, municipal bond yields / index for periods beyond the depletion of the assets.

Based on the current funding policy, projected cash flows, and the assumed asset return, the plan assets are not projected to be depleted, and the discount rate can be based on the expected asset return.

4. Expected Return on Assets

6.15% - Selected by the County based on CalPERS CERBT Asset Allocation Strategy 2.

5. Payroll Increases

2.75% - This is the annual rate at which total payroll is expected to increase and is used in the funding method to calculate the funding contribution as a level percent of payroll.

6. Inflation

2.50% - This is the assumed annual rate of inflation for future years.

For demographic assumptions:

Public Agency Police consists of Law Enforcement Management and Law Enforcement Executive Staff;

Public Agency County Peace Officer consists of RSA Law Enforcement and RSA Public Safety, and;

Miscellaneous consists of all other bargaining units.

7. Mortality

Mortality rates are based on the Pub-2010 headcount-weighted tables for general employees of all income levels, with generational future improvement scale MP-2020. Sample rates for the 2010 base year mortality are as follows:

Age	Male	Female
30	0.05%	0.02%
40	0.08%	0.04%
50	0.18%	0.10%
60	0.38%	0.21%
70	0.82%	0.53%
80	2.03%	1.41%
90	15.78%	12.12%

8. Termination

Termination rates developed in the 2017 CalPERS Experience Study were used in the valuation. The following sample rates are based on age and service:

Public Agency Police

Attained	Years of Service						
Age	0 – 1	5	10	15	20	25	30
30	10.13%	2.49%	1.79%	1.09%	0.00%	0.00%	0.00%
35	10.13%	2.49%	1.79%	1.09%	0.82%	0.00%	0.00%
40	10.13%	2.49%	1.79%	1.09%	0.82%	0.70%	0.00%
45	10.13%	2.49%	1.79%	1.09%	0.82%	0.70%	0.65%
50	10.13%	0.86%	0.53%	0.27%	0.17%	0.12%	0.09%
55	10.13%	0.86%	0.53%	0.27%	0.17%	0.12%	0.09%

Termination (cont.)

Public Agency County Peace Officer

Attained Age	Years of Service 0 – 1	5	10	15	20	25	30
30	23.76%	2.42%	1.06%	0.50%	0.00%	0.00%	0.00%
35	23.76%	2.42%	1.06%	0.50%	0.24%	0.00%	0.00%
40	23.76%	2.42%	1.06%	0.50%	0.24%	0.10%	0.00%
45	23.76%	2.42%	1.06%	0.50%	0.24%	0.10%	0.06%
50	23.76%	2.42%	1.06%	0.50%	0.24%	0.10%	0.06%
55	23.76%	2.42%	1.06%	0.50%	0.24%	0.10%	0.06%

Miscellaneous

Attained Age	Years of Service 0 – 1	5	10	15	20	25	30
30	16.06%	6.15%	4.16%	2.62%	0.00%	0.00%	0.00%
35	15.37%	5.67%	3.99%	2.52%	1.84%	0.00%	0.00%
40	14.68%	5.19%	3.75%	2.43%	1.76%	1.07%	0.00%
45	14.00%	4.80%	3.51%	2.16%	1.68%	1.00%	0.26%
50	13.32%	4.41%	2.86%	1.88%	1.30%	0.94%	0.20%
55	12.62%	3.68%	2.22%	1.43%	0.92%	0.53%	0.16%

9. Disability

Disability rates developed in the 2017 CalPERS Experience Study were used in the valuation. Sample rates are as follows:

	Public Agency Police		Public Agency County Peace Officer		CalPERS Miscellaneous	
Age	Male	Female	Male	Female	Male	Female
25	0.18%	0.18%	0.14%	0.14%	0.02%	0.01%
30	0.50%	0.50%	0.26%	0.26%	0.02%	0.02%
35	0.82%	0.82%	0.41%	0.41%	0.04%	0.07%
40	1.14%	1.14%	0.58%	0.58%	0.10%	0.14%
45	1.46%	1.46%	0.80%	0.80%	0.15%	0.19%
50	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
55	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

10. Retirement Age

Retirement rates developed in the 2017 CalPERS Experience Study are used in the valuation. Sample rates are provided below.

- Hire date prior to August 24, 2012:
  - Police 3% @ 50 were used for safety employees (including County Peace Officers)
  - Miscellaneous 3% @ 60 rates were used for all other employees.
- Hire date August 24, 2012 to December 31, 2012:
  - Police 2% @ 50 were used for safety employees (including County Peace Officers)
  - Miscellaneous 2% @ 60 rates were used for all other employees.
- Hire date post December 31, 2012:
  - Police 2.7% @ 57 were used for safety employees (including County Peace Officers)
  - Miscellaneous 2% @ 62 rates were used for all other employees.

Miscellaneous 3% @ 60

Attained	Years of Service						
Age	5	10	15	20	25	30	35
50	1.30%	1.90%	2.60%	4.20%	3.80%	6.40%	10.00%
55	4.00%	5.20%	6.40%	8.50%	9.50%	12.00%	17.20%
60	8.90%	10.60%	12.30%	18.00%	22.60%	31.60%	38.70%
65	20.00%	24.20%	28.30%	33.00%	30.00%	34.20%	37.00%
70	22.00%	25.50%	29.10%	32.60%	35.80%	38.80%	40.00%
75	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Miscellaneous 2% @ 60

Attained	Years of Service						
Age	5	10	15	20	25	30	35
50	2.00%	2.00%	2.00%	2.00%	2.00%	15.00%	15.00%
55	1.90%	2.60%	3.30%	9.20%	13.60%	14.60%	15.00%
60	7.00%	7.40%	8.90%	11.30%	13.70%	16.10%	24.60%
65	14.00%	17.80%	21.50%	26.40%	32.10%	37.70%	41.20%
70	14.00%	17.80%	21.50%	26.40%	32.10%	37.70%	41.20%
75	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Miscellaneous 2% @ 62

Attained	Years of Service						
Age	5	10	15	20	25	30	35
50	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
55	1.20%	2.10%	2.90%	3.80%	6.80%	10.30%	16.60%
60	3.50%	5.50%	7.50%	9.50%	11.50%	14.50%	19.30%
65	11.50%	14.70%	18.00%	21.30%	24.50%	31.50%	35.40%
70	12.70%	16.40%	20.00%	23.60%	27.30%	35.00%	39.40%
75	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Police 3% @ 50

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	5.00%	5.00%	5.00%	10.00%	15.50%	40.00%	40.00%
55	7.00%	7.00%	7.00%	12.00%	17.50%	34.00%	34.00%
60	15.00%	15.00%	15.00%	15.00%	18.50%	35.00%	35.00%
65	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
70	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
75	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Police 2% @ 50

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	5.00%	5.00%	5.00%	5.00%	5.00%	10.00%	11.00%
55	7.20%	7.20%	7.20%	9.60%	14.10%	25.50%	40.80%
60	15.00%	15.00%	15.00%	15.00%	15.00%	22.80%	35.00%
65	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
70	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
75	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Police 2.7% @ 57

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	5.00%	5.00%	5.00%	5.00%	6.00%	10.20%	0.00%
55	6.84%	6.84%	6.84%	10.66%	13.89%	25.00%	38.76%
60	15.00%	15.00%	15.00%	15.00%	15.14%	24.78%	35.00%
65	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
70	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
75	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

11. Annual Medical Inflation ("Trend")

County Contribution: PEMHCA amounts have been determined through 2021 ($143.00). After 2021, the PEMHCA amounts will increase at the same rate as the Medical CPI. For valuation purposes, this is assumed to be 4% for all years. This applies to RSA Public Safety, Deputy District Attorney, Law Enforcement Management, Confidential, Management, Executive Staff, and Unrepresented who were assumed to participate in CalPERS Health Benefits programs and receive the PEMHCA amounts.

All other County contributions are assumed to remain at their current level.

For purposes of calculating the implicit subsidy, a medical trend rate assumption was used to develop the projected future medical claim amounts. The medical trend rate represents the long-term expected growth of medical benefits paid by the plan, due to non-age-related factors such as general medical inflation, utilization, new technology, and the like. The following table sets forth the trend assumptions used for the valuation:

	Medical	
Year	Pre Medicare	Post Medicare
2019	Actual	Actual
2020	6.99%	8.22%
2021	6.65%	7.71%
2022	6.30%	7.19%
2023	5.95%	6.66%
2024	5.59%	6.12%
2025	5.23%	5.59%
2026	4.87%	5.04%
2027+	4.50%	4.50%

The "Further Consolidated Appropriations Act, 2020" signed into law on December 20, 2019, included a permanent repeal of the excise tax on high-cost plans (a.k.a. "the Cadillac tax") originally imposed by the Affordable Care Act in 2010. As a result, there is no impact from the excise tax in the valuation.

12. Monthly Medical Costs (for implicit Subsidy calculations)

The table below shows 2021 premiums as of the valuation date based on Region 3 (Los Angeles, Riverside, San Bernardino).

Plan	HMO/PPO	Employee Only	Employee & 1 Dep.
Basic			
Anthem Select	HMO	$639.10	$1,278.20
Anthem Traditional	HMO	984.21	1,968.42
Blue Shield Access +	HMO	834.88	1,669.76
Blue Shield Trio	HMO	660.49	1,320.98
Health Net Salud y Más	HMO	412.88	825.76
Health Net SmartCare	HMO	691.48	1,382.96
Kaiser	HMO	669.84	1,339.68
PERS Choice	PPO	761.23	1,522.46
PERS Select	PPO	459.94	919.88
PERSCare	PPO	1,036.07	2,072.14
PORAC	PPO	725.00	1,450.00
United Healthcare	HMO	720.89	1,441.78
Supplemental/Managed Medicare			
Anthem	HMO	383.37	766.74
Kaiser	HMO	324.48	648.96
PERS Choice	PPO	349.97	699.94
PERS Select	PPO	349.97	699.94
PERSCare	PPO	381.25	762.50
PORAC	PPO	513.00	1,022.00
United Healthcare	PPO	311.56	623.12

Monthly Medical costs were developed by applying age adjustments to the above premiums to reflect the implicit subsidy. These age adjustments are based on statewide information provided by CalPERS (updated in 2020). Single rate age adjustment factors are used for retirees and spouses. A sampling of the factors used is included below.

Aging Factors		
Age	HMO Plans	PPO Plans
20	0.32	0.27
30	0.51	0.45
40	0.67	0.60
50	0.99	0.89
60	1.47	1.32
64	1.71	1.54
65	0.78	0.73
70	0.90	0.86
80	1.17	1.14
90+	1.20	1.25

13. Retiree Contributions

Retirees pay the premiums in excess of the County contributions.

14. Dental Benefits

Retirees are eligible for dental benefits if they pay the entire premium. Since dental claims are not assumed to vary with age, costs are expected to be fully paid by retirees and no County liabilities exist.

15. Participants Valued

Only current active and retired participants are directly valued. No future entrants are considered in this valuation.

Certain employees are eligible for retirement benefits at termination but do not immediately elect coverage. Such former employees may still be eligible to elect retiree coverage at a later date. Although the liabilities for such benefits are not directly valued, the County believes that the likelihood of such former employees returning to elect benefit coverage is considerably small, except for RSA, as discussed below. The plan participation assumptions are adjusted to consider this liability.

For RSA, it is anticipated that a significant number of retirees will defer benefits to later years. The RSA retiree liability was loaded 15% to account for such current "deferred" retirees that are not included in the census data.

16. Plan Participation

Assumed plan participation rates of future retirees is as set out in the following table:

Health Plan / Benefit Eligibility	Assumed Participation Rate
CalPERS health plans	60% - 90% (54% of total) elect CalPERS Health Plans - 10% (6% of total) elect County Health Plans
RSA health plans	60% immediate / 20% defer to age 65
County health plans	
$25 per month benefit	10%

These percentages were developed based on a review of the County's recent experience.

17. Spousal Coverage Assumption

50% of future eligible retirees are assumed to cover their spouses. Males are assumed to be three years older than their female spouses. Current spousal coverage is used for current retirees.

18. Participants Excluded

Special District (Waste, Parks, Flood and RCA) employees, along with active Court members, were not included in this valuation.

19. Changes in Valuation Assumptions

The following assumptions were changed from the prior valuation:

1) Mortality improvement was updated from scale MP-2019 to scale MP-2020.
2) The claims table was updated to reflect most recent CalPERS monthly premiums available for 2020. Aging factors are also updated to reflect the most recent CalPERS demographic experience.
3) Expected return on assets was updated from 7.01% to 6.15%.
4) Discount rate was updated from 7.01% to 6.15%, in light of change in expected return assumption.
5) Future health plan participation for those bargaining units that have access to CalPERS health plans and elect coverage was changed to reflect that 90% of participants are assumed to elect a CalPERS Health Plan and 10% are assumed to elect a County Health Plan.
6) Funding policy - Effective July 1, 2020, the County elected to exclude the implicit subsidy liability in the funding contribution development.

COVID-19 Impacts

Given the 2020 events related to COVID-19, we reviewed participant information, as available, including terminations, retirements, and deaths over the year to compare plan experience against the assumptions used in the valuation to determine whether a modification to future assumptions may be warranted. Evaluation of the information provided did not suggest a significant impact to the plan or justify a change to assumptions other than those already used.

Additional assumption analysis is included in the assumption rationale document "20210122_2016240_2020 COR Postretirement Benefits Plan Assumption Rationale.pdf" dated January 2021.

Appendix A—Comparison of County Contribution to PEMHCA

The following table compares the projected monthly benefit per participant under the current plan to the projected monthly benefit per participant under PEMHCA. The PEMHCA amounts are assumed to increase at the same rate as medical inflation each year after 2021.

	Current Benefits		
Year	Low - $25/month	High - $256/month	PEMHCA Benefit
2020	$25.00	$256.00	$141.00
2021	$25.00	$256.00	$145.86
2022	$25.00	$256.00	$151.69
2023	$25.00	$256.00	$157.76
2024	$25.00	$256.00	$164.07
2025	$25.00	$256.00	$170.64
2026	$25.00	$256.00	$177.46
2027	$25.00	$256.00	$184.56
2028	$25.00	$256.00	$191.94
2029	$25.00	$256.00	$199.62
2030	$25.00	$256.00	$207.60
2031	$25.00	$256.00	$215.91
2032	$25.00	$256.00	$224.54
2033	$25.00	$256.00	$233.53
2034	$25.00	$256.00	$242.87
2035	$25.00	$256.00	$252.58
2036	$25.00	$256.00	$262.69
2037	$25.00	$256.00	$273.19
2038	$25.00	$256.00	$284.12
2039	$25.00	$256.00	$295.49
2040	$25.00	$256.00	$307.31
2041	$25.00	$256.00	$319.60

Appendix B—GASB 75 Expense Estimate for Fiscal Year Ending June 30, 2022

The following table illustrates the estimated OPEB expense under GASB 75 for the Fiscal Year ending June 30, 2022. The amounts shown are estimates based on the results of the July 1, 2020 actuarial valuation and a 6.15% discount rate.

	Fiscal Year Ending 6/30/2022[1]
(1) Service Cost	$ 10,522,000
(2) Interest Cost	14,898,000
(3) Expected Investment Return	(3,537,000)
(4) Employee Contributions	0
(5) Administrative Expense	28,000
(6) Plan Changes	0
(7) Amortization of Unrecognized	
(a) Liability (Gain)/Loss	576,000
(b) Asset (Gain)/Loss	(48,000)
(c) Assumption Change (Gain)/Loss	17,035,000
(8) Total Estimated Expense	$ 39,474,000
(9) Total Expense as a Percentage of Payroll[2]	2.66%

The FYE 2022 estimate is significantly higher than the FYE 2021 expense of $24.5 million, primarily due to a) the recognition of a higher normal cost as a result of SEIU bargaining unit participants being provided with access to CalPERS health plans, and b) a lower discount rate. The estimated FYE 2022 expense has been developed based on the same eligibility basis used for all groups as of June 30, 2020.

[1] Final FYE 2022 expense information will be provided in the actuarial valuation based on a June 30, 2021 measurement date reflecting updated census, assumptions, plan provisions and actual asset values, in addition to any asset, liability, or assumption gains/losses initially recognized over the period June 30, 2020 to June 30, 2021.

[2] Based on estimated payroll.

Appendix C—Pre-65 / Post-65 Breakdown

Alternate breakdown of AAL is shown below to help understand the source of costs.

	Pre-65	Post-65	Total
All Benefits			
County Contribution - Flat Dollar (County & RSA)			
Retirees	$434,702	$2,077,585	$2,512,287
Actives	$901,610	$1,439,614	$2,341,224
Subtotal	$1,336,312	$3,517,199	$4,853,511
County Contribution - CalPERS Benefits			
Retirees	$5,538,611	$47,493,909	$53,032,521
Actives	$19,631,603	$62,374,113	$82,005,716
Subtotal	$25,170,214	$109,868,022	$135,038,237
CalPERS - Implicit Subsidy			
Retirees	$16,112,727	$10,075,861	$26,188,588
Actives	$59,974,919	$9,288,017	$69,262,936
Subtotal	$76,087,646	$19,363,878	$95,451,524
Total AAL	**$102,594,172**	**$132,749,099**	**$235,343,272**
Number of Retirees as of 7/1/2020[1]	884	2,522	2,522
Number of Actives as of 7/1/2020[1]	19,142	19,476	19,476
AAL Per Retiree	$24,984	$23,651	$32,408
AAL Per Active	$4,206	$3,753	$7,887
Normal Cost			
Flat Dollar (County & RSA)	$66,657	$93,142	159,799
CalPERS Benefits	$1,298,825	$4,546,801	5,845,626
CalPERS - Implicit Subsidy	$3,742,942	$773,458	4,516,400
Total Normal Cost	**$5,108,424**	**$5,413,401**	**$10,521,825**

[1] For purpose of illustrating per participant AAL, counts reflect number of participants eligible for pre-65 and post-65 benefits, respectively.

Actuarial Valuation Report

County of Riverside

Part-time and Temporary Employees' Retirement Plan

As of July 1, 2020

AON
Empower Results®

Executive Summary

Background

The County of Riverside established the Part-Time and Temporary Employees' Retirement Plan to provide retirement benefits to eligible employees as a substitute for benefits under Social Security, as allowed under OBRA '90. The Plan is an IRS Section 401(a) defined benefit plan.

The County's current funding policy is to contribute a level percentage of pay based on the sum of

a) Normal Cost with interest and administrative expense, plus

b) Amortization of July 1, 2017 Unfunded Actuarial Accrued Liability (UAAL) over the period ending June 30, 2037, plus

c) Amortization of subsequent unanticipated changes in liability (i.e., actuarial gains / losses and changes in assumptions) over 15-year periods and unanticipated changes in assets over 5-year periods, less

d) Expected Employee Contributions

Amortization amounts are calculated based on the discount rate and payroll increase assumption appropriate for the valuation date.

Summary of Results

Funding Contribution

The funding contribution for Fiscal Year Ending (FYE) 2021 is $1,325,770 and was developed based on the prior year valuation. The funding contribution for FYE 2022 is $1,547,637 and is developed based on the funding policy described in the Background section above. This increase is mainly a result of lower than expected asset returns and higher than expected liabilities due to actuarial losses.

GASB 68

This valuation is based on census data provided as of July 1, 2020 for the purpose of providing GASB 68 financial statement information, including expense, for FYE June 30, 2021. The final FYE June 30, 2021 expense is $1,918,663, which is lower than estimated in the prior valuation due to actual employee contribution higher than projected.

The measurement date for results shown in this valuation report is June 30, 2020.

ASOP 51

In September 2017, the Actuarial Standards Board (ASB) introduced Actuarial Standard of Practice (ASOP) No. 51, Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions, which is effective for any actuarial work product with a measurement date on or after November 1, 2018. This ASOP provides guidance to actuaries with regard to the assessment and disclosure of the risk that actual future measurements may differ significantly from expected future measurements. Examples of future measurements include pension liabilities, actuarially determined contributions, and funded status. A report that addresses the requirements of ASOP 51 will be provided in a report separate to these valuation results.

Comparison to Prior Valuation

The purpose of the actuarial valuation of the Plan is to:

- Determine the Plan's funded status and annual costs; and
- Provide information for Government Accounting Standards Board financial statement disclosure.

The following table summarizes the current valuation results as of July 1, 2020, compared to prior year results:

	July 1, 2019	July 1, 2020
Active participant count	1,503	1,394
Funding Contribution		
Discount Rate	6.00%	6.00%
Actuarial accrued liability (Projected Unit Credit):	$55,684,019	$58,549,103
Smoothed value of plan assets	42,667,330	45,479,406
Unfunded liability	$13,016,689	$13,069,697
Funded percentage	76.6%	77.7%
Actuarially Determined Contribution (ADC), FYE 2021 / 2022	$1,325,770	$1,547,637
Expected Participant Compensation	$32,979,000	$27,756,000
Contribution as a Percentage of Compensation	4.02%	5.58%
GASB 68 Expense		
Discount Rate	6.00%	6.00%
Total Pension Liability (Entry Age Normal):	$53,122,016	$54,846,295
Plan Fiduciary Net Position	43,574,690	45,366,169
Net Pension Liability	$9,547,326	$9,480,126
GASB 68 Annual Pension Expense/(Income), FYE 2021 final / 2022 estimate	$1,918,663	$1,994,000

Overall, the plan's funded status and Net Pension Liability remained fairly stable from the prior valuation, with the following offsetting factors:

- Demographic experience was different than expected, primarily due to fewer terminations than expected, which resulted in a liability loss;
- Assets were lower than expected due to unfavorable investment return on plan assets (3.72% actual compared to 6.0% assumed);
- Mortality assumptions were updated to reflect the recent public mortality table Pub-2010 amount-weighted for General employees, with generational future improvement scale MP-2020, resulting in a decrease in liabilities.

The funding contribution (Actuarial Determined Contribution) increased in magnitude compared to FYE 2021 due to a small liability loss. The Contribution as a Percentage of Compensation increase was magnified further when compared to FYE 2021 by the lower overall compensation base, resulting in fewer active participants to spread costs over.

Projected Funding Status

80% Funded Status

The County's goal is to maintain an 80% funded status for the Plan. The valuation projects the Plan to be slightly below 80% funded in 2021 based on the cost method used for funding, as shown below.

Projected Actuarial Accrued Liability (AAL), 6/30/2021	$60,964,089
Projected Smoothed Value of Assets, 6/30/2021	48,675,516
Funding Shortfall, 6/30/2021	12,288,573
Projected Funded Status, 6/30/2021	79.8%
Shortfall to achieve 80% as of 6/30/2021	95,755
Additional funding in FYE 2021 to achieve 80% as of 6/30/2021[1]	$92,966

[1] Assumes funding on 1/1/2021 and is in addition to the proposed FYE 2021 contribution of $1,325,770.

The plan is not projected to be less than 80% in the future years after 2021.

90% Funded Status

The County also requested review of maintaining an alternative 90% funded status for the Plan. The valuation projects the Plan to be under 90% funded based on the cost method used for funding, as shown below.

Projected Actuarial Accrued Liability (AAL), 6/30/2021	$60,964,089
Projected Smoothed Value of Assets, 6/30/2021	48,675,516
Funding Shortfall, 6/30/2021	12,288,573
Projected Funded Status, 6/30/2021	79.8%
Shortfall to achieve 90% as of 6/30/2021	6,192,164
Additional funding in FYE 2021 to achieve 90% as of 6/30/2021[1]	$6,011,809

[1] Assumes funding on 1/1/2021 and is in addition to the proposed FYE 2021 contribution of $1,325,770.

The table below summarizes the estimated contribution projected in order to attain 90% at various future dates. The total contributions include the fiscal year ending June 30, 2022 ADC rate of 5.58% plus the additional amount to attain 90% funded status by the target funding date.

	Additional Payment to Fund 90% by Target Date		Total Contribution to Fund 90% by Target Date	
90% Target Funding Date	Annual Payment in FYE 2022[1]	% of Pay	Annual Payment in FYE 2022[1,2]	% of pay[2]
6/30/2022	$5,339,386	19.24%	$6,887,023	24.81%
6/30/2023	2,187,823	7.88%	3,735,460	13.46%
6/30/2024	1,140,439	4.11%	2,688,076	9.68%
6/30/2025	541,417	1.95%	2,089,054	7.53%
6/30/2026	204,340	0.74%	1,751,977	6.31%
6/30/2027	18,926	0.07%	1,566,563	5.64%
6/30/2028	0	0.00%	1,547,637	5.58%

[1] Contributions shown for FYE 2022 are assumed to be made throughout the year based on a level percent of pay and are therefore assumed to increase at 2.75% per year from FYE 2022 to the target funding date.

[2] Includes current FYE 2022 contribution of $1,547,637 (5.58% of pay).

For example, to attain 90% funded by FYE 2023 the County would need to contribute approx. $2.2M in FYE 2022 and $2.2M in FYE 2023 in addition to the current ADC contributions of $1.5M in FYE 2022 and $1.6M in FYE 2023.

* * *

This July 1, 2020 valuation is based on census data provided as of June 30, 2020 for the purpose of providing GASB 68 financial statement information, including final expense for the fiscal year ending June 30, 2021, estimated expense for fiscal year ending June 30, 2022 and the funding contribution amount for the fiscal year ending June 30, 2022.

The following report provides details of the results summarized above and the disclosure information for fiscal year ending 2021.

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Actuarial Valuation Certification

This report documents the results of the July 1, 2020 actuarial valuation for the County of Riverside Part-time and Temporary Employee's Retirement Plan. The information provided in this report is intended strictly for documenting the development of the Funding Contribution and disclosure items under Governmental Accounting Standards Board (GASB) Statements No. 68.

Determinations for purposes other than the financial accounting requirements may be significantly different from the results in this report. Thus, the use of this report for purposes other than those expressed here may not be appropriate.

This valuation has been conducted in accordance with generally accepted actuarial principles and practices, including the applicable Actuarial Standards of Practice as issued by the Actuarial Standards Board. In addition, the valuation results are based on our understanding of the financial accounting and reporting requirements under U.S. Generally Accepted Accounting Principles as set forth in Government Accounting Standards Board Statement 68 (GASB 68) including any guidance or interpretations provided by the Company and/or its audit partners prior to the issuance of this report. The information in this report is not intended to supersede or supplant the advice and interpretations of the County of Riverside's auditors.

A valuation model was used to develop the liabilities for the January 1, 2020 valuation. The valuation model relies on ProVal software, which was developed by Winklevoss Technologies, LLC. Experts within Aon selected this software and determined it is appropriate for performing valuations. We coded and reviewed the software for the provisions, assumptions, methods, and data of the County of Riverside Part-time and Temporary Employee's Retirement Plan. The undersigned relied on experts at Aon for the development of the capital market assumptions models underlying the discount rate and the expected rate of return.

A model was used to develop the appropriate GASB discount rate. The undersigned relied on experts within Aon for the development of the capital market assumptions and the model underlying the expected rate of return.

The valuation model outputs various cost scenarios. The "1% increase" and "1% decrease" interest rate scenarios vary only the discount rate assumption, in order to illustrate the impact of a change in that assumption in isolation. In practice, certain other assumptions, such as the expected or realized asset returns, would also be expected to vary when the discount rate changes. Therefore, the output from these scenarios should be used solely for assessing the impact of the discount rate in isolation and may not represent a realistic set of results for other purposes.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to (but not limited to) such factors as the following:

- Plan experience differing from that anticipated by the economic or demographic assumptions
- Changes in actuarial methods or in economic or demographic assumptions
- Increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period)
- Changes in plan provisions or applicable law

Due to the limited scope of this valuation report, we have not included an analysis of the potential range of such future measurements. However, an assessment and disclosure of risks pertaining to the funding valuation as required by the actuarial standards of practice is being provided in a separate report.

In conducting the valuation, we have relied on personnel, plan design, and asset information supplied by the County of Riverside as of the valuation date. While we cannot verify the accuracy of all the information, the supplied information was reviewed for consistency and reasonableness. As a result of this review, we have no reason to doubt the substantial accuracy or completeness of the information and believe that it has produced appropriate results. We have relied on actual and expected contributions as summarized within this report.

Actuarial computations under GASB are for purposes of fulfilling plan and employer accounting requirements. The calculations reported herein have been made on a basis consistent with our understanding of these accounting standards. Determinations for purposes other than meeting Employer financial accounting requirements may be different from these results.

This report is intended for the sole use of the County of Riverside. It is intended only to supply information for the County of Riverside to comply with the stated purpose of the report and may not be appropriate for other business purposes. Reliance on information contained in this report by anyone for other than the intended purposes, puts the relying entity at risk of being misled because of confusion or failure to understand applicable assumptions, methodologies, or limitations of the report's conclusions. Accordingly, no person or entity, including the County of Riverside, should base any representations or warranties in any business agreement on any statements or conclusions contained in this report without the written consent of Aon.

Funded status measurements shown in this report may not be appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations, and funded status measurements for the employer and plan disclosure and reporting purposes may not be appropriate for assessing the need for or the amount of future contributions.

In determining the annual expense and Funding Contribution for the County of Riverside Part-time and Temporary Employees' Retirement Plan and information relating to plan disclosure and reporting requirements, Aon may be assisting the appropriate plan fiduciary as it performs tasks that are required for the administration of an employee benefit plan. Aon also may be consulting with the employer/plan sponsor (County of Riverside) as it considers alternative strategies for funding the plan, or as it evaluates information relating to employer reporting requirements. Thus, Aon potentially will be providing assistance to County of Riverside (and/or certain of its employees) acting in a fiduciary capacity (for the benefit of plan participants and beneficiaries) and to County of Riverside (and/or its executives) acting in a settlor capacity (for the benefit of the employer sponsoring the County of Riverside Part-time and Temporary Employees' Retirement Plan).

The undersigned are familiar with the near-term and long-term aspects of pension valuations and collectively meet the Qualification Standards of the American Academy of Actuaries necessary to render the actuarial opinions contained herein. The information provided in this report is dependent upon various factors as documented throughout this report, which may be subject to change. Each section of this report is considered to be an integral part of the actuarial opinions.

To our knowledge, no colleague of Aon providing services to the County of Riverside has any material direct or indirect financial interest in the County of Riverside. Thus, we believe there is no relationship existing that might affect our capacity to prepare and certify this actuarial report for the County of Riverside.

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January 4, 2021

Summary of Liabilities

This exhibit shows the plan liabilities as of July 1, 2020 based on census data provided by the County as of June 30, 2020 and the Summary of Plan Provisions and Summary of Actuarial Assumptions described in this report.

The Actuarial Accrued Liability (AAL) is the portion of the actuarial present value of all future benefits to be paid to current plan participants that is attributable to past service.

GASB 68 prescribes use of the Entry Age Normal (EAN) cost method for development of expense and disclosure information. For funding contributions, the Projected Unit Credit (PUC) cost method is used to maintain a more stable contribution level for this plan that experiences high turnover rates.

	Funding Contributions	GASB 68
Cost Method	PUC	EAN
Discount Rate	6.00%	6.00%
Actuarial Accrued Liability (AAL), as of July 1, 2020		
Actives	$12,104,410	$13,313,785
Actives not accruing benefits[1]	13,726,098	8,813,915
Deferred Vested Terminated	20,067,981	20,067,981
Retirees and Beneficiaries	12,650,614	12,650,614
Total	$58,549,103	$ 54,846,295
Normal (Service) Cost, as of July 1, 2020	$1,003,889	$1,099,119

[1] Participants who become full-time employees and transfer to CalPERS are no longer accruing a benefit under the plan.

Summary of Plan Assets

This exhibit develops the asset values used in the valuation.

Statement of Invested Plan Assets as of June 30, 2020	2020
1. Mutual Funds – Equity	$31,312,865
2. Mutual Funds – Fixed Income	12,934,490
3. Cash and Equivalents (including receivables)	1,118,814
4. Total Assets held in Trust for Pension Benefits	$45,366,169
Reconciliation of Plan Assets	
1. Market Value of Assets at beginning of Plan Year	$43,574,690
2. Employer Contributions	811,519
3. Employee Contributions	1,722,324
4. Net Investment Income	1,622,054
5. Benefit Payments	(2,107,016)
6. Administrative Expenses	(257,402)
7. Market Value of Assets at end of Plan Year	$45,366,169
Rate of Return for 2019/2020 Plan year (net of expenses)	3.72%
Development of (Gain)/Loss	
1. Expected Investment Earnings (assumed 6.00%)	$2,619,490
2. Actual Investment Earnings	1,622,054
3. (Gain)/Loss on Assets (1)-(2)	**$997,436**
Smoothed Value of Assets as of June 30, 2020	
1. Market Value of Assets at end of Plan Year	$45,366,169
2. Unrecognized (Gain)/Loss[1]	113,237
3. Preliminary Smoothed Value of Assets at end of Plan Year (1)+(2)	$45,479,406
4. Lower Corridor (80% of Market Value)	$36,292,935
5. Upper Corridor (120% of Market Value)	$54,439,402
6. Smoothed Value of Assets	$45,479,406

[1] Schedule of the Current and Prior Asset (Gains)/Losses as of June 30, 2020.

Date Established	Original (Gain)/Loss	Years Remaining as of 06/30/2020	Amount recognized	Total Amount Unrecognized
7/1/2020	$997,436	4	$199,487	$797,949
7/1/2019	$556,864	3	$222,746	$334,118
7/1/2018	($1,383,353)	2	($830,012)	($553,341)
7/1/2017	($2,327,445)	1	($1,861,956)	($465,489)
Total			($2,269,735)	$113,237

Development of Funding Contribution

The County's current funding policy is to contribute an amount equal to a level percentage of pay. Note the determination developed below assumes a constant active population over which the unfunded liabilities are amortized. The funding contribution is based on the sum of:

a) Normal Cost with interest and administrative expense, plus
b) Amortization of July 1, 2017 Unfunded Actuarial Accrued Liability (UAAL) over the period ending June 30, 2037, plus
c) Amortization of subsequent unanticipated changes in liability (i.e., actuarial gains / losses and changes in assumptions) over 15-year periods and unanticipated changes in assets over 5-year periods, less
d) Expected Employee Contributions

The following table shows the development of the funding contribution as a level percentage of pay, assuming middle of year payment, for the FYE June 30, 2022:

	Total
Funding Contribution, FYE June 30, 2022	
Projected Normal Cost (including expense), plus interest	$1,320,581
Amortization of UAAL, plus interest	1,267,906
Expected Employee Contributions During FYE June 30, 2022	(1,040,850)
Funding Contribution	$1,547,637
Funding Contribution as a Percentage of Pay	
Estimated Participant Compensation[1]	$27,756,000
Normal Cost	4.76%
Amortization of UAAL	4.57%
Employee Contributions	(3.75%)
Funding Contribution, not less than 0	5.58%

We understand the County makes plan contributions based on the percentage of pay determined above. To the extent actual funding differs from dollar **amount** anticipated, the variation will be reflected in future contribution levels through amortization of unexpected changes in the UAAL.

The following table shows the development of the liability gain / loss as of June 30, 2020.

Liability as of June 30, 2019	$55,684,019
Service Cost	1,247,333
Interest on Liability	3,352,671
Plan Change	0
Assumption Changes	**(273,516)**
Benefit Payments	(2,107,016)
Expected Liability as of June 30, 2020	57,903,491
Actual Liability as of June 30, 2020	58,549,103
Liability (Gain)/Loss	**$645,612**

[1] Based on 2.75% payroll increase assumption.

Amortization Schedule

The following table shows the amortization of Unfunded Actuarial Accrued Liability as of July 1, 2021. Amortization of bases is first recognized in the fiscal year subsequent to the year established.

Date Established	Type of Base	Original Period	Remaining Period as of June 30, 2020	Original Balance	Balance Remaining as of June 30, 2021	Amortization Recognized in FYE June 30, 2022
7/1/2017	7/1/2017 UAAL[1]	20	16	$8,013,534	$7,193,693	$562,078
7/1/2018	Liability (Gain)/Loss	15	13	1,628,720	1,625,967	149,751
7/1/2018	Assets (Gain)/Loss	5	3	(1,383,353)	(957,628)	(329,200)
7/1/2018	Assumptions	15	13	(67,964)	(67,851)	(6,249)
7/1/2019	Liability (Gain)/Loss	15	14	2,675,755	2,759,474	239,435
7/1/2019	Assets (Gain)/Loss	5	4	556,864	492,643	128,972
7/1/2019	Assumptions	15	14	2,564,505	2,644,738	229,480
7/1/2020	Liability (Gain)/Loss	15	15	645,612	684,349	56,225
7/1/2020	Assets (Gain)/Loss	5	5	997,436	1,057,282	224,827
7/1/2020	Assumptions	15	15	(273,516)	(289,927)	(23,820)
	Total Charges			$15,357,593	$15,142,739	$1,231,499

[1] Includes Asset (Gain)/Loss as of 6/30/2017.

GASB 68 Reporting and Disclosure Information for Fiscal Year Ending June 30, 2021

Development of GASB 68 Annual Expense

The expense amounts shown below have been prepared for GASB 68 reporting purposes for the fiscal year ending June 30, 2021 based on a Valuation Date of July 1, 2020 and Measurement period July 1, 2019 to July 1, 2020.

The following table illustrates the Net Pension Liability under GASB 68.

	Fiscal Year Ending 6/30/2020	Fiscal Year Ending 6/30/2021
1. Pension Liability		
(a) Actives	$ 14,146,362	$ 13,313,785
(b) Actives not accruing benefits[1]	$ 10,039,217	$ 8,813,915
(c) Deferred Vested Terminated	$ 17,582,100	$ 20,067,981
(d) Retirees and Beneficiaries	$ 11,354,337	$ 12,650,614
(e) Total	$ 53,122,016	$ 54,846,295
2. Plan Fiduciary Net Position	$ 43,574,690	$ 45,366,169
3. Net Pension Liability	$ 9,547,326	$ 9,480,126
4. Plan Fiduciary Net Position as a Percentage of the Total Pension Liability	82.03%	82.72%
5. Deferred Outflow of Resources for Contributions Made After Measurement Date	$ 811,519	TBD

Annual Expense, FYE June 30, 2021	
1. Service Cost	$ 1,255,013
2. Interest Cost	3,200,332
3. Expected Return on Assets	(2,619,490)
4. Employee Contributions	(1,722,324)
5. Administrative Expense	257,402
6. Plan Changes	0
7. Amortization of Unrecognized	
(a) Liability (Gain)/Loss	1,082,624
(b) Asset (Gain)/Loss	(28,390)
(c) Assumption Changes	493,496
(d) Total	1,547,730
8. Annual Expense	$ 1,918,663

[1] Participants who become full-time employees and transfer to CalPERS are no longer accruing a benefit under the plan.

Reconciliation of Net Pension Liability

The following table shows details regarding the Total Pension Liability, Plan Fiduciary Net Position and Net Pension Liability for the measurement period June 30, 2019 to June 30, 2020.

	Increase (Decrease)		
	Total Pension Liability (a)	Plan Fiduciary Net Position (b)	Net Pension Liability (a) – (b)
Balance Recognized at 6/30/2020 (Based on 6/30/2019 Measurement Date)	$53,122,016	$43,574,690	$9,547,326
Changes for the year:			
Service Cost	$1,255,013	N/A	$1,255,013
Interest Cost	$3,200,332	N/A	$3,200,332
Plan Amendment	$0	N/A	$0
Differences Between expected and actual experience	($365,443)	N/A	($365,443)
Changes of Assumptions	($258,607)	N/A	($258,607)
Benefit Payments, including refunds of employee contributions	($2,107,016)	($2,107,016)	$0
Contributions – Employer	N/A	$811,519	($811,519)
Contributions – Employee	N/A	$1,722,324	($1,722,324)
Net Investment Income	N/A	$1,622,054	($1,622,054)
Administrative Expenses	N/A	($257,402)	$257,402
Other Changes	$0	$0	$0
Net Changes	$1,724,279	$1,791,479	($67,200)
Balance Recognized at 6/30/2021 (Based on 6/30/2020 Measurement Date)	$54,846,295	$45,366,169	$9,480,126

Development of Items Used in Determination of 2021 Expense

Liability (Gain)/Loss

The following table illustrates the liability (gain)/loss under GASB 68.

		Fiscal Year Ending 6/30/2021
1.	Pension Liability at Beginning of Measurement Period	$ 53,122,016
2.	Service Cost	1,255,013
3.	Interest on the Total Pension Liability	3,200,332
4.	Changes of Benefit Terms	0
5.	Changes of Assumptions	(258,607)
6.	Benefit Payments	(2,107,016)
7.	Expected Pension Liability at End of Measurement Period	55,211,738
8.	Actual Pension Liability at End of Measurement Period	54,846,295
9.	Pension Liability (Gain)/Loss	$ (365,443)
10.	Average Future Working Life Expectancy	9.31
11.	Pension Liability (Gain)/Loss Amortization	$ (39,253)

Asset (Gain)/Loss

The following illustrates the asset (gain)/loss under GASB 68.

		Fiscal Year Ending 6/30/2021
1.	Pension Asset at Beginning of Measurement Period	$ 43,574,690
2.	Contributions—Employer	811,519
3.	Contributions—Employee	1,722,324
4.	Expected Investment Income	2,619,490
5.	Benefit Payments	(2,107,016)
6.	Administrative Expense	(257,402)
7.	Other	0
8.	Expected Pension Asset at End of Measurement Period	46,363,605
9.	Actual Pension Asset at End of Measurement Period	45,366,169
10.	Pension Asset (Gain)/Loss	$ 997,436
11.	Amortization Factor	5.00
12.	Pension Asset (Gain)/Loss Amortization	$ 199,487

Deferred Outflows/Inflows of Resources

The following table illustrates the Deferred Inflows and Outflows as of June 30, 2021 under GASB 68.

	Deferred Outflows of Resources	Deferred Inflows of Resources
1. Difference between actual and expected experience	$4,806,002	$326,190
2. Net difference between expected and actual earnings on pension plan investments	108,008	0
3. Assumption changes	3,201,697	823,918
4. Total	$8,115,707	$1,150,108

Amortization of Deferred Inflows/Outflows

The table below lists the amortization bases included in the deferred inflows/outflows as of June 30, 2021.

Date		Period[1]		Balance		Annual
Established	Type of Base	Original	Remaining	Original	Remaining	Payment
6/30/2020	Liability (Gain)/Loss	9.31	8.31	($365,443)	($326,190)	($39,253)
6/30/2020	Asset (Gain)/Loss	5.00	4.00	997,436	797,949	199,487
6/30/2020	Assumptions	9.31	8.31	(258,607)	(230,830)	(27,777)
6/30/2019	Liability (Gain)/Loss	8.78	6.78	2,732,087	2,109,743	311,172
6/30/2019	Asset (Gain)/Loss	5.00	3.00	556,864	334,118	111,373
6/30/2019	Assumptions	8.78	6.78	2,985,149	2,305,161	339,994
6/30/2018	Liability (Gain)/Loss	8.07	5.07	1,620,937	1,018,357	200,860
6/30/2018	Asset (Gain)/Loss	5.00	2.00	(1,383,353)	(553,340)	(276,671)
6/30/2018	Assumptions	8.07	5.07	39,510	24,822	4,896
6/30/2017	Liability (Gain)/Loss	7.97	3.97	1,456,980	725,748	182,808
6/30/2017	Asset (Gain)/Loss	5.00	1.00	(2,353,591)	(470,719)	(470,718)
6/30/2017	Assumptions	7.97	3.97	(746,218)	(371,706)	(93,628)
6/30/2016	Liability (Gain)/Loss	7.97	2.97	1,524,469	568,089	191,276
6/30/2016	Asset (Gain)/Loss	5.00	0.00	2,040,695	0	408,139
6/30/2016	Assumptions	7.97	2.97	(594,082)	(221,382)	(74,540)
6/30/2015	Liability (Gain)/Loss	8.53	2.53	795,023	235,804	93,203
6/30/2015	Assumptions	8.53	2.53	2,939,020	871,714	344,551
6/30/2014	Liability (Gain)/Loss	8.04	1.04	1,146,168	148,261	142,558
	Total Charges			$13,133,044	$6,965,599	$1,547,730

[1] Periods prior to 6/30/2017 were based on future working life as of the end of the measurement period.

Amounts reported as Deferred Outflows of Resources and Deferred (Inflows) of Resources related to pensions will be recognized in pension expense as follows:

Year Ending June 30		
2022	$	1,139,590
2023		1,473,457
2024		1,535,177
2025		1,075,882
2026		789,892
Thereafter		1,903,206

Plan Fiduciary Net Position Projection

The following table illustrates the projection of the fiduciary net position for use in the calculation of the discount rate as of June 30, 2021.

($ in thousands)

Year Ending June 30[2]	Beginning Fiduciary Net Position (a)	Total Contributions (b)	Benefit Payments (c)	Administrative Expenses (d)	Investment Earnings (e)	Ending Fiduciary Net Position[1] (f)
2021	45,366	2,562	2,526	228	2,717	47,892
2022	47,892	2,085	2,312	216	2,861	50,310
2023	50,310	1,915	2,467	214	2,997	52,541
2024	52,541	1,803	2,663	215	3,121	54,588
2025	54,588	2,121	2,798	216	3,250	56,944
2026	56,944	1,962	2,917	217	3,383	59,155
2027	59,155	1,704	3,119	219	3,502	61,023
2028	61,023	1,719	3,281	220	3,609	62,851
2029	62,851	1,747	3,486	222	3,714	64,604
2030	64,604	1,781	3,608	224	3,816	66,369
2031	66,369	1,820	3,656	225	3,922	68,231
2032	68,231	1,862	3,701	226	4,034	70,199
2033	70,199	1,906	3,805	228	4,150	72,223
2034	72,223	1,952	3,843	229	4,272	74,374
2035	74,374	1,790	3,999	231	4,391	76,325
2036	76,325	1,128	4,094	232	4,485	77,611
2037	77,611	1,103	4,173	233	4,559	78,867
2038	78,867	234	4,300	234	4,605	79,173
2039	79,173	234	4,309	234	4,623	79,487
2040	79,487	235	4,422	235	4,639	79,704
2041	79,704	235	4,473	235	4,650	79,880
2042	79,880	235	4,659	235	4,655	79,877
2043	79,877	234	4,697	234	4,654	79,833
2044	79,833	233	4,754	233	4,650	79,729
2045	79,729	231	4,800	231	4,642	79,572
2046	79,572	230	4,897	230	4,630	79,304
2047	79,304	227	4,943	227	4,612	78,974
2048	78,974	225	5,055	225	4,589	78,508
2049	78,508	222	5,092	222	4,560	77,976
2050	77,976	219	5,126	219	4,527	77,377

[1] (f)=(a) + (b) − (c) − (d) + (e).
[2] Years later than 2049 were omitted from this table.

Plan Fiduciary Net Position

The last year in which projected benefit payments are due from the Plan is 2116.

The Plan's projected fiduciary net position is not projected to reach $0.

As such, the Plan's fiduciary net position was projected to be available to make all projected future benefit payments for current Plan members. In other words, there is no projected "depletion date" when projected benefits are not covered by projected assets. Therefore, the long-term expected rate of return on Plan investments of 6.00% per annum was applied to all periods of projected benefit payments to determine the total Pension liability as of June 30, 2021 shown earlier in this report.

Asset Projection Basis

In projecting the Plan's fiduciary net position, the following assumptions were made:

1. Interest rate for discounting was 6.00% per annum.
2. Projected total contributions are employer and employee contributions to the unfunded actuarial accrued liability and normal cost (for the current active population only). Contributions are assumed to be paid mid-year.
3. Projected employee contributions to the plan are 3.75% of compensation.
4. Assumed contributions are based on the County of Riverside continuing to follow the current funding policy.
5. Projected benefit payments have been determined in accordance with Paragraph 39 of GASB Statement No. 67, and are based on the closed group of active, inactive vested, retired members and beneficiaries as of June 30, 2021. Benefit payments are assumed to be paid mid-year.
6. Administrative expenses are assumed to be $225,000 per year increased with inflation at 2.5% per year and pro-rated based on projected proportion of headcount that relates to current population.

Sensitivity to Discount Rate

The following table illustrates the impact of interest rate sensitivity on the Net Pension Liability for fiscal year ending June 30, 2020:

	1% Decrease (5.0%)	Current Rate (6.0%)	1% Increase (7.0%)
Total Pension Liability	$62,078,659	$53,122,016	$46,121,113
Plan Fiduciary Net Position	(43,574,690)	(43,574,690)	(43,574,690)
Net Pension Liability	$18,503,969	$9,547,326	$2,546,423

The following table illustrates the impact of interest rate sensitivity on the Net Pension Liability for fiscal year ending June 30, 2021:

	1% Decrease (5.0%)	Current Rate (6.0%)	1% Increase (7.0%)
Total Pension Liability	$64,161,459	$54,846,295	$47,554,255
Plan Fiduciary Net Position	($45,366,169)	($45,366,169)	($45,366,169)
Net Pension Liability	$18,795,290	$9,480,126	$2,188,086

Schedule of Changes in the Net Pension Liability and Related Ratios

The following exhibit is a 10-year history of change in Net Pension Liability.

Year Ending June 30,	2015	2016	2017	2018	2019	2020	2021
Total Pension Liability							
Service Cost	$1,556,594	$1,511,755	$1,717,422	$1,913,998	$1,299,918	$1,082,026	$1,255,013
Interest Cost	$1,800,053	$1,983,322	$2,186,254	$2,358,408	$2,547,913	$2,747,097	$3,200,332
Changes of Benefit Terms	$0	$0	$0	$0	$0	$0	$0
Differences Between Expected and Actual Experiences	$1,146,168	$795,023	$1,524,469	$1,456,980	$1,620,937	$2,732,087	($365,443)
Changes of Assumptions	$0	$2,939,020	($594,082)	($746,218)	$39,510	$2,985,149	($258,607)
Benefit Payments, Including Refunds of Member Contributions	($1,761,676)	($1,511,284)	($1,506,614)	($1,757,166)	($1,726,399)	($2,222,152)	($2,107,016)
Net Change in Total Pension Liability	$2,741,139	$5,717,836	$3,327,449	$3,226,002	$3,781,879	$7,324,207	$1,724,279
Total Pension Liability (Beginning)	$27,003,504	$29,744,643	$35,462,479	$38,789,928	$42,015,930	$45,797,809	$53,122,016
Total Pension Liability (Ending)	$29,744,643	$35,462,479	$38,789,928	$42,015,930	$45,797,809	$53,122,016	$54,846,295
Plan Fiduciary Net Position							
Contributions—Employer	$955,554	$606,694	$667,952	$1,341,340	$815,531	$831,825	$811,519
Contributions—Member	$1,394,450	$1,266,962	$1,399,254	$1,674,410	$1,632,926	$1,701,351	$1,722,324
Net Investment Income	$4,437,066	$131,206	($116,966)	$4,288,900	$3,647,940	$1,939,447	$1,622,054
Benefit Payments, Including Refunds of Member Contributions	($1,761,676)	($1,511,284)	($1,506,614)	($1,757,166)	($1,726,399)	($2,222,152)	($2,107,016)
Administrative Expense	($227,581)	($217,041)	($188,657)	($127,973)	($347,081)	($251,756)	($257,402)
Other	$0	$0	$0	$0	$0	$0	$0
Net Change in Plan Fiduciary Net Position	$4,797,813	$276,537	$254,969	$5,419,511	$4,022,617	$1,998,715	$1,791,479
Plan Fiduciary Net Position (Beginning)	$26,804,528	$31,602,341	$31,878,878	$32,133,847	$37,553,358	$41,575,975	$43,574,690
Plan Fiduciary Net Position (Ending)	$31,602,341	$31,878,878	$32,133,847	$37,553,358	$41,575,975	$43,574,690	$45,366,169
Net Pension Liability (Ending)	($1,857,698)	$3,583,601	$6,656,081	$4,462,572	$4,221,834	$9,547,326	$9,480,126
Net Position as a % of Pension Liability	106.25%	89.89%	82.84%	89.38%	90.78%	82.03%	82.72%
Covered-Employee Payroll	$29,516,733	$23,120,653	$33,058,770	$34,610,720	$29,381,080	$32,096,397	$27,012,910
Net Pension Liability as a % of Payroll	(6.29%)	15.50%	20.13%	12.89%	14.37%	29.75%	35.09%

Notes to Schedule:

- No changes have been made over the 10-year history since GASB 68 has become effective.

Schedule of Contributions

The follow exhibit is a 10-year history of Schedule of Contributions.

Year Ending June 30,	2015	2016	2017	2018	2019	2020	2021
Actuarially Determined Contributions	$252,273	$122,127	$727,119	$656,930	$610,522	$474,617	$1,325,770
Contributions in Relation to the Actuarially Determined Contribution	$606,694	$667,952	$1,341,340	$815,531	$831,825	$811,519	TBD
Contribution Deficiency/(Excess)	($354,421)	($545,825)	($585,457)	($158,601)	($221,303)	($366,902)	TBD
Covered-Employee Payroll	$37,918,375	$41,747,000	$44,650,933	$43,544,693	$50,109,940	$53,040,458	TBD
Contributions as a Percentage of Covered-Employee Payroll	1.60%	1.60%	3.00%	1.87%	1.66%	1.53%	TBD

Schedule of Investment Returns

The follow exhibit is a 10-year history of Investment Returns.

Year Ending June 30,	2015	2016	2017	2018	2019	2020	2021
Annual Money-Weighted Rate of Return, Net of Investment Expense	16.5%	0.41%	(0.36%)	13.12%	9.66%	4.66%	3.72%

These schedules are presented to illustrate the requirement to show information for 10 years. However, until a full 10-year trend is compiled, pension plans should present information for those years for which information is available

Participant Information

The below exhibits summarize participant demographic information as of June 30, 2020.

Number of Participants:	
Actives	1,394
Full-time Actives (not accruing benefits)[1]	5,051
Deferred Vested	2,720
Retirees	357
Total	9,522
Participant Compensation – Active Participants Currently Accruing Benefits	
Compensation (prior year)	$27,012,910
Number of Active Participants below assumed retirement age	1,394
Average Compensation	$19,378
Actives	
Average Age	38.20
Average Benefit Service (years)	2.91
Full-time Actives	
Average Age	43.32
Average Accrued Annual Benefit	$545
Deferred Vested	
Average Age	47.99
Average Accrued Annual Benefit	$1,370
Retired	
Average Age	73.76
Average Annual Benefit	$3,731

Reconciliation of Participants from Prior Valuation

	Active	Full-time Actives[1]	Terminated Vested	Retirees and Beneficiaries	Total
As of July 1, 2019	1,503	5,040	2,448	321	9,312
Duplicates	0	0	0	0	0
Classification Change	(212)	212	0	0	0
New Entrants	714	317	89	0	1,120
Vested Terminations	(270)	(233)	503	0	0
Rehires	8	19	(20)	0	7
Retired	(7)	(5)	(20)	42	0
Deaths	0	0	0	(6)	(6)
Lump Sum Cash-outs	(342)	(299)	(270)	0	(911)
Data Correction	0	0	0	0	0
Net Change	(109)	11	272	36	210
As of July 1, 2020	**1,394**	**5,051**	**2,720**	**357**	**9,522**

[1] Participants who become full-time employees and transfer to CalPERS are no longer accruing a benefit under the plan.

Active Age Distribution as of July 1, 2020

Age	Number of Participants
15-19	23
20-24	188
25-29	280
30-34	235
35-39	139
40-44	127
45-49	113
50-54	88
55-59	76
60-64	64
65-69	38
70-74	8
75 +	15
Total	1,394

Active Career Earnings Distribution as of July 1, 2020

Career Earnings	Number of Participants
Under $5,000	474
$5,000 - $10,000	199
$10,000 - $25,000	165
$25,000 - $50,000	92
$50,000 - $100,000	155
Over $100,000	309
Total	1,394

This valuation includes the following active participants by category:

Category	Number of participants
▪ Seasonal	0
▪ Resident/Physician	85
▪ Per Diem	629
▪ Temporary	676
▪ Regular	4
	1,394

Development of GASB 75 Amortization Period for Changes in Liability

	July 1, 2019		July 1, 2020	
Status	Count	Average Future Working Life	Count	Average Future Working Life[1]
1. Actives	1,503	0.98	1,394	0.94
2. Actives not accruing benefits	5,040	16.91	5,051	16.79
3. Deferred Vested Terminated	2,448	0.00	2,720	0.00
4. Retirees	321	0.00	357	0.00
5. Total/Weighted Average	9,312	9.31	9,522	9.04

[1] Based on demographic assumptions set out in the Actuarial Assumption and Methods section of this report.

Summary of Principal Plan Provisions

1. **Membership Requirements**

   All employees of the County not covered by another retirement plan as provided by Code Section 3121(b)(7)(F).

2. **Career Compensation**

   Total amount of compensation, limited annually by the Social Security Wage Base.

3. **Normal or Late Retirement Benefit**

   Eligibility: Age 65

   Benefit: 2% times Career Compensation, payable as a single life annuity.

4. **Pre-Retirement Death Benefit**

   Refund of contributions accumulated with interest at 5% per annum.

5. **Death after Retirement**

   None. Benefits are payable for the life of the employee only.

6. **Termination Benefit**

   Normal retirement benefit accrued to date of termination.

   A lump sum distribution is paid if the actuarial equivalent benefit is less than $5,000. Actuarial Equivalence for this purpose is based on the greater of the factor produced under the UP1984 unisex mortality table at 6% or the applicable mortality table and interest rate under 417(e).

7. **Vesting**

   Benefits are 100% vested immediately.

8. **Member Contributions**

   3.75% of compensation per pay period.

Actuarial Assumptions and Methods

1. **Actuarial Cost Method**

   Actuarially Determined Contributions – Projected Unit Credit

   GASB 68 – Entry Age Normal

2. **Funding Contribution Methodology**

   Funding contributions are based on the sum of:

   a) Normal Cost with interest and administrative expense, plus
   b) Amortization of July 1, 2017 Unfunded Actuarial Accrued Liability (UAAL) over the period ending June 30, 2037, plus
   c) Amortization of subsequent unanticipated changes in liability (i.e., actuarial gains / losses and changes in assumptions) over 15-year periods and unanticipated changes in assets year 5-year periods, less
   d) Expected Employee Contributions

3. **Interest Rates**

   Funding Interest Rate – 6.00%

   Used as the asset return assumption and based on the long term expected return on plan assets.

   GASB 68 Discount Rate – 6.00%

   The discount rate is based on a single equivalent rate that reflects a blend of:

   - Expected return on assets during the period such that assets are projected to be sufficient to pay benefits of current participants (6.00%); and
   - Municipal bond index for periods beyond the depletion of assets (2.21%).

   Based on the current funding policy, projected cash flows, and the assumed asset return, the plan assets are not projected to be depleted, and the discount rate can be based on the 6.00% asset return.

4. **Salary Increases**

   2.75% per year

5. **Payroll Growth (used for amortization of unfunded liability)**

   2.75% per year (same as CalPERS assumption)

6. Mortality

Pub-2010 amount-weighted tables for General employees of all income levels, projected using improvement scale MP-2020 from 2010.

Sample rates for the 2010 base year are as follows:

Age	Male	Female
30	0.04%	0.02%
40	0.07%	0.04%
50	0.30%	0.02%
60	0.61%	0.38%
70	0.70%	0.49%
80	1.73%	1.33%
90	14.67%	11.49%

7. Termination Rates

Actives (accruing benefits)

	Years of Service	
Attained Age	0-2	2+
20-24	65%	65%
25-29	65%	55%
30-34	65%	50%
35-39	65%	50%
40-44	65%	40%
45-49	65%	40%
50-54	55%	40%
55-59	50%	35%
60-64	50%	30%

Full-time Actives (no longer accruing benefits)

Turnover rates developed in the 2017 CalPERS Experience Study for Miscellaneous were used in the valuation. The following sample rates are based on age and service:

Attained	Years of Service						
Age	0 – 1	5	10	15	20	25	30
30	16.06%	6.15%	4.16%	2.62%	0.00%	0.00%	0.00%
35	15.37%	5.67%	3.99%	2.52%	1.84%	0.00%	0.00%
40	14.68%	5.19%	3.75%	2.43%	1.76%	1.07%	0.00%
45	14.00%	4.80%	3.51%	2.16%	1.68%	1.00%	0.26%
50	13.32%	4.41%	2.86%	1.88%	1.30%	0.94%	0.20%
55	12.62%	3.68%	2.22%	1.43%	0.92%	0.53%	0.16%

8. Retirement Rates

Actives (accruing benefits)

Attained Age	Probability of Retirement
65-66	60%
67-74	50%
75+	100%

Full-time Actives (no longer accruing benefits)

Retirement rates developed in the 2017 CalPERS Experience Study for Miscellaneous were used in the valuation. Applicable retirement rate table is based on employee date of hire, as summarized below:

- Hire date prior to August 24, 2012: Miscellaneous 3% @ 60 rates
- Hire date August 24, 2012 to December 31, 2012: Miscellaneous 2% @ 60 rates
- Hire date post December 31, 2012: Miscellaneous 2% @ 62 rates

Sample rates from the 'Miscellaneous 3% @ 60 table' are as follows:

Attained	Years of Service						
Age	5	10	15	20	25	30	35
<65	N/A	N/A	N/A	N/A	N/A	N/A	N/A
65	20.00%	24.20%	28.30%	33.00%	30.00%	34.20%	37.00%
70	22.00%	25.50%	29.10%	32.60%	35.80%	38.80%	40.00%
75	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Sample rates from the 'Miscellaneous 2% @ 60 table' are as follows:

Attained	Years of Service						
Age	5	10	15	20	25	30	35
<65	N/A	N/A	N/A	N/A	N/A	N/A	N/A
65	14.00%	17.80%	21.50%	26.40%	32.10%	37.70%	41.20%
70	14.00%	17.80%	21.50%	26.40%	32.10%	37.70%	41.20%
75	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Sample rates from the 'Miscellaneous 2% @ 62 table' are as follows:

Attained	Years of Service						
Age	5	10	15	20	25	30	35
<65	N/A	N/A	N/A	N/A	N/A	N/A	N/A
65	11.50%	14.70%	18.00%	21.30%	24.50%	31.50%	35.40%
70	12.70%	16.40%	20.00%	23.60%	27.30%	35.00%	39.40%
75	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

9. Value of Assets

Funding – Effective June 30, 2014, smoothed asset value, with differences between actual and expected earnings recognized over a 5-year period (with the first year of recognition being the period in which the Gain/(Loss) occurred), subject to an 80%-120% corridor around market value.

GASB 68 – Market value

10. Form of Benefit Paid

Lump sums paid immediately at termination for benefits with a present value less than $5,000. Single life annuities deferred to normal retirement age paid for benefits with a present value greater than $5,000.

11. Lump Sum Conversion Assumptions

Mortality – Current IRC section 417(e) table

Lump Sum Interest Rate – 4.00%
Used to estimate lump sum benefit amounts and based on the long term expected effective rate used for determining lump sums under plan provisions. Generally, this is based on high quality corporate bonds.

12. Administrative Expenses

Assumed $225,000 per year

13. Participants Valued

Only current active, full time active, terminated vested, retirees and beneficiaries of the plan as of June 30, 2020 are included in the valuation.

Changes in Assumptions and Methods Since the Prior Valuation

1) Mortality improvement scale was updated from MP-2019 to MP-2020

COVID-19 Impacts

Given the 2020 events related to COVID-19, we reviewed participant information, as available, including terminations, retirements, and deaths over the year to compare plan experience against the assumptions used in the valuation to determine whether a modification to future assumptions may be warranted. Evaluation of the information provided did not suggest a significant impact to the plan or justify a change to assumptions other than those already used.

Additional assumption analysis is included in the assumption rationale document "20210104_2016240_2020 COR PT Temp EEs Ret Plan Assumption Rationale" dated December 2020.

Appendix A – Estimated Annual Expense for FYE 2022

Development of Annual Expense FYE 2022 under GASB 68 (Estimate)

The estimated expense amount shown below has been prepared for GASB 68 for the fiscal year ending June 30, 2022.

The Actuarial Accrued Liability as of July 1, 2020 has been prepared using the Entry Age Normal cost method, as required by GASB 68. The following estimated expense amounts have been prepared based on a Valuation Date of July 1, 2020, Measurement Date of July 1, 2021 and interest rate of 6.00%.

The expense shown below will be updated in next year's report to reflect actual administrative costs, employee contributions, and any gains or losses with respect to assets and liabilities.

Unfunded Actuarial Accrued Liability, as of July 1, 2020	
Actuarial Accrued Liability as of 7/1/2020	$54,846,295
Value of Plan Assets as of 7/1/2020	45,366,169
Unfunded Actuarial Accrued Liability (UAAL)	$9,480,126
Estimated Annual Expense, FYE June 30, 2022[1]	
1. Service Cost	$1,099,000
2. Interest Cost	3,295,000
3. Expected Return on Assets	(2,723,000)
4. Employee Contributions[2]	(1,041,000)
5. Administrative Expense	225,000
6. Plan Changes	0
7. Amortization of Unrecognized	
(a) Liability (Gain)/Loss	1,083,000
(b) Asset (Gain)/Loss	(437,000)
(c) Assumption Changes	493,000
(d) Total	1,139,000
8. Annual Expense	$1,994,000

[1] Final FYE 2022 expense information will be provided in the actuarial valuation based on a June 30, 2021 measurement date reflecting updated census, assumptions, plan provisions and actual asset values, in addition to any asset, liability, or assumption gains/losses initially recognized over the period June 30, 2020 to June 30, 2021

[2] Employee contribution was developed assuming a constant active population