State Actuarial Valuation

As of June 30, 2018

Required Contributions for Fiscal Year

July 1, 2019 through June 30, 2020

CalPERS

Table of Contents

Actuarial Certification

October 2019

To the best of our knowledge, this report is complete and accurate and contains sufficient information to fully and fairly disclose the actuarial funded condition of the State plans. This valuation is based on the member and financial data as of June 30, 2018 provided by the various CalPERS databases and the benefits under these plans with CalPERS as of the date this report was produced. In our opinion, this valuation has been performed in accordance with generally accepted actuarial principles and in accordance with standards of practice prescribed by the Actuarial Standards Board. The assumptions and methods are internally consistent and reasonable for these plans, as prescribed by the CalPERS Board of Administration according to provisions set forth in California Public Employees' the Retirement Law.

The undersigned are actuaries for CalPERS, who are members of the American Academy of Actuaries and the Society of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Nina Ramsey, ASA, MAAA
Associate Pension Actuary, CalPERS

Shelly Chu, ASA, MAAA
Senior Pension Actuary, CalPERS

Paul Tschida, FSA, EA, MAAA
Senior Pension Actuary, CalPERS

Scott Terando, ASA, EA, MAAA, FCA, CFA
Chief Actuary, CalPERS

Highlights and Executive Summary

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Introduction

This is the actuarial valuation report as of June 30, 2018 for the State plans. This actuarial valuation was used to set the 2019-20 required employer contribution rates.

The five plans included in this valuation provide retirement benefits to members employed by the State of California. This includes employees of the California State University system but generally does not include employees of the University of California system. It also does not cover school employees or employees of local governments that have elected to contract with CalPERS.

Purpose of Report

This actuarial valuation was performed by the CalPERS Actuarial Office using data as of June 30, 2018. The purpose of the report is to:

- Set forth the assets and accrued liabilities of the State plans as of June 30, 2018.
- Determine the required employer contribution rates of these plans for the fiscal year July 1, 2019 through June 30, 2020.
- Provide actuarial information as of June 30, 2018 to the CalPERS Board of Administration (“Board”) 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 Number 68 for an Agent Employer Defined Benefit Pension Plan.

The use of this report for any other purposes may be inappropriate.

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

California Actuarial Advisory Panel Recommendations

This report includes all the basic disclosure elements as described in the *Model Disclosure Elements for Actuarial Valuation Reports* recommended in 2011 by the California Actuarial Advisory Panel (CAAP), except for the following:

- Due to the various employee contribution rates within the majority of State plans, we have shown the total normal cost for the plans and shown the average employee portion as “Employee Contribution.” Specific employee normal costs are shown in Appendix B.
- The “Schedule of Amortization Bases” does not give the original base amounts of the various components of the unfunded liabilities.

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

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

Employer Required Contribution Rates

The actuarially required employer contribution rates for Fiscal Year July 1, 2019 through June 30, 2020 are shown in the table below. For comparison purposes, the corresponding contribution rates for Fiscal Year July 1, 2018 through June 30, 2019 are also provided. The expected contribution amounts that these rates generate are also shown.

	Fiscal Year 2018-19		Fiscal Year 2019-20	
Plan	Expected Employer Contribution	Required Employer Rate[1]	Expected Employer Contribution	Required Employer Rate[1,2]
State Miscellaneous	$3,631,721,124	29.298%	$4,006,671,712	30.977%
State Industrial	134,969,006	19.550%	153,724,045	20.823%
State Safety	466,765,057	20.352%	526,375,464	21.526%
State Peace Officers & Firefighters	1,581,049,078	43.724%	1,755,305,847	47.198%
California Highway Patrol	484,055,746	53.805%	532,158,559	57.811%
Total State	$6,298,560,011		$6,974,235,627	

(1) Excludes additional contributions pursuant to Government Code Section 20683.2. See “Additional Contributions” section on page 6 for more information about that requirement.

(2) For Fiscal Year 2019-20, reflects the total contribution requirement before prospective adjustment for an advance payment by the State in July 2019. Please see Appendix E for the adjusted Employer Rate for the remainder of Fiscal Year 2019-20.

Note that the payroll used to calculate the expected dollar contribution is the payroll used in the valuation incorporating two years of payroll growth using the annual payroll growth assumption on the valuation date (e.g. two years at 2.75 percent for fiscal year 2019-20 contributions). To the extent that payroll in the contribution year is different than the projected payroll, the actual contribution amounts will be different than the expected contributions shown in the table above. State Miscellaneous and State Industrial include both Tier 1 and Tier 2 benefit levels.

The supporting exhibits in this report entitled “Reconciliation of Employer Contribution Rates” on page 26 and “Reconciliation of Employer Contributions” on page 27 provide explanations of the changes in required contribution rates and expected contribution amounts from Fiscal Year 2018-19 to Fiscal Year 2019-20.

Reasons for Change in Employer Contributions for the State Plans

Overall, the required contributions for the State plans have increased by $676 million between Fiscal Year 2018-19 and Fiscal Year 2019-20, a 10.7% relative increase. This change is driven mainly by the factors listed below.

CalPERS currently employs an amortization and smoothing policy that spreads rate increases or decreases over a 5-year period and amortizes all experience gains and losses over a fixed 30-year period. This means that only one-fifth of the total anticipated rate change caused by each gain or loss is realized in the first year, culminating in the full increase in the fifth year. As a result, the progression of these gain or loss amortization bases will affect contribution levels in increasing measure throughout the ramp period. A complete description of the actuarial methods used in the June 30, 2018 valuation is provided in Appendix A.

On December 21, 2016, the Board 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 employer contributions for Fiscal Year 2019-20 were calculated using a discount rate of 7.00 percent, down from 7.25 percent the prior year. In addition, on December 20, 2017, the Board adopted new actuarial assumptions based on an experience study of CalPERS membership performed every four years. As a result of the study, updates were made to various assumptions including mortality, retirement rates and inflation. The reduction of the inflation assumption was implemented in two steps in conjunction with the decreases in the discount rate. For the June 30, 2018 valuation, an inflation rate of 2.50 percent was used, down from 2.625 percent the prior year. The impact on required contributions of these assumption changes is approximately $229.3 million, which accounts for the increase in normal cost and year one of the five-year phase-in of the increase in unfunded liability, to be paid over 20 years.

CalPERS has implemented a new actuarial valuation software system for the June 30, 2018 valuation. With this new system we have refined and improved some of our calculation methodology. The impact on required contributions of this method change is approximately $59.9 million, which accounts for the change in normal cost and year one of the five-year phase-in of the increase in unfunded liability, to be paid over 20 years.

Employer Required Contribution Rates (Continued)

Overall, payroll across the State plans increased by 4.6 percent, as compared to the payroll growth assumption of 2.875 percent. This led to a contribution increase of $94.7 million. The payroll growth for the year ranges from a 2.6 percent increase for California Highway Patrol to a 7.2 percent increase for Industrial.

Senate Bill 84 (SB 84), approved by the Governor on July 10, 2017, directed the State to contribute an additional $6 billion to the State plans during Fiscal Year 2017-18 to pay down the Unfunded Accrued Liability. Payments were made in three equal installments during the fiscal year. These payments were in addition to the actuarially required contributions for Fiscal Year 2017-18. The additional payments served to increase the aggregate funded status of the State plans as of June 30, 2018 by approximately 3 percent.

The Public Employees' Pension Reform Act of 2013 (PEPRA) requires lower benefits for new members as defined by PEPRA who are hired on or after January 1, 2013. The normal cost for all of the plans, before reflecting the discount rate change, is lower due to the enrollment of new hires into the lower benefit level. The number of PEPRA members range between a high of 37 percent of active members (32 percent by payroll) for State Safety to a low of 17 percent of active members (14 percent by payroll) for California Highway Patrol.

The net return on plan assets for the year ending June 30, 2018 was approximately 8.6 percent, greater than the assumed return of 7.25 percent, leading to an experience gain. In addition, the plans in aggregate experienced a loss due to demographic sources and a gain due to actual contributions being greater than expected. The net effect of this experience is a gain that will be amortized over the next 30 years.

The table below highlights all major contributors to the change in required contributions.

Reason for Change	Change in Required Contribution (Dollars in Millions)
Change due to normal progression of existing amortization bases	$340.4
Change in assumptions (reduction in discount rate to 7% and inflation assumption to 2.5%)	229.3
Change in method (new actuarial valuation system)	59.9
Change due to increase in overall payroll	94.7
Decrease in normal cost due to new hires in lower benefit level	(43.2)
First installment of the 5-year phased-in 30-year amortization of the following gains and losses:	
• Impact of investment experience	(18.1)
• Impact of greater than expected contributions received due to higher than expected payroll	(4.9)
• Demographic gains and losses	17.6
Total Change in Required Contributions	$ 675.7

Employer Required Contribution Rates (continued)

Additional Contributions

One of the provisions of pension reform added Government Code Section 20683.2, which changed the contribution rates of many State members effective July 1, 2013, July 1, 2014, and July 1, 2015. Government Code Section 20683.2 also stipulates that "savings realized by the state employer as a result of the employee contribution rate increases required by this section shall be allocated to any unfunded liability, subject to appropriation in the annual Budget Act." Under the California Constitution, the Board has plenary authority over the actuarial function at CalPERS consistent with the fiduciary duties of a trustee. This includes authority to set employer contribution rates. By statute, the State may pay additional contributions in addition to the actuarially required contribution rates set by the Board and CalPERS will generally accept these payments.

The table below shows the:

- Actuarially required contributions (rates set by the Board based on staff recommendation),
- Additional contributions that the State is to make to offset the savings due to the increased member contributions, and
- Total contributions that the State is to make for each plan.

Plan	Actuarially Required Employer Contribution for 2019-20	Additional Statutory Contribution to Offset Increased Member Contributions	Total Contribution 2019-20
State Miscellaneous	30.977%	0.098%	31.075%
State Industrial	20.823%	0.881%	21.704%
State Safety	21.526%	1.182%	22.708%
State Peace Officers & Firefighters	47.198%	1.647%	48.845%
California Highway Patrol	57.811%	1.319%	59.130%

In all cases, the savings are less than the actual increase in member contributions. This is because the additional member contributions increase the value of the benefit in some circumstances. The obvious example is when the member terminates and takes a refund. A less obvious example is for Tier 2 members where the members are assumed to elect to receive a Tier 1 benefit with an actuarial equivalent reduction to offset the missed Tier 1 contributions. Because the members will make additional contributions, a smaller reduction will apply in the future.

The rates and information shown in the remainder of this report reflect the rates set by the Board at its April 2019 meeting (shown above as the actuarially required employer contribution). The additional contribution pursuant to Government Code Section 20683.2 will be realized in future valuations as actuarial gains.

Subsequent to the Board adopting rates in April 2019 for Fiscal Year 2019-20, the state made an advance payment of the unfunded liability pursuant to Senate Bill 90 (SB 90). As a result, the contribution rates for the remainder of FY 2019-20 were reduced in accordance with Government Code section 20825.1. Rates that reflect the advance payment are shown in the table below:

Plan	Total Employer Contribution for FY 2019-20	Reduction due to Gov. Code Section 20825.1	Remaining Employer Contribution for FY 2019-20
State Miscellaneous	31.075%	(0.258%)	30.817%
State Industrial	21.704%	(0.441%)	21.263%
State Safety	22.708%	(0.296%)	22.412%
State Peace Officers & Firefighters	48.845%	(1.463%)	47.382%
California Highway Patrol	59.130%	(0.000%)	59.130%

See Appendix E for more information on the advanced payment and adjusted rates for Fiscal Year 2019-20.

Expected Future Changes

The table below shows the required and projected employer contribution rates for the next six fiscal years. Projected results reflect a 6.7 percent investment return reduced for estimated administrative expenses for Fiscal Year 2018-19 and the anticipated decrease in normal cost due to new hires entering lower benefit formulas under PEPRA. Projected rates also reflect the additional $2.5 billion contributed by the State in July 2019 pursuant to SB 90. Rates do not reflect additional contributions to offset increased member contributions pursuant to Government Code Section 20683.2. It is assumed that all other actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur during the projection period.

	New Rate	Projected Future Employer Contribution Rates				
Plan	2019-20[1]	2020-21	2021-22	2022-23	2023-24	2024-25
State Miscellaneous	30.977%	31.7%	32.3%	32.6%	33.2%	32.3%
State Industrial	20.823%	21.1%	21.5%	21.6%	22.0%	20.2%
State Safety	21.526%	21.6%	21.8%	21.7%	21.3%	21.0%
State Peace Officers & Firefighters	47.198%	47.0%	47.6%	48.1%	48.8%	47.4%
California Highway Patrol	57.811%	59.7%	60.8%	61.4%	62.3%	61.2%

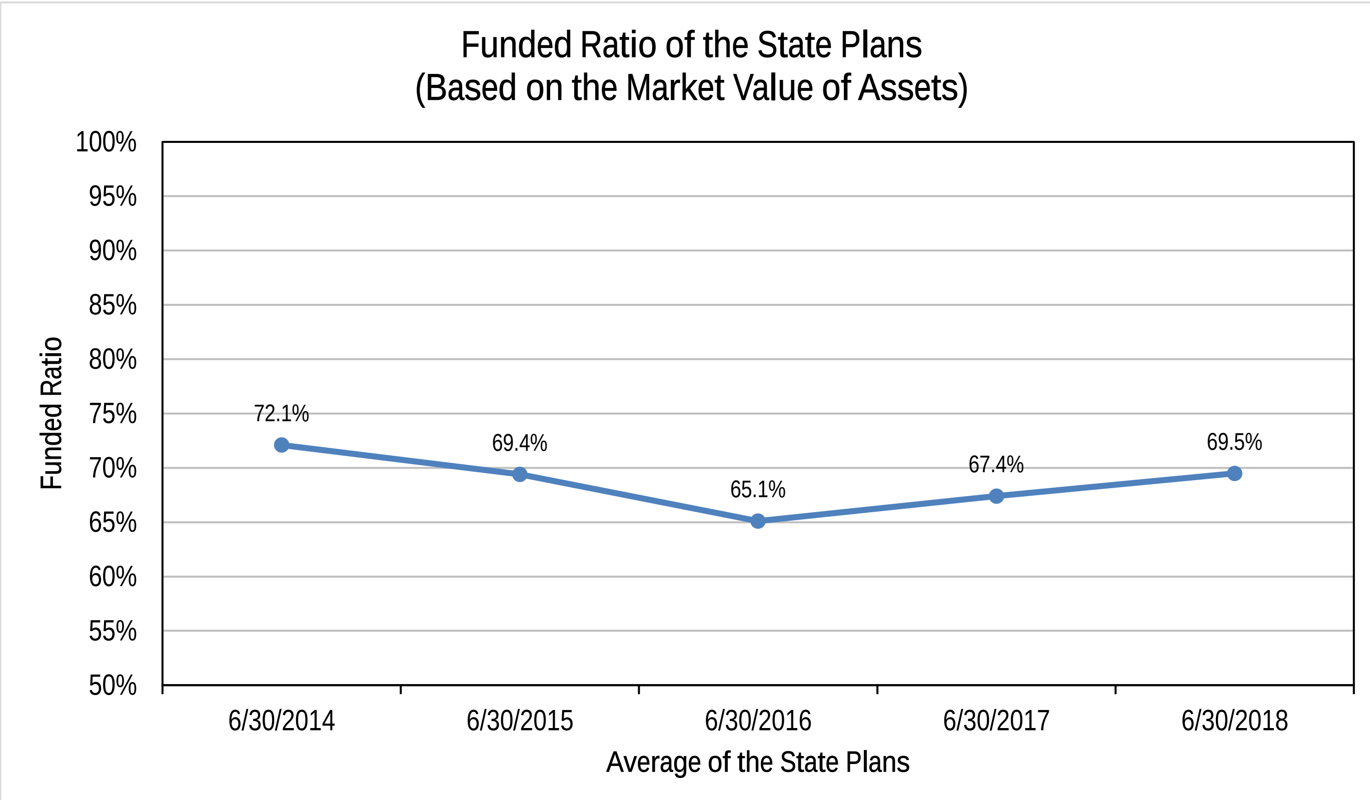
(1) Fiscal Year 2019-20 rates represent total rates before prospective adjustment for the advance payment in July 2019. See Appendix E for the adjusted Employer Rate for the remainder of Fiscal Year 2019-20.

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

A scenario analysis was performed to determine the effects of various investment returns on future employer contribution rates for three years beyond the estimated 2020-21 employer rates shown above. That information is available in the “Risk Analysis” section of this report.

Funded Status of the Plans

The funded status of a pension plan is defined as the ratio of assets to accrued liabilities. Plans with a lower funded ratio are, all other things being equal, more at risk of not being able to meet their future benefit obligations. From June 30, 2017 to June 30, 2018 the funded status for the State plans, on average, increased by 2.1 percent. This was due mainly to additional contributions made in Fiscal Year 2017-18 pursuant to SB 84 and investment return in 2017-18 being greater than expected, offset partially by increases in liability due to the change in discount rate assumption from 7.25 percent to 7.00 percent and the impact of the new actuarial valuation system. The graph below shows the average funded status for the past five years for the State plans.



The tables below show the funded status of the plans on June 30, 2018, and a history of the previous four years.

Funded Status and Unfunded Liability on June 30, 2018

Plan	Present Value of Benefits	Entry Age Normal Accrued Liability	Market Value of Assets	Unfunded Liability	Funded Ratio
State Miscellaneous	$132,446,673,597	$115,469,058,970	$80,223,069,956	$35,245,989,014	69.5%
State Industrial	5,746,905,539	4,670,036,601	3,589,902,866	1,080,133,735	76.9%
State Safety	17,751,712,839	13,590,778,296	10,551,342,261	3,039,436,035	77.6%
State Peace Officers & Firefighters	57,779,361,435	48,792,433,542	33,326,594,392	15,465,839,150	68.3%
California Highway Patrol	15,894,543,442	13,383,782,393	8,540,511,923	4,843,270,470	63.8%
Total for the State	$229,619,196,852	$195,906,089,802	$136,231,421,398	$59,674,668,404	69.5%

Funded Status History (Based on Market Value of Assets)

Plan	June 30, 2014	June 30, 2015	June 30, 2016	June 30, 2017	June 30, 2018
State Miscellaneous	72.4%	69.6%	65.0%	67.5%	69.5%
State Industrial	81.7%	78.6%	73.0%	76.4%	76.9%
State Safety	79.2%	76.6%	73.4%	76.4%	77.6%
State Peace Officers & Firefighters	71.0%	68.5%	64.2%	65.9%	68.3%
California Highway Patrol	64.3%	61.6%	58.5%	60.2%	63.8%
Total for the State	72.1%	69.4%	65.1%	67.4%	69.5%

Changes Since the Prior Year's Valuation

Actuarial Methods and Assumptions

Two assumption changes were recognized in this valuation. On December 21, 2016, the Board 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 employer contributions for Fiscal Year 2019-20 were calculated using a discount rate of 7.00 percent, down from 7.25 percent the prior year. In addition, on December 20, 2017, the Board adopted a reduction in the inflation assumption to be implemented in two steps in conjunction with the decreases in the discount rate. For the June 30, 2018 valuation, an inflation rate of 2.5 percent was used, down from 2.625 percent the prior year.

A complete description of the actuarial methods and assumptions used in the June 30, 2018 valuation may be found in Appendix A of this report.

Plan Provisions

No changes were made since the prior valuation. Please refer to Appendix B for a summary of the plan provisions used in this valuation.

Risk Mitigation

The Board adopted a Risk Mitigation Policy which is designed to reduce funding risk over time. The policy establishes a mechanism whereby CalPERS investment performance that outperforms the discount rate by specified thresholds triggers adjustments to the discount rate, expected investment return and strategic asset allocation targets. A minimum excess investment return of 2 percent above the existing discount rate is necessary to cause a funding risk mitigation event. This policy was suspended until Fiscal Year 2020-21 as part of the reduction in discount rate from 7.5 percent to 7.0 percent. More details on the Risk Mitigation Policy can be found on our website.

Subsequent Events

This actuarial valuation report reflects statutory changes, regulatory changes and Board actions through December 2018.

On February 14, 2018, the Board adopted a new amortization policy effective with the June 30, 2019 actuarial valuation, first affecting State plan employer contributions for Fiscal Year 2020-21. The new policy will generally accelerate the recognition of new sources of Unfunded Accrued Liability. Since this change is not effective until a future valuation and will not affect any amortization bases already in existence upon implementation, it has no effect on the June 30, 2018 valuation results or Fiscal Year 2019-20 required contributions. The new amortization policy is incorporated in the projected contribution rates shown in the "Future Investment Return Scenarios" in the Risk Analysis section of this report.

Senate Bill 90 (SB 90), approved by the Governor in June 2019, established Government Code Section 20825.1 and directed the State to contribute an additional $2.5 billion to the State plans. The additional contribution was made on July 29, 2019. A portion of the contribution was an advance payment of the required employer contribution for Fiscal Year 2019-20 and the remainder went toward paying down the Unfunded Accrued Liability. While the total required employer contribution for Fiscal Year 2019-20 was unaffected, the advance payment portion of the contribution served to reduce the employer contribution rate for the remainder of the fiscal year. See Appendix E for more information on the additional contribution and adjusted rates for Fiscal Year 2019-20.

Assets

Assets

Reconciliation of Market Value of Assets

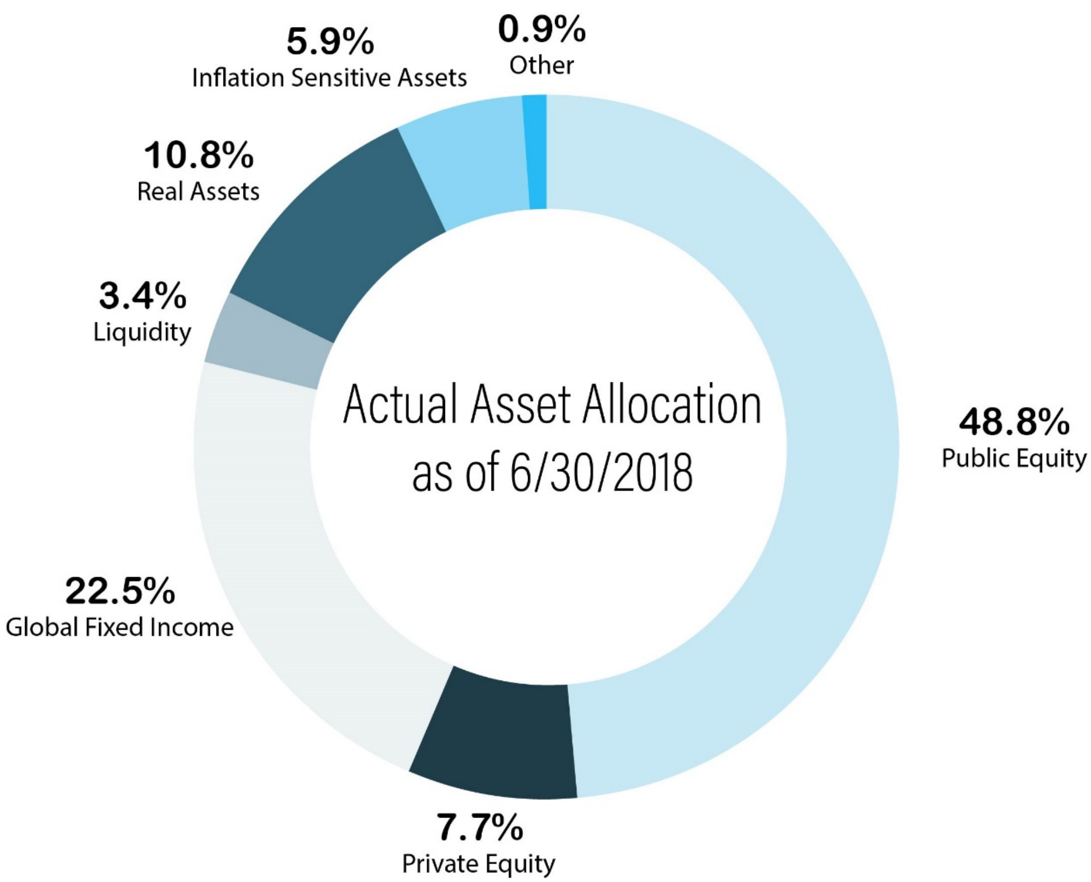
	State Miscellaneous	State Industrial	State Safety	State Peace Officers and Firefighters	California Highway Patrol
1) Market Value of Assets as of June 30, 2017 Including Receivables for Tier 1 Conversion and Service Buybacks	$72,203,626,225	$3,215,014,610	$9,326,848,277	$29,424,432,350	$7,417,410,834
2) Receivables for Tier 1 Conversion and Service Buybacks as of June 30, 2017	307,221,717	14,681,817	17,975,617	74,027,993	11,254,513
3) Market Value of Assets as of June 30, 2017 [(1) - (2)]	$71,896,404,508	$3,200,332,793	$9,308,872,660	$29,350,404,357	$7,406,156,321
4) Employer Contributions Received in 2017-18	7,044,360,055	241,061,563	774,759,246	3,068,270,200	978,059,951
5) Employee Contributions Received in 2017-18	892,166,205	58,557,568	246,993,057	426,334,941	96,207,333
6) Benefit Payments in 2017-18	(5,831,017,143)	(187,977,324)	(566,062,071)	(2,051,206,692)	(577,112,754)
7) Refunds in 2017-18	(34,832,323)	(2,705,440)	(12,441,122)	(13,800,189)	(1,967,082)
8) Administrative Expense	(90,006,089)	(4,008,236)	(11,642,946)	(36,732,694)	(9,259,686)
9) Transfers In/(Out)	(1,340,130)	268,297	531,571	(104,164)	330,009
10) Investment Return	6,111,280,864	271,482,131	794,328,702	2,514,073,535	637,568,753
11) Market Value of Assets as of June 30, 2018 [(3) + (4) + (5) + (6) + (7) + (8) + (9) + (10)]	$79,987,015,947	$3,577,011,352	$10,535,339,097	$33,257,239,294	$8,529,982,845
12) Receivables for Tier 1 Conversion and Service Buybacks as of June 30, 2018	236,054,009	12,891,514	16,003,164	69,355,098	10,529,078
13) Market Value of Assets as of June 30, 2018 Including Receivables for Tier 1 Conversion and Service Buybacks	$80,223,069,956	$3,589,902,866	$10,551,342,261	$33,326,594,392	$8,540,511,923

Asset Allocation

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

The asset allocation and market value of assets shown below reflect the values of the Public Employees' Retirement Fund (PERF) in its entirety as of June 30, 2018. The assets of the State plans are part of the PERF and are invested accordingly.

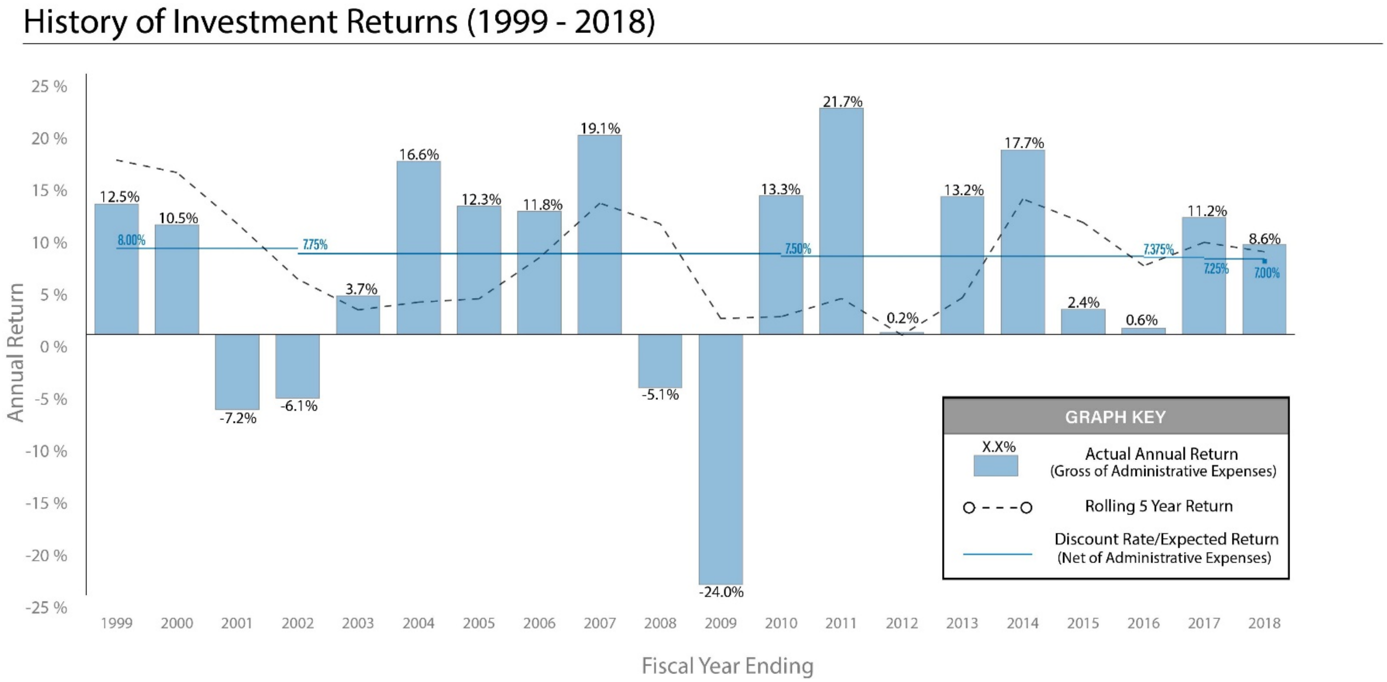
Asset Class	Market Value (Dollars in Billions)	Actual Allocation	Policy Target Allocation
Public Equity	$171.8	48.8%	49.0%
Private Equity	27.2	7.7%	8.0%
Global Fixed Income	79.1	22.5%	22.0%
Liquidity	11.8	3.4%	3.0%
Real Assets	38.1	10.8%	12.0%
Inflation Sensitive Assets	20.8	5.9%	6.0%
Other	3.1	0.9%	0.0%
Total Fund	$351.9	100.0%	100.0%



Assets

CalPERS History of Investment Returns

Following is a chart with the 20-year historical annual returns of the PERF for each fiscal year ending on June 30. Beginning in 2002, the figures are reported as gross of fees.



The table below shows historical geometric mean annual returns of the PERF for various time periods ending on June 30, 2018 (figures are reported as gross of fees). The geometric mean rate of return is the average rate per period compounded over multiple periods. It should be recognized that in any given year the rate of return is volatile. The portfolio has an expected volatility of 11.4 percent per year based on the most recent Asset Liability Modelling study. The volatility is a measure of the risk of the portfolio expressed in the standard deviation of the fund's total return distribution, expressed as a percentage. Consequently, when looking at investment returns, it is more instructive to look at returns over longer time horizons.

History of CalPERS Geometric Rates of Return and Volatilities

	1 Year	5 Year	10 Year	20 Year	30 Year
Geometric Return	8.6%	7.9%	5.7%	6.0%	8.3%
Volatility	–	6.9%	12.9%	11.1%	10.1%

Liabilities and Employer Contributions

Liabilities and Employer Contributions

Comparison of Current and Prior Year

Shown below are the key valuation results for the current valuation compared to corresponding results from the prior valuation.

State Miscellaneous

Participant Information

	June 30, 2017	June 30, 2018
Members Included in the Valuation[1]		
Active Members	172,365	174,402
Transfers from State Miscellaneous	36,841	37,586
Vested Terminations[2]	58,106	61,005
Receiving Payments	190,693	195,158
Total	458,005	468,151
Average Entry Age of Active Members	34.8	34.8
Average Age for Active Members	47.3	47.2
Average Age of Retired Members	72.0	72.2
Average Pay	$67,953	$70,249
Covered Payroll in Fiscal Year Ending on Valuation Date	$11,712,643,755	$12,251,583,453
Projected Payroll for Contribution Rate	$12,395,802,003	$12,934,685,803

(1) 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 coverage group. This does not result in double counting liabilities.

(2) Includes non-vested terminated participants with employee contributions remaining in the plan.

Funded Status

	June 30, 2017	June 30, 2018
Present Value of Benefits	$122,604,179,567	$132,446,673,597
Accrued Liability	106,955,886,517	115,469,058,970
Market Value of Assets	72,203,626,225	80,223,069,956
Unfunded Liability/(Surplus)	34,752,260,292	35,245,989,014
Funded Status	67.5%	69.5%

Employer Contribution

	June 30, 2017	June 30, 2018
Contribution Required in Dollars		
Total Normal Cost	$2,000,308,588	$2,174,670,866
Employee Contribution	841,100,840	893,164,372
Employer Normal Costs	1,159,207,749	1,281,506,494
Amortization of Unfunded Liability	2,469,290,467	2,725,165,218
Group Term Life Benefits	3,222,908	0
Total	$3,631,721,124	$4,006,671,712
Contribution Required (Percent of Payroll)		
Total Normal Cost	16.137%	16.813%
Employee Contribution	6.785%	6.905%
Employer Normal Costs	9.352%	9.908%
Amortization of Unfunded Liability	19.920%	21.069%
Group Term Life Benefits	0.026%	0.000%
Total	29.298%	30.977%

Comparison of Current and Prior Year (continued)

State Industrial

Participant Information

	June 30, 2017	June 30, 2018
Members Included in the Valuation[1]		
Active Members	11,610	11,811
Transfers from State Industrial	8,823	8,909
Vested Terminations[2]	3,457	3,566
Receiving Payments	14,126	14,642
Total	38,016	38,928
Average Entry Age of Active Members	35.7	35.7
Average Age for Active Members	45.1	45.2
Average Age of Retired Members	68.0	68.5
Average Pay	$56,186	$59,204
Covered Payroll in Fiscal Year Ending on Valuation Date	$652,319,822	$699,252,899
Projected Payroll for Contribution Rate	$690,367,395	$738,240,618

(1) 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 coverage group. This does not result in double counting liabilities.

(2) Includes non-vested terminated participants with employee contributions remaining in the plan.

Funded Status

	June 30, 2017	June 30, 2018
Present Value of Benefits	$5,197,892,110	$5,746,905,539
Accrued Liability	4,210,362,730	4,670,036,601
Market Value of Assets	3,215,014,610	3,589,902,866
Unfunded Liability/(Surplus)	995,348,120	1,080,133,735
Funded Status	76.4%	76.9%

Employer Contribution

	June 30, 2017	June 30, 2018
Contribution Required in Dollars		
Total Normal Cost	$122,084,570	$134,810,119
Employee Contribution	54,469,987	58,830,395
Employer Normal Costs	67,614,583	75,979,724
Amortization of Unfunded Liability	67,354,423	77,744,321
Group Term Life Benefits	—	—
Total	$134,969,006	$153,724,045
Contribution Required (Percent of Payroll)		
Total Normal Cost	17.684%	18.261%
Employee Contribution	7.890%	7.969%
Employer Normal Costs	9.794%	10.292%
Amortization of Unfunded Liability	9.756%	10.531%
Group Term Life Benefits	0.000%	0.000%
Total	19.550%	20.823%

Liabilities and Employer Contributions

Comparison of Current and Prior Year (continued)

State Safety

Participant Information

	June 30, 2017	June 30, 2018
Members Included in the Valuation[1]		
Active Members	27,422	28,335
Transfers from State Safety	5,880	5,956
Vested Terminations[2]	6,730	7,103
Receiving Payments	24,742	25,749
Total	64,774	67,143
Average Entry Age of Active Members	38.7	38.6
Average Age for Active Members	46.9	46.7
Average Age of Retired Members	68.4	68.7
Average Pay	$79,027	$81,741
Covered Payroll in Fiscal Year Ending on Valuation Date	$2,167,067,002	$2,316,124,913
Projected Payroll for Contribution Rate	$2,293,464,571	$2,445,263,353

(1) 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 coverage group. This does not result in double counting liabilities.

(2) Includes non-vested terminated participants with employee contributions remaining in the plan.

Funded Status

	June 30, 2017	June 30, 2018
Present Value of Benefits	$15,994,713,061	$17,751,712,839
Accrued Liability	12,204,328,400	13,590,778,296
Market Value of Assets	9,326,848,277	10,551,342,261
Unfunded Liability/(Surplus)	2,877,480,123	3,039,436,035
Funded Status	76.4%	77.6%

Employer Contribution

	June 30, 2017	June 30, 2018
Contribution Required in Dollars		
Total Normal Cost	$514,722,254	$566,958,761
Employee Contribution	239,621,178	256,385,863
Employer Normal Costs	275,101,075	310,572,898
Amortization of Unfunded Liability	191,663,982	215,802,566
Group Term Life Benefits	—	—
Total	$466,765,057	$526,375,464
Contribution Required (Percent of Payroll)		
Total Normal Cost	22.443%	23.186%
Employee Contribution	10.448%	10.485%
Employer Normal Costs	11.995%	12.701%
Amortization of Unfunded Liability	8.357%	8.825%
Group Term Life Benefits	0.000%	0.000%
Total	20.352%	21.526%

Comparison of Current and Prior Year (continued)

State Peace Officers and Firefighters

Participant Information

	June 30, 2017	June 30, 2018
Members Included in the Valuation[1]		
Active Members	41,445	41,289
Transfers from State POFF	5,817	6,173
Vested Terminations[2]	7,016	7,078
Receiving Payments	38,250	39,947
Total	92,528	94,487
Average Entry Age of Active Members	29.7	29.7
Average Age for Active Members	41.7	41.7
Average Age of Retired Members	63.6	63.9
Average Pay	$82,439	$85,317
Covered Payroll in Fiscal Year Ending on Valuation Date	$3,416,664,854	$3,522,647,266
Projected Payroll for Contribution Rate	$3,615,947,170	$3,719,056,868

(1) 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 coverage group. This does not result in double counting liabilities.

(2) Includes non-vested terminated participants with employee contributions remaining in the plan.

Funded Status

	June 30, 2017	June 30, 2018
Present Value of Benefits	$53,048,435,271	$57,779,361,435
Accrued Liability	44,618,700,274	48,792,433,542
Market Value of Assets	29,424,432,350	33,326,594,392
Unfunded Liability/(Surplus)	15,194,267,924	15,465,839,150
Funded Status	65.9%	68.3%

Employer Contribution

	June 30, 2017	June 30, 2018
Contribution Required in Dollars		
Total Normal Cost	$1,032,135,960	$1,111,774,860
Employee Contribution	412,651,891	426,055,155
Employer Normal Costs	619,484,069	685,719,705
Amortization of Unfunded Liability	961,565,009	1,069,586,142
Group Term Life Benefits	—	—
Total	$1,581,049,078	$1,755,305,847
Contribution Required (Percent of Payroll)		
Total Normal Cost	28.544%	29.894%
Employee Contribution	11.412%	11.456%
Employer Normal Costs	17.132%	18.438%
Amortization of Unfunded Liability	26.592%	28.760%
Group Term Life Benefits	0.000%	0.000%
Total	43.724%	47.198%

Comparison of Current and Prior Year (continued)

California Highway Patrol

Participant Information

	June 30, 2017	June 30, 2018
Members Included in the Valuation[1]		
Active Members	7,357	7,311
Transfers from CHP	262	265
Vested Terminations[2]	428	451
Receiving Payments	8,971	9,158
Total	17,018	17,185
Average Entry Age of Active Members	27.0	27.5
Average Age for Active Members	40.6	40.6
Average Age of Retired Members	68.3	68.5
Average Pay	$115,546	$119,258
Covered Payroll in Fiscal Year Ending on Valuation Date	$850,071,470	$871,895,121
Projected Payroll for Contribution Rate	$899,653,217	$920,508,723

(1) 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 coverage group. This does not result in double counting liabilities.

(2) Includes non-vested terminated participants with employee contributions remaining in the plan.

Funded Status

	June 30, 2017	June 30, 2018
Present Value of Benefits	$14,677,215,002	$15,894,543,442
Accrued Liability	12,321,822,329	13,383,782,393
Market Value of Assets	7,417,410,834	8,540,511,923
Unfunded Liability/(Surplus)	4,904,411,495	4,843,270,470
Funded Status	60.2%	63.8%

Employer Contribution

	June 30, 2017	June 30, 2018
Contribution Required in Dollars		
Total Normal Cost	$253,756,186	$274,753,444
Employee Contribution	94,391,615	96,865,133
Employer Normal Costs	159,364,571	177,888,311
Amortization of Unfunded Liability	324,691,175	354,215,017
Group Term Life Benefits	—	55,231
Total	$484,055,746	$532,158,559
Contribution Required (Percent of Payroll)		
Total Normal Cost	28.206%	29.848%
Employee Contribution	10.492%	10.523%
Employer Normal Costs	17.714%	19.325%
Amortization of Unfunded Liability	36.091%	38.480%
Group Term Life Benefits	0.000%	0.006%
Total	53.805%	57.811%

Liabilities and Employer Contributions

Accrued and Unfunded Liabilities

The following table shows the development of the accrued liabilities and unfunded liability.

	State Miscellaneous	State Industrial	State Safety	State Peace Officers and Firefighters	California Highway Patrol
1) Present Value of Benefits					
a) Actives and Inactives	$63,996,646,238	$3,372,361,657	$10,311,603,531	$27,643,845,609	$7,639,069,328
b) Retired	68,450,027,359	2,374,543,882	7,440,109,308	30,135,515,826	8,255,474,114
c) Total	$132,446,673,597	$5,746,905,539	$17,751,712,839	$57,779,361,435	$15,894,543,442
2) Present Value of Future Employee Contributions	$7,521,086,689	$517,278,112	$2,033,271,815	$3,728,828,211	$928,809,764
3) Present Value of Future Employer Normal Costs	9,456,527,938	559,590,826	2,127,662,728	5,258,099,682	1,581,951,285
4) Accrued Liability [(1c) – (2) – (3)]	115,469,058,970	4,670,036,601	13,590,778,296	48,792,433,542	13,383,782,393
5) Market Value of Assets	$80,223,069,956	3,589,902,866	10,551,342,261	33,326,594,392	8,540,511,923
6) Unfunded Liability/(Surplus) [(4) – (5)]	$35,245,989,014	$1,080,133,735	$3,039,436,035	$15,465,839,150	$4,843,270,470
7) Funded Status [(5) / (4)]	69.5%	76.9%	77.6%	68.3%	63.8%

Employer Contribution Rates

The following table shows the development of the employer contribution rates.

	State Miscellaneous	State Industrial	State Safety	State Peace Officers and Firefighters	California Highway Patrol
Employer Contribution Amount					
Normal Cost	$1,281,506,494	$75,979,724	$310,572,898	$685,719,705	$177,888,311
Payment on the Unfunded Liability	2,725,165,218	77,744,321	215,802,566	1,069,586,142	354,215,017
Payment for Term Life Benefits[1]	0	0	0	0	55,231
Total Employer Contribution Amount	$4,006,671,712	$153,724,045	$526,375,464	$1,755,305,847	$532,158,559
Projected Payroll	$12,934,685,803	$738,240,618	$2,445,263,353	$3,719,056,868	$920,508,723
Employer Contribution (as a percent of payroll)					
Normal Cost	9.908%	10.292%	12.701%	18.438%	19.325%
Payment on the Unfunded Liability	21.069%	10.531%	8.825%	28.760%	38.480%
Payment for Term Life Benefits[1]	0.000%	0.000%	0.000%	0.000%	0.006%
Total Employer Contribution Rate	30.977%	20.823%	21.526%	47.198%	57.811%

(1) Sec. 21600-21605

Schedule of Amortization Bases

The schedules below show the development of payments on the amortization bases used to determine employer contribution rates. Each row of each schedule gives a brief description of a base (or portion of the Unfunded Actuarial Liability), the date the base was established, the balance of the base on the valuation date, and the number of years remaining in the amortization period. The schedules also show the expected payment for the year immediately following the valuation date, the balance on the date a year after the valuation date, and the scheduled payment for Fiscal Year 2019-20. Please refer to Appendix A for an explanation of how amortization periods are determined.

There is a one-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, 2018.
- The required employer contributions determined by the valuation are for the fiscal year beginning one year after the valuation date: Fiscal Year 2019-20.

This one-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 employers with their required employer contribution 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 one year 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, plus any additional discretionary payments made during the year, minus the Expected Normal Cost for the year. The Employer Contribution for the first fiscal year is determined by the actuarial valuation one year ago. The Normal Cost Rate for the fiscal year is assumed to be the same as the rate determined by the current valuation. Expected dollar amounts are determined by multiplying the rate by the expected payroll for the applicable fiscal year, based on payroll as of the valuation date.

State Miscellaneous

Reason for Base	Date Established	Remaining Amortization Period	Balance on 6/30/2018	Expected Payment in 2018-19	Amount Remaining on 6/30/2019	Scheduled Payment for Fiscal Year 2019-20	Payment as Percentage of Payroll
Assumption Change	6/30/2003	5	$559,000,737	$106,802,257	$487,653,675	$109,225,522	0.844%
Assumption Change	6/30/2009	11	1,910,436,079	205,187,942	1,831,918,546	209,244,477	1.618%
Assumption Change	6/30/2011	13	1,647,991,256	157,576,227	1,600,352,528	160,543,824	1.241%
Assumption Change	6/30/2013	15	5,267,680,342	479,314,401	5,140,611,294	488,114,749	3.774%
Assumption Change	6/30/2018	20	2,881,969,570	(91,258,849)	3,178,106,328	59,254,620	0.458%
Method Change	6/30/2018	20	934,076,514	(8,592,162)	1,008,349,671	18,800,308	0.145%
Reclass of BU 7 Members	6/30/2005	7	(69,039,017)	(10,292,806)	(63,224,787)	(10,516,258)	(0.081%)
New Rate Stabilization Policies	6/30/2004	6	(136,366,073)	(22,780,528)	(122,347,337)	(23,286,283)	(0.180%)
Actuarial Equivalent Reduction Benefits	6/30/2004	6	189,149,343	31,598,196	169,704,369	32,299,714	0.250%
Benefit Change (SB 1801)	6/30/2003	5	(1,631,648)	(311,741)	(1,423,395)	(318,815)	(0.002%)
(Gain)/Loss Prior to 2009	Various	14	10,151,814,275	923,113,727	9,907,565,010	940,075,131	7.268%
(Gain)/Loss in 2009	6/30/2009	21	1,151,940,780	81,108,993	1,148,676,840	82,354,825	0.637%
(Gain)/Loss in 2010	6/30/2010	22	(44,717,195)	(3,065,207)	(44,676,724)	(3,111,056)	(0.024%)
(Gain)/Loss in 2011	6/30/2011	23	23,577,822	1,576,148	23,597,889	1,599,101	0.012%
(Gain)/Loss	Various	25	315,570,047	20,157,242	316,809,137	20,435,289	0.158%
Payment (Gain)/Loss	Various	25	368,944,037	23,566,540	370,392,701	23,891,615	0.185%
(Gain)/Loss	6/30/2014	26	4,771,682,987	252,688,869	4,844,317,397	320,339,633	2.477%
(Gain)/Loss	6/30/2015	27	3,932,319,360	156,561,942	4,045,632,783	211,603,112	1.636%
(Gain)/Loss	6/30/2016	28	3,853,924,983	103,868,746	4,016,257,066	157,833,518	1.220%
(Gain)/Loss	6/30/2017	29	(2,696,855,467)	(37,380,480)	(2,846,968,680)	(75,677,180)	(0.585%)
(Gain)/Loss	6/30/2018	30	$234,520,284	$68,508,930	$180,070,516	$2,459,373	0.019%
Total			$35,245,989,014	$2,437,948,386	$35,191,374,825	$2,725,165,218	21.069%

Schedule of Amortization Bases (continued)

State Industrial

Reason for Base	Date Established	Remaining Amortization Period	Balance on 6/30/2018	Expected Payment in 2018-19	Amount Remaining on 6/30/2019	Scheduled Payment for Fiscal Year 2019-20	Payment as Percentage of Payroll
Assumption Change	6/30/2003	5	$59,879,734	$11,440,577	$52,237,091	$11,700,155	1.585%
Assumption Change	6/30/2009	11	63,259,776	6,794,335	60,659,845	6,928,658	0.939%
Assumption Change	6/30/2011	13	60,512,013	5,785,986	58,762,783	5,894,952	0.799%
Assumption Change	6/30/2013	15	162,839,357	14,817,006	158,911,282	15,089,050	2.044%
Assumption Change	6/30/2017	19	10,636,102	200,445	11,173,288	407,439	0.055%
Assumption Change	6/30/2018	20	127,279,731	(5,368,191)	141,742,212	2,642,731	0.358%
New Rate Stabilization Policies	6/30/2004	6	(4,681,393)	(782,046)	(4,200,135)	(799,409)	(0.108%)
Actuarial Equivalent Reduction Benefits	6/30/2004	6	8,503,127	1,420,483	7,628,987	1,452,020	0.197%
(Gain)/Loss in 2009	6/30/2009	21	39,836,274	2,804,901	39,723,401	2,847,984	0.386%
(Gain)/Loss in 2010	6/30/2010	22	5,463,641	374,513	5,458,696	380,115	0.051%
(Gain)/Loss in 2011	6/30/2011	23	(7,379,808)	(493,331)	(7,386,089)	(500,515)	(0.068%)
(Gain)/Loss	Various	25	97,416,544	6,222,545	97,799,052	6,308,378	0.855%
Payment (Gain)/Loss	Various	25	(1,471,097)	(93,967)	(1,476,873)	(95,263)	(0.013%)
(Gain)/Loss	6/30/2014	26	149,259,360	7,904,167	151,531,381	10,020,299	1.357%
(Gain)/Loss	6/30/2015	27	165,321,909	6,582,151	170,085,813	8,896,182	1.205%
(Gain)/Loss	6/30/2016	28	241,851,865	6,518,251	252,038,964	9,904,793	1.342%
(Gain)/Loss	6/30/2017	29	(154,507,502)	(2,141,592)	(163,107,747)	(4,335,676)	(0.587%)
(Gain)/Loss	6/30/2018	30	9,233,460	3,802,869	5,946,084	81,211	0.011%
Method Change	6/30/2018	20	46,880,642	727,995	49,409,243	921,217	0.125%
Total			$1,080,133,735	$66,517,096	$1,086,937,278	$77,744,321	10.531%

State Safety

Reason for Base	Date Established	Remaining Amortization Period	Balance on 6/30/2018	Expected Payment in 2018-19	Amount Remaining on 6/30/2019	Scheduled Payment for Fiscal Year 2019-20	Payment as Percentage of Payroll
Assumption Change	6/30/2003	5	$(2,171,244)	$(414,836)	$(1,894,121)	$(424,249)	(0.017%)
Assumption Change	6/30/2009	11	244,585,127	26,269,353	234,532,856	26,788,694	1.096%
Assumption Change	6/30/2011	13	165,981,656	15,870,693	161,183,600	16,169,582	0.661%
Assumption Change	6/30/2013	15	515,966,443	46,948,587	503,520,098	47,810,576	1.955%
Assumption Change	6/30/2017	19	183,572,986	3,459,560	192,844,498	7,032,155	0.288%
Assumption Change	6/30/2018	20	366,406,891	(20,879,634)	413,653,435	7,712,416	0.315%
New Rate Stabilization Policies	6/30/2004	6	(5,281,642)	(882,321)	(4,738,677)	(901,909)	(0.037%)
Benefit Change (Arnett)	6/30/2002	4	61,259,046	13,766,412	51,307,092	14,085,311	0.576%
(Gain)/Loss in 2009	6/30/2009	21	149,922,325	10,556,141	149,497,531	10,718,283	0.438%
(Gain)/Loss in 2010	6/30/2010	22	(112,440,481)	(7,707,401)	(112,338,717)	(7,822,687)	(0.320%)
(Gain)/Loss in 2011	6/30/2011	23	(10,262,351)	(686,025)	(10,271,085)	(696,016)	(0.028%)
(Gain)/Loss	Various	25	841,437,589	53,747,372	844,741,506	54,488,759	2.228%
Payment (Gain)/Loss	Various	25	(43,611,484)	(2,785,712)	(43,782,725)	(2,824,138)	(0.115%)
(Gain)/Loss	6/30/2014	26	187,845,240	9,947,518	190,704,614	12,610,703	0.516%
(Gain)/Loss	6/30/2015	27	455,601,435	18,139,383	468,730,012	24,516,493	1.003%
(Gain)/Loss	6/30/2016	28	443,233,180	11,945,763	461,902,709	18,152,157	0.742%
(Gain)/Loss	6/30/2017	29	(469,707,347)	(6,510,503)	(495,852,344)	(13,180,583)	(0.539%)
(Gain)/Loss	6/30/2018	30	(70,674,678)	13,406,243	(89,489,432)	(1,222,232)	(0.050%)
Method Change	6/30/2018	20	137,773,344	(2,110,689)	149,600,792	2,789,252	0.114%
Total			$3,039,436,035	$182,079,902	$3,063,851,642	$215,802,566	8.825%

Schedule of Amortization Bases (continued)

State Peace Officers and Firefighters

Reason for Base	Date Established	Remaining Amortization Period	Balance on 6/30/2018	Expected Payment in 2018-19	Amount Remaining on 6/30/2019	Scheduled Payment for Fiscal Year 2019-20	Payment as Percentage of Payroll
Assumption Change	6/30/2003	5	$234,537,629	$44,810,581	$204,602,837	$45,827,301	1.232%
Assumption Change	6/30/2009	11	634,379,858	68,134,757	608,307,307	69,481,771	1.868%
Assumption Change	6/30/2011	13	698,744,117	66,811,921	678,545,417	68,070,175	1.830%
Assumption Change	6/30/2013	15	2,420,624,390	220,256,366	2,362,233,141	224,300,335	6.031%
Assumption Change	6/30/2017	19	147,559,200	2,780,855	155,011,805	5,652,570	0.152%
Assumption Change	6/30/2018	20	1,405,715,169	(48,296,903)	1,554,073,936	28,975,135	0.779%
Benefit Change (SB 65)	6/30/2006	8	227,500,234	30,745,372	211,621,990	31,397,747	0.844%
New Rate Stabilization Policies	6/30/2004	6	(39,066,162)	(6,526,167)	(35,050,074)	(6,671,056)	(0.179%)
Benefit Change (SB 183)	6/30/2004	6	12,748,636	2,129,713	11,438,048	2,176,996	0.059%
(Gain)/Loss in 2009	6/30/2009	21	373,490,651	26,297,750	372,432,393	26,701,683	0.718%
(Gain)/Loss in 2010	6/30/2010	22	44,365,601	3,041,106	44,325,448	3,086,595	0.083%
(Gain)/Loss in 2011	6/30/2011	23	299,693,979	20,034,172	299,949,049	20,325,926	0.547%
(Gain)/Loss	Various	25	4,674,490,420	298,586,109	4,692,844,876	302,704,781	8.139%
Payment (Gain)/Loss	Various	25	(2,588,353)	(165,333)	(2,598,516)	(167,613)	(0.005%)
(Gain)/Loss	6/30/2014	26	1,633,436,005	86,500,109	1,658,300,117	109,658,226	2.949%
(Gain)/Loss	6/30/2015	27	1,574,634,807	62,692,742	1,620,009,366	84,733,104	2.278%
(Gain)/Loss	6/30/2016	28	1,767,302,858	47,631,319	1,841,743,839	72,378,064	1.946%
(Gain)/Loss	6/30/2017	29	(879,920,035)	(12,196,365)	(928,898,419)	(24,691,671)	(0.664%)
(Gain)/Loss	6/30/2018	30	(161,999,890)	13,124,690	(186,916,167)	(2,552,870)	(0.069%)
Method Change	6/30/2018	20	400,190,035	(11,160,952)	439,748,316	8,198,945	0.220%
Total			$15,465,839,150	$915,231,844	$15,601,724,710	$1,069,586,142	28.760%

California Highway Patrol

Reason for Base	Date Established	Remaining Amortization Period	Balance on 6/30/2018	Expected Payment in 2018-19	Amount Remaining on 6/30/2019	Scheduled Payment for Fiscal Year 2019-20	Payment as Percentage of Payroll
Assumption Change	6/30/2003	5	$38,522,695	$7,360,117	$33,605,920	$7,527,113	0.818%
Assumption Change	6/30/2009	11	155,082,460	16,656,433	148,708,683	16,985,728	1.845%
Assumption Change	6/30/2011	13	181,184,881	17,324,382	175,947,343	17,650,648	1.917%
Assumption Change	6/30/2013	15	860,625,893	78,309,684	839,865,538	79,747,472	8.663%
Assumption Change	6/30/2018	20	386,653,071	(12,735,921)	426,892,925	7,959,261	0.865%
Benefit Change (AB 2936)	6/30/2008	10	(180,465,242)	(20,743,254)	(171,640,819)	(21,163,256)	(2.299%)
Benefit Change (SB 439)	6/30/2005	7	130,208,068	19,412,303	119,242,390	19,833,736	2.155%
New Rate Stabilization Policies	6/30/2004	6	(13,322,174)	(2,225,525)	(11,952,625)	(2,274,935)	(0.247%)
Benefit Change (SB 1801)	6/30/2003	5	6,103,094	1,166,052	5,324,136	1,192,509	0.130%
Benefit Change (Arnett)	6/30/2002	4	1,138,222	255,786	953,310	261,712	0.028%
Benefit Change (AB 2621)	6/30/2001	3	1,372,913	377,957	1,078,055	386,880	0.042%
(Gain)/Loss Prior to 2009	Various	19	1,559,894,599	116,585,040	1,548,490,719	118,472,037	12.870%
(Gain)/Loss in 2009	6/30/2009	21	302,377,140	21,290,596	301,520,377	21,617,619	2.348%
(Gain)/Loss in 2010	6/30/2010	22	100,891,975	6,915,791	100,800,663	7,019,236	0.763%
(Gain)/Loss in 2011	6/30/2011	23	(44,680,942)	(2,986,866)	(44,718,970)	(3,030,363)	(0.329%)
(Gain)/Loss	Various	25	219,000,492	13,988,799	219,860,401	14,181,759	1.541%
Payment (Gain)/Loss	Various	25	(21,093,015)	(1,347,330)	(21,175,837)	(1,365,915)	(0.148%)
(Gain)/Loss	6/30/2014	26	471,927,906	24,991,377	479,111,578	31,682,158	3.442%
(Gain)/Loss	6/30/2015	27	532,376,773	21,196,127	547,717,702	28,647,872	3.112%
(Gain)/Loss	6/30/2016	28	337,895,759	9,106,770	352,128,346	13,838,172	1.503%
(Gain)/Loss	6/30/2017	29	(212,330,623)	(2,943,065)	(224,149,436)	(5,958,266)	(0.647%)
(Gain)/Loss	6/30/2018	30	(63,668,700)	1,637,576	(69,819,431)	(953,582)	(0.104%)
Method Change	6/30/2018	20	93,575,224	(4,698,739)	104,985,903	1,957,423	0.213%
Total			$4,843,270,470	$308,894,091	$4,862,776,871	$354,215,017	38.480%

Liabilities and Employer Contributions

(Gain)/Loss Analysis

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. Deviations between expected and actual experience result in actuarial gains or losses, as shown below.

	State Miscellaneous	State Industrial	State Safety
1) Total (Gain)/Loss for the Year			
a) Unfunded Liability/(Surplus) as of June 30, 2017	$34,752,260,292	$995,348,120	$2,877,480,123
b) Expected Payment on Unfunded Liability During 2017-18	5,867,404,455	164,897,989	463,653,579
c) Interest through June 30, 2018 [.0725 x (1a) – ((1.0725)$^{1/2}$ – 1) X (1b)]	2,310,566,809	66,289,771	192,103,934
d) Expected Unfunded Liability as of June 30, 2018 After All Changes [(1a) – (1b) + (1c)]	$31,195,422,646	$896,739,902	$2,605,930,478
e) Change Due to Method Change	934,076,514	46,880,642	137,773,344
f) Change Due to Assumption Change	2,881,969,570	127,279,731	366,406,891
g) Expected Unfunded Liability After All Other Changes [(1d) + (1e) + (1f)]	$35,011,468,730	$1,070,900,275	$3,110,110,713
h) Actual Unfunded Liability as of June 30, 2018	35,245,989,014	1,080,133,735	3,039,436,035
i) Total (Gain)/Loss for 2017-18 [(1h) – (1g)]	$234,520,284	$9,233,460	$(70,674,678)
2) Contribution (Gain)/Loss for the Year			
a) Expected Contribution for 2017-18	$7,826,864,585	$283,773,619	$965,088,005
b) Actual Contributions for 2017-18	7,936,526,260	299,619,131	1,021,752,303
c) Contribution (Gain)/Loss for 2017-18 [(2a) – (2b)]	$(109,661,675)	$(15,845,512)	$(56,664,298)
3) Asset (Gain)/Loss for the Year			
a) Market Value of Assets as of June 30, 2017	$72,203,626,225	$3,215,014,610	$9,326,848,277
b) Receivables as of June 30, 2017	(307,221,717)	(14,681,817)	(17,975,617)
c) Receivables as of June 30, 2018	236,054,009	12,891,514	16,003,164
d) Contributions Received During 2017-18	7,936,526,260	299,619,131	1,021,752,303
e) Benefits and Refunds Paid During 2017-18	(5,865,849,466)	(190,682,764)	(578,503,193)
f) Transfers In/(Out) During 2017-18	(1,340,130)	268,297	531,571
g) Expected Interest for 2017-18 [0.0725 x (3a + 3b) + ((1.0725)$^{1/2}$ – 1) x ((3d) + (3e) + (3f))]	5,286,190,322	235,913,534	690,698,854
h) Expected Assets as of June 30, 2018 [(3a) + (3b) + (3c) + (3d) + (3e) + (3f) + (3g)]	79,487,985,503	3,558,342,505	10,459,355,359
i) Actual Market Value of Assets as of June 30, 2018	80,223,069,956	3,589,902,866	10,551,342,261
j) Asset (Gain)/Loss for 2017-18 [(3h) – (3i)]	$(735,084,453)	$(31,560,361)	$(91,986,902)
4) Liability (Gain)/Loss for the Year			
a) Total (Gain)/Loss for 2017-18 (1i)	$234,520,284	$9,233,460	$(70,674,678)
b) Contribution (Gain)/Loss for 2017-18 (2c)	(109,661,675)	(15,845,512)	(56,664,298)
c) Asset (Gain)/Loss for 2017-18 (3j)	(735,084,453)	(31,560,361)	(91,986,902)
d) Liability (Gain)/Loss for 2017-18 [(4a) – (4b) – (4c)]	$1,079,266,412	$56,639,333	$77,976,522

(Gain)/Loss Analysis (continued)

	State Peace Officers and Firefighters	California Highway Patrol
1) Total (Gain)/Loss for the Year		
a) Unfunded Liability/(Surplus) as of June 30, 2017	$15,194,267,924	$4,904,411,495
b) Expected Payment on Unfunded Liability During 2017-18	2,388,838,226	804,613,532
c) Interest through June 30, 2018 [.0725 x (1a) – ((1.0725)$^{1/2}$ – 1) X (1b)]	1,016,504,138	326,912,912
d) Expected Unfunded Liability as of June 30, 2018 After All Changes [(1a) – (1b) + (1c)]	$13,821,933,836	$4,426,710,875
e) Change Due to Method Change	400,190,035	93,575,224
f) Change Due to Assumption Change	1,405,715,169	386,653,071
g) Expected Unfunded Liability After All Other Changes [(1d) + (1e) + (1f)]	$15,627,839,040	$4,906,939,170
h) Actual Unfunded Liability as of June 30, 2018	15,465,839,150	4,843,270,470
i) Total (Gain)/Loss for 2017-18 [(1h) – (1g)]	$(161,999,890)	$(63,668,700)
2) Contribution (Gain)/Loss for the Year		
a) Expected Contribution for 2017-18	$3,395,547,168	$1,019,734,773
b) Actual Contributions for 2017-18	3,494,605,141	1,074,267,284
c) Contribution (Gain)/Loss for 2017-18 [(2a) – (2b)]	$(99,057,973)	$(54,532,511)
3) Asset (Gain)/Loss for the Year		
a) Market Value of Assets as of June 30, 2017	$29,424,432,350	$7,417,410,834
b) Receivables as of June 30, 2017	(74,027,993)	(11,254,513)
c) Receivables as of June 30, 2018	69,355,098	10,529,078
d) Contributions Received During 2017-18	3,494,605,141	1,074,267,284
e) Benefits and Refunds Paid During 2017-18	(2,065,006,881)	(579,079,836)
f) Transfers In/(Out) During 2017-18	(104,164)	330,009
g) Expected Interest for 2017-18 [0.0725 x (3a + 3b) + ((1.0725)$^{1/2}$ – 1) x ((3d) + (3e) + (3f))]	2,178,816,833	554,594,564
h) Expected Assets as of June 30, 2018 [(3a) + (3b) + (3c) + (3d) + (3e) + (3f) + (3g)]	33,028,070,384	8,466,797,420
i) Actual Market Value of Assets as of June 30, 2018	33,326,594,392	8,540,511,923
j) Asset (Gain)/Loss for 2017-18 [(3h) – (3i)]	$(298,524,008)	$(73,714,503)
4) Liability (Gain)/Loss for the Year		
a) Total (Gain)/Loss for 2017-18 (1i)	$(161,999,890)	$(63,668,700)
b) Contribution (Gain)/Loss for 2017-18 (2c)	(99,057,973)	(54,532,511)
c) Asset (Gain)/Loss for 2017-18 (3j)	(298,524,008)	(73,714,503)
d) Liability (Gain)/Loss for 2017-18 [(4a) – (4b) – (4c)]	$235,582,091	$64,578,314

Group Term Life Insurance (GTLI) Contributions

	State Miscellaneous	State Industrial	State Safety	State Peace Officers and Firefighters	California Highway Patrol
1) GTLI Market Value of Assets as of June 30, 2017	$5,677,583	$1,286,249	$2,926,328	$3,993,706	$630,508
2) Contributions Received for GTLI During Fiscal Year 2017-18	2,659,944	(4)	245,517	22,075	332
3) Benefits Paid for GTLI During Fiscal Year 2017-18	(3,521,007)	(207,405)	(1,257,049)	(817,282)	(360,628)
4) Investment Return During Fiscal Year 2017-18	554,873	91,338	243,523	294,113	36,679
5) GTLI Market Value of Assets as of June 30, 2018	$5,371,393	$1,170,178	$2,158,319	$3,492,612	$306,891
6) Expected GTLI Benefit Payments for Fiscal Year 2018-19	3,127,784	196,738	718,874	972,305	236,792
7) Closed Group Projected Payroll for Fiscal Year 2018-19	11,837,861,822	682,403,882	2,231,143,485	3,460,646,632	862,347,205
8) Required GTLI Contribution Rate [(1.5 x (6) - (5), but not less than zero) / (7)]	0.000%	0.000%	0.000%	0.000%	0.006%
9) Projected Payroll for Contributions	$12,934,685,803	$738,240,618	$2,445,263,353	$3,719,056,868	$920,508,723
10) Required GTLI Contribution for Fiscal Year 2019-20[1] [(8) x (9)]	$0	$0	$0	$0	$55,231

(1) The Required GTLI Contribution for Miscellaneous Tier 1 and Tier 2 is divided equally between the two groups as a percentage of payroll.

Liabilities and Employer Contributions

Reconciliation of Employer Contribution Rates

Change in Normal Cost Rate from 2018-19 to 2019-20

	State Miscellaneous	State Industrial	State Safety	State Peace Officers and Firefighters	California Highway Patrol
2018-19 Normal Cost Rate	9.352%	9.794%	11.995%	17.132%	17.714%
Effect of Changes in Demographic Results	(0.213%)	(0.136%)	(0.248%)	(0.309%)	(0.291%)
Effect of Change in Assumptions	0.701%	0.735%	0.867%	1.302%	1.378%
Effect of Change in Method	0.068%	(0.101%)	0.087%	0.313%	0.524%
2019-20 Normal Cost Rate	9.908%	10.292%	12.701%	18.438%	19.325%

Change in Unfunded Liability Amortization Rate from 2018-19 to 2019-20

	State Miscellaneous	State Industrial	State Safety	State Peace Officers and Firefighters	California Highway Patrol
2018-19 Rate to Amortize the Unfunded Liability	19.920%	9.756%	8.357%	26.592%	36.091%
Effect of Progression of Amortization Bases and Change in Payroll	0.702%	0.370%	0.166%	1.518%	1.772%
Effect of (Gain)/Loss	0.019%	0.011%	(0.051%)	(0.070%)	(0.105%)
Effect of Change in Assumptions	0.280%	0.268%	0.236%	0.502%	0.508%
Effect of Change in Method	0.148%	0.126%	0.117%	0.218%	0.215%
2019-20 Rate to Amortize the Unfunded Liability	21.069%	10.531%	8.825%	28.760%	38.480%

Change in Group Term Life Insurance Rate from 2018-19 to 2019-20

	State Miscellaneous	State Industrial	State Safety	State Peace Officers and Firefighters	California Highway Patrol
2018-19 Group Term Life Insurance Rate	0.026%	0.000%	0.000%	0.000%	0.000%
Effect of (Gain)/Loss and Other Changes	(0.026%)	0.000%	0.000%	0.000%	0.006%
2019-20 Group Term Life Insurance Rate	0.000%	0.000%	0.000%	0.000%	0.006%

Change in Total Rate from 2018-19 to 2019-20

	State Miscellaneous	State Industrial	State Safety	State Peace Officers and Firefighters	California Highway Patrol
2018-19 Employer Rate	29.298%	19.550%	20.352%	43.724%	53.805%
Effect of Progression of Amortization Bases and Change in Payroll	0.702%	0.370%	0.166%	1.518%	1.772%
Effect of (Gain)/Loss and Changes in Demographic Results	(0.220%)	(0.125%)	(0.299%)	(0.379%)	(0.390%)
ffect of Change in Assumptions	0.981%	1.003%	1.103%	1.804%	1.886%
Effect of Change in Method	0.216%	0.025%	0.204%	0.531%	0.739%
2019-20 Employer Rate	30.977%	20.823%	21.526%	47.198%	57.811%

Reconciliation of Employer Contributions

Change in Normal Cost Contribution from 2018-19 to 2019-20

	State Miscellaneous	State Industrial	State Safety	State Peace Officers and Firefighters	California Highway Patrol
2018-19 Normal Cost Contribution	$1,159,207,749	$67,614,583	$275,101,075	$619,484,069	$159,364,571
Effect of Change in Payroll	50,396,413	4,688,704	18,208,264	17,664,753	3,694,344
Effect of Change in Assumptions	87,755,234	5,254,300	20,495,935	46,870,575	12,282,410
Effect of Change in Method	8,818,828	(745,987)	2,079,573	11,786,030	4,835,871
Effect of (Gain)/Loss	(24,671,730)	(831,876)	(5,311,949)	(10,085,722)	(2,288,885)
2019-20 Normal Cost Contribution	$1,281,506,494	$75,979,724	$310,572,898	$685,719,705	$177,888,311

Change in Unfunded Liability Amortization Contribution from 2018-19 to 2019-20

	State Miscellaneous	State Industrial	State Safety	State Peace Officers and Firefighters	California Highway Patrol
2018-19 Amortization of the Unfunded Liability	$2,469,290,467	$67,354,423	$191,663,982	$961,565,009	$324,691,175
Effect of Progression of Amortization Bases	204,640,536	7,582,291	17,294,957	86,204,281	24,687,462
Effect of Change in Assumptions	29,684,068	1,791,589	5,260,822	16,107,016	3,823,316
Effect of Change in Method	19,047,252	933,344	2,825,870	8,306,470	1,983,048
Effect of (Gain)/Loss	2,502,895	82,674	(1,243,065)	(2,596,634)	(969,984)
2019-20 Amortization of the Unfunded Liability	$2,725,165,218	$77,744,321	$215,802,566	$1,069,586,142	$354,215,017

Change in Group Term Life Insurance Contribution from 2018-19 to 2019-20

	State Miscellaneous	State Industrial	State Safety	State Peace Officers and Firefighters	California Highway Patrol
2018-19 Group Term Life Insurance Contribution	$3,222,908	$0	$0	$0	$0
Effect of (Gain)/Loss and Other Changes	(3,222,908)	0	0	0	55,231
2019-20 Group Term Life Insurance Contribution	$0	$0	$0	$0	$55,231

Change in Total Contribution from 2018-19 to 2019-20

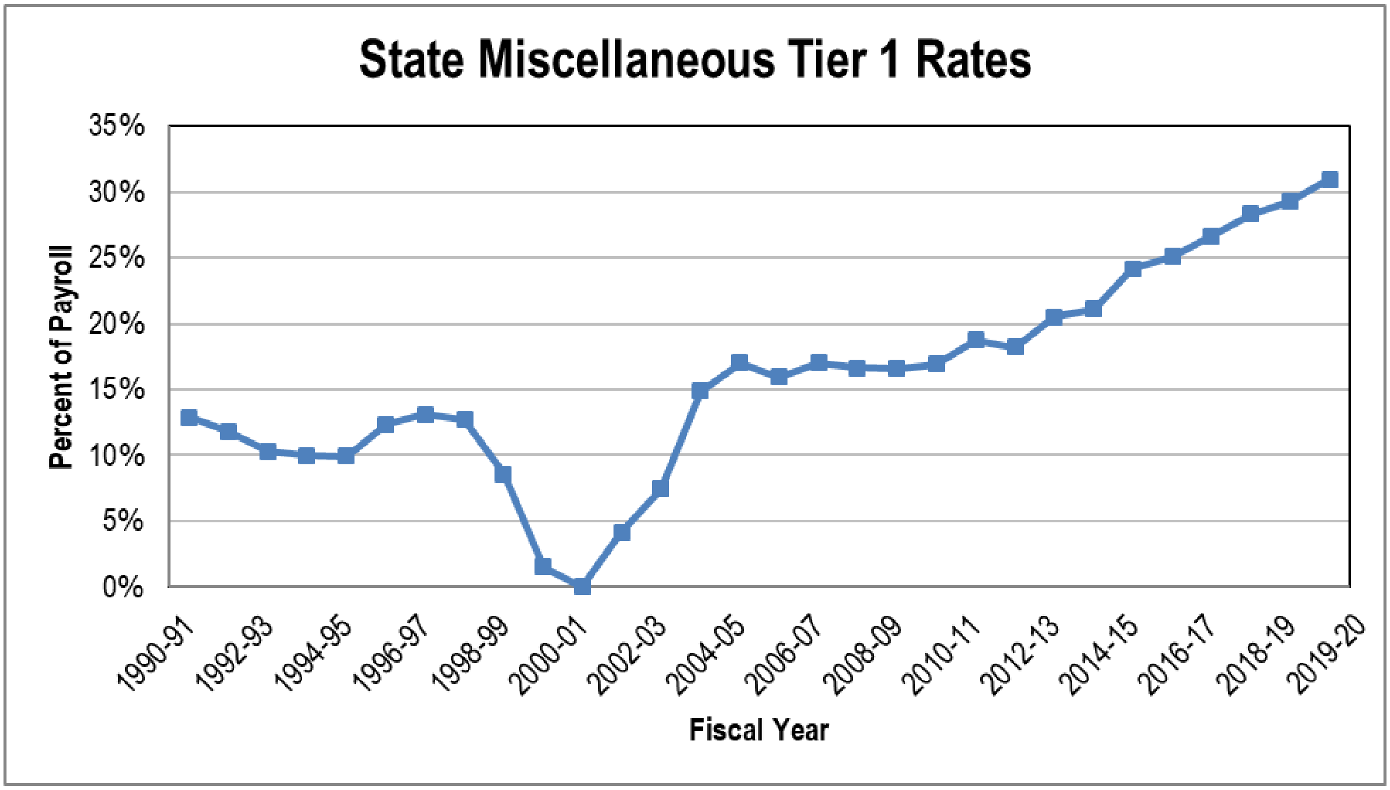
	State Miscellaneous	State Industrial	State Safety	State Peace Officers and Firefighters	California Highway Patrol
2018-19 Employer Contribution	$3,631,721,124	$134,969,006	$466,765,057	$1,581,049,078	$484,055,746
Effect of Change in Payroll and Progression of Amortization Bases	255,036,949	12,270,995	35,503,221	103,869,034	28,381,806
Effect of Change in Assumptions	117,439,302	7,045,889	25,756,757	62,977,591	16,105,726
Effect of Change in Method	27,866,080	187,357	4,905,443	20,092,500	6,818,919
Effect of (Gain)/Loss	(25,391,743)	(749,202)	(6,555,014)	(12,682,356)	(3,203,638)
2019-20 Employer Contribution	$4,006,671,712	$153,724,045	$526,375,464	$1,755,305,847	$532,158,559

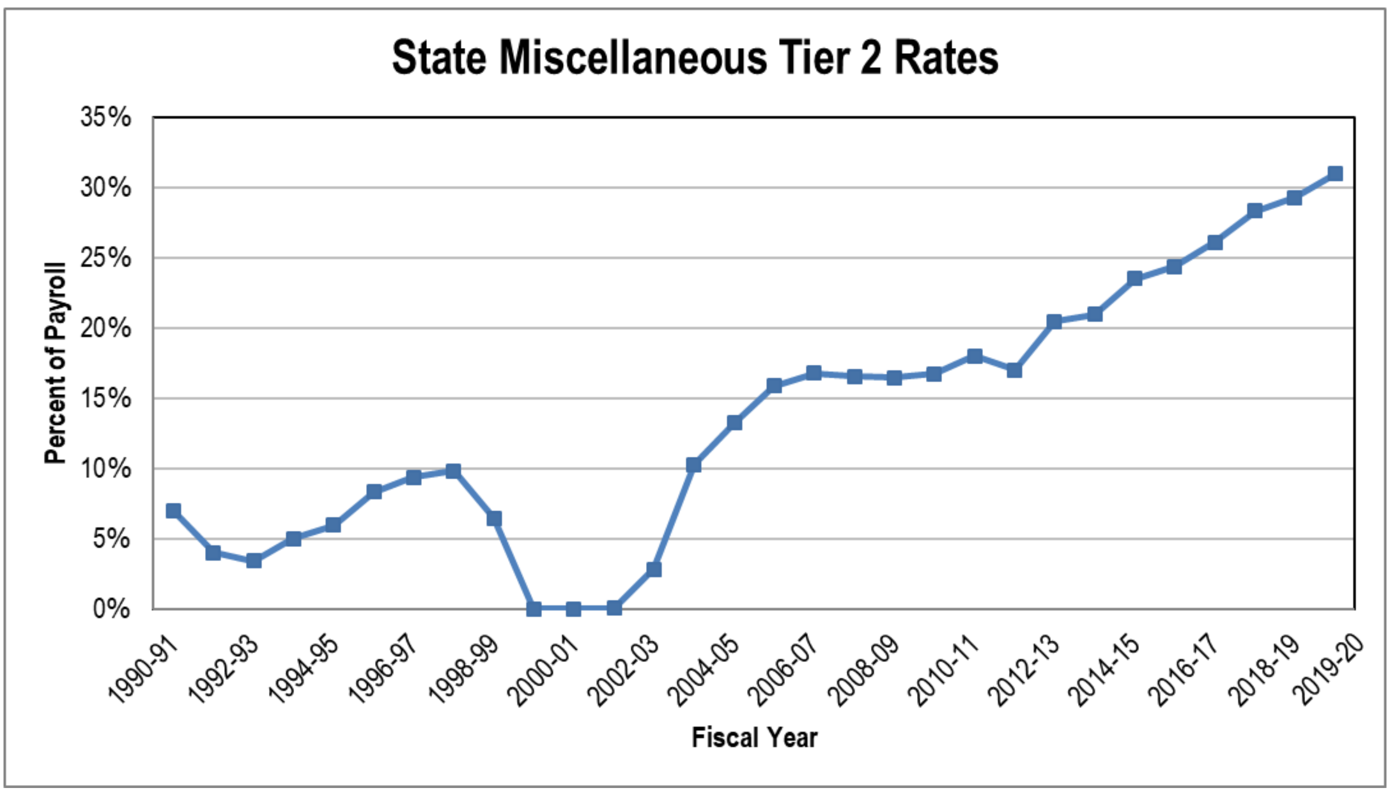
History of Employer Contribution Rates

The table below provides a 30-year history of contribution rates. In cases where the contribution rate changed during the course of a fiscal year, the entry shown is the weighted average of the rates effective during the fiscal year.

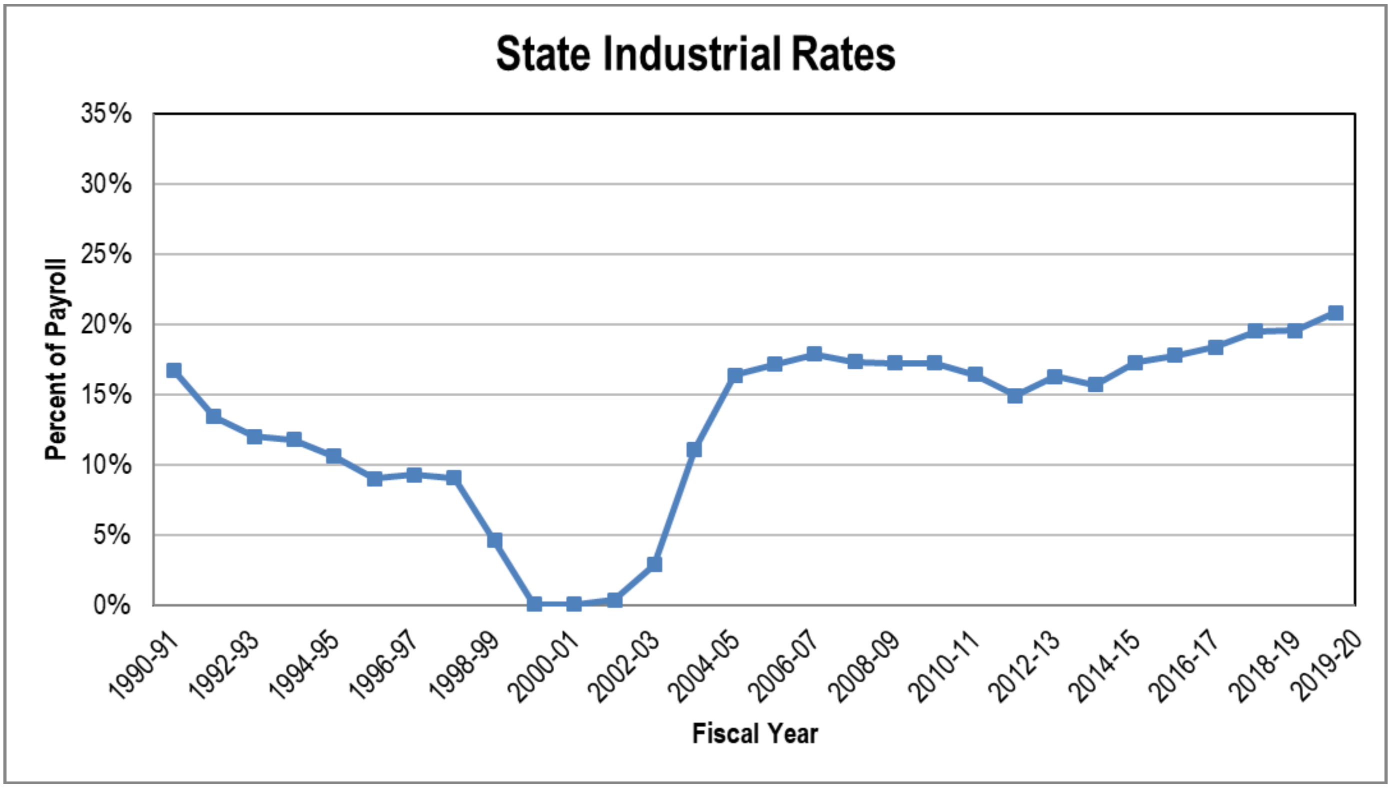
	State Miscellaneous					
Fiscal Year	Tier 1	Tier 2	State Industrial	State Safety	State Peace Officers and Firefighters	California Highway Patrol
2019-20	30.977%	30.977%	20.823%	21.526%	47.198%	57.811%
2018-19	29.298%	29.298%	19.550%	20.352%	43.724%	53.805%
2017-18	28.325%	28.325%	19.527%	19.402%	42.598%	52.785%
2016-17	26.646%	26.095%	18.365%	18.753%	40.276%	48.719%
2015-16	25.068%	24.389%	17.775%	18.082%	37.338%	45.406%
2014-15	24.198%	23.510%	17.286%	18.156%	35.180%	42.175%
2013-14	21.121%	20.992%	15.682%	17.205%	30.495%	34.616%
2012-13	20.503%	20.457%	16.302%	17.503%	30.297%	33.728%
2011-12	18.175%	17.025%	14.934%	16.428%	27.415%	31.264%
2010-11	18.725%	18.032%	16.433%	18.187%	28.722%	31.291%
2009-10	16.917%	16.737%	17.251%	18.099%	25.848%	28.438%
2008-09	16.574%	16.470%	17.236%	18.411%	26.064%	32.149%
2007-08	16.633%	16.565%	17.345%	18.835%	25.552%	32.212%
2006-07	16.997%	16.778%	17.861%	19.294%	24.505%	31.463%
2005-06	15.942%	15.890%	17.147%	19.026%	23.563%	26.396%
2004-05	17.022%	13.216%	16.386%	20.773%	23.841%	33.434%
2003-04	14.843%	10.265%	11.099%	21.930%	20.325%	32.653%
2002-03	7.413%	2.813%	2.858%	17.055%	13.925%	23.076%
2001-02	4.166%	0.036%	0.350%	12.923%	9.638%	16.897%
2000-01	0.000%	0.000%	0.026%	6.808%	2.729%	13.711%
1999-00	1.491%	0.000%	0.026%	7.487%	0.000%	13.345%
1998-99	8.541%	6.437%	4.583%	9.440%	9.591%	13.541%
1997-98	12.721%	9.822%	9.048%	13.754%	15.270%	15.515%
1996-97	13.106%	9.345%	9.260%	14.656%	15.401%	15.851%
1995-96	12.350%	8.326%	8.981%	14.228%	14.350%	14.778%
1994-95	9.934%	5.947%	10.597%	13.927%	12.817%	15.552%
1993-94	9.939%	5.005%	11.765%	15.485%	15.202%	16.940%
1992-93	10.266%	3.391%	11.995%	15.698%	15.560%	17.074%
1991-92	11.804%	3.986%	13.399%	17.376%	17.386%	21.721%
1990-91	12.878%	6.975%	16.720%	17.916%	15.702%	18.090%

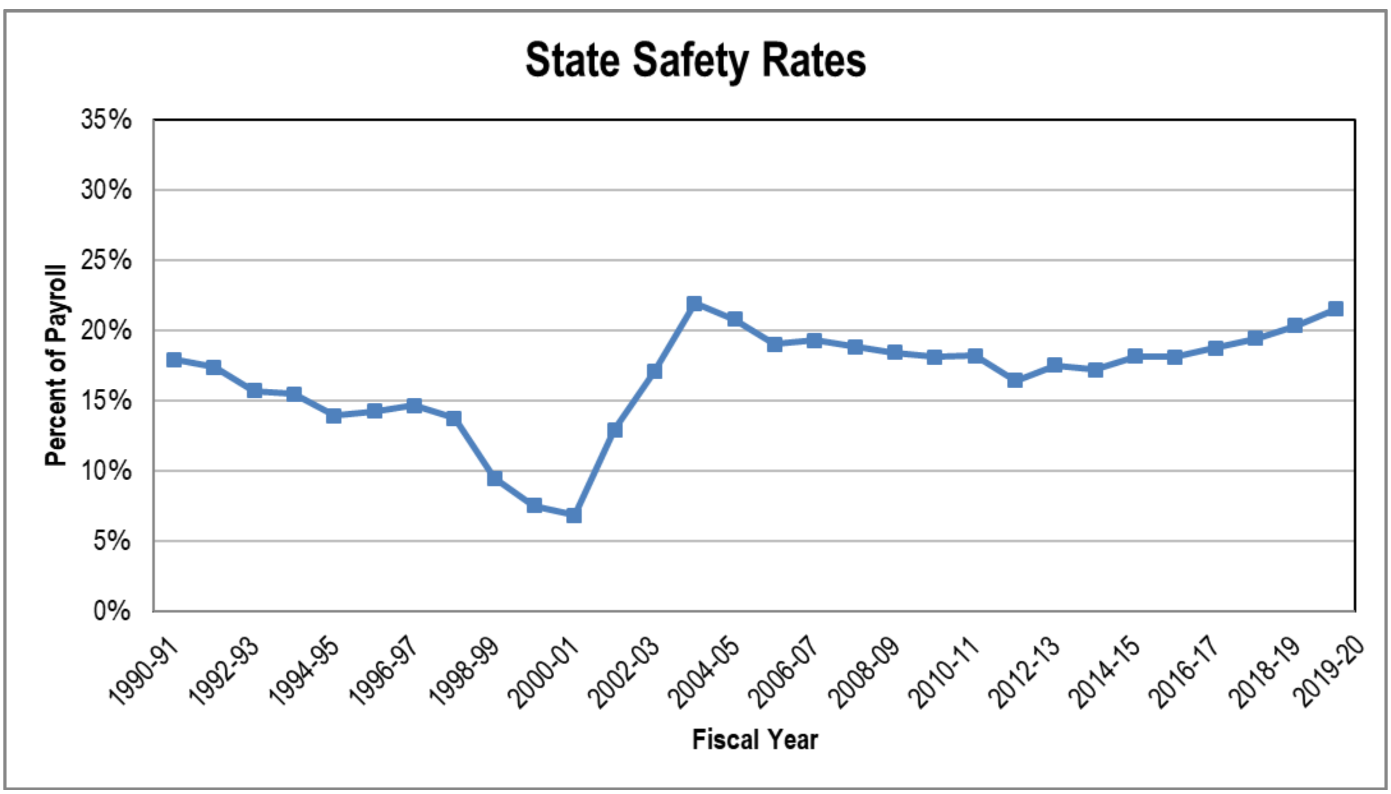
History of Employer Contribution Rates (continued)



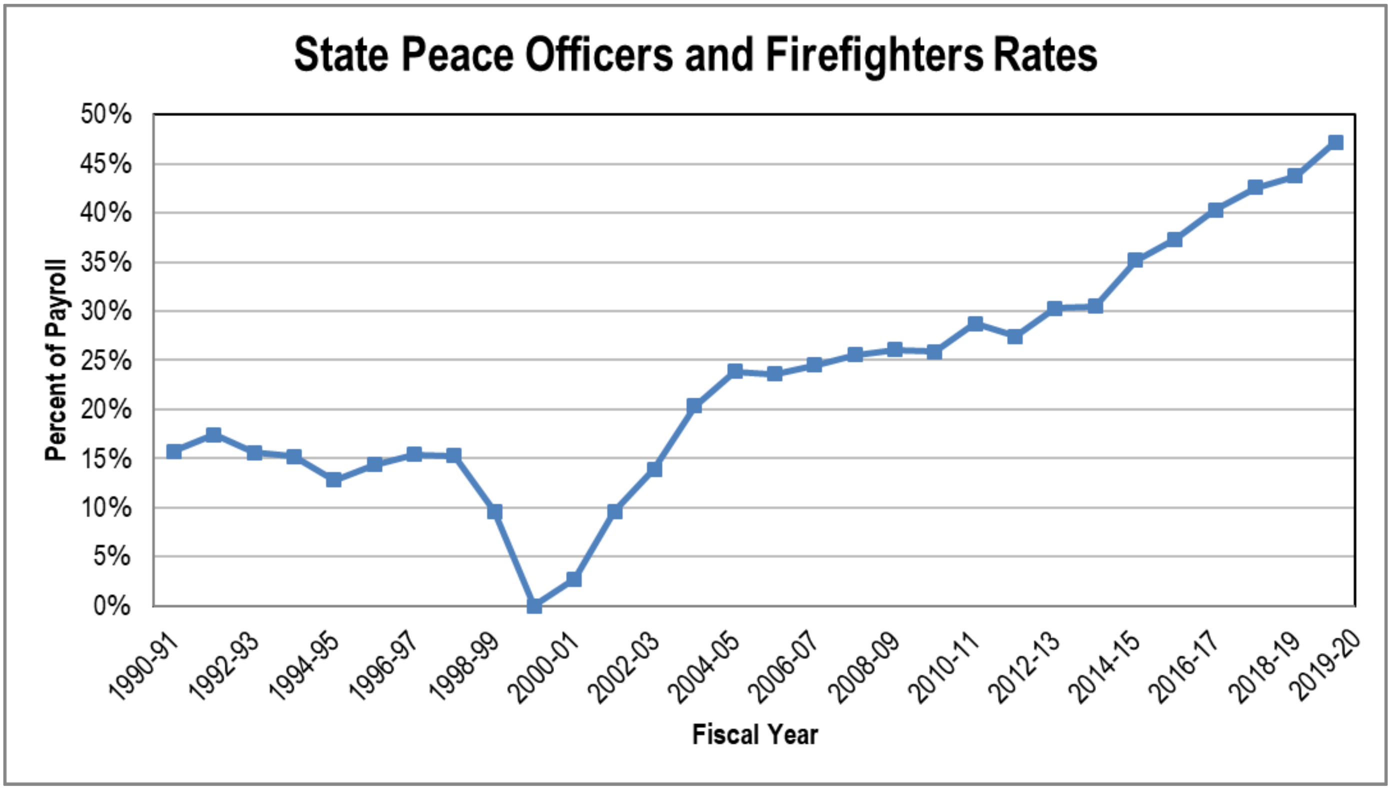


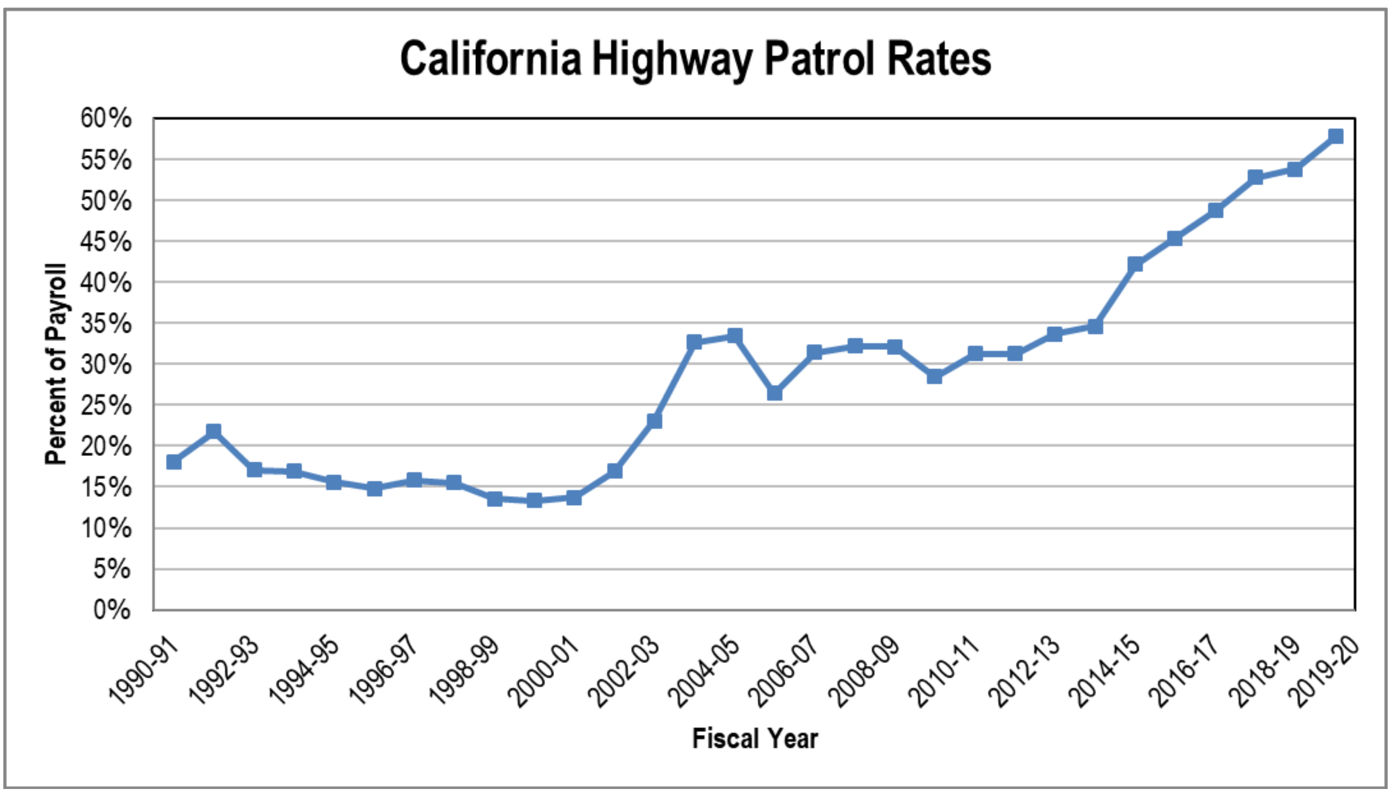
History of Employer Contribution Rates (continued)





History of Employer Contribution Rates (continued)





History of Funded Status and Funding Progress

Shown below is a 30-year history of funding progress for the plans on a market value of assets basis. One could view the trend in the ratio of the unfunded liability to covered payroll as a measure of the ability of the employer to address the unfunded liability.

State Miscellaneous (Dollars in Millions)

Valuation Date	Actuarial Accrued Liabilities	Market Value of Assets	Funded Status	Unfunded Liabilities/(Surplus)	Projected Payroll for Contribution	Unfunded/(Surplus) as a % of Payroll
6/30/18	$115,469	$80,223	69.5%	$35,246	$12,935	272.5%
6/30/17	106,956	72,204	67.5%	34,752	12,396	280.4%
6/30/16	102,444	66,608	65.0%	35,836	11,995	298.7%
6/30/15	97,831	68,080	69.6%	29,751	11,558	257.4%
6/30/14	94,442	68,359	72.4%	26,084	10,854	240.3%
6/30/13	90,277	60,029	66.5%	30,248	10,014	302.1%
6/30/12	83,524	55,371	66.3%	28,152	10,254	274.6%
6/30/11	81,271	57,452	70.7%	23,819	10,426	228.5%
6/30/10	76,980	48,646	63.2%	28,335	10,515	269.5%
6/30/09	74,763	44,094	59.0%	30,669	10,465	293.1%
6/30/08	69,648	59,979	86.1%	9,669	10,241	94.4%
6/30/07	65,342	64,442	98.6%	900	9,530	9.4%
6/30/06	61,299	55,051	89.8%	6,248	8,956	69.8%
6/30/05	58,267	50,231	86.2%	8,036	8,897	90.3%
6/30/04	54,701	45,460	83.1%	9,241	9,079	101.8%
6/30/03	51,559	39,324	76.3%	12,235	9,207	132.9%
6/30/02	48,118	39,530	82.2%	8,588	9,238	93.0%
6/30/01	45,261	43,933	97.1%	1,328	8,816	15.1%
6/30/00	42,386	49,208	116.1%	(6,822)	8,246	(82.7%)
6/30/99	35,771	46,176	129.1%	(10,405)	7,332	(141.9%)
6/30/98	34,169	42,011	122.9%	(7,842)	6,592	(119.0%)
6/30/97	32,557	35,959	110.4%	(3,401)	6,624	(51.4%)
6/30/96	31,742	30,452	95.9%	1,290	6,881	18.8%
6/30/95	29,960	27,088	90.4%	2,872	7,009	41.0%
6/30/94	27,821	24,278	87.3%	3,542	6,827	51.9%
6/30/93	26,162	24,715	94.5%	1,447	6,310	22.9%
6/30/92	24,887	22,979	92.3%	1,908	6,243	30.6%
6/30/91	23,153	22,441	96.9%	711	6,303	11.3%
6/30/90	22,442	16,027	71.4%	6,415	5,816	110.3%
6/30/89	19,972	17,132	85.8%	2,840	5,348	53.1%

History of Funded Status and Funding Progress (continued)

State Industrial (Dollars in Millions)

Valuation Date	Actuarial Accrued Liabilities	Market Value of Assets (MVA)	Funded Status (MVA)	Unfunded Liabilities/(Surplus) (MVA)	Projected Payroll for Contribution	Unfunded/(Surplus) as a % of Payroll
6/30/18	$4,670	$3,590	76.9%	$1,080	$738	146.3%
6/30/17	4,210	3,215	76.4%	995	690	144.2%
6/30/16	3,970	2,898	73.0%	1,072	672	159.6%
6/30/15	3,669	2,885	78.6%	785	636	123.3%
6/30/14	3,458	2,825	81.7%	633	581	108.9%
6/30/13	3,236	2,418	74.7%	818	532	153.7%
6/30/12	2,968	2,168	73.0%	800	578	138.4%
6/30/11	2,832	2,180	77.0%	652	616	105.7%
6/30/10	2,614	1,785	68.3%	830	616	134.7%
6/30/09	2,467	1,556	63.1%	912	574	158.9%
6/30/08	2,235	2,034	91.0%	201	522	38.5%
6/30/07	2,044	2,119	103.7%	(76)	440	(17.2%)
6/30/06	1,870	1,776	95.0%	94	381	24.6%
6/30/05	1,754	1,586	90.4%	168	380	44.2%
6/30/04	1,602	1,415	88.3%	187	378	49.5%
6/30/03	1,462	1,201	82.1%	261	381	68.5%
6/30/02	1,295	1,200	92.7%	95	390	24.4%
6/30/01	1,196	1,325	110.8%	(129)	390	(33.1%)
6/30/00	1,079	1,463	135.6%	(384)	379	(101.3%)
6/30/99	880	1,360	154.5%	(480)	344	(139.5%)
6/30/98	790	1,226	155.2%	(436)	297	(147.1%)
6/30/97	741	1,042	140.7%	(302)	285	(106.0%)
6/30/96	721	861	119.4%	(140)	294	(47.7%)
6/30/95	659	751	113.9%	(91)	271	(33.7%)
6/30/94	619	665	107.5%	(46)	235	(19.7%)
6/30/93	597	668	111.8%	(71)	278	(25.4%)
6/30/92	540	610	113.0%	(70)	268	(26.2%)
6/30/91	492	579	117.6%	(87)	256	(33.8%)
6/30/90	460	401	87.2%	59	224	26.2%
6/30/89	386	406	105.0%	(19)	191	(10.1%)

History of Funded Status and Funding Progress (continued)

State Safety (Dollars in Millions)

Valuation Date	Actuarial Accrued Liabilities	Market Value of Assets (MVA)	Funded Status (MVA)	Unfunded Liabilities/(Surplus) (MVA)	Projected Payroll for Contribution	Unfunded/(Surplus) as a % of Payroll
6/30/18	$13,591	$10,551	77.6%	$3,039	$2,445	124.3%
6/30/17	12,204	9,327	76.4%	2,877	2,293	125.5%
6/30/16	11,288	8,288	73.4%	3,000	2,245	133.6%
6/30/15	10,255	7,859	76.6%	2,396	2,135	112.2%
6/30/14	9,551	7,562	79.2%	1,990	2,038	97.6%
6/30/13	8,834	6,327	71.6%	2,507	1,881	133.3%
6/30/12	7,827	5,524	70.6%	2,303	1,899	121.3%
6/30/11	7,224	5,390	74.6%	1,835	1,984	92.5%
6/30/10	6,436	4,196	65.2%	2,239	2,004	111.7%
6/30/09	6,006	3,514	58.5%	2,492	2,048	121.7%
6/30/08	5,146	4,365	84.8%	781	1,914	40.8%
6/30/07	4,467	4,342	97.2%	126	1,530	8.2%
6/30/06	3,907	3,486	89.2%	421	1,226	34.3%
6/30/05	3,473	3,000	86.4%	473	1,107	42.7%
6/30/04	3,087	2,509	81.3%	579	889	65.1%
6/30/03	2,788	2,049	73.5%	739	891	82.9%
6/30/02	2,476	1,926	77.8%	551	876	62.9%
6/30/01	2,179	2,000	91.8%	180	850	21.1%
6/30/00	1,865	2,122	113.8%	(257)	759	(33.9%)
6/30/99	1,364	1,927	141.3%	(563)	682	(82.6%)
6/30/98	1,285	1,672	130.1%	(386)	511	(75.7%)
6/30/97	1,086	1,404	129.2%	(318)	414	(76.8%)
6/30/96	947	1,123	118.6%	(176)	474	(37.2%)
6/30/95	914	936	102.5%	(23)	408	(5.5%)
6/30/94	761	762	100.1%	(1)	385	(0.2%)
6/30/93	644	722	112.0%	(77)	265	(29.2%)
6/30/92	602	680	112.8%	(77)	263	(29.4%)
6/30/91	548	637	116.2%	(89)	262	(33.8%)
6/30/90	499	426	85.3%	73	232	31.5%
6/30/89	420	440	104.8%	(20)	185	(11.0%)

History of Funded Status and Funding Progress (continued)

State Peace Officers and Firefighters (Dollars in Millions)

Valuation Date	Actuarial Accrued Liabilities	Market Value of Assets (MVA)	Funded Status (MVA)	Unfunded Liabilities/(Surplus) (MVA)	Projected Payroll for Contribution	Unfunded/(Surplus) as a % of Payroll
6/30/18	$48,792	$33,327	68.3%	$15,466	$3,719	415.9%
6/30/17	44,619	29,424	65.9%	15,194	3,616	420.2%
6/30/16	41,485	26,622	64.2%	14,863	3,434	432.9%
6/30/15	39,394	26,973	68.5%	12,420	3,335	372.4%
6/30/14	37,466	26,591	71.0%	10,875	3,206	339.2%
6/30/13	35,271	22,919	65.0%	12,352	3,087	400.1%
6/30/12	31,336	20,526	65.5%	10,810	3,132	345.2%
6/30/11	30,127	20,801	69.0%	9,326	3,393	274.8%
6/30/10	27,712	17,199	62.1%	10,512	3,455	304.3%
6/30/09	26,291	15,083	57.4%	11,208	3,592	312.0%
6/30/08	24,004	19,734	82.2%	4,270	3,589	119.0%
6/30/07	22,250	20,539	92.3%	1,711	3,420	50.0%
6/30/06	19,737	16,973	86.0%	2,764	3,058	90.4%
6/30/05	17,753	14,985	84.4%	2,769	2,860	96.8%
6/30/04	15,668	12,999	83.0%	2,670	2,604	102.5%
6/30/03	14,220	11,038	77.6%	3,182	2,507	126.9%
6/30/02	12,827	10,731	83.7%	2,095	2,407	87.1%
6/30/01	11,949	11,574	96.9%	375	2,304	16.3%
6/30/00	10,720	12,668	118.2%	(1,947)	2,227	(87.4%)
6/30/99	8,091	11,685	144.4%	(3,594)	2,018	(178.1%)
6/30/98	7,016	10,322	147.1%	(3,306)	1,540	(214.6%)
6/30/97	6,495	8,436	129.9%	(1,941)	1,410	(137.7%)
6/30/96	6,129	6,860	111.9%	(731)	1,654	(44.2%)
6/30/95	5,552	5,892	106.1%	(340)	1,592	(21.4%)
6/30/94	4,884	5,032	103.0%	(148)	1,505	(9.8%)
6/30/93	4,476	4,867	108.7%	(392)	1,348	(29.1%)
6/30/92	4,193	4,232	100.9%	(39)	1,332	(2.9%)
6/30/91	3,773	3,854	102.1%	(81)	1,320	(6.1%)
6/30/90	3,440	2,585	75.2%	855	1,151	74.3%
6/30/89	2,665	2,595	97.4%	70	1,002	7.0%

History of Funded Status and Funding Progress (continued)

California Highway Patrol (Dollars in Millions)

Valuation Date	Actuarial Accrued Liabilities	Market Value of Assets (MVA)	Funded Status (MVA)	Unfunded Liabilities/(Surplus) (MVA)	Projected Payroll for Contribution	Unfunded/(Surplus) as a % of Payroll
6/30/18	$13,384	$8,541	63.8%	$4,843	$921	526.2%
6/30/17	12,322	7,417	60.2%	4,904	900	545.1%
6/30/16	11,471	6,706	58.5%	4,765	848	562.2%
6/30/15	10,942	6,735	61.6%	4,207	852	493.9%
6/30/14	10,329	6,645	64.3%	3,684	801	460.0%
6/30/13	9,775	5,760	58.9%	4,014	767	523.5%
6/30/12	8,659	5,220	60.3%	3,439	773	445.0%
6/30/11	8,193	5,336	65.1%	2,857	780	366.4%
6/30/10	7,704	4,440	57.6%	3,264	767	425.4%
6/30/09	7,300	3,932	53.9%	3,368	734	459.1%
6/30/08	6,609	5,238	79.3%	1,371	675	203.2%
6/30/07	6,249	5,546	88.8%	703	613	114.6%
6/30/06	5,744	4,682	81.5%	1,062	556	191.0%
6/30/05	5,349	4,249	79.4%	1,100	546	201.4%
6/30/04	4,742	3,734	78.7%	1,008	509	198.2%
6/30/03	4,421	3,230	73.1%	1,191	476	250.3%
6/30/02	4,138	3,159	76.3%	979	461	212.3%
6/30/01	3,981	3,466	87.1%	515	455	113.2%
6/30/00	3,635	3,443	94.7%	192	433	44.4%
6/30/99	2,983	3,249	108.9%	(266)	402	(66.1%)
6/30/98	2,756	2,901	105.3%	(145)	367	(39.5%)
6/30/97	2,621	2,912	111.1%	(291)	371	(78.6%)
6/30/96	2,328	2,496	107.2%	(168)	343	(49.0%)
6/30/95	2,134	2,207	103.4%	(73)	302	(24.2%)
6/30/94	1,971	1,968	99.9%	2	288	0.8%
6/30/93	1,773	1,941	109.5%	(168)	279	(60.2%)
6/30/92	1,733	1,956	112.9%	(224)	282	(79.2%)
6/30/91	1,629	1,916	117.6%	(287)	288	(99.7%)
6/30/90	1,613	1,395	86.5%	218	271	80.3%
6/30/89	1,415	1,484	104.9%	(69)	249	(27.6%)

Risk Analysis

Risk Analysis

Projected Rates

The table below shows the required and projected employer contribution rates for the next six fiscal years. Projected results reflect a 6.7 percent investment return reduced for estimated administrative expenses for Fiscal Year 2018-19 and the anticipated decrease in normal cost due to new hires entering lower benefit formulas under PEPRA. Projected rates also reflect the additional $2.5 billion contributed by the State in July 2019 pursuant to SB 90. Rates do not reflect additional contributions to offset increased member contributions pursuant to Government Code Section 20683.2. It is assumed that all other actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur during the projection period.

	New Rate	Projected Future Employer Contribution Rates				
Plan	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
State Miscellaneous	30.977%	31.7%	32.3%	32.6%	33.2%	32.3%
State Industrial	20.823%	21.1%	21.5%	21.6%	22.0%	20.2%
State Safety	21.526%	21.6%	21.8%	21.7%	21.3%	21.0%
State Peace Officers & Firefighters	47.198%	47.0%	47.6%	48.1%	48.8%	47.4%
California Highway Patrol	57.811%	59.7%	60.8%	61.4%	62.3%	61.2%

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

Future Investment Return Scenarios

Analysis was performed to determine the effects of various future investment returns on required employer contributions. Starting with the baseline projections and underlying inputs/assumptions described in “Projected Rates” above, the projections below provide a range of results based on five hypothetical investment return scenarios over the three following fiscal years (2019-20, 2020-21, and 2021-22). Each scenario assumes an alternate fixed annual return during each of these fiscal years.

The alternate investment returns were chosen based on stochastic analysis of possible future investment returns over a four-year period. Using the expected return and volatility of each asset class in which the funds are invested, 10,000 stochastic outcomes were generated for this period. Annual returns were then selected that approximate the 5th, 25th, 50th, 75th, and 95th percentiles of these outcomes. The corresponding annual returns are 1.0 percent, 4.0 percent, 7.0 percent, 9.0 percent and 12.0 percent. 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.

On February 14, 2018, the Board adopted a new amortization policy effective with the June 30, 2019 actuarial valuation, first affecting State plan employer contributions for Fiscal Year 2020-21. The new policy will generally accelerate the recognition of new sources of UAL. Existing UAL bases will not be affected. The new policy is reflected in the projected contribution rates shown below.

Future Investment Return Scenarios (continued)

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

The tables below show the projected contribution rates for 2021-22 through 2023-24 for the various State plans under the five different scenarios.

Estimated: 2021-22 Rates as a Percentage of Payroll

	Annual Investment Return Scenario				
	1st Scenario	2nd Scenario	3rd Scenario	4th Scenario	5th Scenario
Plan	1.0%	4.0%	7.0%	9.0%	12.0%
State Miscellaneous	33.2%	32.8%	32.3%	32.1%	31.6%
State Industrial	22.2%	21.8%	21.5%	21.3%	20.9%
State Safety	22.4%	22.1%	21.8%	21.6%	21.2%
State Peace Officers & Firefighters	48.9%	48.3%	47.6%	47.2%	46.5%
California Highway Patrol	62.1%	61.5%	60.8%	60.4%	59.7%

Estimated: 2022-23 Rates as a Percentage of Payroll

	Annual Investment Return Scenario				
	1st Scenario	2nd Scenario	3rd Scenario	4th Scenario	5th Scenario
Plan	1.0%	4.0%	7.0%	9.0%	12.0%
State Miscellaneous	35.1%	33.9%	32.6%	31.8%	30.5%
State Industrial	23.6%	22.6%	21.6%	20.9%	19.8%
State Safety	23.6%	22.7%	21.7%	21.1%	20.1%
State Peace Officers & Firefighters	51.9%	50.0%	48.1%	46.8%	44.8%
California Highway Patrol	65.2%	63.3%	61.4%	60.0%	58.0%

Estimated: 2023-24 Rates as a Percentage of Payroll

	Annual Investment Return Scenario				
	1st Scenario	2nd Scenario	3rd Scenario	4th Scenario	5th Scenario
Plan	1.0%	4.0%	7.0%	9.0%	12.0%
State Miscellaneous	38.1%	35.7%	33.2%	31.5%	28.8%
State Industrial	26.0%	24.0%	22.0%	20.5%	18.4%
State Safety	24.9%	23.1%	21.3%	20.0%	18.0%
State Peace Officers & Firefighters	56.3%	52.6%	48.8%	46.2%	42.2%
California Highway Patrol	69.8%	66.1%	62.3%	59.6%	55.5%

The projections above do not reflect any potential impact of CalPERS' Risk Mitigation Policy.

Discount Rate Sensitivity and Government Code Section 20229

The discount rate reflects expectations of what the markets will deliver in the future. It is calculated based on two components: expected price inflation and real rate of return. A change in either component over the long term would necessitate further evaluation of the discount rate.

This section includes an analysis of discount rate sensitivity on employer contribution rates under two different discount rate scenarios. This type of analysis conveys a sense of the long-term risk to the employer contribution rates and changes to the funded status on a Market Value of Assets basis.

The first section shows the impact on employer contribution rates 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 current rate. This analysis shows the potential plan impacts if the PERF were to realize investment returns of 6.0 percent or 8.0 percent over the long term.

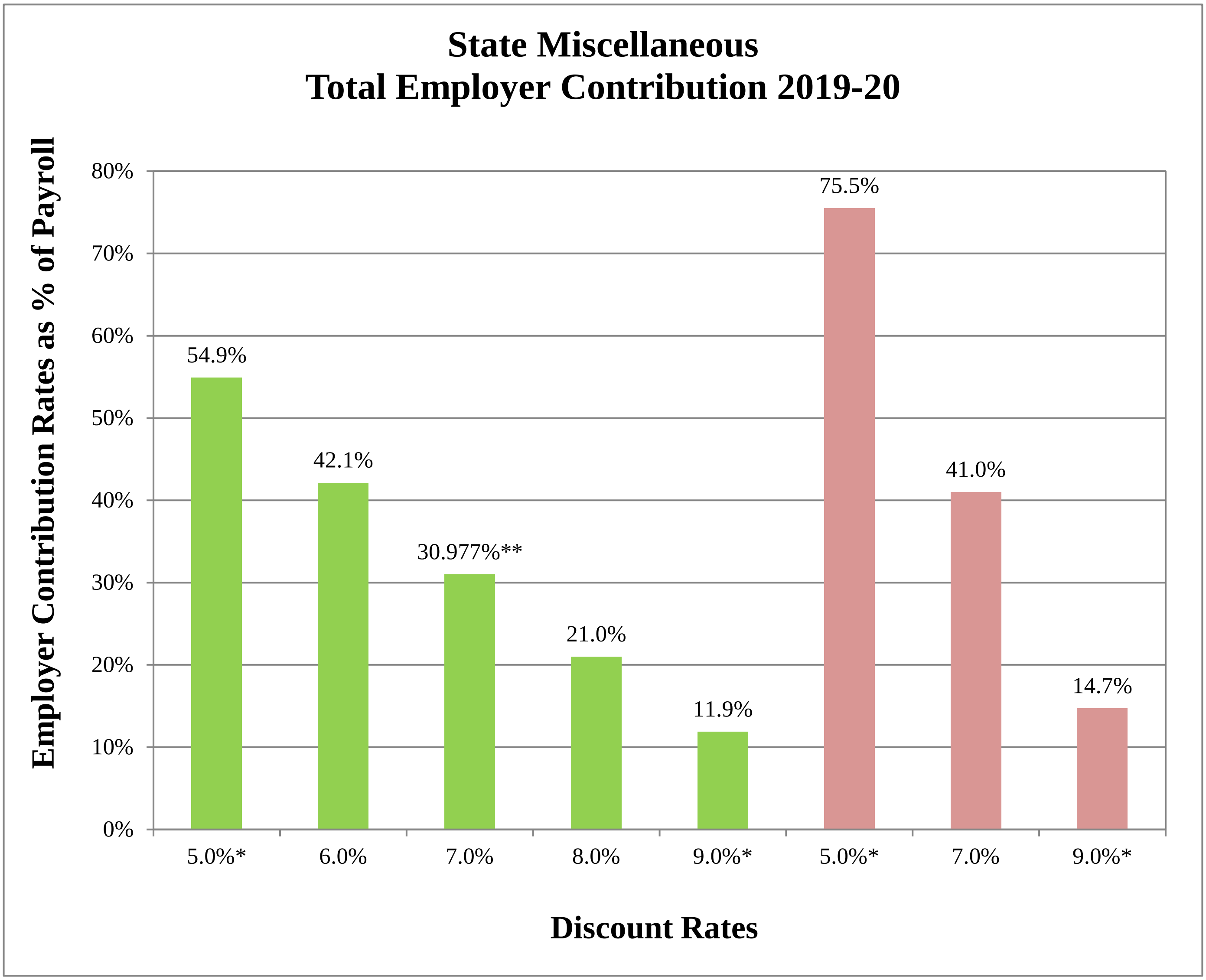
The second section is in response to Government Code section 20229, which requires the Board to provide an annual report with a calculation of the contribution rates and liabilities under specified scenarios, including:

- Investment return and discount rate assumptions that are 2.0 percentage points above and 2.0 percentage points below the current investment return and discount rate assumptions set by the Board
- An amortization period equal to the estimated average remaining service periods (EARSP) of the employees covered by the contributions

Results are presented for three different investment return assumptions (5.0 percent, 7.0 percent and 9.0 percent) for all the State plans. For comparison, contribution rates for the current fiscal year have been calculated using both the current amortization method and amortization over the EARSP of the employees covered by the contributions.

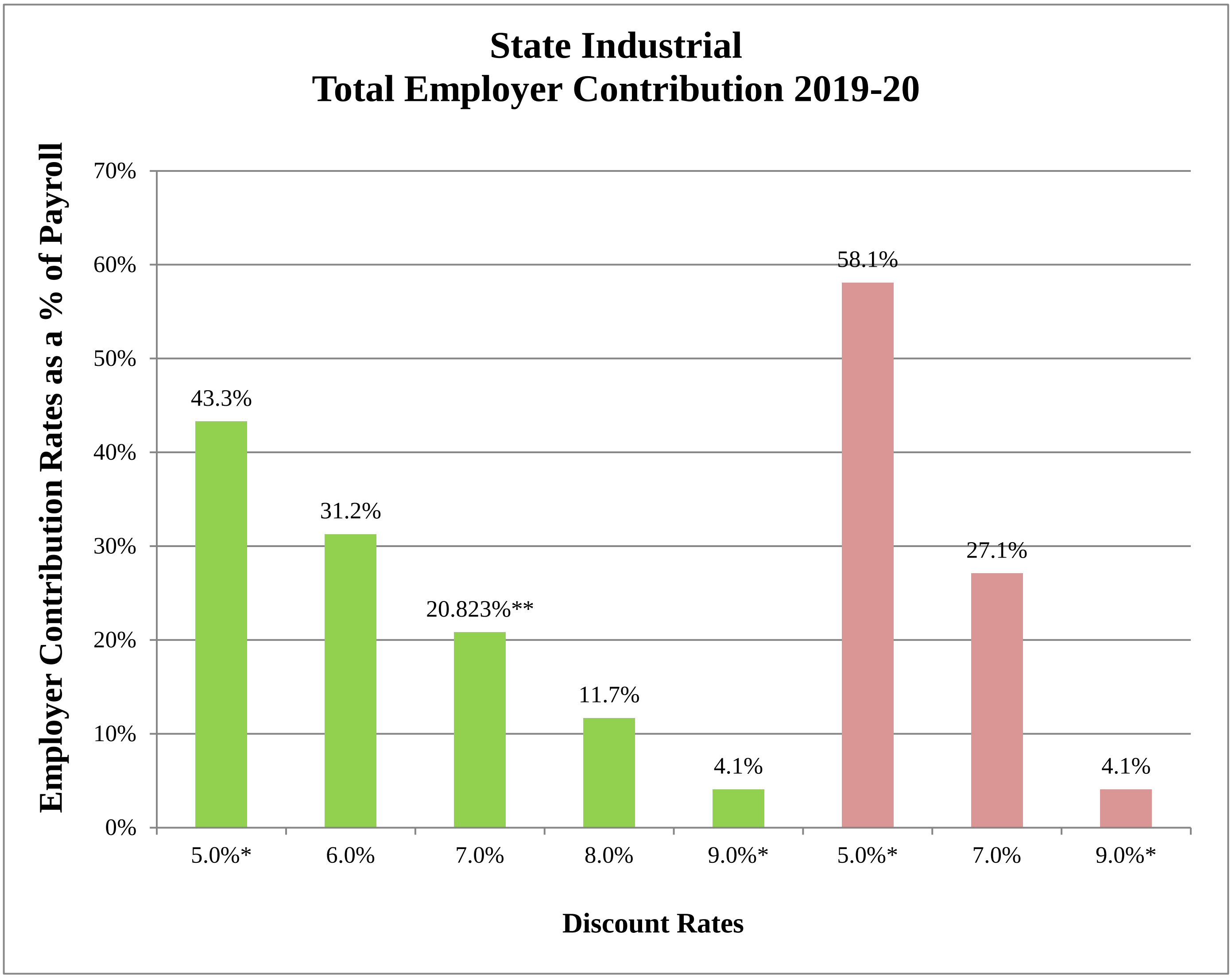
The results of the analysis are presented in three sections. The first section is a graphical representation of the impact on employer rates for both +/- 1.0 percent change in discount rate and +/- 2.0 percent change in discount rate due to G.C. 20229 from the discount rate of 7.0 percent. The second and third sections are numerical representations. The reader may interpolate between the data points presented in the graph to estimate other data points of interest.

Discount Rate Sensitivity and Government Code Section 20229 (continued)



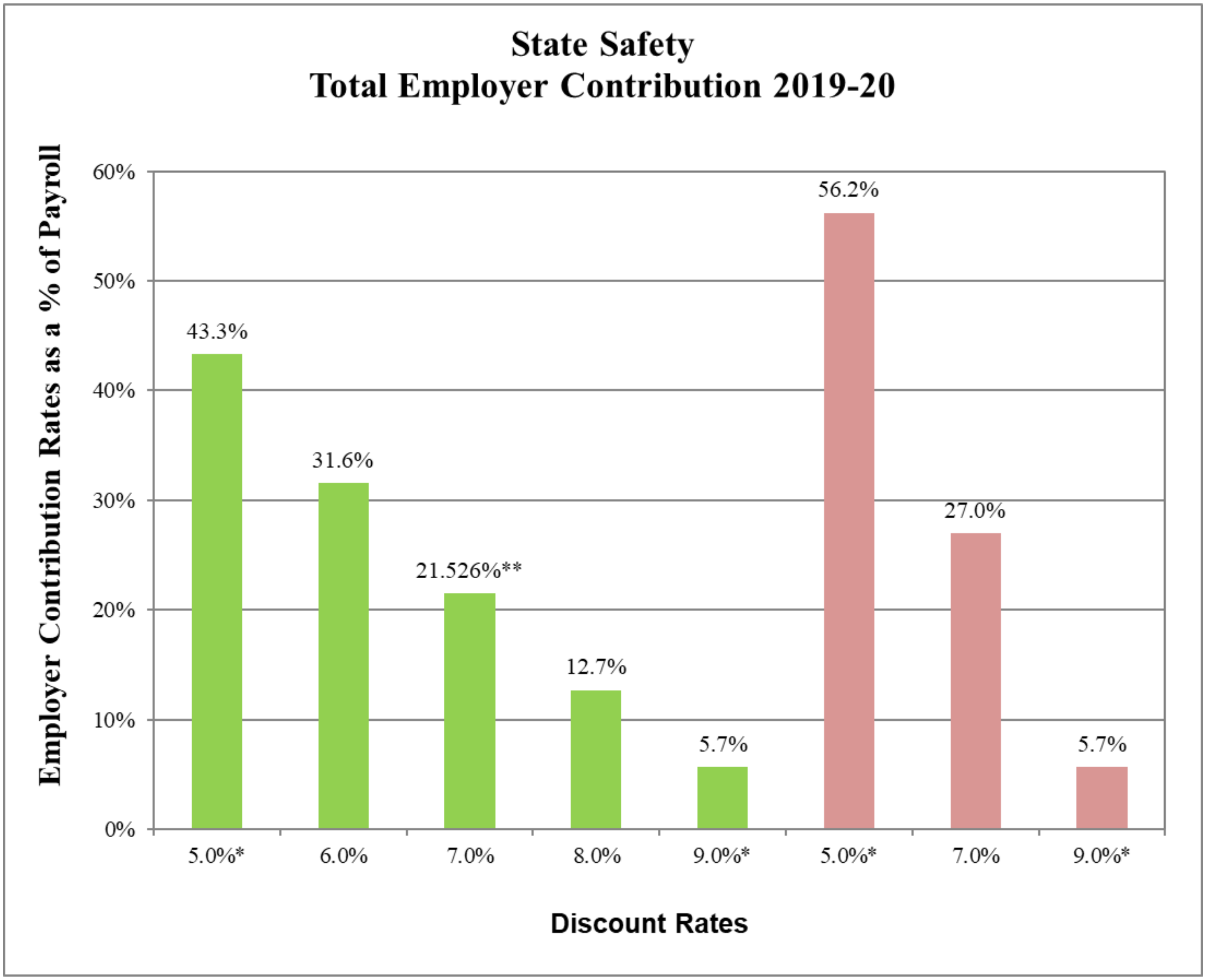
	Analysis of discount rate sensitivity based on current amortization method (varies from 5 to 30 years) or normal cost if in a surplus position
	Analysis of discount rate sensitivity based on amortization of UAL over EARSP (11 years)
*	Required by Government Code Section 20229
**	Actuarially required contribution rate for 2019-20 adopted by CalPERS Board

Discount Rate Sensitivity and Government Code Section 20229 (continued)



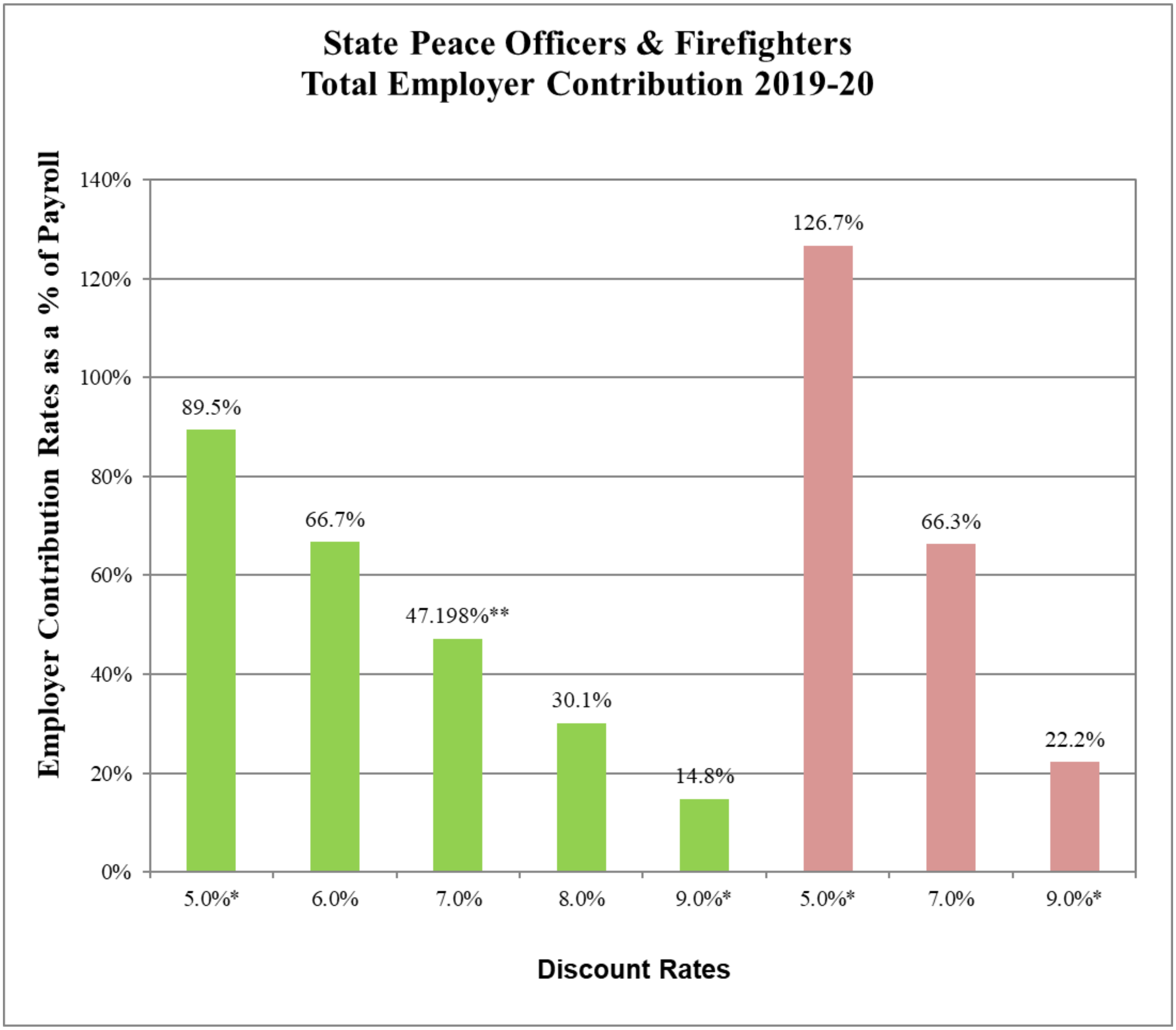
	Analysis of discount rate sensitivity based on current amortization method (varies from 5 to 30 years) or normal cost if in a surplus position
	Analysis of discount rate sensitivity based on amortization of UAL over EARSP (11 years)
*	Required by Government Code Section 20229
**	Actuarially required contribution rate for 2019-20 adopted by CalPERS Board

Discount Rate Sensitivity and Government Code Section 20229 (continued)



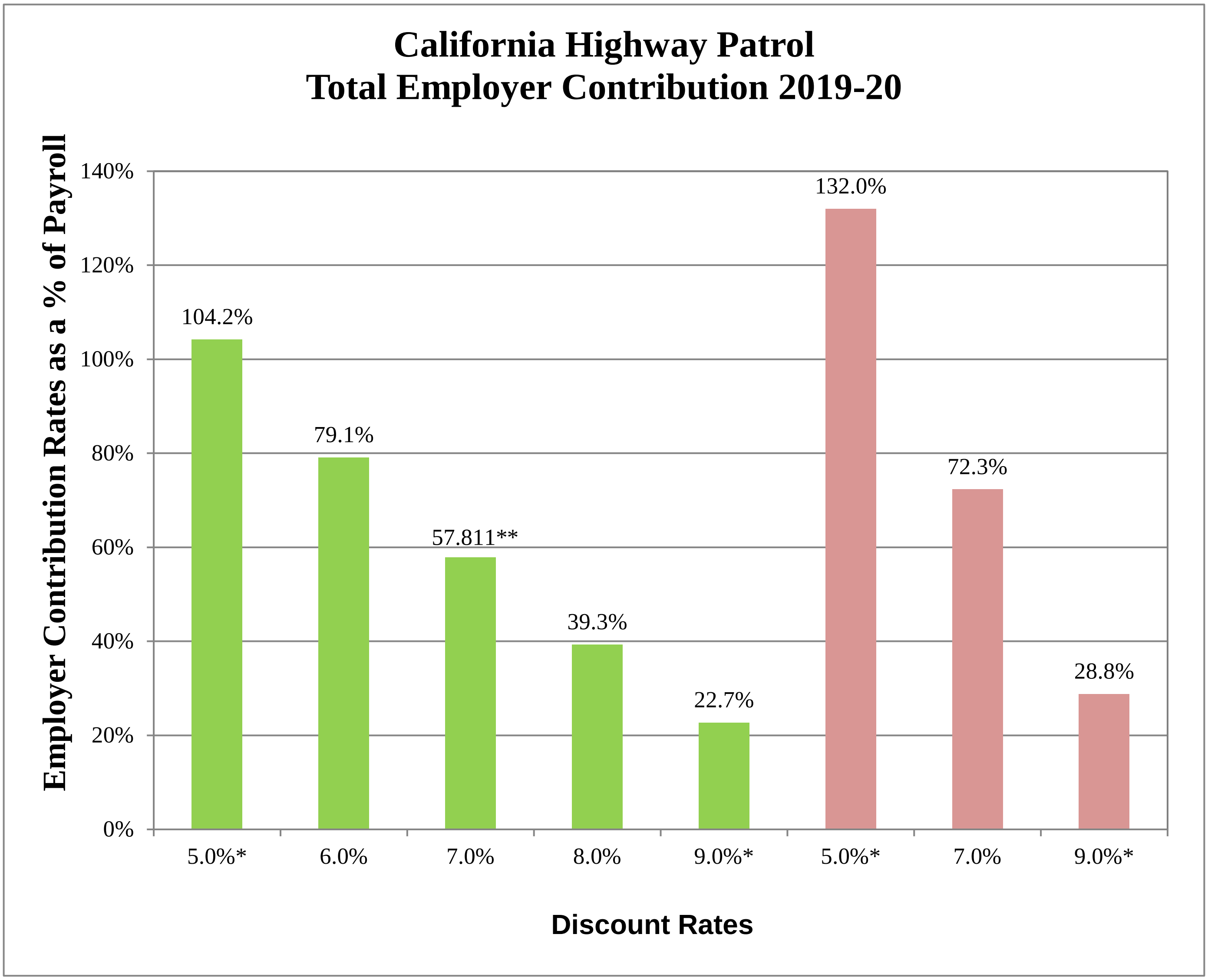
	Analysis of discount rate sensitivity based on current amortization method (varies from 4 to 30 years) or normal cost if in a surplus position
	Analysis of discount rate sensitivity based on amortization of UAL over EARSP (11 years)
*	Required by Government Code Section 20229
**	Actuarially required contribution rate for 2019-20 adopted by CalPERS Board

Discount Rate Sensitivity and Government Code Section 20229 (continued)



	Analysis of discount rate sensitivity based on current amortization method (varies from 5 to 30 years) or normal cost if in a surplus position
	Analysis of discount rate sensitivity based on amortization of UAL over EARSP (11 years)
*	Required by Government Code Section 20229
**	Actuarially required contribution rate for 2019-20 adopted by CalPERS Board

Discount Rate Sensitivity and Government Code Section 20229 (continued)



	Analysis of discount rate sensitivity based on current amortization method (varies from 3 to 30 years) or normal cost if in a surplus position
	Analysis of discount rate sensitivity based on amortization of UAL over EARSP (13 years)
*	Required by Government Code Section 20229
**	Actuarially required contribution rate for 2019-20 adopted by CalPERS Board

Discount Rate Sensitivity and Government Code Section 20229 (continued)

State Miscellaneous

Discount Rate Sensitivity (+/- 1% Change in Discount Rate)

Sensitivity Analysis							
As of June 30, 2018	Employer Normal Cost	Unfunded Liability Rate	Group Term Life Insurance	Total Employer Rate	Accrued Liability	Unfunded Accrued Liability	Funded Status
6.0%	14.4%	27.7%	0.0%	42.1%	129,676,794,916	49,453,724,960	61.9%
7.0% (current discount rate)	9.9%	21.1%	0.0%	31.0%	115,469,058,970	35,245,989,014	69.5%
8.0%	6.5%	14.5%	0.0%	21.0%	103,581,496,857	23,358,426,901	77.4%

Government Code Section 20229 (+/- 2% Change in Discount Rate)

Current Amortization Method							
As of June 30, 2018	Employer Normal Cost	Unfunded Liability Rate	Group Term Life Insurance	Total Employer Rate	Accrued Liability	Unfunded Accrued Liability	Funded Status
5.0%	20.4%	34.5%	0.0%	54.9%	146,794,528,715	66,571,458,759	54.6%
7.0% (current discount rate)	9.9%	21.1%	0.0%	31.0%	115,469,058,970	35,245,989,014	69.5%
9.0%	3.9%	8.0%	0.0%	11.9%	93,558,705,385	13,335,635,429	85.7%

Amortization of Unfunded Accrued Liability over EARSP (11 Years)							
As of June 30, 2018	Employer Normal Cost	Unfunded Liability Rate	Group Term Life Insurance	Total Employer Rate	Accrued Liability	Unfunded Accrued Liability	Funded Status
5.0%	20.4%	55.1%	0.0%	75.5%	146,794,528,715	66,571,458,759	54.6%
7.0% (current discount rate)	9.9%	31.1%	0.0%	41.0%	115,469,058,970	35,245,989,014	69.5%
9.0%	3.9%	10.8%	0.0%	14.7%	93,558,705,385	13,335,635,429	85.7%

- The change in accrued liability due to the change in discount rate of +/-1% or +/-2% was amortized over 20 years as a level percentage of pay (except for the "Amortization of Unfunded Accrued Liability over EARSP").
- In the case of a surplus, rates were calculated to equal the employer normal cost rate. This is based on a provision in the Public Employees' Pension Reform Act of 2013 (PEPRA) that requires a minimum employer contribution rate in combination with employee contributions shall not be less than the normal cost rate.
- Numbers may not add due to rounding.

Discount Rate Sensitivity and Government Code Section 20229 (continued)

State Industrial

Discount Rate Sensitivity (+/- 1% Change in Discount Rate)

Sensitivity Analysis							
As of June 30, 2018	Employer Normal Cost	Unfunded Liability Rate	Group Term Life Insurance	Total Employer Rate	Accrued Liability	Unfunded Accrued Liability	Funded Status
6.0%	14.8%	16.4%	0.0%	31.2%	5,317,593,075	1,727,690,209	67.5%
7.0% (current discount rate)	10.3%	10.5%	0.0%	20.8%	4,670,036,601	1,080,133,735	76.9%
8.0%	6.8%	4.9%	0.0%	11.7%	4,137,058,459	547,155,593	86.8%

Government Code Section 20229 (+/- 2% Change in Discount Rate)

Current Amortization Method							
As of June 30, 2018	Employer Normal Cost	Unfunded Liability Rate	Group Term Life Insurance	Total Employer Rate	Accrued Liability	Unfunded Accrued Liability	Funded Status
5.0%	20.8%	22.4%	0.0%	43.3%	6,111,854,858	2,521,951,992	58.7%
7.0% (current discount rate)	10.3%	10.5%	0.0%	20.8%	4,670,036,601	1,080,133,735	76.9%
9.0%	4.1%	0.0%	0.0%	4.1%	3,694,427,349	104,524,483	97.2%

Amortization of Unfunded Accrued Liability over EARSP (11 Years)							
As of June 30, 2018	Employer Normal Cost	Unfunded Liability Rate	Group Term Life Insurance	Total Employer Rate	Accrued Liability	Unfunded Accrued Liability	Funded Status
5.0%	20.8%	37.3%	0.0%	58.1%	6,111,854,858	2,521,951,992	58.7%
7.0% (current discount rate)	10.3%	16.8%	0.0%	27.1%	4,670,036,601	1,080,133,735	76.9%
9.0%	4.1%	0.0%	0.0%	4.1%	3,694,427,349	104,524,483	97.2%

- The change in accrued liability due to the change in discount rate of +/-1% or +/-2% was amortized over 20 years as a level percentage of pay (except for the "Amortization of Unfunded Accrued Liability over EARSP").
- In the case of a surplus, rates were calculated to equal the employer normal cost rate. This is based on a provision in the Public Employees' Pension Reform Act of 2013 (PEPRA) that requires a minimum employer contribution rate in combination with employee contributions shall not be less than the normal cost rate.
- Numbers may not add due to rounding.

Discount Rate Sensitivity and Government Code Section 20229 (continued)

State Safety

Discount Rate Sensitivity (+/- 1% Change in Discount Rate)

Sensitivity Analysis							
As of June 30, 2018	Employer Normal Cost	Unfunded Liability Rate	Group Term Life Insurance	Total Employer Rate	Accrued Liability	Unfunded Accrued Liability	Funded Status
6.0%	17.8%	13.8%	0.0%	31.6%	15,410,130,408	4,858,788,147	68.5%
7.0% (current discount rate)	12.7%	8.8%	0.0%	21.5%	13,590,778,296	3,039,436,035	77.6%
8.0%	8.8%	3.9%	0.0%	12.7%	12,086,822,280	1,535,480,019	87.3%

Government Code Section 20229 (+/- 2% Change in Discount Rate)

Current Amortization Method							
As of June 30, 2018	Employer Normal Cost	Unfunded Liability Rate	Group Term Life Insurance	Total Employer Rate	Accrued Liability	Unfunded Accrued Liability	Funded Status
5.0%	24.3%	19.0%	0.0%	43.3%	17,631,830,432	7,080,488,171	59.8%
7.0% (current discount rate)	12.7%	8.8%	0.0%	21.5%	13,590,778,296	3,039,436,035	77.6%
9.0%	5.7%	0.0%	0.0%	5.7%	10,832,584,150	281,241,889	97.4%

Amortization of Unfunded Accrued Liability over EARSP (11 Years)							
As of June 30, 2018	Employer Normal Cost	Unfunded Liability Rate	Group Term Life Insurance	Total Employer Rate	Accrued Liability	Unfunded Accrued Liability	Funded Status
5.0%	24.3%	31.9%	0.0%	56.2%	17,631,830,432	7,080,488,171	59.8%
7.0% (current discount rate)	12.7%	14.3%	0.0%	27.0%	13,590,778,296	3,039,436,035	77.6%
9.0%	5.7%	0.0%	0.0%	5.7%	10,832,584,150	281,241,889	97.4%

- The change in accrued liability due to the change in discount rate of +/-1% or +/-2% was amortized over 20 years as a level percentage of pay (except for the "Amortization of Unfunded Accrued Liability over EARSP").
- In the case of a surplus, rates were calculated to equal the employer normal cost rate. This is based on a provision in the Public Employees' Pension Reform Act of 2013 (PEPRA) that requires a minimum employer contribution rate in combination with employee contributions shall not be less than the normal cost rate.
- Numbers may not add due to rounding.

Discount Rate Sensitivity and Government Code Section 20229 (continued)

State Peace Officers and Firefighters

Discount Rate Sensitivity (+/- 1% Change in Discount Rate)

Sensitivity Analysis							
As of June 30, 2018	Employer Normal Cost	Unfunded Liability Rate	Group Term Life Insurance	Total Employer Rate	Accrued Liability	Unfunded Accrued Liability	Funded Status
6.0%	26.5%	40.2%	0.0%	66.7%	55,658,656,050	22,332,061,658	59.9%
7.0% (current discount rate)	18.4%	28.8%	0.0%	47.2%	48,792,433,542	15,465,839,150	68.3%
8.0%	12.3%	17.8%	0.0%	30.1%	43,171,628,137	9,845,033,745	77.2%

Government Code Section 20229 (+/- 2% Change in Discount Rate)

Current Amortization Method							
As of June 30, 2018	Employer Normal Cost	Unfunded Liability Rate	Group Term Life Insurance	Total Employer Rate	Accrued Liability	Unfunded Accrued Liability	Funded Status
5.0%	37.3%	52.2%	0.0%	89.5%	64,138,576,002	30,811,981,610	52.0%
7.0% (current discount rate)	18.4%	28.8%	0.0%	47.2%	48,792,433,542	15,465,839,150	68.3%
9.0%	7.7%	7.1%	0.0%	14.8%	38,522,722,512	5,196,128,120	86.5%

Amortization of Unfunded Accrued Liability over EARSP (11 Years)							
As of June 30, 2018	Employer Normal Cost	Unfunded Liability Rate	Group Term Life Insurance	Total Employer Rate	Accrued Liability	Unfunded Accrued Liability	Funded Status
5.0%	37.3%	89.4%	0.0%	126.7%	64,138,576,002	30,811,981,610	52.0%
7.0% (current discount rate)	18.4%	47.9%	0.0%	66.3%	48,792,433,542	15,465,839,150	68.3%
9.0%	7.7%	14.5%	0.0%	22.2%	38,522,722,512	5,196,128,120	86.5%

- The change in accrued liability due to the change in discount rate of +/-1% or +/-2% was amortized over 20 years as a level percentage of pay (except for the "Amortization of Unfunded Accrued Liability over EARSP").
- In the case of a surplus, rates were calculated to equal the employer normal cost rate. This is based on a provision in the Public Employees' Pension Reform Act of 2013 (PEPRA) that requires a minimum employer contribution rate in combination with employee contributions shall not be less than the normal cost rate.
- Numbers may not add due to rounding.

Discount Rate Sensitivity and Government Code Section 20229 (continued)

California Highway Patrol

Discount Rate Sensitivity (+/- 1% Change in Discount Rate)

Sensitivity Analysis							
As of June 30, 2018	Employer Normal Cost	Unfunded Liability Rate	Group Term Life Insurance	Total Employer Rate	Accrued Liability	Unfunded Accrued Liability	Funded Status
6.0%	28.2%	50.9%	0.0%	79.1%	15,296,297,968	6,755,786,045	55.8%
7.0% (current discount rate)	19.3%	38.5%	0.0%	57.8%	13,383,782,393	4,843,270,470	63.8%
8.0%	12.7%	26.6%	0.0%	39.3%	11,821,619,229	3,281,107,306	72.2%

Government Code Section 20229 (+/- 2% Change in Discount Rate)

Current Amortization Method							
As of June 30, 2018	Employer Normal Cost	Unfunded Liability Rate	Group Term Life Insurance	Total Employer Rate	Accrued Liability	Unfunded Accrued Liability	Funded Status
5.0%	40.1%	64.1%	0.0%	104.2%	17,664,170,545	9,123,658,622	48.3%
7.0% (current discount rate)	19.3%	38.5%	0.0%	57.8%	13,383,782,393	4,843,270,470	63.8%
9.0%	7.7%	15.1%	0.0%	22.7%	10,532,102,079	1,991,590,156	81.1%

Amortization of Unfunded Accrued Liability over EARSP (13 Years)							
As of June 30, 2018	Employer Normal Cost	Unfunded Liability Rate	Group Term Life Insurance	Total Employer Rate	Accrued Liability	Unfunded Accrued Liability	Funded Status
5.0%	40.1%	91.9%	0.0%	132.0%	17,664,170,545	9,123,658,622	48.3%
7.0% (current discount rate)	19.3%	53.0%	0.0%	72.3%	13,383,782,393	4,843,270,470	63.8%
9.0%	7.7%	21.1%	0.0%	28.8%	10,532,102,079	1,991,590,156	81.1%

- The change in accrued liability due to the change in discount rate of +/-1% or +/-2% was amortized over 20 years as a level percentage of pay (except for the "Amortization of Unfunded Accrued Liability over EARSP").
- In the case of a surplus, rates were calculated to equal the employer normal cost rate. This is based on a provision in the Public Employees' Pension Reform Act of 2013 (PEPRA) that requires a minimum employer contribution rate in combination with employee contributions shall not be less than the normal cost rate.
- Numbers may not add due to rounding.

Mortality Rate Sensitivity

The following tables show how June 30, 2018 valuation results would differ under two alternate longevity scenarios, namely assuming rates of mortality are 10 percent lower or 10 percent higher than the current mortality assumption. This type of analysis highlights the impact on the plans of improving or worsening mortality over the long term.

State Miscellaneous

As of June 30, 2018	Accrued Liability	Market Value of Assets	Unfunded Accrued Liability/(Surplus)	Funded Status
10% lower mortality rates	$118,079,871,357	$80,223,069,956	$37,856,801,401	67.9%
Current mortality rates	115,469,058,970	80,223,069,956	35,245,989,014	69.5%
10% higher mortality rates	113,073,654,069	80,223,069,956	32,850,584,113	70.9%

State Industrial

As of June 30, 2018	Accrued Liability	Market Value of Assets	Unfunded Accrued Liability/(Surplus)	Funded Status
10% lower mortality rates	$4,763,636,531	$3,589,902,866	$1,173,733,665	75.4%
Current mortality rates	4,670,036,601	3,589,902,866	1,080,133,735	76.9%
10% higher mortality rates	4,583,761,343	3,589,902,866	993,858,477	78.3%

State Safety

As of June 30, 2018	Accrued Liability	Market Value of Assets	Unfunded Accrued Liability/(Surplus)	Funded Status
10% lower mortality rates	$13,856,875,748	$10,551,342,261	$3,305,533,487	76.1%
Current mortality rates	13,590,778,296	10,551,342,261	3,039,436,035	77.6%
10% higher mortality rates	13,345,471,748	10,551,342,261	2,794,129,487	79.1%

State Peace Officers & Firefighters

As of June 30, 2018	Accrued Liability	Market Value of Assets	Unfunded Accrued Liability/(Surplus)	Funded Status
10% lower mortality rates	$49,553,446,584	$33,326,594,392	$16,226,852,192	67.3%
Current mortality rates	48,792,433,542	33,326,594,392	15,465,839,150	68.3%
10% higher mortality rates	48,085,967,121	33,326,594,392	14,759,372,729	69.3%

California Highway Patrol

As of June 30, 2018	Accrued Liability	Market Value of Assets	Unfunded Accrued Liability/(Surplus)	Funded Status
10% lower mortality rates	$13,595,528,412	$8,540,511,923	$5,055,016,489	62.8%
Current mortality rates	13,383,782,393	8,540,511,923	4,843,270,470	63.8%
10% higher mortality rates	13,187,558,671	8,540,511,923	4,647,046,748	64.8%

Risk Analysis

Inflation Rate Sensitivity

The following tables show how June 30, 2018 valuation results would differ under two alternate inflation rate scenarios, namely assuming the inflation rate is 1 percent lower or 1 percent higher than the current valuation inflation rate assumption of 2.5 percent, while holding the discount rate fixed at 7.0 percent. This type of analysis highlights the impact on the plans of higher or lower inflation over the long term.

State Miscellaneous

As of June 30, 2018	Accrued Liability	Market Value of Assets	Unfunded Accrued Liability/(Surplus)	Funded Status
-1% inflation rate	$108,270,854,781	$80,223,069,956	$28,047,784,825	74.1%
Current inflation rate	115,469,058,970	80,223,069,956	35,245,989,014	69.5%
+1% inflation rate	119,118,063,434	80,223,069,956	38,894,993,478	67.3%

State Industrial

As of June 30, 2018	Accrued Liability	Market Value of Assets	Unfunded Accrued Liability/(Surplus)	Funded Status
-1% inflation rate	$4,340,180,481	$3,589,902,866	$750,277,615	82.7%
Current inflation rate	4,670,036,601	3,589,902,866	1,080,133,735	76.9%
+1% inflation rate	4,863,347,215	3,589,902,866	1,273,444,349	73.8%

State Safety

As of June 30, 2018	Accrued Liability	Market Value of Assets	Unfunded Accrued Liability/(Surplus)	Funded Status
-1% inflation rate	$12,686,297,156	$10,551,342,261	$2,134,954,895	83.2%
Current inflation rate	13,590,778,296	10,551,342,261	3,039,436,035	77.6%
+1% inflation rate	14,093,866,916	10,551,342,261	3,542,524,655	74.9%

State Peace Officers & Firefighters

As of June 30, 2018	Accrued Liability	Market Value of Assets	Unfunded Accrued Liability/(Surplus)	Funded Status
-1% inflation rate	$45,469,130,403	$33,326,594,392	$12,142,536,011	73.3%
Current inflation rate	48,792,433,542	33,326,594,392	15,465,839,150	68.3%
+1% inflation rate	50,716,343,329	33,326,594,392	17,389,748,937	65.7%

California Highway Patrol

As of June 30, 2018	Accrued Liability	Market Value of Assets	Unfunded Accrued Liability/(Surplus)	Funded Status
-1% inflation rate	$12,443,365,741	$8,540,511,923	3,902,853,818	68.6%
Current inflation rate	13,383,782,393	8,540,511,923	4,843,270,470	63.8%
+1% inflation rate	13,963,996,558	8,540,511,923	5,423,484,635	61.2%

Maturity Measures

As pension plans mature they become more sensitive to risks. To understand plan maturity and how it affects the ability of a pension plan sponsor to tolerate risk, it is important to understand how a plan is impacted by investment return volatility, other economic variables and changes in longevity or other demographic assumptions.

One measure of a plan's maturity is the ratio of retiree liability to 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. For both CalPERS and many other retirement systems in the United States, these ratios have been steadily increasing in recent years.

Ratio of Retiree Accrued Liability to Total Accrued Liability

	June 30, 2017			June 30, 2018		
Plan	Retiree Accrued Liability	Total Accrued Liability	Ratio	Retiree Accrued Liability	Total Accrued Liability	Ratio
State Miscellaneous	$63,383,034,503	$106,955,886,517	59.3%	$68,450,027,359	$115,469,058,970	59.3%
State Industrial	2,159,093,009	4,210,362,730	51.3%	2,374,543,882	4,670,036,601	50.8%
State Safety	6,767,232,803	12,204,328,400	55.4%	7,440,109,308	13,590,778,296	54.7%
State Peace Officers & Firefighters	27,517,540,419	44,618,700,274	61.7%	30,135,515,826	48,792,433,542	61.8%
California Highway Patrol	7,514,630,194	12,321,822,329	61.0%	8,255,474,114	13,383,782,393	61.7%

Another measure of maturity is the ratio of actives to retirees, also called the 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.

Support Ratio

	June 30, 2017			June 30, 2018		
Plan	Number of Actives	Number of Retirees	Support Ratio	Number of Actives	Number of Retirees	Support Ratio
State Miscellaneous	172,365	190,693	90.4%	174,402	195,158	89.4%
State Industrial	11,610	14,126	82.2%	11,811	14,642	80.7%
State Safety	27,422	24,742	110.8%	28,335	25,749	110.0%
State Peace Officers & Firefighters	41,445	38,250	108.4%	41,289	39,947	103.4%
California Highway Patrol	7,357	8,971	82.0%	7,311	9,158	79.8%

Volatility ratios, presented in the following section, are another measure for assessing plan maturity.

Volatility Ratios

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

Asset Volatility Ratio

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

Liability Volatility Ratio

Plans that have higher liability-to-payroll ratios produce more volatile employer rates due to investment return and changes in liability. For example, a plan with a liability-to-payroll ratio of 12 is expected to have twice the contribution volatility of a plan with a liability-to-payroll ratio of 6. The liability volatility ratio is also included in the table below. It should be noted that this ratio indicates a longer-term potential for contribution volatility. The asset volatility ratio, described above, will tend to move closer to the liability volatility ratio as the plan matures.

Rate Volatility

	Market Value of Assets without Receivables	Annual Covered Payroll	Asset Volatility Ratio	Accrued Liability	Liability Volatility Ratio
Plan	(1)	(2)	(1)/(2)	(3)	(3)/(2)
State Miscellaneous	$79,987,015,947	$12,251,583,453	6.5	$115,469,058,970	9.4
State Industrial	3,577,011,352	699,252,899	5.1	4,670,036,601	6.7
State Safety	10,535,339,097	2,316,124,913	4.5	13,590,778,296	5.9
State Peace Officers & Firefighters	33,257,239,294	3,522,647,266	9.4	48,792,433,542	13.9
California Highway Patrol	8,529,982,845	871,895,121	9.8	13,383,782,393	15.4

The above analysis shows that the CHP, POFF and Miscellaneous plans are expected to have more volatile contributions than the Industrial and Safety plans. It also shows that the contribution volatility is expected to increase as the plans become better funded. The contribution volatility would be 29 to 57 percent greater if the plans were 100 percent funded at the current discount rate.

Appendices

Appendix A – Statement of Actuarial Methods and Assumptions

Actuarial Data

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

Actuarial Methods

Actuarial Cost Method

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

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

Amortization of Unfunded Actuarial Accrued Liability

The excess of the total accrued liability over the market value of plan assets is called the unfunded accrued liability (UAL). Funding requirements are determined by adding the normal cost and an amortization payment toward the UAL. The UAL is amortized as a "level percentage of pay" wherein the amortization payment increases each year at an escalation rate equal to the assumed payroll growth rate. Commencing with the June 30, 2014 valuation, all new gains or losses are tracked and amortized over a fixed 30-year period with a 5-year ramp up at the beginning and a 5-year ramp down at the end of the amortization period. All changes in liability due to plan amendments (other than golden handshakes), changes in actuarial assumptions, or changes in actuarial methodology are amortized separately 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 UAL due to a golden handshake are amortized over a period of 5 years. A summary of the current policy is provided in the table below:

	Source				
	(Gain)/Loss				
Driver	Investment	Non-Investment	Assumption or 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

Actuarial Methods (continued)

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.

On February 14, 2018, the Board adopted a new amortization policy effective with the June 30, 2019 actuarial valuation, first affecting State plan employer contributions for Fiscal Year 2020-21. The new policy will generally accelerate the recognition of new sources of UAL. Since this change is not effective until a future valuation and will not affect any amortization bases already in existence upon implementation, it has no effect on the June 30, 2018 valuation results or Fiscal Year 2019-20 required contributions. The new amortization policy is incorporated in the projected contribution rates shown in the “Analysis of Future Investment Return Scenarios” section of this report.

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:

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

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

By State statute for California Highway Patrol only, a portion of the assets in excess of the Entry Age Normal accrued liability can be applied as a direct offset to required employer and employee contributions.

The 1959 Survivor Program valuation is not provided in this report. A separate report for that program is available.

The Term Insurance Method is used for the State Group Term Life Insurance Program. The required contribution for the coming fiscal year is the difference between the reserves for that benefit and one and one-half times the expected benefit payments, but not less than zero.

Purchasing Power Protection Act (PPPA) Method

PPPA benefits are cost-of-living adjustments intended to maintain the individual’s current retirement benefit at 75 percent of the original benefit at retirement adjusted for inflation since retirement. The PPPA benefit is paid, if necessary, in addition to any other cost-of-living adjustment provided under the terms of the plan. Prior to January 1, 2001, there was a single PPPA pool covering all CalPERS employers. However, commencing January 1, 2001, separate PPPA pools were established. A pool was set up for all State plans and a separate pool for School employers. The public agencies were removed entirely from PPPA pooling resulting in each public agency plan paying for its own PPPA benefits. The creation of separate pools effectively eliminates the cross subsidization between the State, Schools and public agencies. Because there is a single PPPA pool for all State plans, cross subsidization between State plans still occurs.

For the State plans, the total annual outlay for PPPA benefits is limited by State statute to earnings of up to 1.1 percent of accumulated member contributions. If this annual outlay is insufficient to provide the PPPA benefits in a given fiscal year, the 75 percent maintenance target would be proportionately reduced. Since the inception of the PPPA benefit program, 1.1 percent has proved more than sufficient to provide the 75 percent maintenance. Under the inflation assumption of 2.5 percent compounded annually, the 1.1 percent appears to remain more than sufficient in the foreseeable future.

Actuarial Methods (continued)

Internal Revenue Code Section 415

The valuation reflects the limitations on benefits imposed by Internal Revenue Code Section 415. The current valuation is based on the IRC 415(b) dollar limit for 2018 of $220,000, up from the 2017 limit of $215,000 used in the prior valuation.

Internal Revenue Code Section 401(a)(17)

The valuation reflects the limitations on pensionable compensation imposed by Internal Revenue Code Section 401(a)(17). The current valuation is based on the IRC 401(a)(17) limit for 2018 of $275,000, up from the 2017 limit of $270,000 used in the prior valuation.

PEPRA Assumptions

The Public Employees' Pension Reform Act of 2013 (PEPRA) mandated new benefit formulas and new member contributions for members hired on or after January 1, 2013, as defined by PEPRA. Different assumptions for PEPRA members are disclosed below.

Asset Valuation Method

Market value of assets plus accounts receivable.

It is the policy of the CalPERS Board of Administration to use professionally accepted amortization methods to eliminate a surplus or an unfunded accrued liability in a manner that maintains benefit security for the members of the System while minimizing substantial variations in required employer contribution rates. CalPERS' policy in effect for this valuation amortizes all gains and losses over a fixed 30-year period. The increase or decrease in the rate is then spread directly over a 5-year period. This method is referred to as "direct rate smoothing." The direct rate smoothing method is equivalent to a method using a 5-year asset smoothing period with no actuarial value of asset corridor and a 25-year amortization period for gains and losses.

Accounts Receivable

In preparing valuations and setting employer contribution rates, asset values include accounts receivable. The CalPERS Actuarial Office assumes that all assets are accruing interest at the actuarially assumed rate. Therefore, the rates depicted assume that all payments have been made and are accruing interest.

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 7.0 percent. The Board also approved several changes to the demographic assumptions that more closely aligned with actual experience. These new actuarial assumptions were first used in the June 30, 2017 valuation to set the Fiscal Year 2018-19 contribution for the State plans.

Actuarial Assumptions (continued)

On December 21, 2016, the CalPERS Board of Administration lowered the discount rate from 7.5 percent to 7.0 percent using a three-year phase-in beginning with the June 30, 2016 actuarial valuations. The minimum employer contributions for Fiscal Year 2019-20 determined in this valuation were calculated using a discount rate of 7.0 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 further change to the discount rate.

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 used in this valuation represent estimates of future experience rather than observations of estimates inherent in market data.

Economic Assumptions

Discount Rate

The discount rate assumption adopted by the Board is 7.0 percent compounded annually (net of investment and administrative expenses).

Salary Growth

Annual increases vary by entry age and duration of service. A sample of assumed increases is shown below. Wage inflation assumption in the valuation year (2.75 percent for 2018) is added to these factors for total salary growth.

Annual Percentage Increase

State Miscellaneous Tier 1 & Tier 2

Duration of Service	Entry Age		
	20	30	40
0	6.4%	5.6%	4.4%
3	5.3%	4.4%	3.1%
5	4.3%	3.6%	2.4%
10	2.3%	1.8%	1.2%
15	1.5%	1.2%	0.8%
20	1.0%	0.9%	0.6%
25	0.7%	0.6%	0.4%
30	0.5%	0.4%	0.3%

Economic Assumptions (continued)

Annual Percentage Increase (continued)

State Industrial

Duration of Service	Entry Age		
	20	30	40
0	7.3%	7.0%	6.4%
3	5.1%	4.7%	3.9%
5	4.0%	3.6%	2.8%
10	2.7%	2.2%	1.4%
15	1.8%	1.5%	1.1%
20	1.2%	1.0%	0.8%
25	0.8%	0.7%	0.6%
30	0.5%	0.5%	0.4%

State Safety, POFF and CHP

Duration of Service	State Safety	POFF	CHP
0	5.0%	14.7%	6.8%
3	3.1%	6.7%	4.0%
5	2.1%	4.0%	2.4%
10	0.8%	1.2%	1.0%
15	0.7%	0.5%	1.0%
20	0.6%	1.4%	1.8%
25	0.5%	1.5%	2.0%
30	0.5%	1.0%	1.0%

Overall Payroll Growth

2.75 percent compounded annually (used in projecting the payroll over which unfunded accrued liability is amortized). For the State Miscellaneous plan, the payroll of Tier 2 members is assumed to decrease in accordance with actuarial assumptions based on the assumption that all new State Miscellaneous entrants will elect Tier 1. The payroll of Tier 1 members is assumed to grow at the rate necessary for the overall payroll of the State Miscellaneous plan to grow annually at a rate of 2.75 percent.

Inflation

2.50 percent compounded annually.

Demographic Assumptions

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-Industrial Disabled (Not Job-Related)		Industrial 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, it is assumed the following are married upon retirement.

Plan	Percent Married
State Miscellaneous	70%
State Industrial	70%
State Safety	70%
State Peace Officers & Firefighters	80%
California Highway Patrol	90%

Age of Spouse

It is assumed that female spouses are 3 years younger than male spouses.

Terminated Members

Terminated members who are non-vested are assumed to refund immediately. Terminated members who are vested are assumed to retire at age 59 (State Miscellaneous and Industrial) or age 54 (State Safety, State Peace Officers and Firefighters, and California Highway Patrol).

Miscellaneous Loading Factors

Credit for Unused Sick Leave

Total years of service is increased by 1 percent for plans with the Credit for Unused Sick Leave provision.

Norris Decision (Best Factors)

Projected benefit amounts for employees hired prior to July 1, 1982 are increased 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.

Miscellaneous Assumptions

Tier 2 Members electing Tier 1 benefits

In general, Tier 2 members of both the State Miscellaneous and State Industrial plans have the right to convert their Tier 2 service to Tier 1 service provided they make up the shortfall in their accumulated contributions with interest. In this valuation, we have assumed that all Tier 2 members eligible to convert their Tier 2 service to Tier 1 service will elect to do so.

PLAN SPECIFIC ACTUARIAL ASSUMPTIONS

State Miscellaneous Tier 1

Service Retirement - Classic Members

Rates vary by age and service. See sample rates in the table below.

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.007	0.010	0.014	0.019	0.019	0.022	0.029
52	0.013	0.012	0.013	0.018	0.020	0.023	0.031
54	0.011	0.017	0.020	0.030	0.035	0.039	0.049
56	0.023	0.035	0.043	0.062	0.083	0.106	0.165
58	0.027	0.043	0.047	0.074	0.089	0.121	0.170
60	0.037	0.062	0.075	0.119	0.141	0.175	0.246
62	0.087	0.127	0.152	0.221	0.263	0.310	0.356
65	0.090	0.158	0.175	0.245	0.249	0.301	0.344
70	0.140	0.176	0.184	0.223	0.276	0.299	0.299
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement - PEPRA Members

Rates vary by age and service. See sample rates in the table below.

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000
52	0.009	0.008	0.009	0.013	0.014	0.016	0.022
54	0.008	0.012	0.014	0.021	0.025	0.027	0.034
56	0.016	0.025	0.030	0.043	0.058	0.074	0.116
58	0.020	0.032	0.035	0.056	0.067	0.091	0.128
60	0.030	0.050	0.060	0.095	0.113	0.140	0.197
62	0.070	0.102	0.122	0.177	0.210	0.248	0.285
65	0.081	0.142	0.158	0.221	0.224	0.271	0.310
70	0.140	0.176	0.184	0.223	0.276	0.299	0.299
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Termination with Refund

Rates vary by entry age and service. See sample rates in the table below.

Duration of Service	Entry Age				
	20	25	30	35	40
0	0.16570	0.16570	0.15120	0.13660	0.12920
1	0.13660	0.13660	0.12160	0.10660	0.09650
2	0.11060	0.11060	0.09650	0.08250	0.07190
3	0.08770	0.08770	0.07600	0.06430	0.05540
4	0.06790	0.06790	0.06000	0.05200	0.04680
5	0.02720	0.02720	0.02230	0.01740	0.01600
10	0.00480	0.00480	0.00430	0.00370	0.00270
15	0.00160	0.00160	0.00120	0.00080	0.00070
20	0.00110	0.00110	0.00080	0.00050	0.00050
25	0.00080	0.00080	0.00060	0.00040	0.00030
30	0.00060	0.00060	0.00040	0.00020	0.00020

PLAN SPECIFIC ACTUARIAL ASSUMPTIONS (continued)

State Miscellaneous Tier 1 (continued)

Termination with Vested Benefits

Rates vary by entry age and service. See sample rates in the table below.

Duration of Service	Entry Age				
	20	25	30	35	40
5	0.04410	0.04410	0.03940	0.03460	0.02890
6	0.03970	0.03970	0.03570	0.03180	0.02610
7	0.03550	0.03550	0.03220	0.02890	0.02330
8	0.03170	0.03170	0.02880	0.02600	0.02060
9	0.02820	0.02820	0.02570	0.02320	0.01800
10	0.02510	0.02510	0.02270	0.02040	0.01560
14	0.01610	0.01610	0.01370	0.01130	0.00850
15	0.01460	0.01460	0.01220	0.00970	0.00740
19	0.01040	0.01040	0.00790	0.00540	0.00430
20	0.00950	0.00950	0.00710	0.00470	0.00380
24	0.00580	0.00580	0.00370	0.00170	0.00130
25	0.00500	0.00500	0.00290	0.00080	0.00070
29	0.00290	0.00290	0.00150	0.00000	0.00000
30	0.00260	0.00260	0.00130	0.00000	0.00000

- When a member is eligible to retire, the termination with vested benefits probability is set to zero.
- After termination with vested benefits, a miscellaneous member is assumed to retire at age 59 and a safety member at age 54.

Non-Industrial (Not Job-Related) Death and Disability

Rates vary by age and gender. See sample rates in the table below.

	Non-Industrial Death (Not Job-Related)		Non-Industrial Disability (Not Job-Related)	
Attained Age	Male	Female	Male	Female
20	0.000216	0.000069	0.000190	0.000390
25	0.000289	0.000109	0.000190	0.000390
30	0.000379	0.000155	0.000190	0.000460
35	0.000491	0.000270	0.000360	0.000960
40	0.000637	0.000366	0.001030	0.001860
45	0.000795	0.000543	0.002040	0.003260
50	0.001161	0.000794	0.002740	0.004050
55	0.001717	0.001204	0.002380	0.003100
60	0.002550	0.001657	0.002000	0.002560

PLAN SPECIFIC ACTUARIAL ASSUMPTIONS (continued)

State Miscellaneous Tier 2

Service Retirement - Classic Members

Rates vary by age and service. See sample rates in the table below.

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.007	0.010	0.014	0.019	0.019	0.022	0.029
52	0.013	0.012	0.013	0.018	0.020	0.023	0.031
54	0.011	0.017	0.020	0.030	0.035	0.039	0.049
56	0.023	0.035	0.043	0.062	0.083	0.106	0.165
58	0.027	0.043	0.047	0.074	0.089	0.121	0.170
60	0.037	0.062	0.075	0.119	0.141	0.175	0.246
62	0.087	0.127	0.152	0.221	0.263	0.310	0.356
65	0.090	0.158	0.175	0.245	0.249	0.301	0.344
70	0.140	0.176	0.184	0.223	0.276	0.299	0.299
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement - PEPRA Members

Rates vary by age and service. See sample rates in the table below.

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000
52	0.009	0.008	0.009	0.013	0.014	0.016	0.022
54	0.008	0.012	0.014	0.021	0.025	0.027	0.034
56	0.016	0.025	0.030	0.043	0.058	0.074	0.116
58	0.020	0.032	0.035	0.056	0.067	0.091	0.128
60	0.030	0.050	0.060	0.095	0.113	0.140	0.197
62	0.070	0.102	0.122	0.177	0.210	0.248	0.285
65	0.081	0.142	0.158	0.221	0.224	0.271	0.310
70	0.140	0.176	0.184	0.223	0.276	0.299	0.299
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Termination with Refund

Rates vary by entry age and service. See sample rates in the table below.

Duration of Service	Entry Age				
	20	25	30	35	40
0	0.1496	0.1433	0.1370	0.1307	0.1244
1	0.1365	0.1302	0.1239	0.1176	0.1113
2	0.1234	0.1172	0.1109	0.1046	0.0983
3	0.1104	0.1041	0.0978	0.0915	0.0852
4	0.0973	0.0910	0.0848	0.0785	0.0722
5	0.0843	0.0780	0.0717	0.0654	0.0591
6	0.0792	0.0729	0.0666	0.0603	0.0540
7	0.0741	0.0678	0.0615	0.0553	0.0490
8	0.0691	0.0628	0.0565	0.0502	0.0439
9	0.0640	0.0577	0.0514	0.0451	0.0388

PLAN SPECIFIC ACTUARIAL ASSUMPTIONS (continued)

State Miscellaneous Tier 2 (continued)

Termination with Vested Deferred Benefits

Rates vary by entry age and service. See sample rates in the table below.

Duration of Service	Entry Age				
	20	25	30	35	40
10	0.0589	0.0526	0.0463	0.0400	0.0000
14	0.0480	0.0417	0.0354	0.0291	—
15	0.0453	0.0390	0.0327	—	—
19	0.0344	0.0281	0.0218	—	—
20	0.0317	0.0254	—	—	—
24	0.0208	0.0145	—	—	—
25	0.0180	—	—	—	—
29	0.0071	—	—	—	—
30	—	—	—	—	—

- When a member is eligible to retire, the termination with vested benefits probability is set to zero.
- After termination with vested benefits, a miscellaneous member is assumed to retire at age 59 and a safety member at age 54.

Non-Industrial (Not Job-Related) Death and Disability

Rates vary by age and gender. See sample rates in the table below.

	Non-Industrial Death (Not Job-Related)		Non-Industrial Disability (Not Job-Related)	
Attained Age	Male	Female	Male	Female
20	0.000216	0.000069	0.000190	0.000390
25	0.000289	0.000109	0.000190	0.000390
30	0.000379	0.000155	0.000190	0.000460
35	0.000491	0.000270	0.000360	0.000960
40	0.000637	0.000366	0.001030	0.001860
45	0.000795	0.000543	0.002040	0.003260
50	0.001161	0.000794	0.002740	0.004050
55	0.001717	0.001204	0.002380	0.003100
60	0.002550	0.001657	0.002000	0.002560

PLAN SPECIFIC ACTUARIAL ASSUMPTIONS (continued)

State Industrial

Service Retirement - Classic Members

Rates vary by age and years of service. See sample rates in the table below.

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.006	0.008	0.013	0.019	0.026	0.029	0.036
52	0.007	0.009	0.015	0.023	0.031	0.034	0.043
54	0.014	0.020	0.030	0.046	0.062	0.069	0.086
56	0.028	0.040	0.062	0.094	0.126	0.140	0.174
58	0.029	0.041	0.064	0.098	0.131	0.145	0.181
60	0.042	0.060	0.093	0.142	0.191	0.211	0.262
62	0.079	0.113	0.176	0.266	0.357	0.398	0.493
65	0.081	0.117	0.182	0.276	0.371	0.413	0.511
70	0.097	0.139	0.217	0.329	0.443	0.493	0.611
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement - PEPRA Members

Rates vary by age and years of service. See sample rates in the table below.

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000
52	0.005	0.006	0.011	0.016	0.022	0.024	0.030
54	0.010	0.014	0.021	0.032	0.043	0.048	0.060
56	0.020	0.028	0.043	0.066	0.088	0.098	0.122
58	0.022	0.031	0.048	0.074	0.098	0.109	0.136
60	0.034	0.048	0.074	0.114	0.153	0.169	0.210
62	0.063	0.090	0.141	0.213	0.286	0.318	0.394
65	0.073	0.105	0.164	0.248	0.334	0.372	0.460
70	0.097	0.139	0.217	0.329	0.443	0.493	0.611
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Termination with Refund

Rates vary by years of service. See sample rates in the table below.

Duration of Service									
0	5	10	15	20	25	30	35	40	45
0.0912	0.0190	0.0029	0.0016	0.0010	0.0006	0.0004	0.0002	0.0001	0.0001

PLAN SPECIFIC ACTUARIAL ASSUMPTIONS (continued)

State Industrial (continued)

Termination with Vested Deferred Benefits

Rates vary by entry age and years of service. See sample rates in the table below.

Duration of Service	Entry Age 20	25	30	35	40
5	0.0496	0.0449	0.0405	0.0356	0.0311
6	0.0470	0.0421	0.0377	0.0328	0.0281
7	0.0442	0.0393	0.0346	0.0297	0.0250
8	0.0414	0.0365	0.0316	0.0267	0.0220
9	0.0384	0.0335	0.0285	0.0234	0.0187
10	0.0353	0.0302	0.0253	0.0201	—
14	0.0311	0.0257	0.0206	0.0152	—
15	0.0302	0.0246	0.0194	—	—
19	0.0248	0.0190	0.0136	—	—
20	0.0232	0.0176	—	—	—
24	0.0173	0.0115	—	—	—
25	0.0159	—	—	—	—
29	0.0091	—	—	—	—
30	—	—	—	—	—

- When a member is eligible to retire, the termination with vested benefits probability is set to zero.
- After termination with vested benefits, a miscellaneous member is assumed to retire at age 59 and a safety member at age 54.

Non-Industrial (Not Job-Related) Death

Rates vary by age and gender. See sample rates in the table below.

Non-Industrial (Not Job-Related) Disability, Industrial (Job-Related) Disability & Industrial (Job-Related) Death

Rates vary by age. See sample rates in the table below.

	Non-Industrial Death		Non-Industrial Disability	Industrial Death	Industrial Disability
Attained Age	Male	Female	Male and Female	Male and Female	Male and Female
20	0.000216	0.000069	0.000430	0.000040	0.000150
25	0.000289	0.000109	0.000430	0.000060	0.000150
30	0.000379	0.000155	0.001060	0.000070	0.000150
35	0.000491	0.000270	0.001840	0.000090	0.000290
40	0.000637	0.000366	0.002950	0.000100	0.000290
45	0.000795	0.000543	0.004480	0.000120	0.000440
50	0.001161	0.000794	0.006010	0.000130	0.000440
55	0.001717	0.001204	0.007710	0.000150	0.000580
60	0.002550	0.001657	0.007710	0.000160	0.000580

PLAN SPECIFIC ACTUARIAL ASSUMPTIONS (continued)

State Safety

Service Retirement - Classic Members

Rates vary by age and years of service. See sample rates in the table below.

Attained Age	Years of Service 5	10	15	20	25	30	35
50	0.008	0.013	0.020	0.030	0.032	0.039	0.045
52	0.008	0.017	0.017	0.030	0.030	0.035	0.044
54	0.016	0.023	0.023	0.034	0.041	0.054	0.099
56	0.032	0.039	0.058	0.109	0.138	0.171	0.231
58	0.035	0.047	0.069	0.109	0.132	0.179	0.256
60	0.048	0.056	0.090	0.154	0.158	0.201	0.257
62	0.084	0.095	0.140	0.239	0.253	0.308	0.356
65	0.111	0.138	0.172	0.249	0.257	0.311	0.359
70	0.137	0.167	0.214	0.281	0.309	0.373	0.401
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement - PEPRA Members

Rates vary by age and years of service. See sample rates in the table below.

Attained Age	Years of Service 5	10	15	20	25	30	35
50	0.007	0.011	0.017	0.026	0.027	0.033	0.038
52	0.007	0.014	0.014	0.026	0.026	0.030	0.037
54	0.012	0.017	0.017	0.026	0.031	0.041	0.074
56	0.024	0.029	0.044	0.082	0.104	0.128	0.173
58	0.028	0.038	0.055	0.087	0.106	0.143	0.205
60	0.043	0.050	0.081	0.139	0.142	0.181	0.231
62	0.067	0.076	0.112	0.191	0.202	0.246	0.285
65	0.100	0.124	0.155	0.224	0.231	0.280	0.323
70	0.137	0.167	0.214	0.281	0.309	0.373	0.401
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Termination with Refund

Rates vary by service. See sample rates in the table below.

Duration of Service 0	1	2	3	4	5	10	15	20	25	30
0.1408	0.1014	0.0723	0.0533	0.0444	0.0155	0.0033	0.0019	0.0011	0.0006	0.0004

Termination with Vested Deferred Benefits

Rates vary by service. See sample rates in the table below.

Duration of Service 5	6	7	8	9	10	15	20	25	30	35
0.0246	0.0218	0.0194	0.0173	0.0155	0.0141	0.0097	0.0073	0.0050	0.0034	0.0000

- When a member is eligible to retire, the termination with vested benefits probability is set to zero.
- After termination with vested benefits, a miscellaneous member is assumed to retire at age 59 and a safety member at age 54.

PLAN SPECIFIC ACTUARIAL ASSUMPTIONS (continued)

State Safety (continued)

Non-Industrial (Not Job-Related) Death

Rates vary by age and gender. See sample rates in the table below.

Non-Industrial (Not Job-Related) Disability, Industrial (Job-Related) Disability & Industrial (Job-Related) Death

Rates vary by age. See sample rates in the table below.

	Non-Industrial Death		Non-Industrial Disability	Industrial Death	Industrial Disability
Attained Age	Male	Female	Male and Female	Male and Female	Male and Female
20	0.000216	0.000069	0.000360	0.000040	0.000020
25	0.000289	0.000109	0.000540	0.000060	0.000760
30	0.000379	0.000155	0.000630	0.000070	0.001700
35	0.000491	0.000270	0.000720	0.000090	0.002640
40	0.000637	0.000366	0.000720	0.000100	0.003600
45	0.000795	0.000543	0.001080	0.000120	0.004570
50	0.001161	0.000794	0.002010	0.000130	0.005570
55	0.001717	0.001204	0.002400	0.000150	0.006580
60	0.002550	0.001657	0.003200	0.000160	0.007620

State Peace Officers and Firefighters

Service Retirement - Classic Members

Rates vary by age and years of service. See sample rates in the table below.

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.012	0.030	0.044	0.109	0.224	0.449	0.467
52	0.012	0.026	0.041	0.096	0.145	0.255	0.257
54	0.021	0.042	0.053	0.118	0.162	0.292	0.306
56	0.031	0.044	0.057	0.135	0.213	0.335	0.345
58	0.020	0.065	0.070	0.158	0.224	0.354	0.354
60	0.035	0.066	0.094	0.179	0.276	0.360	0.367
62	0.067	0.104	0.130	0.221	0.324	0.415	0.440
65	0.065	0.081	0.127	0.231	0.342	0.427	0.453
70	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement - PEPRA Members – 2.5% @ 57

Rates vary by age and years of service. See sample rates in the table below.

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.008	0.021	0.031	0.076	0.157	0.314	0.327
52	0.008	0.018	0.029	0.067	0.102	0.179	0.180
54	0.016	0.032	0.040	0.089	0.122	0.219	0.230
56	0.025	0.035	0.046	0.108	0.170	0.268	0.276
58	0.018	0.059	0.063	0.142	0.202	0.319	0.319
60	0.033	0.063	0.089	0.170	0.262	0.342	0.349
62	0.067	0.104	0.130	0.221	0.324	0.415	0.440
65	0.065	0.081	0.127	0.231	0.342	0.427	0.453
70	1.000	1.000	1.000	1.000	1.000	1.000	1.000

PLAN SPECIFIC ACTUARIAL ASSUMPTIONS (continued)

State Peace Officers and Firefighters (continued)

Service Retirement - PEPRA Members – 2.7% @ 57

Rates vary by age and years of service. See sample rates in the table below.

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.008	0.021	0.031	0.076	0.157	0.314	0.327
52	0.009	0.020	0.031	0.072	0.109	0.191	0.193
54	0.017	0.034	0.042	0.094	0.130	0.234	0.245
56	0.026	0.037	0.048	0.115	0.181	0.285	0.293
58	0.020	0.065	0.070	0.158	0.224	0.354	0.354
60	0.035	0.066	0.094	0.179	0.276	0.360	0.367
62	0.067	0.104	0.130	0.221	0.324	0.415	0.440
65	0.065	0.081	0.127	0.231	0.342	0.427	0.453
70	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Termination with Refund

Rates vary by years of service. See sample rates in the table below.

Duration of Service										
0	1	2	3	4	5	10	15	20	25	30
0.1217	0.0779	0.0431	0.0353	0.0275	0.0056	0.0039	0.0025	0.0015	0.0006	0.0003

Termination with Vested Deferred Benefits

Rates vary by years of service. See sample rates in the table below.

Duration of Service										
5	6	7	8	9	10	15	20	25	30	35
0.0117	0.0115	0.0112	0.0108	0.0103	0.0098	0.0069	0.0049	0.0031	0.0020	0.0000

- When a member is eligible to retire, the termination with vested benefits probability is set to zero.
- After termination with vested benefits, a miscellaneous member is assumed to retire at age 59 and a safety member at age 54.

Non-Industrial (Not Job-Related) Death

Rates vary by age and gender. See sample rates in the table below.

Non-Industrial (Not Job-Related) Disability, Industrial (Job-Related) Disability & Industrial (Job-Related) Death

Rates vary by age. See sample rates in the table below.

	Non-Industrial Death		Non-Industrial Disability	Industrial Death	Industrial Disability
Attained Age	Male	Female	Male and Female	Male and Female	Male and Female
20	0.000216	0.000069	0.000300	0.000040	0.000390
25	0.000289	0.000109	0.000300	0.000060	0.000870
30	0.000379	0.000155	0.000300	0.000070	0.001670
35	0.000491	0.000270	0.000300	0.000090	0.002890
40	0.000637	0.000366	0.000400	0.000100	0.004640
45	0.000795	0.000543	0.000600	0.000120	0.007060
50	0.001161	0.000794	0.000980	0.000130	0.010270
55	0.001717	0.001204	0.001430	0.000150	0.014420
60	0.002550	0.001657	0.001880	0.000160	0.019660

PLAN SPECIFIC ACTUARIAL ASSUMPTIONS (continued)

California Highway Patrol

Service Retirement - Classic Members

Rates vary by age and years of service. See sample rates in the table below.

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.038	0.038	0.038	0.049	0.107	0.418	0.453
52	0.027	0.027	0.027	0.027	0.093	0.315	0.383
54	0.038	0.038	0.038	0.038	0.124	0.309	0.404
56	0.051	0.051	0.051	0.084	0.139	0.350	0.380
58	0.049	0.049	0.049	0.049	0.171	0.338	0.350
60	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement - PEPRA Members – 2.5% @ 57

Rates vary by age and years of service. See sample rates in the table below.

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.027	0.027	0.027	0.034	0.075	0.293	0.317
52	0.020	0.020	0.020	0.020	0.070	0.236	0.287
54	0.030	0.030	0.030	0.030	0.099	0.247	0.323
56	0.043	0.043	0.043	0.071	0.118	0.298	0.323
58	0.044	0.044	0.044	0.044	0.154	0.304	0.315
60	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Termination with Refund

Rates vary by service. See sample rates in the table below.

Duration of Service										
0	1	2	3	4	5	10	15	20	25	30
0.1050	0.0243	0.0152	0.0091	0.0054	0.0029	0.0005	0.0003	0.0002	0.0002	0.0002

Termination with Vested Deferred Benefits

Rates vary by service. See sample rates in the table below.

Duration of Service										
5	6	7	8	9	10	15	20	25	30	35
0.0090	0.0084	0.0079	0.0075	0.0071	0.0067	0.0049	0.0034	0.0023	0.0010	0.0000

- When a member is eligible to retire, the termination with vested benefits probability is set to zero.
- After termination with vested benefits, a miscellaneous member is assumed to retire at age 59 and a safety member at age 54.

PLAN SPECIFIC ACTUARIAL ASSUMPTIONS (continued)

California Highway Patrol (continued)

Non-Industrial (Not Job-Related) Death

Rates vary by age and gender. See sample rates in the table below.

Non-Industrial (Not Job-Related) Disability, Industrial (Job-Related) Disability & Industrial (Job-Related) Death

Rates vary by age. See sample rates in the table below.

	Non-Industrial Death		Non-Industrial Disability	Industrial Death	Industrial Disability
Attained Age	Male	Female	Male and Female	Male and Female	Male and Female
20	0.000216	0.000069	0.000100	0.000040	0.000156
25	0.000289	0.000109	0.000100	0.000060	0.000348
30	0.000379	0.000155	0.000100	0.000070	0.000684
35	0.000491	0.000270	0.000100	0.000090	0.001224
40	0.000637	0.000366	0.000100	0.000100	0.002022
45	0.000795	0.000543	0.000200	0.000120	0.003162
50	0.001161	0.000794	0.000200	0.000130	0.012138
55	0.001717	0.001204	0.000200	0.000150	0.054066
60	0.002550	0.001657	0.000200	0.000160	0.204306

Appendix B – Principal Plan Provisions

State Miscellaneous Tier 1

The following is a summary of the major plan provisions for the most representative group used in calculating the liabilities of this plan. Many of the statements in this summary are general in nature and intended to provide a summary of the complex Public Employees' Retirement Law. The law itself governs in all situations.

RETIREMENT PROGRAM

Service Retirement

Eligibility

A CalPERS Classic and Safety PEPRA members become 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). PEPRA Miscellaneous members become eligible for Service Retirement upon attainment of age 52 with at least five years of service.

Benefit

The Service Retirement benefit calculated for service earned by this group of employees is a monthly allowance equal to the product of the *benefit factor*, *years of service*, and *final compensation*, where

- The *benefit factor* for this group of employees comes from the **2% at 55** benefit factor table. New Classic members hired on or after January 15, 2011 are subject to the **2% at 60** benefit factor table. New PEPRA members hired on or after January 1, 2013 are subject to the **2% at 62** benefit factor table. The factor depends on the member's age at retirement. Listed below are the factors for retirement at whole year ages:

Retirement Age	2% @ 55 Factor	2% @ 60 Factor	2% @ 62 Factor
50	1.100%	1.092%	N/A
51	1.280%	1.156%	N/A
52	1.460%	1.224%	1.000%
53	1.640%	1.296%	1.100%
54	1.820%	1.376%	1.200%
55	2.000%	1.460%	1.300%
59	2.064%	1.552%	1.400%
57	2.126%	1.650%	1.500%
58	2.188%	1.758%	1.600%
59	2.250%	1.874%	1.700%
60	2.314%	2.000%	1.800%
61	2.376%	2.134%	1.900%
62	2.438%	2.272%	2.000%
63	2.500%	2.418%	2.100%
64	2.500%	2.418%	2.200%
65	2.500%	2.418%	2.300%
66	2.500%	2.418%	2.400%
67 & Up	2.500%	2.418%	2.500%

- 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. Any unused sick leave accumulated at the time of retirement will be converted to credited service at the rate of 0.004 years of service for each day of sick leave.

State Miscellaneous Tier 1 (continued)

- The *final compensation* is the monthly average of the member's highest 12 consecutive months' full-time equivalent monthly pay (no matter which CalPERS employer paid this compensation). For some new members hired after July 1, 2006 and for all new members hired on or after January 15, 2011, final compensation is based on the monthly average of the member's highest 36 consecutive months' full-time equivalent monthly pay. 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 who participate in Social Security this cap is $121,388 for 2018 and for those employees who do not participate in Social Security the cap for 2018 is $145,666. Adjustments to the caps are permitted annually based on changes to the CPI for All Urban Consumers.
- Employees may or may not be covered by Social Security. For employees covered by Social Security, the final compensation is offset by $133.33 (or by one third if the final compensation is less than $400). For some PEPRA members, the final compensation is not offset.
- The Service Retirement benefit is not capped.

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 five 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 and Safety PEPRA members become eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for Deferred Status and upon attainment of age 50. 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 five years of credited service (total service across all PERS employers, and with certain other Retirement Systems with which PERS 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 working with any CalPERS employer at the time of disability in order to be eligible for this benefit.

Benefit

The 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.

State Miscellaneous Tier 1 (continued)

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.

Post-Retirement Death Benefit

Lump Sum Payment

Upon the death of a retiree, a one-time lump sum payment of $2,000 will be made to the retiree's designated survivor(s), or to the retiree's estate.

Form of Payment for Retirement Allowance

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.

For retirement allowances with respect to service earned by employment in this group, 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. This additional benefit is often referred to as *post retirement survivor allowance* (PRSA) or simply as *survivor continuance*.

In other words, 25 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 children until they attain age 18; or, if no eligible children, to a qualifying dependent parent) for the rest of his or her lifetime.

The remaining 75 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

Group Term Life Insurance

Eligibility

An employee's beneficiary (or estate) will receive the Group Term Life Insurance benefit if the member dies while actively employed. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. This benefit is in addition to other pre-retirement death benefits.

Benefit

The benefit is a lump sum payment of $5,000 plus an additional amount equal to 50 percent of the annual compensation earned by the deceased member during the 12 months immediately preceding the member's death. The additional amount shall not be paid if the member is eligible for service retirement or the Alternate Death Benefit.

State Miscellaneous Tier 1 (continued)

For members with less than 20 years of service credit and not age-eligible to retire:

Basic Death Benefit

Eligibility

An employee's beneficiary (or estate) may receive the Basic Death benefit if the member dies while actively employed. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. A member's survivor who is eligible for any other pre-retirement death benefit described below 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 at the greater of 6 percent or the prevailing discount rate. In addition, a lump sum in the amount of six months' salary shall be paid only if the member is eligible for service retirement or eligible for the Alternate Death Benefit. 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.

For members with more than 20 years of service credit and not age-eligible to retire:

In addition to the above pre-retirement death benefits, members are eligible for:

Alternate Death Benefit

Eligibility

This benefit may be received in lieu of the lump sum Basic Death Benefit if there is a surviving spouse or minor child of the member. The member must have died before reaching the minimum retirement age and must have been credited with at least 20 years of state service.

Benefit

The Alternate Death Benefit is calculated as though the member were the minimum retirement age and elected an optional form of benefit that provided 100 percent continuance to the member's spouse. If the member did not have a spouse at the time of death, one-half of the formula benefit would be paid to the surviving child. If the benefit is payable to a surviving child, the benefit will be discontinued upon death or the attainment of age 18.

For members who are age-eligible to retire:

In addition to the above pre-retirement death benefits, members are eligible for:

1957 Survivor 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 five 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 or, if there is no eligible spouse, to the member's unmarried children under age 18. A member's survivor may choose this benefit in lieu of the Basic Death benefit or the Optional Settlement 2W Death benefit.

State Miscellaneous Tier 1 (continued)

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 a dependent child, the benefit will be discontinued upon death or attainment of age 18, unless the child is disabled. There is a guarantee that the total amount paid will at least equal the Basic Death benefit.

Optional Settlement 2W Death Benefit

Eligibility

An employee's *eligible survivor* may receive the Optional Settlement 2W Death benefit if the member dies while actively employed, has attained at least age 50 for Classic and Safety PEPRA members and age 52 for Miscellaneous PEPRA members, and has at least five 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 may choose this benefit in lieu of the Basic Death benefit or the 1957 Survivor benefit.

Benefit

The Optional Settlement 2W Death benefit is a monthly allowance equal to the Service Retirement benefit that the member would have received had the member retired on the date of his or her death and elected Optional Settlement 2W. (A retiree who elects Optional Settlement 2W receives an allowance that has been reduced so that it will continue to be paid after his or her death to a surviving beneficiary.) The allowance is payable as long as the surviving spouse lives. Upon the death of the surviving spouse, the benefit shall be continued to minor children. There is a guarantee that the total amount paid will at least equal the Basic Death Benefit.

Cost-Of-Living Adjustments

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

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 75 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. The total annual outlay for PPPA is limited to 1.1 percent of accumulated member contributions. If this amount of member contributions were insufficient to provide for PPPA payments, the 75 percent target would be proportionately reduced.

State Miscellaneous Tier 1 (continued)

Employee Contributions

Each employee contributes toward his or her retirement based upon one of the following schedules. The employer may choose to "pick-up" these contributions for the employees. For employees covered by Social Security, the monthly compensation breakpoint is $513, and the contribution schedule is as follows:

- The percent contributed below the monthly compensation breakpoint is 0 percent.
- The percent contributed above the monthly compensation breakpoint ranges from 5 percent to 10 percent.

There are a small number of employees not covered by Social Security in this plan. For those employees, the monthly compensation breakpoint is $317, and contributions are as follows:

- The percent contributed below the monthly compensation breakpoint is 0 percent.
- The percent contributed above the monthly compensation breakpoint is 1 percent greater than those covered by Social Security.

For some new PEPRA members, the monthly compensation breakpoint is $0, and contributions are as follows:

- The percent contributed below the monthly compensation breakpoint is 0 percent.
- The percent contributed above the monthly compensation breakpoint is 6.5 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 annually with 6 percent interest.

1959 Survivor Benefits Program

For these benefits, please refer to the 1959 Survivor Report.

State Miscellaneous Tier 2

The following is a summary of the major plan provisions applicable to State Miscellaneous Tier 2 members. Many of the statements in this summary are general in nature and intended to provide an easily understood summary of the complex Public Employees' Retirement Law. The law itself governs in all situations.

RETIREMENT PROGRAM

Tier 2 Members electing Tier 1 benefits

In general, State Miscellaneous Tier 2 members have the right to convert their Tier 2 service to Tier 1 service provided they make up the shortfall in their accumulated contributions with interest. In this valuation, we have assumed that all State Miscellaneous Tier 2 members eligible to convert their Tier 2 service to Tier 1 service will elect to do so.

Service Retirement

Eligibility

A CalPERS member becomes eligible for Service Retirement upon attainment of age 55 with at least 10 years of credited service (total service across all CalPERS employers, and with certain other Retirement Systems with which CalPERS has reciprocity agreements).

State Miscellaneous Tier 2 (continued)

Benefit

The Service Retirement benefit calculated for service earned by this group of employees is a monthly allowance equal to the product of the *benefit factor*, *years of service*, and *final compensation*, where

- The *benefit factor* for Classic employees comes from the **1.25% at 65** Tier 2 benefit factor table. New PEPRA members hired on or after January 1, 2013 are subject to the **1.25% at 67** benefit factor table. The factor depends on the member's age at retirement. Listed below are the factors for retirement at whole year ages:

Retirement Age	1.25% @ 65 Tier 2 Factor	1.25% @ 67 Tier 2 Factor
50	0.500%	N/A
51	0.550%	N/A
52	0.600%	0.650%
53	0.650%	0.690%
54	0.700%	0.730%
55	0.750%	0.770%
59	0.800%	0.810%
57	0.850%	0.850%
58	0.900%	0.890%
59	0.950%	0.930%
60	1.000%	0.970%
61	1.050%	1.010%
62	1.100%	1.050%
63	1.150%	1.090%
64	1.200%	1.130%
65	1.250%	1.170%
66	1.250%	1.210%
67 & Up	1.250%	1.250%

- 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. Any unused sick leave accumulated at the time of retirement will be converted to credited service at the 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 12 consecutive months' full-time equivalent monthly pay (no matter which CalPERS employer paid this compensation). For some new members hired after July 1, 2006 and for all new members hired on or after January 15, 2011, final compensation is based on the monthly average of the member's highest 36 consecutive months' full-time equivalent monthly pay. 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 who participate in Social Security this cap is $121,388 for 2018 and for those employees who do not participate in Social Security the cap for 2018 is $145,666. Adjustments to the caps are permitted annually based on changes to the CPI for All Urban Consumers
- Employees may or may not be covered by Social Security. The final compensation is not offset by a dollar amount.
- The Service Retirement benefit is not capped.

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 10 years of credited service (total service across all CalPERS employers, and with certain other Retirement Systems with which CalPERS has reciprocity agreements).

State Miscellaneous Tier 2 (continued)

Eligibility to Start Receiving Benefits
The CalPERS member becomes eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for Deferred Status and upon attainment of age 55. Members with five years of service before January 1, 1985, are eligible at age 50.

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 10 years of credited service (total service across all PERS employers, and with certain other Retirement Systems with which PERS 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 working with any CalPERS employer at the time of disability in order to be eligible for this benefit. Members with five years of service before January 1, 1985 are also eligible.

Benefit
The Non-Industrial Disability Retirement benefit is a monthly allowance equal to 1.125 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 29.628 years of service; or
- Service is CalPERS credited service plus the additional number of years that the member would have worked until age 65, for members with at least 10 years but not more than 29.628 years of service. The maximum benefit in this case is 33 1/3 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.

Post-Retirement Death Benefit

Lump Sum Payment
Upon the death of a retiree, a one-time lump sum payment of $2,000 will be made to the retiree's designated survivor(s), or to the retiree's estate.

Form of Payment for Retirement Allowance

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.

State Miscellaneous Tier 2 (continued)

For retirement allowances with respect to service earned by employment in this group, 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. This additional benefit is often referred to as *post retirement survivor allowance* (PRSA) or simply as *survivor continuance*.

In other words, 25 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 children until they attain age 18; or, if no eligible children, to a qualifying dependent parent) for the rest of his or her lifetime.

The remaining 75 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

Group Term Life Insurance

Eligibility
An employee's beneficiary (or estate) will receive the Group Term Life Insurance benefit if the member dies while actively employed. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. This benefit is in addition to other pre-retirement death benefits.

Benefit
The benefit is a lump sum payment of $5,000 plus an additional amount equal to 50 percent of the annual compensation earned by the deceased member during the 12 months immediately preceding the member's death. The additional amount shall not be paid if the member is eligible for service retirement or the Alternate Death Benefit.

For members with less than 20 years of service credit and not age-eligible to retire:

Basic Death Benefit

Eligibility
An employee's beneficiary (or estate) may receive the Basic Death benefit if the member dies while actively employed. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. A member's survivor who is eligible for any other pre-retirement death benefit described below 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 the greater of 6 percent or the prevailing discount rate. In addition, a lump sum in the amount of six months' salary shall be paid only if the member is eligible for service retirement or eligible for the Alternate Death Benefit. 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.

State Miscellaneous Tier 2 (continued)

For members with more than 20 years of service credit and not age-eligible to retire:
In addition to the above pre-retirement death benefits, members are eligible for:

Alternate Death Benefit

Eligibility
This benefit may be received in lieu of the lump sum Basic Death Benefit if there is a surviving spouse or minor child of the member. The member must have died before reaching the minimum retirement age and must have been credited with at least 20 years of state service.

Benefit
The Alternate Death Benefit is calculated as though the member were the minimum retirement age and elected an optional form of benefit that provided 100 percent continuance to the member's spouse. If the member did not have a spouse at the time of death, one-half of the formula benefit would be paid to the surviving child. If the benefit is payable to a surviving child, the benefit will be discontinued upon death or the attainment of age 18.

For members who are age-eligible to retire:
In addition to the above pre-retirement death benefits, members are eligible for:

1957 Survivor Benefit

Eligibility
An employee's *eligible survivor(s)* may receive the 1957 Survivor benefit if the member dies while actively employed and has attained retirement eligibility. 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 or, if there is no eligible spouse, to the member's unmarried children under age 18. A member's survivor may choose this benefit in lieu of the Basic Death benefit or the Optional Settlement 2W Death 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 a dependent child, the benefit will be discontinued upon death or attainment of age 18, unless the child is disabled. There is a guarantee that the total amount paid will at least equal the Basic Death benefit.

Optional Settlement 2W Death Benefit

Eligibility
An employee's *eligible survivor* may receive the Optional Settlement 2W Death benefit if the member dies while actively employed and has attained retirement eligibility. 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 may choose this benefit in lieu of the Basic Death benefit or the 1957 Survivor benefit.

Benefit
The Optional Settlement 2W Death benefit is a monthly allowance equal to the Service Retirement benefit that the member would have received had the member retired on the date of his or her death and elected Optional Settlement 2W. (A retiree who elects Optional Settlement 2W receives an allowance that has been reduced so that it will continue to be paid after his or her death to a surviving beneficiary.) The allowance is payable as long as the surviving spouse lives. Upon the death of the surviving spouse, the benefit shall be continued to minor children. There is a guarantee that the total amount paid will at least equal the Basic Death Benefit.

State Miscellaneous Tier 2 (continued)

Cost-of-Living Adjustments

Beginning the second calendar year after the year of retirement, retirement and survivor allowances will be annually adjusted on a compound basis by 3 percent.

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 75 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. The total annual outlay for PPPA is limited to 1.1 percent of accumulated member contributions. If this amount of member contributions were insufficient to provide for PPPA payments, the 75 percent target would be proportionately reduced.

Employee Contributions

Each employee contributes toward his or her retirement based upon one of the following schedules. The employer may choose to "pick-up" these contributions for the employees.

- The percent contributed above the monthly compensation breakpoint is 3.75 percent.
- The monthly compensation breakpoint is $0.
- The percent contributed below the monthly compensation breakpoint is 0 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 annually with 6 percent interest.

1959 Survivor Benefits Program

For these benefits, please refer to the 1959 Survivor Report.

State Industrial Tier 1

The following is a summary of the major plan provisions for the most representative group used in calculating the liabilities of the plan. Many of the statements in this summary are general in nature and intended to provide an easily understood summary of the complex Public Employees' Retirement Law. The law itself governs in all situations.

RETIREMENT PROGRAM

Service Retirement

Eligibility

A CalPERS Classic and Safety PEPRA members become eligible for Service Retirement upon attainment of age 50 with at least five years of credited service (total service across all CalPERS employers, and with certain other Retirement Systems with which CalPERS has reciprocity agreements). PEPRA Miscellaneous members become eligible for Service Retirement upon attainment of age 52 with at least five years of service.

State Industrial Tier 1 (continued)

Benefit

The Service Retirement benefit calculated for service earned by this group of employees is a monthly allowance equal to the product of the *benefit factor*, *years of service*, and *final compensation*, where

- The *benefit factor* for this group of employees comes from the **2% at 55** benefit factor table. New Classic members hired on or after January 15, 2011 are subject to the **2% at 60** benefit factor table. New PEPRA members hired on or after January 1, 2013 are subject to the **2% at 62** benefit factor table. The factor depends on the member's age at retirement. Listed below are the factors for retirement at whole year ages:

Retirement Age	2% @ 55 Factor	2% @ 60 Factor	2% @ 62 Factor
50	1.100%	1.092%	N/A
51	1.280%	1.156%	N/A
52	1.460%	1.224%	1.000%
53	1.640%	1.296%	1.100%
54	1.820%	1.376%	1.200%
55	2.000%	1.460%	1.300%
59	2.064%	1.552%	1.400%
57	2.126%	1.650%	1.500%
58	2.188%	1.758%	1.600%
59	2.250%	1.874%	1.700%
60	2.314%	2.000%	1.800%
61	2.376%	2.134%	1.900%
62	2.438%	2.272%	2.000%
63	2.500%	2.418%	2.100%
64	2.500%	2.418%	2.200%
65	2.500%	2.418%	2.300%
66	2.500%	2.418%	2.400%
67 & Up	2.500%	2.418%	2.500%

- 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. Any unused sick leave accumulated at the time of retirement will be converted to credited service at the 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 12 consecutive months' full-time equivalent monthly pay (no matter which CalPERS employer paid this compensation). For some new members hired after July 1, 2006 and for all new members hired on or after January 15, 2011, final compensation is based on the monthly average of the member's highest 36 consecutive months' full-time equivalent monthly pay. 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 who participate in Social Security this cap is $121,388 for 2018 and for those employees who do not participate in Social Security the cap for 2018 is $145,666. Adjustments to the caps are permitted annually based on changes to the CPI for All Urban Consumers.
- Employees may or may not be covered by Social Security. For employees covered by Social Security, the final compensation is offset by $133.33 (or by one third if the final compensation is less than $400). For some PEPRA members, the final compensation is not offset.
- The Service Retirement benefit is not capped.

State Industrial Tier 1 (continued)

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 five 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 and Safety PEPRA members become eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for Deferred Status and upon attainment of age 50. 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 five years of credited service (total service across all PERS employers, and with certain other Retirement Systems with which PERS 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 working with any CalPERS employer at the time of disability in order to be eligible for this benefit.

Benefit

The 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.

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.

State Industrial Tier 1 (continued)

Industrial (Job-Related) Disability Retirement

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 in the next paragraph.

Benefit

The Industrial Disability Retirement benefit is a monthly allowance equal to 50 percent of final compensation. However, 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. 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 or annuitization of the accumulated member contributions with respect to employment in this group.

Post-Retirement Death Benefit

Lump Sum Payment

Upon the death of a retiree, a one-time lump sum payment of $2,000 will be made to the retiree's designated survivor(s), or to the retiree's estate.

Form of Payment for Retirement Allowance

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.

For retirement allowances with respect to service earned by employment in this group, 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. This additional benefit is often referred to as *post retirement survivor allowance* (PRSA) or simply as *survivor continuance*.

In other words, 25 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 children until they attain age 18; or, if no eligible children, to a qualifying dependent parent) for the rest of his or her lifetime.

The remaining 75 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*.

State Industrial Tier 1 (continued)

Pre-Retirement Death Benefits

Group Term Life Insurance

Eligibility
An employee's beneficiary (or estate) will receive the Group Term Life Insurance benefit if the member dies while actively employed. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. This benefit is in addition to other pre-retirement death benefits.

Benefit
The benefit is a lump sum payment of $5,000 plus an additional amount equal to 50 percent of the annual compensation earned by the deceased member during the 12 months immediately preceding the member's death. The additional amount shall not be paid if the member is eligible for service retirement or the Alternate Death Benefit.

For members with less than 20 years of service credit and not age-eligible to retire:

Basic Death Benefit

Eligibility
An employee's beneficiary (or estate) may receive the Basic Death benefit if the member dies while actively employed. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. A member's survivor who is eligible for any other pre-retirement death benefit described below 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 the greater of 6 percent or the prevailing discount rate. In addition, a lump sum in the amount of six months' salary shall be paid only if the member is eligible for service retirement or eligible for the Alternate Death Benefit. 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.

Special Death Benefit

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 children 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 children under age 22. There is a guarantee that the total amount paid will at least equal the Basic Death Benefit.

State Industrial Tier 1 (continued)

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 children (*eligible* means unmarried children 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% of final compensation
- If 2 eligible children: 20.0% of final compensation
- If 3 or more eligible children: 25.0% of final compensation

For members with more than 20 years of service credit and not age-eligible to retire:
In addition to the above pre-retirement death benefits, members are eligible for:

Alternate Death Benefit

Eligibility

This benefit may be received in lieu of the lump sum Basic Death Benefit if there is a surviving spouse or minor child of the member. The member must have died before reaching the minimum retirement age and must have been credited with at least 20 years of state service.

Benefit

The Alternate Death Benefit is calculated as though the member were the minimum retirement age and elected an optional form of benefit that provided 100 percent continuance to the member's spouse. If the member did not have a spouse at the time of death, one-half of the formula benefit would be paid to the surviving child. If the benefit is payable to a surviving child, the benefit will be discontinued upon death or the attainment of age 18.

For members who are age-eligible to retire:
In addition to the above pre-retirement death benefits, members are eligible for:

1957 Survivor 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 five 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 or, if there is no eligible spouse, to the member's unmarried children under age 18. A member's survivor may choose this benefit in lieu of the Basic Death benefit or the Special Death 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 a dependent child, the benefit will be discontinued upon death or attainment of age 18, unless the child is disabled. There is a guarantee that the total amount paid will at least equal the Basic Death benefit.

State Industrial Tier 1 (continued)

Optional Settlement 2W Death Benefit

Eligibility

An employee's *eligible survivor* may receive the Optional Settlement 2W Death benefit if the member dies while actively employed, has attained at least age 50 for Classic and Safety PEPRA members and age 52 for Miscellaneous PEPRA members, and has at least five 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 may choose this benefit in lieu of the Basic Death benefit or the 1957 Survivor benefit.

Benefit

The Optional Settlement 2W Death benefit is a monthly allowance equal to the Service Retirement benefit that the member would have received had the member retired on the date of his or her death and elected Optional Settlement 2W. (A retiree who elects Optional Settlement 2W receives an allowance that has been reduced so that it will continue to be paid after his or her death to a surviving beneficiary.) The allowance is payable as long as the surviving spouse lives. Upon the death of the surviving spouse, the benefit shall be continued to minor children. There is a guarantee that the total amount paid will at least equal the Basic Death Benefit.

Cost-of-Living Adjustments

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

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 75 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. The total annual outlay for PPPA is limited to 1.1 percent of accumulated member contributions. If this amount of member contributions were insufficient to provide for PPPA payments, the 75 percent target would be proportionately reduced.

Employee Contributions

Each employee contributes toward his or her retirement based upon one of the following schedules. The employer may choose to "pick-up" these contributions for the employees. For employees covered by Social Security, the monthly compensation breakpoint is $513, and the contribution schedule is as follows:

- The percent contributed below the monthly compensation breakpoint is 0 percent.
- The percent contributed above the monthly compensation breakpoint is ranges from 9 percent to 10 percent.

There are a small number of employees not covered by Social Security in this plan. For those employees, the monthly compensation breakpoint is $317, and contributions are as follows:

- The percent contributed below the monthly compensation breakpoint is 0 percent.
- The percent contributed above the monthly compensation breakpoint is 1 percent greater than those covered by Social Security.

State Industrial Tier 1 (continued)

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 annually with 6 percent interest.

1959 Survivor Benefits Program

For these benefits, please refer to the 1959 Survivor Report.

State Industrial Tier 2

The following is a summary of the major plan provisions applicable to State Industrial Tier 2 Members. Many of the statements in this summary are general in nature and intended to provide an easily understood summary of the complex Public Employees' Retirement Law. The law itself governs in all situations.

RETIREMENT PROGRAM

Tier 2 Members Electing Tier 1 Benefits

State Industrial Tier 2 members have the right to convert their Tier 2 service to Tier 1 service provided they make up the shortfall in their accumulated contributions with interest. In this valuation, we have assumed that all State Industrial Tier 2 members eligible to convert their Tier 2 service to Tier 1 service will elect to do so.

Service Retirement

Eligibility

A CalPERS member becomes eligible for Service Retirement upon attainment of age 55 with at least 10 years of credited service (total service across all CalPERS employers, and with certain other Retirement Systems with which CalPERS has reciprocity agreements). Members with 5 years of service before January 1, 1985 are also eligible.

State Industrial Tier 2 (continued)

Benefit

The Service Retirement benefit calculated for service earned by this group of employees is a monthly allowance equal to the product of the *benefit factor*, *years of service*, and *final compensation*, where

- The benefit factor for Classic employees comes from the **1.25% at 65** Tier 2 benefit factor table. New PEPRA members hired on or after January 1, 2013 are subject to the **1.25% at 67** benefit factor table. The factor depends on the member's age at retirement. Listed below are the factors for retirement at whole year ages:

Retirement Age	1.25% @ 65 Tier 2 Factor	1.25% @ 67 Tier 2 Factor
50	0.500%	N/A
51	0.550%	N/A
52	0.600%	0.650%
53	0.650%	0.690%
54	0.700%	0.730%
55	0.750%	0.770%
59	0.800%	0.810%
57	0.850%	0.850%
58	0.900%	0.890%
59	0.950%	0.930%
60	1.000%	0.970%
61	1.050%	1.010%
62	1.100%	1.050%
63	1.150%	1.090%
64	1.200%	1.130%
65	1.250%	1.170%
66	1.250%	1.210%
67 & Up	1.250%	1.250%

- 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. Any unused sick leave accumulated at the time of retirement will be converted to credited service at the 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 12 consecutive months' full-time equivalent monthly pay (no matter which CalPERS employer paid this compensation). For some new members hired after July 1, 2006 and for all new members hired on or after January 15, 2011, final compensation is based on the monthly average of the member's highest 36 consecutive months' full-time equivalent monthly pay. 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 who participate in Social Security this cap is $121,388 for 2018 and for those employees who do not participate in Social Security the cap for 2018 is $145,666. Adjustments to the caps are permitted annually based on changes to the CPI for All Urban Consumers.
- The employees in this group may or may not be covered by Social Security. The final compensation is not offset by a dollar amount.
- The Service Retirement benefit is not capped.

State Industrial Tier 2 (continued)

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 10 years of credited service (total service across all CalPERS employers, and with certain other Retirement Systems with which CalPERS has reciprocity agreements). Members with five years of service before January 1, 1985 are also eligible.

Eligibility to Start Receiving Benefits

The CalPERS member becomes eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for Deferred Status and upon attainment of age 55. Members with five years of service before January 1, 1985 are eligible at age 50.

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 10 years of credited service (total service across all PERS employers, and with certain other Retirement Systems with which PERS 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 working with any CalPERS employer at the time of disability in order to be eligible for this benefit. Members with five years of service before January 1, 1985 are also eligible.

Benefit

The Non-Industrial Disability Retirement benefit is a monthly allowance equal to 1.125 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 29.628 years of service; or
- *Service* is CalPERS credited service plus the additional number of years that the member would have worked until age 65, for members with at least 10 years but not more than 29.628 years of service. The maximum benefit in this case is 33 1/3 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.

State Industrial Tier 2 (continued)

Industrial (Job-Related) Disability Retirement

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 in the next paragraph.

Benefit
The Industrial Disability Retirement benefit is a monthly allowance equal to 50 percent of final compensation. However, 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. 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 or annuitization of the accumulated member contributions with respect to employment in this group.

Post-Retirement Death Benefit

Lump Sum Payment
Upon the death of a retiree, a one-time lump sum payment of $2,000 will be made to the retiree's designated survivor(s), or to the retiree's estate.

Form of Payment for Retirement Allowance

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.

For retirement allowances with respect to service earned by employment in this group, 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. This additional benefit is often referred to as post retirement survivor allowance (PRSA) or simply as *survivor continuance*.

In other words, 25 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 children until they attain age 18; or, if no eligible children, to a qualifying dependent parent) for the rest of his or her lifetime.

The remaining 75 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*.

State Industrial Tier 2 (continued)

Pre-Retirement Death Benefits

Group Term Life Insurance

Eligibility
An employee's beneficiary (or estate) will receive the Group Term Life Insurance benefit if the member dies while actively employed. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. This benefit is in addition to other pre-retirement death benefits.

Benefit
The benefit is a lump sum payment of $5,000 plus an additional amount equal to 50 percent of the annual compensation earned by the deceased member during the 12 months immediately preceding the member's death. The additional amount shall not be paid if the member is eligible for service retirement or the Alternate Death Benefit.

For members with less than 20 years of service credit and not age-eligible to retire:

Basic Death Benefit

Eligibility
An employee's beneficiary (or estate) may receive the Basic Death benefit if the member dies while actively employed. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. A member's survivor who is eligible for any other pre-retirement death benefit described below 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 the greater of 6 percent or the prevailing discount rate. In addition, a lump sum in the amount of six months' salary shall be paid only if the member is eligible for service retirement or eligible for the Alternate Death Benefit. 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.

Special Death Benefit

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 children 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 children under age 22. There is a guarantee that the total amount paid will at least equal the Basic Death Benefit.

State Industrial Tier 2 (continued)

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 children (*eligible* means unmarried children 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% of final compensation
- If 2 eligible children: 20.0% of final compensation
- If 3 or more eligible children: 25.0% of final compensation

For members with more than 20 years of service credit and not age-eligible to retire:

In addition to the above pre-retirement death benefits, members are eligible for:

Alternate Death Benefit

Eligibility

This benefit may be received in lieu of the lump sum Basic Death Benefit if there is a surviving spouse or minor child of the member. The member must have died before reaching the minimum retirement age and must have been credited with at least 20 years of state service.

Benefit

The Alternate Death Benefit is calculated as though the member were the minimum retirement age and elected an optional form of benefit that provided 100 percent continuance to the member's spouse. If the member did not have a spouse at the time of death, one-half of the formula benefit would be paid to the surviving child. If the benefit is payable to a surviving child, the benefit will be discontinued upon death or the attainment of age 18.

For members who are age-eligible to retire:

In addition to the above pre-retirement death benefits, members are eligible for:

1957 Survivor Benefit

Eligibility

An employee's *eligible survivor(s)* may receive the 1957 Survivor benefit if the member dies while actively employed and has attained retirement eligibility. 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 or, if there is no eligible spouse, to the member's unmarried children under age 18. A member's survivor may choose this benefit in lieu of the Basic Death benefit or the Special Death 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 a dependent child, the benefit will be discontinued upon death or attainment of age 18, unless the child is disabled. There is a guarantee that the total amount paid will at least equal the Basic Death benefit.

State Industrial Tier 2 (continued)

Optional Settlement 2W Death Benefit

Eligibility

An employee's *eligible survivor* may receive the Optional Settlement 2W Death benefit if the member dies while actively employed and has attained retirement eligibility. 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 may choose this benefit in lieu of the Basic Death benefit or the 1957 Survivor benefit.

Benefit

The Optional Settlement 2W Death benefit is a monthly allowance equal to the Service Retirement benefit that the member would have received had the member retired on the date of his or her death and elected Optional Settlement 2W. (A retiree who elects Optional Settlement 2W receives an allowance that has been reduced so that it will continue to be paid after his or her death to a surviving beneficiary.) The allowance is payable as long as the surviving spouse lives. Upon the death of the surviving spouse, the benefit shall be continued to minor children. There is a guarantee that the total amount paid will at least equal the Basic Death Benefit.

Cost-of-Living Adjustments

Beginning the second calendar year after the year of retirement, retirement and survivor allowances will be annually adjusted on a compound basis by 3 percent.

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 75 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. The total annual outlay for PPPA is limited to 1.1 percent of accumulated member contributions. If this amount of member contributions were insufficient to provide for PPPA payments, the 75 percent target would be proportionately reduced.

Employee Contributions

Each employee contributes toward his or her retirement based upon one of the following schedules. The employer may choose to "pick-up" these contributions for the employees.

- The percent contributed above the monthly compensation breakpoint is 3.75 percent.
- The monthly compensation breakpoint is $0.
- The percent contributed below the monthly compensation breakpoint is 0 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 annually with 6 percent interest.

1959 Survivor Benefits Program

For these benefits, please refer to the 1959 Survivor Report.

Appendix B – Principal Plan Provisions

State Safety

The following is a summary of the major plan provisions for the most representative group used in calculating the liabilities of the plan. Many of the statements in this summary are general in nature and intended to provide an easily understood summary of the complex Public Employees' Retirement Law. The law itself governs in all situations.

RETIREMENT PROGRAM

Service Retirement

Eligibility

A CalPERS Classic and Safety PEPRA members become eligible for Service Retirement upon attainment of age 50 with at least five years of credited service (total service across all CalPERS employers, and with certain other Retirement Systems with which CalPERS has reciprocity agreements). PEPRA Miscellaneous members become eligible for Service Retirement upon attainment of age 52 with at least five years of service.

Benefit

The Service Retirement benefit calculated for service earned by this group of employees is a monthly allowance equal to the product of the *benefit factor*, *years of service*, and *final compensation*, where

- The *benefit factor* for this group of employees comes from the **2.5% at 55** Safety benefit factor table. New Classic members hired on or after January 15, 2011 are subject to either the **2.5% at 60** Safety or the **2% at 55** Safety benefit factor table. New PEPRA members hired on or after January 1, 2013 are subject to the **2% at 57** benefit factor table. The factor depends on the member's age at retirement. Listed below are the factors for retirement at whole year ages:

Retirement Age	2.5% @ 55 Factor	2.5% @ 60 Factor	2% @ 55 Factor	2% @ 57 Factor
50	1.700%	1.426%	1.426%	1.426%
51	1.800%	1.522%	1.522%	1.508%
52	1.900%	1.628%	1.628%	1.590%
53	2.000%	1.742%	1.742%	1.672%
54	2.250%	1.866%	1.866%	1.754%
55	2.500%	2.000%	2.000%	1.836%
59	2.500%	2.100%	2.000%	1.918%
57	2.500%	2.200%	2.000%	2.000%
58	2.500%	2.300%	2.000%	2.000%
59	2.500%	2.400%	2.000%	2.000%
60 & Up	2.500%	2.500%	2.000%	2.000%

- 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. Any unused sick leave accumulated at the time of retirement will be converted to credited service at the 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 12 consecutive months' full-time equivalent monthly pay (no matter which CalPERS employer paid this compensation). For some new members hired after July 1, 2006 and for all new members hired on or after January 15, 2011, final compensation is based on the monthly average of the member's highest 36 consecutive months' full-time equivalent monthly pay. 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 who participate in Social Security this cap is $121,388 for 2018 and for those employees who do not participate in Social Security the cap for 2018 is $145,666. Adjustments to the caps are permitted annually based on changes to the CPI for All Urban Consumers.
- The employees in this group are not covered by Social Security. The final compensation is not offset by a dollar amount.
- The Service Retirement benefit is capped at 80 percent of final compensation.

State Safety (continued)

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 five 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 and Safety PEPRA members become eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for Deferred Status and upon attainment of age 50. 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 five years of credited service (total service across all PERS employers, and with certain other Retirement Systems with which PERS 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 working with any CalPERS employer at the time of disability in order to be eligible for this benefit.

Benefit

The 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.

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.

State Safety (continued)

Industrial (Job-Related) Disability Retirement

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 in the next paragraph.

Benefit

The Industrial Disability Retirement benefit is a monthly allowance equal to 50 percent of final compensation. However, 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. 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 or annuitization of the accumulated member contributions with respect to employment in this group.

Post-Retirement Death Benefit

Lump Sum Payment

Upon the death of a retiree, a one-time lump sum payment of $2,000 will be made to the retiree's designated survivor(s), or to the retiree's estate.

Form of Payment for Retirement Allowance

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.

For retirement allowances with respect to service earned by employment in this group, 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 often referred to as *post retirement survivor allowance* (PRSA) or simply as *survivor continuance*.

In other words, 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 children until they attain age 18; or, if no eligible children, to a qualifying dependent parent) for the rest of his or her lifetime.

The remaining 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*.

State Safety (continued)

Pre-Retirement Death Benefits

Group Term Life Insurance

Eligibility

An employee's beneficiary (or estate) will receive the Group Term Life Insurance benefit if the member dies while actively employed. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. This benefit is in addition to other pre-retirement death benefits.

Benefit

The benefit is a lump sum payment of $5,000 plus an additional amount equal to 50 percent of the annual compensation earned by the deceased member during the 12 months immediately preceding the member's death. The additional amount shall not be paid if the member is eligible for service retirement or the Alternate Death Benefit.

For members with less than 20 years of service credit and not age-eligible to retire:

Basic Death Benefit

Eligibility

An employee's beneficiary (or estate) may receive the Basic Death benefit if the member dies while actively employed. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. A member's survivor who is eligible for any other pre-retirement death benefit described below 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 the greater of 6 percent or the prevailing discount rate. In addition, a lump sum in the amount of six months' salary shall be paid only if the member is eligible for service retirement or eligible for the Alternate Death Benefit. 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.

Special Death Benefit

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 children 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 children under age 22. There is a guarantee that the total amount paid will at least equal the Basic Death Benefit.

State Safety (continued)

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 children (*eligible* means unmarried children 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% of final compensation
- If 2 eligible children: 20.0% of final compensation
- If 3 or more eligible children: 25.0% of final compensation

For members with more than 20 years of service credit and not age-eligible to retire:
In addition to the above pre-retirement death benefits, members are eligible for:

Alternate Death Benefit

Eligibility
This benefit may be received in lieu of the lump sum Basic Death Benefit if there is a surviving spouse or minor child of the member. The member must have died before reaching the minimum retirement age and must have been credited with at least 20 years of state service.

Benefit
The Alternate Death Benefit is calculated as though the member were the minimum retirement age and elected an optional form of benefit that provided 100 percent continuance to the member's spouse. If the member did not have a spouse at the time of death, one-half of the formula benefit would be paid to the surviving child. If the benefit is payable to a surviving child, the benefit will be discontinued upon death or the attainment of age 18.

For members who are age-eligible to retire:
In addition to the above pre-retirement death benefits, members are eligible for:

1957 Survivor 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 five 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 or, if there is no eligible spouse, to the member's unmarried children under age 18. A member's survivor may choose this benefit in lieu of the Basic Death benefit or the Special Death 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 a dependent child, the benefit will be discontinued upon death or attainment of age 18, unless the child is disabled. There is a guarantee that the total amount paid will at least equal the Basic Death benefit.

State Safety (continued)

Optional Settlement 2W Death Benefit

Eligibility
An employee's *eligible survivor* may receive the Optional Settlement 2W Death benefit if the member dies while actively employed, has attained at least age 50 for Classic and Safety PEPRA members and age 52 for Miscellaneous PEPRA members, and has at least five 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 may choose this benefit in lieu of the Basic Death benefit or the 1957 Survivor benefit.

Benefit
The Optional Settlement 2W Death benefit is a monthly allowance equal to the Service Retirement benefit that the member would have received had the member retired on the date of his or her death and elected Optional Settlement 2W. (A retiree who elects Optional Settlement 2W receives an allowance that has been reduced so that it will continue to be paid after his or her death to a surviving beneficiary.) The allowance is payable as long as the surviving spouse lives. Upon the death of the surviving spouse, the benefit shall be continued to minor children. There is a guarantee that the total amount paid will at least equal the Basic Death Benefit.

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

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 75 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. The total annual outlay for PPPA is limited to 1.1 percent of accumulated member contributions. If this amount of member contributions were insufficient to provide for PPPA payments, the 75 percent target would be proportionately reduced.

Employee Contributions
Each employee contributes toward his or her retirement based upon the following schedule. The employer may choose to "pick-up" these contributions for the employees.

The active population is subject to the following schedule:

- The percent contributed below the monthly compensation breakpoint is 0 percent.
- The monthly compensation breakpoint is $317.
- The percent contributed above the monthly compensation breakpoint is 11 percent.

State Safety (continued)

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 annually with 6 percent interest.

1959 Survivor Benefits Program

For these benefits, please refer to the 1959 Survivor Report.

State Peace Officers and Firefighters

The following is a summary of the major plan provisions for the most representative group used in calculating the liabilities of this plan. Many of the statements in this summary are general in nature and intended to provide an easily understood summary of the complex Public Employees' Retirement Law. The law itself governs in all situations.

RETIREMENT PROGRAM

Service Retirement

Eligibility

A CalPERS Classic and Safety PEPRA members become eligible for Service Retirement upon attainment of age 50 with at least five years of credited service (total service across all CalPERS employers, and with certain other Retirement Systems with which CalPERS has reciprocity agreements). PEPRA Miscellaneous members become eligible for Service Retirement upon attainment of age 52 with at least five years of service.

Benefit

The Service Retirement benefit calculated for service earned by this group of employees is a monthly allowance equal to the product of the *benefit factor*, *years of service*, and *final compensation*, where

- The *benefit factor* for this group of employees comes from either the **3% at 55** or the **3% at 50** benefit factor table. New Classic members, except firefighters, hired on or after January 15, 2011 are subject to the **2.5% at 55** Safety benefit factor table. New Classic firefighters hired on or after October 31, 2010 are subject to the **3% at 55** benefit factor table. The factor depends on the member's age at retirement. New PEPRA members hired on or after January 1, 2013 are subject to the **2.5% at 57** or **2.7% at 57** benefit factor table. Listed below are the factors for retirement at whole year ages:

Retirement Age	3% @ 50 Factor	3% @ 55 Factor	2.5% @ 55 Factor	2.5% @ 57 Factor	2.7% @ 57 Factor
50	3.000%	2.400%	2.000%	2.000%	2.000%
51	3.000%	2.520%	2.100%	2.071%	2.100%
52	3.000%	2.640%	2.200%	2.143%	2.200%
53	3.000%	2.760%	2.300%	2.214%	2.300%
54	3.000%	2.880%	2.400%	2.286%	2.400%
55	3.000%	3.000%	2.500%	2.357%	2.500%
59	3.000%	3.000%	2.500%	2.429%	2.600%
57 & Up	3.000%	3.000%	2.500%	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. Any unused sick leave accumulated at the time of retirement will be converted to credited service at the rate of 0.004 years of service for each day of sick leave.

State Peace Officers and Firefighters (continued)

- The *final compensation* is the monthly average of the member's highest 12 consecutive months' full-time equivalent monthly pay (no matter which CalPERS employer paid this compensation). For some new members hired after January 1, 2007 and for all new members hired on or after January 15, 2011, final compensation is based on the monthly average of the member's highest 36 consecutive months' full-time equivalent monthly pay. 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 who participate in Social Security this cap is $121,388 for 2018 and for those employees who do not participate in Social Security the cap for 2018 is $145,666. Adjustments to the caps are permitted annually based on changes to the CPI for All Urban Consumers.
- The employees in this group are not covered by Social Security. The final compensation is not offset by a dollar amount.
- The 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 five 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 and Safety PEPRA members become eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for Deferred Status and upon attainment of age 50. 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 five years of credited service (total service across all PERS employers, and with certain other Retirement Systems with which PERS 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 working with any CalPERS employer at the time of disability in order to be eligible for this benefit.

Benefit

The 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.

State Peace Officers and Firefighters (continued)

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

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 in the next paragraph.

Benefit

The Industrial Disability Retirement benefit is a monthly allowance equal to 50 percent of final compensation. However, 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. 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 or annuitization of the accumulated member contributions with respect to employment in this group.

Post-Retirement Death Benefit

Lump Sum Payment

Upon the death of a retiree, a one-time lump sum payment of $2,000 will be made to the retiree's designated survivor(s), or to the retiree's estate.

Form of Payment for Retirement Allowance

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.

For retirement allowances with respect to service earned by employment in this group, 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 often referred to as *post retirement survivor allowance* (PRSA) or simply as *survivor continuance*. In other words, 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 children until they attain age 18; or, if no eligible children, to a qualifying dependent parent) for the rest of his or her lifetime.

The remaining 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*.

State Peace Officers and Firefighters (continued)

Pre-Retirement Death Benefits

Group Term Life Insurance

Eligibility
An employee's beneficiary (or estate) will receive the Group Term Life Insurance benefit if the member dies while actively employed. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. This benefit is in addition to other pre-retirement death benefits.

Benefit
The benefit is a lump sum payment of $5,000 plus an additional amount equal to 50 percent of the annual compensation earned by the deceased member during the 12 months immediately preceding the member's death. The additional amount shall not be paid if the member is eligible for service retirement or the Alternate Death Benefit.

For members with less than 20 years of service credit and not age-eligible to retire:

Basic Death Benefit

Eligibility
An employee's beneficiary (or estate) may receive the Basic Death benefit if the member dies while actively employed. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. A member's survivor who is eligible for any other pre-retirement death benefit described below 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 the greater of 6 percent or the prevailing discount rate. In addition, a lump sum in the amount of six months' salary shall be paid only if the member is eligible for service retirement or eligible for the Alternate Death Benefit. 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.

Special Death Benefit

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 children 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 children under age 22. There is a guarantee that the total amount paid will at least equal the Basic Death Benefit.

State Peace Officers and Firefighters (continued)

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 children (*eligible* means unmarried children 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% of final compensation
- If 2 eligible children: 20.0% of final compensation
- If 3 or more eligible children: 25.0% of final compensation

For members with more than 20 years of service credit and not age-eligible to retire:
In addition to the above pre-retirement death benefits, members are eligible for:

Alternate Death Benefit

Eligibility
This benefit may be received in lieu of the lump sum Basic Death Benefit if there is a surviving spouse or minor child of the member. The member must have died before reaching the minimum retirement age and must have been credited with at least 20 years of state service.

Benefit
The Alternate Death Benefit is calculated as though the member were the minimum retirement age and elected an optional form of benefit that provided 100 percent continuance to the member's spouse. If the member did not have a spouse at the time of death, one-half of the formula benefit would be paid to the surviving child. If the benefit is payable to a surviving child, the benefit will be discontinued upon death or the attainment of age 18.

For members who are age-eligible to retire:
In addition to the above pre-retirement death benefits, members are eligible for:

1957 Survivor 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 five 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 or, if there is no eligible spouse, to the member's unmarried children under age 18. A member's survivor may choose this benefit in lieu of the Basic Death benefit or the Special Death 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 a dependent child, the benefit will be discontinued upon death or attainment of age 18, unless the child is disabled. There is a guarantee that the total amount paid will at least equal the Basic Death benefit.

State Peace Officers and Firefighters (continued)

Optional Settlement 2W Death Benefit

Eligibility
An employee's *eligible survivor* may receive the Optional Settlement 2W Death benefit if the member dies while actively employed, has attained at least age 50 for Classic and Safety PEPRA members and age 52 for Miscellaneous PEPRA members, and has at least five 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 may choose this benefit in lieu of the Basic Death benefit or the 1957 Survivor benefit.

Benefit
The Optional Settlement 2W Death benefit is a monthly allowance equal to the Service Retirement benefit that the member would have received had the member retired on the date of his or her death and elected Optional Settlement 2W. (A retiree who elects Optional Settlement 2W receives an allowance that has been reduced so that it will continue to be paid after his or her death to a surviving beneficiary.) The allowance is payable as long as the surviving spouse lives. Upon the death of the surviving spouse, the benefit shall be continued to minor children. There is a guarantee that the total amount paid will at least equal the Basic Death Benefit.

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

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 75 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. The total annual outlay for PPPA is limited to 1.1 percent of accumulated member contributions. If this amount of member contributions were insufficient to provide for PPPA payments, the 75 percent target would be proportionately reduced.

Employee Contributions
Each employee contributes toward his or her retirement based upon one of the following schedules. The employer may choose to "pick-up" these contributions for the employees.

The active population has a monthly compensation breakpoint ranging from $513 to $863 and is subject to the following schedule:

- The percent contributed below the monthly compensation breakpoint is 0 percent.
- The percent contributed above the monthly compensation breakpoint is 13 percent.

A small portion of the active population has a monthly compensation breakpoint of $238 and is subject to the following schedule:

- The percent contributed below the monthly compensation breakpoint is 0 percent.
- The percent contributed above the monthly compensation breakpoint is 8 percent.

State Peace Officers and Firefighters (continued)

For some new PEPRA members, the monthly compensation breakpoint is $0 and contributions are as follows:

- The percent contributed below the monthly compensation breakpoint is 0 percent.
- The percent contributed above the monthly compensation breakpoint is 11 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 annually with 6 percent interest.

1959 Survivor Benefits Program

For these benefits, please refer to the 1959 Survivor Report.

California Highway Patrol

The following is a summary of the major plan provisions used in calculating the liabilities of the plan. Many of the statements in this summary are general in nature and intended to provide an easily understood summary of the complex Public Employees' Retirement Law. The law itself governs in all situations.

RETIREMENT PROGRAM

Service Retirement

Eligibility

A CalPERS Classic and Safety PEPRA members become eligible for Service Retirement upon attainment of age 50 with at least five years of credited service (total service across all CalPERS employers, and with certain other Retirement Systems with which CalPERS has reciprocity agreements). PEPRA Miscellaneous members become eligible for Service Retirement upon attainment of age 52 with at least five years of service.

Benefit

The Service Retirement benefit calculated for service earned by this group of employees is a monthly allowance equal to the product of the *benefit factor*, *years of service*, and *final compensation*, where

- The *benefit factor* for this group of employees is **3% at 50**. New Classic members hired on or after October 31, 2010 are subject to the **3% at 55** benefit factor table. New PEPRA members hired on or after January 1, 2013 are subject to the **2.7% at 57** benefit factor table.

Retirement Age	3% @ 50 Factor	3% @ 55 Factor	2.7% @ 57 Factor
50	3.000%	2.400%	2.000%
51	3.000%	2.520%	2.100%
52	3.000%	2.640%	2.200%
53	3.000%	2.760%	2.300%
54	3.000%	2.880%	2.400%
55	3.000%	3.000%	2.500%
59	3.000%	3.000%	2.600%
57 & Up	3.000%	3.000%	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 including service at the CHP Academy for graduating members). 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. Any unused sick leave accumulated at the time of retirement will be converted to credited service at the rate of 0.004 years of service for each day of sick leave.

California Highway Patrol (continued)

- The *final compensation* is the monthly average of the member's highest 12 consecutive months' full-time equivalent monthly pay (no matter which CalPERS employer paid this compensation). The *final compensation* for an employee hired on or after October 31, 2010 is the monthly average of the member's highest 36 consecutive months' full-time equivalent monthly pay. 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 who participate in Social Security this cap is $121,388 for 2018 and for those employees who do not participate in Social Security the cap for 2018 is $145,666. Adjustments to the caps are permitted annually based on changes to the CPI for All Urban Consumers.
- The employees in this group are not covered by Social Security. The final compensation is not offset by a dollar amount.
- The 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 five 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 and Safety PEPRA members become eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for Deferred Status and upon attainment of age 50. 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 five years of credited service (total service across all PERS employers, and with certain other Retirement Systems with which PERS 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 working with any CalPERS employer at the time of disability in order to be eligible for this benefit.

Benefit

The 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.

California Highway Patrol (continued)

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

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 in the next paragraph.

Benefit

The Industrial Disability Retirement benefit is a monthly allowance equal to 50 percent of final compensation. For members who, as a result of a single event, incur serious bodily injury, the benefit provided is equal to the greater of 50 percent of final compensation, or, three percent of final compensation multiplied by the number of years of service credited to the member, plus an annuity purchased with the accumulated additional contributions, if any. However, 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, plus an annuity purchased with the accumulated additional contributions, if any. 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 or annuitization of the accumulated member contributions with respect to employment in this group.

Post-Retirement Death Benefit

Lump Sum Payment

Upon the death of a retiree, a one-time lump sum payment of $2,000 will be made to the retiree's designated survivor(s), or to the retiree's estate.

Form of Payment for Retirement Allowance

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.

For retirement allowances with respect to service earned by employment in this group, 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 often referred to as *post retirement survivor allowance* (PRSA) or simply as *survivor continuance*.

In other words, 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 children until they attain age 18; or, if no eligible children, to a qualifying dependent parent) for the rest of his or her lifetime.

The remaining 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.

California Highway Patrol (continued)

Pre-Retirement Death Benefits

Group Term Life Insurance

Eligibility
An employee's beneficiary (or estate) will receive the Group Term Life Insurance benefit if the member dies while actively employed. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. This benefit is in addition to other pre-retirement death benefits.

Benefit
The benefit is a lump sum payment of $5,000 plus an additional amount equal to 50 percent of the annual compensation earned by the deceased member during the 12 months immediately preceding the member's death. The additional amount shall not be paid if the member is eligible for service retirement or the Alternate Death Benefit.

For members with less than 20 years of service credit and not age-eligible to retire:

Basic Death Benefit

Eligibility
An employee's beneficiary (or estate) may receive the Basic Death benefit if the member dies while actively employed. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. A member's survivor who is eligible for any other pre-retirement death benefit described below 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 the greater of 6 percent or the prevailing discount rate. In addition, a lump sum in the amount of six months' salary shall be paid only if the member is eligible for service retirement or eligible for the Alternate Death Benefit. 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.

Special Death Benefit

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 children 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. It will be increased whenever the compensation paid to active employees is increased but ceases 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 children under age 22. There is a guarantee that the total amount paid will at least equal the Basic Death Benefit.

California Highway Patrol (continued)

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 children (*eligible* means unmarried children 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% of final compensation
- If 2 eligible children: 20.0% of final compensation
- If 3 or more eligible children: 25.0% of final compensation

For members with more than 20 years of service credit and not age-eligible to retire:
In addition to the above pre-retirement death benefits, members are eligible for:

Alternate Death Benefit

Eligibility
This benefit may be received in lieu of the lump sum Basic Death Benefit if there is a surviving spouse or minor child of the member. The member must have died before reaching the minimum retirement age and must have been credited with at least 20 years of state service.

Benefit
The Alternate Death Benefit is calculated as though the member were the minimum retirement age and elected an optional form of benefit that provided 100 percent continuance to the member's spouse. If the member did not have a spouse at the time of death, one-half of the formula benefit would be paid to the surviving child. If the benefit is payable to a surviving child, the benefit will be discontinued upon death or the attainment of age 18.

For members who are age-eligible to retire:
In addition to the above pre-retirement death benefits, members are eligible for:

1957 Survivor 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 five 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 or, if there is no eligible spouse, to the member's unmarried children under age 18. A member's survivor may choose this benefit in lieu of the Basic Death benefit or the Special Death 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 a dependent child, the benefit will be discontinued upon death or attainment of age 18, unless the child is disabled. There is a guarantee that the total amount paid will at least equal the Basic Death benefit.

California Highway Patrol (continued)

Optional Settlement 2W Death Benefit

Eligibility

An employee's *eligible survivor* may receive the Optional Settlement 2W Death benefit if the member dies while actively employed, has attained at least age 50 for Classic and Safety PEPRA members and age 52 for Miscellaneous PEPRA members, and has at least five 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 may choose this benefit in lieu of the Basic Death benefit or the 1957 Survivor benefit.

Benefit

The Optional Settlement 2W Death benefit is a monthly allowance equal to the Service Retirement benefit that the member would have received had the member retired on the date of his or her death and elected Optional Settlement 2W. (A retiree who elects Optional Settlement 2W receives an allowance that has been reduced so that it will continue to be paid after his or her death to a surviving beneficiary.) The allowance is payable as long as the surviving spouse lives. Upon the death of the surviving spouse, the benefit shall be continued to minor children. There is a guarantee that the total amount paid will at least equal the Basic Death Benefit.

Cost-of-Living Adjustments

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

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 75 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. The total annual outlay for PPPA is limited to 1.1 percent of accumulated member contributions. If this amount of member contributions were insufficient to provide for PPPA payments, the 75 percent target would be proportionately reduced.

Employee Contributions

Each employee contributes toward his or her retirement based upon the following schedule. The employer may choose to "pick-up" these contributions for the employees.

- The percent contributed below the monthly compensation breakpoint is 0 percent.
- The monthly compensation breakpoint is $863.
- The percent contributed above the monthly compensation breakpoint is 11.5 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 annually with 6 percent interest.

1959 Survivor Benefits Program

For these benefits, please refer to the 1959 Survivor Report.

Appendix C – Participant Data

Source of Participant Information

The data was extracted from various databases within CalPERS and placed in a data warehouse by a series of extract programs. Included in this data is:

- Individual member and beneficiary information,
- Employment and payroll information,
- Accumulated contributions with interest,
- Service information,
- Benefit payment information,
- Information about the various organizations which contract with CalPERS, and
- Detailed information about the plan provisions applicable to each group of members.

Data Validation

Once the information is extracted from the various computer systems into the data warehouse, update queries are then run against this data to correct for flaws found in the data. This part of the process is intended to validate the participant data for all CalPERS plans. It is not specific to the State plans.

Checks on the data included:

- A reconciliation of the membership of the plans,
- Comparisons of various member statistics (average attained age, average entry age, average salary, etc.) for each plan with those from the prior valuation,
- Comparison of pension amounts for each retiree and beneficiary receiving payments with those from the prior valuation,
- Checks for invalid ages and dates, and
- Reasonableness checks on various key data elements such as service and salary.

As a result of the tests on the data, a number of adjustments were determined to be necessary, such as dates of hire and dates of entry being adjusted to be consistent with the service fields, the date of birth and each other.

Appendix C - Participant Data

Data Statement

The data does not contain information about reciprocal systems and hence salary information for terminated participants covered by reciprocal systems may not be up to date. This situation is not expected to have a material impact on the employer contribution rates since the total present value for all terminated participants represents less than 2 percent of the present value of benefits for all members. We are unaware of any other data issues that would have a material effect on the results of this valuation.

It is our opinion that, after the adjustments noted above, the participant data was sufficient and reliable for the purposes of the valuation.

Reconciliation of Participants

State Miscellaneous Tier 1

	Active	Transfer	Terminated	Receiving	Total
As of June 30, 2017	168,328	27,823	56,572	184,454	437,177
Retirements	(6,189)	(1,139)	(681)	8,009	-
Industrial Disabilities	(1)	(42)	(4)	47	-
Non-Industrial Disabilities	(234)	(20)	(32)	286	-
Deaths[1]	(267)	(25)	(172)	(6,266)	(6,730)
New Survivors	n/a	n/a	n/a	1,752	1,752
Non-Vested Terminations[2]	(3,666)	(273)	3,939	-	-
Vested Terminations	(1,419)	(328)	1,753	(6)	-
Refunds of Contributions	(732)	(71)	(1,204)	-	(2,007)
Transfers	(2,080)	2,869	(761)	(28)	-
Redeposits/Rehires	1,684	(502)	(1,104)	(78)	-
First Year in Status	16,155	523	1,342	717	18,737
Moved from Tier 2	244	679	96	5	1,024
Data Corrections[3]	(826)	(298)	(242)	(153)	(1,519)
As of June 30, 2018	170,997	29,196	59,502	188,739	448,434

(1) Includes both deaths without survivors and deaths with survivors receiving a benefit.
(2) Includes non-vested terminated participants with employee contributions left in the plan.
(3) May include the combining of data records into a single record.

State Miscellaneous Tier 2

	Active	Transfer	Terminated	Receiving	Total
As of June 30, 2017	4,037	9,018	1,534	6,239	20,828
Retirements	(41)	(150)	(65)	256	-
Industrial Disabilities	-	(5)	-	5	-
Non-Industrial Disabilities	(5)	(17)	(8)	30	-
Deaths[1]	(18)	(23)	(248)	(167)	(456)
New Survivors	n/a	n/a	n/a	67	67
Non-Vested Terminations[2]	(20)	(122)	142	-	-
Vested Terminations	(36)	(15)	52	(1)	-
Refunds of Contributions	(10)	(12)	(52)	-	(74)
Transfers	(364)	519	(151)	(4)	-
Redeposits/Rehires	63	(54)	(9)	-	-
First Year in Status	122	156	347	38	663
Moved from Tier 1	(244)	(679)	(96)	(5)	(1,024)
Data Corrections[3]	(79)	(226)	57	(39)	(287)
As of June 30, 2018	3,405	8,390	1,503	6,419	19,717

(1) Includes both deaths without survivors and deaths with survivors receiving a benefit.
(2) Includes non-vested terminated participants with employee contributions left in the plan.
(3) May include the combining of data records into a single record.

Appendix C - Participant Data

Reconciliation of Participants (continued)

State Industrial

	Active	Transfer	Terminated	Receiving	Total
As of June 30, 2017	11,610	8,823	3,457	14,126	38,016
Retirements	(338)	(353)	(46)	730	(7)
Industrial Disabilities	(2)	(13)	(3)	20	2
Non-Industrial Disabilities	(26)	(16)	(9)	56	5
Deaths[1]	(19)	(18)	(24)	(323)	(384)
New Survivors	n/a	n/a	n/a	202	202
Non-Vested Terminations[2]	(149)	(41)	190	-	-
Vested Terminations	(92)	(90)	182	-	-
Refunds of Contributions	(37)	(26)	(114)	-	(177)
Transfers	(673)	796	(113)	(10)	-
Redeposits/Rehires	222	(177)	(37)	(8)	-
First Year in Status	1,329	60	80	23	1,492
Data Corrections[3]	(14)	(36)	3	(174)	(221)
As of June 30, 2018	11,811	8,909	3,566	14,642	38,928

(1) Includes both deaths without survivors and deaths with survivors receiving a benefit.
(2) Includes non-vested terminated participants with employee contributions left in the plan.
(3) May include the combining of data records into a single record.

State Safety

	Active	Transfer	Terminated	Receiving	Total
As of June 30, 2017	27,422	5,880	6,730	24,742	64,774
Retirements	(851)	(271)	(93)	1,233	18
Industrial Disabilities	(135)	(23)	(11)	148	(21)
Non-Industrial Disabilities	(34)	(7)	(9)	53	3
Deaths[1]	(40)	(17)	(20)	(645)	(722)
New Survivors	n/a	n/a	n/a	252	252
Non-Vested Terminations[2]	(458)	(34)	492	-	-
Vested Terminations	(286)	(75)	361	-	-
Refunds of Contributions	(209)	(30)	(242)	-	(481)
Transfers	(517)	644	(118)	(9)	-
Redeposits/Rehires	314	(143)	(148)	(23)	-
First Year in Status	3,147	86	208	68	3,509
Data Corrections[3]	(18)	(54)	(47)	(70)	(189)
As of June 30, 2018	28,335	5,956	7,103	25,749	67,143

(1) Includes both deaths without survivors and deaths with survivors receiving a benefit.
(2) Includes non-vested terminated participants with employee contributions left in the plan.
(3) May include the combining of data records into a single record.

Reconciliation of Participants (continued)

State Peace Officers and Firefighters

	Active	Transfer	Terminated	Receiving	Total
As of June 30, 2017	41,445	5,817	7,016	38,250	92,528
Retirements	(1,329)	(198)	(88)	1,615	-
Industrial Disabilities	(290)	(23)	(23)	336	-
Non-Industrial Disabilities	(23)	(2)	(2)	27	-
Deaths[1]	(38)	(1)	(64)	(593)	(696)
New Survivors	n/a	n/a	n/a	282	282
Non-Vested Terminations[2]	(345)	(50)	395	-	-
Vested Terminations	(281)	(56)	342	(5)	-
Refunds of Contributions	(94)	(14)	(136)	-	(244)
Transfers	(332)	580	(237)	(11)	-
Redeposits/Rehires	280	(73)	(194)	(13)	-
First Year in Status	2,341	272	169	70	2,852
Data Corrections[3]	(45)	(79)	(100)	(11)	(235)
As of June 30, 2018	41,289	6,173	7,078	39,947	94,487

(1) Includes both deaths without survivors and deaths with survivors receiving a benefit.
(2) Includes non-vested terminated participants with employee contributions left in the plan.
(3) May include the combining of data records into a single record.

California Highway Patrol

	Active	Transfer	Terminated	Receiving	Total
As of June 30, 2017	7,357	262	428	8,971	17,018
Retirements	(234)	(9)	(19)	54	(8)
Industrial Disabilities	(52)	(1)	(1)	62	8
Non-Industrial Disabilities	(1)	-	(1)	2	-
Deaths[1]	(8)		(2)	(250)	(260)
New Survivors	n/a	n/a	n/a	119	119
Non-Vested Terminations[2]	(15)	(1)	16	-	-
Vested Terminations	(28)	(5)	34	(1)	-
Refunds of Contributions	(7)	-	(8)	-	(15)
Transfers	(3)	17	(13)	(1)	-
Redeposits/Rehires	3	(2)	(1)	-	-
First Year in Status	299	4	18	12	333
Data Corrections[3]	-	-	-	(10)	(10)
As of June 30, 2018	7,311	265	451	9,158	17,185

(1) Includes both deaths without survivors and deaths with survivors receiving a benefit.
(2) Includes non-vested terminated participants with employee contributions left in the plan.
(3) May include the combining of data records into a single record.

Appendix C - Participant Data

Active Members

Distribution of Active Members by Age and Years of Service

State Miscellaneous Tier 1 – As of June 30, 2018

	Years of Service at Valuation Date							
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20-24	25+	Total	Payroll
15 - 24	2,776	9	0	0	0	0	2,785	$103,048,564
25 - 29	11,116	919	6	1	0	0	12,042	562,864,027
30 - 34	12,619	4,638	951	68	2	0	18,278	1,061,815,353
35 - 39	10,190	5,244	3,708	1,202	66	2	20,412	1,354,844,746
40 - 44	7,344	4,177	4,074	3,687	699	58	20,039	1,437,413,089
45 - 49	6,176	3,832	4,401	5,335	2,229	1,038	23,011	1,730,530,951
50 - 54	5,169	3,346	3,697	5,243	2,771	4,527	24,753	1,916,673,049
55 - 59	4,350	3,095	3,280	4,902	2,605	6,444	24,676	1,915,194,876
60 - 64	2,654	2,317	2,371	3,282	1,705	4,146	16,475	1,273,234,702
65 and over	1,372	1,426	1,407	1,700	738	1,883	8,526	664,620,438
Total	63,766	29,003	23,895	25,420	10,815	18,098	170,997	$12,020,239,795

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 Average Annual Salaries by Age and Years of Service

State Miscellaneous Tier 1 – As of June 30, 2018

	Years of Service at Valuation Date						
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25+	Average Salary
15 - 24	$37,001	$41,045	$0	$0	$0	$0	$37,001
25 - 29	45,817	57,898	48,208	65,516	0	0	46,742
30 - 34	54,859	64,336	69,413	77,080	91,213	0	58,093
35 - 39	59,856	70,292	74,511	78,191	91,564	82,142	66,375
40 - 44	60,652	72,312	78,454	81,653	90,699	102,111	71,731
45 - 49	59,651	71,431	78,273	83,669	91,183	90,848	75,205
50 - 54	58,668	69,674	76,377	81,865	90,228	92,499	77,432
55 - 59	57,555	66,980	73,245	80,703	90,117	91,090	77,614
60 - 64	57,142	67,063	73,694	79,017	86,539	92,760	77,283
65 and over	52,076	66,909	74,875	81,573	90,214	99,422	77,952
Average	$54,952	$68,530	$75,722	$81,414	$89,854	$92,712	$70,295

Active Members (continued)

Distribution of Active Members by Age and Years of Service

State Miscellaneous Tier 2 – As of June 30, 2018

	Years of Service at Valuation Date							
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20-24	25+	Total	Payroll
15 - 24	4	0	0	0	0	0	4	$204,549
25 - 29	28	0	0	0	0	0	28	1,691,912
30 - 34	12	8	0	0	0	0	20	1,440,238
35 - 39	20	10	4	24	3	0	61	4,106,970
40 - 44	22	9	21	149	68	1	270	18,071,537
45 - 49	27	18	31	211	237	112	636	42,728,132
50 - 54	17	15	27	225	272	283	839	56,410,984
55 - 59	9	12	18	158	238	337	772	54,402,617
60 - 64	9	12	10	120	143	223	517	34,310,278
65 and over	8	12	11	64	57	106	258	17,976,441
Total	156	96	122	951	1,018	1,062	3,405	$231,343,658

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 Average Annual Salaries by Age and Years of Service

State Miscellaneous Tier 2 – As of June 30, 2018

	Years of Service at Valuation Date						
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25+	Average Salary
15 - 24	$51,137	$0	$0	$0	$0	$0	$51,137
25 - 29	60,425	0	0	0	0	0	60,425
30 - 34	76,513	65,261	0	0	0	0	72,012
35 - 39	73,213	83,053	52,968	57,804	71,005	0	67,327
40 - 44	61,876	76,381	59,381	66,256	71,086	69,768	66,932
45 - 49	59,301	47,009	61,733	66,258	68,639	72,493	67,183
50 - 54	65,663	67,398	61,604	61,005	66,757	73,274	67,236
55 - 59	64,520	74,657	54,789	64,925	69,365	74,697	70,470
60 - 64	65,803	48,213	39,018	61,249	65,679	71,782	66,364
65 and over	63,631	51,919	65,152	68,813	66,851	74,653	69,676
Average	$64,356	$62,444	$58,434	$64,120	$67,960	$73,464	$67,942

Appendix C - Participant Data

Active Members (continued)

Distribution of Active Members by Age and Years of Service

State Industrial – As of June 30, 2018

	Years of Service at Valuation Date							
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20-24	25+	Total	Payroll
15 - 24	253	0	0	0	0	0	253	$8,646,547
25 - 29	944	57	1	0	0	0	1,002	41,305,053
30 - 34	1,051	360	87	1	0	0	1,499	78,015,339
35 - 39	763	389	316	68	1	0	1,537	87,120,116
40 - 44	609	345	295	171	33	1	1,454	91,081,567
45 - 49	616	312	341	240	122	44	1,675	106,980,127
50 - 54	504	315	373	266	161	121	1,740	113,402,369
55 - 59	407	239	311	237	151	140	1,485	95,974,878
60 - 64	183	149	194	124	85	48	783	50,553,750
65 and over	91	82	93	55	39	23	383	26,173,153
Total	5,421	2,248	2,011	1,162	592	377	11,811	$699,252,899

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 Average Annual Salaries by Age and Years of Service

State Industrial – As of June 30, 2018

	Years of Service at Valuation Date						
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25+	Average Salary
15 - 24	$34,176	$0	$0	$0	$0	$0	$34,176
25 - 29	40,675	50,023	56,811	0	0	0	41,223
30 - 34	50,009	56,672	57,253	72,458	0	0	52,045
35 - 39	53,104	60,180	59,433	64,221	43,872	0	56,682
40 - 44	58,582	67,025	63,114	65,535	72,291	70,812	62,642
45 - 49	60,035	66,237	64,106	65,853	70,790	68,889	63,869
50 - 54	61,404	67,237	64,328	66,213	69,029	70,699	65,174
55 - 59	60,511	65,130	64,890	62,346	67,957	75,447	64,630
60 - 64	61,281	72,155	61,135	62,400	63,330	75,155	64,564
65 and over	66,341	78,470	62,947	59,191	70,678	79,811	68,337
Average	$52,685	$64,228	$62,748	$64,400	$68,548	$73,374	$59,204

Appendix C - Participant Data

Active Members (continued)

Distribution of Active Members by Age and Years of Service

State Safety – As of June 30, 2018

	Years of Service at Valuation Date							
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20-24	25+	Total	Payroll
15 - 24	392	0	0	0	0	0	392	$17,416,525
25 - 29	1,621	141	3	0	0	0	1,765	102,926,480
30 - 34	2,257	682	186	3	0	0	3,128	217,952,142
35 - 39	2,017	869	630	71	0	0	3,587	268,074,164
40 - 44	1,687	866	940	198	20	0	3,711	304,697,057
45 - 49	1,589	842	1,157	378	119	11	4,096	351,283,522
50 - 54	1,324	809	1,162	440	272	73	4,080	347,129,783
55 - 59	1,057	697	1,077	423	281	118	3,653	319,388,498
60 - 64	559	492	801	388	206	83	2,529	235,303,503
65 and over	218	271	469	228	140	68	1,394	151,953,239
Total	12,721	5,669	6,425	2,129	1,038	353	28,335	$2,316,124,913

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 Average Annual Salaries by Age and Years of Service

State Safety – As of June 30, 2018

	Years of Service at Valuation Date						
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25+	Average Salary
15 - 24	$44,430	$0	$0	$0	$0	$0	$44,430
25 - 29	57,609	66,146	71,917	0	0	0	58,315
30 - 34	68,444	73,483	70,709	68,571	0	0	69,678
35 - 39	72,952	79,110	74,762	71,589	0	0	74,735
40 - 44	74,108	88,653	89,288	88,082	76,651	0	82,106
45 - 49	76,620	90,183	91,461	96,040	89,311	77,104	85,763
50 - 54	76,437	90,769	86,822	91,188	91,523	90,296	85,081
55 - 59	77,795	91,015	89,166	96,868	93,683	88,047	87,432
60 - 64	81,791	97,017	96,023	93,773	101,507	92,057	93,042
65 and over	94,432	115,673	113,674	106,077	110,703	103,272	109,005
Average	$71,451	$87,643	$89,862	$94,269	$96,136	$92,047	$81,741

Active Members (continued)

Distribution of Active Members by Age and Years of Service

State Peace Officers and Firefighters – As of June 30, 2018

	Years of Service at Valuation Date							
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20-24	25+	Total	Payroll
15 - 24	1,209	1	0	0	0	0	1,210	$57,646,525
25 - 29	4,623	166	0	0	0	0	4,789	296,378,259
30 - 34	3,305	1,109	1,062	0	0	0	5,476	401,892,066
35 - 39	1,653	1,168	2,933	766	2	0	6,522	550,772,661
40 - 44	858	768	2,302	2,562	530	3	7,023	639,248,821
45 - 49	557	564	1,606	2,138	2,421	426	7,712	748,548,823
50 - 54	322	336	985	1,155	1,409	644	4,851	472,433,682
55 - 59	142	164	536	617	637	414	2,510	241,808,484
60 - 64	58	85	199	223	244	127	936	89,197,581
65 and over	9	28	48	68	54	53	260	24,720,364
Total	12,736	4,389	9,671	7,529	5,297	1,667	41,289	$3,522,647,266

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 Average Annual Salaries by Age and Years of Service

State Peace Officers and Firefighters – As of June 30, 2018

	Years of Service at Valuation Date						
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25+	Average Salary
15 - 24	$47,611	$85,067	$0	$0	$0	$0	$47,642
25 - 29	61,404	75,358	0	0	0	0	61,887
30 - 34	64,676	82,487	91,017	0	0	0	73,392
35 - 39	67,145	84,144	91,430	95,448	111,552	0	84,448
40 - 44	70,565	87,147	91,527	96,040	103,195	110,311	91,022
45 - 49	78,643	92,086	92,111	96,322	104,014	110,618	97,063
50 - 54	84,721	93,864	92,482	95,855	101,693	106,401	97,389
55 - 59	85,884	94,939	91,293	94,728	99,711	104,219	96,338
60 - 64	81,245	94,453	91,463	94,195	99,145	102,828	95,297
65 and over	60,413	92,169	91,522	94,532	97,806	103,645	95,078
Average	$64,012	$86,337	$91,622	$95,856	$102,512	$106,584	$85,317

Appendix C - Participant Data

Active Members (continued)

Distribution of Active Members by Age and Years of Service

California Highway Patrol – As of June 30, 2018

	Years of Service at Valuation Date							
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20-24	25+	Total	Payroll
15 - 24	157	0	0	0	0	0	157	$13,679,437
25 - 29	572	30	0	0	0	0	602	57,623,993
30 - 34	427	431	280	0	0	0	1,138	124,744,087
35 - 39	197	434	572	218	0	0	1,421	164,976,599
40 - 44	26	226	397	694	212	1	1,556	190,051,818
45 - 49	1	49	164	563	691	157	1,625	209,214,289
50 - 54	1	1	22	91	352	224	691	94,229,971
55 - 59	1	0	0	4	35	80	120	17,202,271
60 - 64	0	0	0	0	0	1	1	172,656
65 and over	0	0	0	0	0	0	0	0
Total	1,382	1,171	1,435	1,570	1,290	463	7,311	$871,895,121

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 Average Annual Salaries by Age and Years of Service

California Highway Patrol – As of June 30, 2018

	Years of Service at Valuation Date						
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25+	Average Salary
15 - 24	$87,130	$0	$0	$0	$0	$0	$87,130
25 - 29	94,690	115,377	0	0	0	0	95,721
30 - 34	97,693	116,163	117,724	0	0	0	109,617
35 - 39	98,951	116,485	119,181	122,738	0	0	116,099
40 - 44	105,593	116,011	117,737	123,527	134,403	125,149	122,141
45 - 49	120,417	117,304	119,317	121,987	134,782	139,901	128,747
50 - 54	161,364	77,611	122,050	127,321	131,963	148,521	136,368
55 - 59	95,784	0	0	138,045	130,592	149,795	143,352
60 - 64	0	0	0	0	0	172,656	172,656
65 and over	0	0	0	0	0	0	0
Average	$95,639	$116,248	$118,557	$123,122	$133,837	$145,820	$119,258

Transferred and Terminated Participants

Distribution by Age and Years of Service – Transfers to Other CalPERS Plans

State Miscellaneous Tier 1 – As of June 30, 2018

	Years of Service at Valuation Date							
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20-24	25+	Total	Average Salary
15 - 24	278	0	0	0	0	0	278	$67,032
25 - 29	1,759	55	0	0	0	0	1,814	66,667
30 - 34	3,002	598	46	0	0	0	3,646	73,140
35 - 39	3,069	977	189	31	1	0	4,267	77,095
40 - 44	2,699	893	289	83	8	2	3,974	80,634
45 - 49	2,465	1,016	384	160	58	12	4,095	83,300
50 - 54	2,210	916	506	280	127	34	4,073	84,524
55 - 59	1,997	821	376	235	115	72	3,616	84,435
60 - 64	1,423	468	203	121	60	40	2,315	80,583
65 and over	750	227	81	37	13	10	1,118	79,205
Total	19,652	5,971	2,074	947	382	170	29,196	$79,512

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

State Miscellaneous Tier 1 – As of June 30, 2018

	Years of Service at Valuation Date							
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20-24	25+	Total	Average Salary
15 - 24	699	0	0	0	0	0	699	$30,265
25 - 29	3,846	56	0	0	0	0	3,902	35,847
30 - 34	6,161	546	33	1	0	0	6,741	41,228
35 - 39	7,610	1,192	209	24	0	0	9,035	43,685
40 - 44	6,678	1,383	406	108	14	0	8,589	48,039
45 - 49	5,741	1,637	599	193	53	9	8,232	51,356
50 - 54	4,842	1,659	637	248	81	36	7,503	51,701
55 - 59	4,503	1,166	450	182	57	33	6,391	47,716
60 - 64	3,593	810	267	89	30	25	4,814	44,966
65 and over	3,046	390	109	31	10	10	3,596	42,565
Total	46,719	8,839	2,710	876	245	113	59,502	$45,905

Transferred and Terminated Participants (continued)

Distribution by Age and Years of Service – Transfers to Other CalPERS Plans

State Miscellaneous Tier 2 – As of June 30, 2018

	Years of Service at Valuation Date							
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20-24	25+	Total	Average Salary
15 - 24	0	0	0	0	0	0	0	$0
25 - 29	2	0	0	0	0	0	2	51,955
30 - 34	10	0	0	0	0	0	10	65,307
35 - 39	130	17	6	4	0	0	157	73,890
40 - 44	741	114	56	47	8	0	966	80,610
45 - 49	1,331	498	128	103	57	7	2,124	81,288
50 - 54	1,133	583	306	141	101	42	2,306	77,403
55 - 59	825	334	234	126	75	66	1,660	73,323
60 - 64	409	142	103	71	62	39	826	76,162
65 and over	180	61	35	28	15	20	339	75,961
Total	4,761	1,749	868	520	318	174	8,390	$77,681

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

State Miscellaneous Tier 2 – As of June 30, 2018

	Years of Service at Valuation Date							
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20-24	25+	Total	Average Salary
15 - 24	0	0	0	0	0	0	0	$0
25 - 29	8	0	0	0	0	0	8	49,011
30 - 34	25	1	0	0	0	0	26	63,561
35 - 39	14	3	5	5	0	0	27	62,082
40 - 44	13	10	33	18	1	0	75	51,982
45 - 49	20	11	141	45	17	3	237	53,307
50 - 54	17	14	234	59	31	3	358	51,350
55 - 59	12	8	216	80	24	5	345	47,717
60 - 64	9	7	170	48	10	3	247	40,362
65 and over	10	15	113	31	7	4	180	37,118
Total	128	69	912	286	90	18	1,503	$47,775

Transferred and Terminated Participants (continued)

Distribution by Age and Years of Service – Transfers to Other CalPERS Plans

State Industrial – As of June 30, 2018

	Years of Service at Valuation Date							
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20-24	25+	Total	Average Salary
15 - 24	34	0	0	0	0	0	34	$39,544
25 - 29	293	6	0	0	0	0	299	50,338
30 - 34	718	134	7	0	0	0	859	62,224
35 - 39	777	204	20	1	0	0	1,002	69,880
40 - 44	830	239	66	26	4	0	1,165	73,978
45 - 49	1,074	357	120	46	14	1	1,612	76,698
50 - 54	1,144	348	157	64	38	11	1,762	76,916
55 - 59	839	242	100	40	26	9	1,256	76,656
60 - 64	471	135	46	12	9	3	676	75,477
65 and over	176	46	11	8	1	2	244	82,259
Total	6,356	1,711	527	197	92	26	8,909	$73,250

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

State Industrial – As of June 30, 2018

	Years of Service at Valuation Date							
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20-24	25+	Total	Average Salary
15 - 24	28	0	0	0	0	0	28	$31,226
25 - 29	174	3	0	0	0	0	177	35,214
30 - 34	271	32	4	0	0	0	307	38,719
35 - 39	337	53	9	0	0	0	399	40,378
40 - 44	335	65	12	7	1	0	420	40,735
45 - 49	451	112	29	14	2	1	609	43,377
50 - 54	407	104	44	14	7	0	576	43,234
55 - 59	327	78	17	4	2	0	428	38,394
60 - 64	226	39	8	1	0	0	274	37,154
65 and over	305	41	1	1	0	0	348	39,141
Total	2,861	527	124	41	12	1	3,566	$40,316

Transferred and Terminated Participants (continued)

Distribution by Age and Years of Service – Transfers to Other CalPERS Plans

State Safety – As of June 30, 2018

	Years of Service at Valuation Date							
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20-24	25+	Total	Average Salary
15 - 24	26	0	0	0	0	0	26	$40,694
25 - 29	219	7	0	0	0	0	226	55,239
30 - 34	423	81	3	1	0	0	508	70,035
35 - 39	604	189	21	0	0	0	814	79,070
40 - 44	643	191	45	2	0	0	881	86,566
45 - 49	662	241	59	15	3	0	980	91,352
50 - 54	644	224	71	24	12	0	975	91,513
55 - 59	544	191	59	22	10	3	829	92,091
60 - 64	344	124	49	11	2	2	532	95,547
65 and over	134	40	8	2	1	0	185	100,480
Total	4,243	1,288	315	77	28	5	5,956	$86,343

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

State Safety – As of June 30, 2018

	Years of Service at Valuation Date							
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20-24	25+	Total	Average Salary
15 - 24	95	0	0	0	0	0	95	$37,792
25 - 29	332	4	0	0	0	0	336	45,127
30 - 34	652	57	7	0	0	0	716	54,141
35 - 39	807	140	17	4	0	0	968	59,589
40 - 44	791	143	35	8	1	0	978	70,646
45 - 49	899	194	53	15	5	0	1,166	70,655
50 - 54	740	162	41	16	6	0	965	68,325
55 - 59	665	78	18	7	1	0	769	62,074
60 - 64	589	55	11	2	1	1	659	63,425
65 and over	415	28	5	2	1	0	451	66,644
Total	5,985	861	187	54	15	1	7,103	$63,663

Transferred and Terminated Participants (continued)

Distribution by Age and Years of Service – Transfers to Other CalPERS Plans

State Peace Officers and Firefighters – As of June 30, 2018

	Years of Service at Valuation Date							
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20-24	25+	Total	Average Salary
15 - 24	56	0	0	0	0	0	56	$50,294
25 - 29	425	4	0	0	0	0	429	70,003
30 - 34	757	80	10	0	0	0	847	79,381
35 - 39	944	145	33	5	0	0	1,127	89,888
40 - 44	869	134	56	24	4	0	1,087	96,902
45 - 49	906	169	72	44	32	6	1,229	102,323
50 - 54	579	136	50	31	17	9	822	101,178
55 - 59	291	61	29	6	5	8	400	94,802
60 - 64	98	23	6	4	2	2	135	84,703
65 and over	30	7	1	3	0	0	41	91,097
Total	4,955	759	257	117	60	25	6,173	$92,132

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

State Peace Officers and Firefighters – As of June 30, 2018

	Years of Service at Valuation Date							
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20-24	25+	Total	Average Salary
15 - 24	174	0	0	0	0	0	174	$38,551
25 - 29	624	2	0	0	0	0	626	39,796
30 - 34	859	107	9	0	0	0	975	41,605
35 - 39	1,088	150	43	2	0	0	1,283	41,442
40 - 44	878	172	77	42	9	0	1,178	46,246
45 - 49	830	201	113	64	31	4	1,243	50,419
50 - 54	621	109	29	8	6	1	774	41,261
55 - 59	394	60	14	9	4	0	481	39,501
60 - 64	182	28	9	3	1	0	223	39,324
65 and over	103	7	7	3	1	0	121	40,755
Total	5,753	836	301	131	52	5	7,078	$43,394

Transferred and Terminated Participants (continued)

Distribution by Age and Years of Service – Transfers to Other CalPERS Plans

California Highway Patrol – As of June 30, 2018

	Years of Service at Valuation Date							
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20-24	25+	Total	Average Salary
15 - 24	0	0	0	0	0	0	0	$0
25 - 29	7	0	0	0	0	0	7	76,630
30 - 34	22	4	0	0	0	0	26	75,667
35 - 39	20	5	1	0	0	0	26	92,201
40 - 44	41	13	4	1	0	0	59	95,556
45 - 49	52	10	10	3	0	0	75	102,380
50 - 54	36	3	1	2	0	0	42	95,838
55 - 59	15	5	2	1	0	0	23	87,208
60 - 64	4	2	0	0	0	0	6	91,926
65 and over	1	0	0	0	0	0	1	40,000
Total	198	42	18	7	0	0	265	$93,735

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

California Highway Patrol – As of June 30, 2018

	Years of Service at Valuation Date							
Attained Age	0 - 4	5 - 9	10 - 14	15 - 19	20-24	25+	Total	Average Salary
15 - 24	2	0	0	0	0	0	2	$62,571
25 - 29	21	0	0	0	0	0	21	65,216
30 - 34	29	14	3	0	0	0	46	78,844
35 - 39	34	20	5	0	0	0	59	88,194
40 - 44	48	46	14	3	1	0	112	83,930
45 - 49	52	41	25	9	3	0	130	81,839
50 - 54	31	17	1	0	1	0	50	71,217
55 - 59	9	10	3	0	0	1	23	65,404
60 - 64	5	2	0	0	0	0	7	60,753
65 and over	1	0	0	0	0	0	1	54,527
Total	232	150	51	12	5	1	451	$79,621

Appendix C - Participant Data

Retired Members and Beneficiaries

Number of Retirees and Beneficiaries - by Age and Retirement Type

State Miscellaneous Tier 1 – As of June 30, 2018

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 30	0	0	1	0	0	227	228
30-34	0	4	5	0	1	144	154
35-39	0	42	11	4	0	211	268
40-44	0	92	29	13	5	220	359
45-49	0	290	55	32	3	324	704
50-54	1,414	728	165	71	11	502	2,891
55-59	9,684	1,492	393	192	19	939	12,719
60-64	23,592	2,016	511	274	10	1,498	27,901
65-69	34,453	2,159	469	350	6	2,338	39,775
70-74	30,521	1,687	344	312	6	3,110	35,980
75-79	20,411	1,127	219	252	9	3,547	25,565
80-84	13,394	662	125	212	8	3,943	18,344
85 and Over	15,056	528	75	276	3	7,913	23,851
Total	148,525	10,827	2,402	1,988	81	24,916	188,739

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Annual Allowance Amounts for Retirees and Beneficiaries - by Age and Retirement Type

State Miscellaneous Tier 1 – Annual Amounts Including PPPA Payments – As of June 30, 2018

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 30	$0	$0	$181	$0	$0	$1,838,644	$1,838,825
30-34	0	17,610	944	0	159	1,382,999	1,401,712
35-39	0	326,437	23,642	94,178	0	2,168,378	2,612,634
40-44	0	989,467	10,451	318,460	65,821	2,508,728	3,892,926
45-49	0	3,709,067	147,180	644,855	1,575	4,700,231	9,202,908
50-54	17,916,067	10,807,743	409,784	1,506,888	92,323	7,259,434	37,992,239
55-59	276,092,131	23,662,543	1,641,718	4,489,961	261,342	15,024,189	321,171,883
60-64	813,431,365	33,403,065	2,191,702	7,372,809	8,528	29,125,534	885,533,002
65-69	1,200,991,202	35,989,002	1,953,145	9,894,036	88,036	52,161,965	1,301,077,386
70-74	1,077,420,808	27,485,312	1,561,373	8,818,385	2,103	78,803,058	1,194,091,040
75-79	731,884,707	20,140,095	1,192,842	7,345,513	29,880	97,863,001	858,456,038
80-84	465,771,954	11,164,873	451,495	6,264,495	9,706	113,380,644	597,043,167
85 and Over	473,095,843	7,536,424	333,545	7,068,621	2,528	205,096,897	693,133,858
Total	$5,056,604,076	$175,231,638	$9,918,001	$53,818,201	$562,001	$611,313,702	$5,907,447,619

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Retired Members and Beneficiaries (continued)

Number of Retirees and Beneficiaries - by Years Retired and Retirement Type

State Miscellaneous Tier 1 – As of June 30, 2018

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 5 Years	38,205	1,640	291	337	4	8,330	48,807
5 - 9	36,795	1,636	310	358	12	5,957	45,068
10 - 14	28,450	1,560	374	320	10	4,198	34,912
15 - 19	19,845	2,039	462	279	8	2,774	25,407
20 - 24	11,417	1,810	358	228	16	1,758	15,587
25 - 29	8,102	1,060	355	182	7	1,001	10,707
30 and over	5,711	1,082	252	284	24	898	8,251
Total	148,525	10,827	2,402	1,988	81	24,916	188,739

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Annual Allowance Amounts for Retirees and Beneficiaries - by Years Retired and Retirement Type

State Miscellaneous Tier 1 – Annual Amounts Including PPPA Payments – As of June 30, 2018

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 5 Years	$1,335,299,087	$26,008,791	$1,422,375	$8,839,815	$41,159	$227,057,266	$1,598,668,492
5 - 9	1,329,672,011	26,282,933	2,003,667	9,921,837	167,489	152,680,316	1,520,728,254
10 - 14	991,319,285	27,295,974	2,319,694	8,619,472	66,528	101,751,727	1,131,372,680
15 - 19	719,700,995	35,374,405	2,129,922	8,338,418	10,315	64,128,818	829,682,873
20 - 24	336,976,735	30,320,444	1,082,769	6,783,697	257,827	35,347,969	410,769,441
25 - 29	240,712,945	17,313,911	731,810	5,154,475	3,983	18,338,355	282,255,479
30 and over	102,923,018	12,635,181	227,765	6,160,487	14,700	12,009,250	133,970,400
Total	$5,056,604,076	$175,231,638	$9,918,001	$53,818,201	$562,001	$611,313,702	$5,907,447,619

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Retired Members and Beneficiaries (continued)

Number of Retirees and Beneficiaries - by Age and Retirement Type

State Miscellaneous Tier 2 – As of June 30, 2018

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	23	23
30-34	0	0	0	0	0	10	10
35-39	0	2	0	1	0	23	26
40-44	0	10	0	2	0	15	27
45-49	0	59	4	4	0	27	94
50-54	109	133	12	10	0	36	300
55-59	383	220	19	19	0	80	721
60-64	691	315	13	22	0	100	1,141
65-69	992	299	8	35	2	149	1,485
70-74	762	223	10	14	0	158	1,167
75-79	443	104	6	8	0	111	672
80-84	307	43	1	6	0	101	458
85 and Over	196	12	1	0	0	86	295
Total	3,883	1,420	74	121	2	919	6,419

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Annual Allowance Amounts for Retirees and Beneficiaries - by Age and Retirement Type

State Miscellaneous Tier 2 – Annual Amounts Including PPPA Payments – As of June 30, 2018

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	$92,833	$92,833
30-34	0	0	0	0	0	52,354	52,354
35-39	0	23,065	0	613	0	133,740	157,417
40-44	0	88,777	0	10,750	0	90,991	190,518
45-49	0	618,539	121,422	23,378	0	190,392	953,731
50-54	183,222	1,504,197	260,745	59,401	0	328,836	2,336,401
55-59	1,398,042	2,876,551	293,888	179,145	0	728,792	5,476,418
60-64	3,853,620	4,504,872	258,638	161,200	0	1,046,123	9,824,452
65-69	7,363,491	4,994,423	218,585	384,519	56,343	1,682,852	14,700,214
70-74	5,753,510	3,756,793	246,348	177,441	0	1,817,409	11,751,502
75-79	4,101,140	1,861,814	88,827	90,080	0	1,367,135	7,508,996
80-84	3,365,743	783,383	29,910	85,028	0	1,128,745	5,392,810
85 and Over	2,657,901	203,577	37,564	0	0	992,871	3,891,914
Total	$28,676,670	$21,215,992	$1,555,929	$1,171,554	$56,343	$9,653,072	$62,329,560

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Retired Members and Beneficiaries (continued)

Number of Retirees and Beneficiaries - by Years Retired and Retirement Type

State Miscellaneous Tier 2 – As of June 30, 2018

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 5 Years	1,379	181	14	29	0	277	1,880
5 - 9	1,015	183	6	28	0	213	1,445
10 - 14	367	137	6	30	0	154	694
15 - 19	497	351	24	16	0	144	1,032
20 - 24	468	336	16	11	2	91	924
25 - 29	127	178	8	4	0	35	352
30 and over	30	54	0	3	0	5	92
Total	3,883	1,420	74	121	2	919	6,419

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Annual Allowance Amounts for Retirees and Beneficiaries - by Years Retired and Retirement Type

State Miscellaneous Tier 2 – Annual Amounts Including PPPA Payments – As of June 30, 2018

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 5 Years	$8,850,918	$1,729,681	$95,392	$272,664	$0	$2,374,873	$13,323,528
5-9	6,973,554	1,917,603	81,381	158,796	0	1,773,075	10,904,410
10-14	2,346,931	1,785,016	177,186	274,685	0	1,675,860	6,259,678
15-19	3,319,693	5,171,621	467,804	213,988	0	1,784,723	10,957,828
20-24	5,478,955	6,196,341	458,592	149,489	56,343	1,451,190	13,790,910
25-29	1,444,644	3,583,712	275,574	72,896	0	516,264	5,893,090
30 and Over	261,975	832,018	0	29,036	0	77,087	1,200,116
Total	$28,676,670	$21,215,992	$1,555,929	$1,171,554	$56,343	$9,653,072	$62,329,560

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Retired Members and Beneficiaries (continued)

Number of Retirees and Beneficiaries - by Age and Retirement Type

State Industrial – As of June 30, 2018

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 30	0	0	1	0	0	20	21
30-34	0	2	0	0	0	16	18
35-39	0	10	4	0	0	17	31
40-44	0	25	9	0	0	20	54
45-49	0	73	21	2	0	16	112
50-54	243	168	49	6	1	46	513
55-59	1,326	233	95	16	2	67	1,739
60-64	2,494	283	112	21	1	102	3,013
65-69	2,839	273	101	16	1	152	3,382
70-74	2,211	194	64	17	1	171	2,658
75-79	1,116	105	33	18	2	164	1,438
80-84	653	45	22	10	2	147	879
85 and Over	495	27	12	5	3	242	784
Total	11,377	1,438	523	111	13	1,180	14,642

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Annual Allowance Amounts for Retirees and Beneficiaries - by Age and Retirement Type

State Industrial – Annual Amounts Including PPPA Payments – As of June 30, 2018

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 30	$0	$0	$37	$0	$0	$72,282	$72,318
30-34	0	21,392	0	0	0	50,742	72,134
35-39	0	51,075	1,958	0	0	93,891	146,923
40-44	0	179,031	120,459	0	0	150,878	450,368
45-49	0	652,568	83,321	21,630	0	219,199	976,718
50-54	1,649,193	1,719,984	277,698	72,972	5,930	288,669	4,014,446
55-59	17,527,875	2,228,435	497,173	123,574	1,159	393,700	20,771,916
60-64	33,783,861	2,867,118	739,622	249,656	453	849,336	38,490,046
65-69	39,924,421	2,515,918	665,367	94,889	68	1,277,717	44,478,379
70-74	32,686,744	1,944,003	554,862	185,274	19,284	1,610,908	37,001,076
75-79	17,650,997	1,093,071	261,423	399,786	1,643	1,695,771	21,102,690
80-84	10,329,261	535,175	173,581	288,970	53,873	2,073,449	13,454,310
85 and Over	8,513,295	396,231	65,782	123,977	70,487	3,705,291	12,875,062
Total	$162,065,648	$14,204,000	$3,441,281	$1,560,728	$152,897	$12,481,833	$193,906,387

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Retired Members and Beneficiaries (continued)

Number of Retirees and Beneficiaries - by Years Retired and Retirement Type

State Industrial – As of June 30, 2018

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 5 Years	3,598	326	100	29	3	436	4,492
5 - 9	3,481	295	95	22	1	290	4,184
10 - 14	2,110	213	103	19	1	202	2,648
15 - 19	1,238	312	103	15	0	112	1,780
20 - 24	535	152	58	12	1	77	835
25 - 29	255	104	36	10	0	38	443
30 and over	160	36	28	4	7	25	260
Total	11,377	1,438	523	111	13	1,180	14,642

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Annual Allowance Amounts for Retirees and Beneficiaries - by Years Retired and Retirement Type

State Industrial – Annual Amounts Including PPPA Payments – As of June 30, 2018

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 5 Years	$51,559,017	$3,348,058	$576,554	$379,042	$6,389	$4,715,482	$60,584,542
5 - 9	50,944,696	2,878,666	794,632	340,554	68	2,924,221	57,882,836
10 - 14	30,328,979	2,158,172	889,960	282,632	1,154	2,303,353	35,964,249
15 - 19	17,807,140	3,214,874	556,754	157,544	0	1,319,080	23,055,392
20 - 24	5,838,859	1,339,406	219,362	182,596	81	601,135	8,181,439
25 - 29	3,493,984	954,948	243,000	178,202	0	314,808	5,184,941
30 and over	2,092,973	309,877	161,019	40,158	145,206	303,754	3,052,987
Total	$162,065,648	$14,204,000	$3,441,281	$1,560,728	$152,897	$12,481,833	$193,906,387

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Retired Members and Beneficiaries (continued)

Number of Retirees and Beneficiaries - by Age and Retirement Type

State Safety – As of June 30, 2018

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 30	0	0	3	0	0	43	46
30-34	0	1	25	0	0	17	43
35-39	0	4	45	0	0	28	77
40-44	0	12	96	2	0	22	132
45-49	0	32	184	3	1	39	259
50-54	299	72	299	16	3	66	755
55-59	1,817	111	557	37	8	146	2,676
60-64	3,580	158	823	58	15	265	4,899
65-69	4,450	187	923	80	14	386	6,040
70-74	3,596	136	730	44	12	460	4,978
75-79	1,889	66	407	23	10	446	2,841
80-84	931	24	194	23	16	382	1,570
85 and Over	591	23	151	18	9	641	1,433
Total	17,153	826	4,437	304	88	2,941	25,749

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Annual Allowance Amounts for Retirees and Beneficiaries - by Age and Retirement Type

State Safety – Annual Amounts Including PPPA Payments – As of June 30, 2018

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 30	$0	$0	$74,313	$0	$0	$341,363	$415,676
30-34	0	4,090	770,581	0	0	172,329	947,000
35-39	0	56,071	1,292,811	0	0	296,718	1,645,601
40-44	0	139,299	2,736,860	52,451	0	218,559	3,147,169
45-49	0	293,294	5,814,629	112,292	29,768	449,504	6,699,486
50-54	3,969,047	833,305	8,799,120	340,016	106,959	910,382	14,958,830
55-59	39,208,287	1,383,639	15,669,560	667,139	325,431	2,436,900	59,690,957
60-64	84,863,717	2,180,567	23,442,847	1,008,501	374,170	4,571,570	116,441,371
65-69	104,320,373	2,749,646	25,668,978	1,315,337	459,239	6,498,387	141,011,960
70-74	83,966,236	1,906,755	19,969,358	865,021	329,009	7,873,193	114,909,571
75-79	42,593,590	1,095,864	11,625,320	439,449	294,243	7,383,153	63,431,618
80-84	18,920,307	376,435	5,785,921	493,850	488,482	6,189,827	32,254,823
85 and Over	12,317,895	386,975	4,313,387	326,338	257,608	10,849,228	28,451,432
Total	$390,159,451	$11,405,939	$125,963,686	$5,620,394	$2,664,909	$48,191,113	$584,005,492

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Retired Members and Beneficiaries (continued)

Number of Retirees and Beneficiaries - by Years Retired and Retirement Type

State Safety – As of June 30, 2018

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 5 Years	5,563	262	947	76	3	1,108	7,959
5 - 9	5,534	193	842	56	7	734	7,366
10 - 14	3,206	111	699	81	7	451	4,555
15 - 19	1,748	122	664	37	14	280	2,865
20 - 24	619	75	340	24	7	183	1,248
25 - 29	242	37	271	9	5	93	657
30 and over	241	26	674	21	45	92	1,099
Total	17,153	826	4,437	304	88	2,941	25,749

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Annual Allowance Amounts for Retirees and Beneficiaries - by Years Retired and Retirement Type

State Safety – Annual Amounts Including PPPA Payments – As of June 30, 2018

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 5 Years	$144,154,920	$4,559,454	$32,506,992	$1,802,097	$105,642	$19,735,577	$202,864,681
5 - 9	143,611,012	3,389,776	28,404,285	1,053,336	436,563	11,957,173	188,852,145
10 - 14	59,520,257	1,238,519	19,288,163	1,351,839	232,821	7,459,884	89,091,483
15 - 19	27,435,837	1,153,800	16,760,915	523,053	324,480	3,960,333	50,158,418
20 - 24	7,493,592	548,203	8,065,395	375,933	270,189	2,388,118	19,141,431
25 - 29	3,305,202	294,301	5,807,394	122,429	124,512	1,406,027	11,059,863
30 and over	4,638,631	221,886	15,130,542	391,708	1,170,703	1,284,001	22,837,471
Total	$390,159,451	$11,405,939	$125,963,686	$5,620,394	$2,664,909	$48,191,113	$584,005,492

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Retired Members and Beneficiaries (continued)

Number of Retirees and Beneficiaries - by Age and Retirement Type

State Peace Officers and Firefighters – As of June 30, 2018

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 30	0	0	5	0	1	58	64
30-34	0	2	37	2	1	18	60
35-39	0	11	173	2	3	36	225
40-44	0	11	432	2	9	36	490
45-49	0	44	773	14	12	58	901
50-54	3,063	69	1,382	26	25	109	4,674
55-59	5,658	110	1,982	47	27	223	8,047
60-64	5,581	102	1,739	40	21	393	7,876
65-69	5,029	95	1,557	63	22	515	7,281
70-74	3,600	60	1,053	31	22	524	5,290
75-79	1,808	25	502	15	11	502	2,863
80-84	821	16	180	8	7	359	1,391
85 and Over	447	6	71	6	0	255	785
Total	26,007	551	9,886	256	161	3,086	39,947

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Annual Allowance Amounts for Retirees and Beneficiaries - by Age and Retirement Type

State Peace Officers and Firefighters – Annual Amounts Including PPPA Payments – As of June 30, 2018

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 30	$0	$0	$97,327	$0	$40,479	$699,106	$836,912
30-34	0	14,900	1,310,138	70,839	57,681	236,746	1,690,305
35-39	0	135,714	6,038,476	79,812	85,686	579,490	6,919,179
40-44	0	176,527	15,274,324	78,487	404,771	837,462	16,771,571
45-49	0	913,461	28,489,505	770,336	626,703	1,444,884	32,244,889
50-54	196,583,608	1,485,996	58,426,600	1,245,367	1,099,576	3,804,484	262,645,631
55-59	359,778,289	2,674,572	84,035,460	2,251,842	1,136,376	8,062,983	457,939,521
60-64	350,098,123	2,890,665	74,670,130	1,669,560	812,962	15,806,270	445,947,711
65-69	299,430,709	2,698,672	70,242,121	2,656,133	879,259	21,333,774	397,240,669
70-74	201,425,512	1,593,070	47,206,866	1,293,133	778,407	21,320,762	273,617,751
75-79	91,638,199	832,524	21,510,861	692,189	407,747	20,213,273	135,294,793
80-84	37,994,621	520,680	7,246,685	233,369	295,958	13,643,678	59,934,991
85 and Over	18,518,358	117,332	2,727,930	199,798	0	8,872,071	30,435,489
Total	$1,555,467,420	$14,054,114	$417,276,424	$11,240,865	$6,625,605	$116,854,983	$2,121,519,412

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Retired Members and Beneficiaries (continued)

Number of Retirees and Beneficiaries - by Years Retired and Retirement Type

State Peace Officers and Firefighters – As of June 30, 2018

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 5 Years	7,626	119	1,980	56	10	1,270	11,061
5 - 9	8,497	124	1,635	46	22	796	11,120
10 - 14	5,151	81	1,600	62	35	513	7,442
15 - 19	2,730	115	2,033	42	36	249	5,205
20 - 24	1,115	73	1,264	33	28	163	2,676
25 - 29	618	33	975	13	9	70	1,718
30 and over	270	6	399	4	21	25	725
Total	26,007	551	9,886	256	161	3,086	39,947

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Annual Allowance Amounts for Retirees and Beneficiaries - by Years Retired and Retirement Type

State Peace Officers and Firefighters – Annual Amounts Including PPPA Payments – As of June 30, 2018

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 5 Years	$450,562,440	$3,662,743	$93,117,451	$2,628,101	$433,293	$52,938,603	$603,342,630
5 - 9	535,517,287	3,671,495	77,651,086	2,267,172	1,140,910	30,119,337	650,367,286
10 - 14	326,377,611	2,075,911	75,277,226	2,834,538	1,501,621	17,944,024	426,010,930
15 - 19	151,613,480	2,516,530	80,605,575	1,537,169	1,406,706	8,351,116	246,030,576
20 - 24	49,823,617	1,454,158	46,616,304	1,402,668	1,126,329	4,976,899	105,399,975
25 - 29	30,568,678	558,264	33,079,269	444,533	360,534	1,858,056	66,869,334
30 and over	11,004,307	115,014	10,929,513	126,684	656,213	666,949	23,498,680
Total	$1,555,467,420	$14,054,114	$417,276,424	$11,240,865	$6,625,605	$116,854,983	$2,121,519,412

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Retired Members and Beneficiaries (continued)

Number of Retirees and Beneficiaries - by Age and Retirement Type

California Highway Patrol – As of June 30, 2018

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 30	0	0	0	0	2	13	15
30-34	0	0	3	0	3	5	11
35-39	0	3	14	0	5	5	27
40-44	0	2	38	0	8	7	55
45-49	0	2	87	1	15	6	111
50-54	519	3	218	4	19	14	777
55-59	911	5	388	4	21	46	1,375
60-64	853	6	444	6	8	75	1,392
65-69	495	5	429	8	8	134	1,079
70-74	541	5	699	5	17	239	1,506
75-79	460	6	626	6	15	293	1,406
80-84	189	2	337	2	13	233	776
85 and Over	143	3	185	3	6	288	628
Total	4,111	42	3,468	39	140	1,358	9,158

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Annual Allowance Amounts for Retirees and Beneficiaries - by Age and Retirement Type

California Highway Patrol – Annual Amounts Including PPPA Payments – As of June 30, 2018

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 30	$0	$0	$0	$0	$98,822	$303,520	$402,342
30-34	0	0	151,718	0	176,738	62,546	391,003
35-39	0	70,295	657,786	0	382,917	145,547	1,256,545
40-44	0	30,628	1,982,327	0	574,640	109,063	2,696,658
45-49	0	35,017	4,338,176	88,827	1,029,419	75,735	5,567,173
50-54	50,274,817	50,972	15,469,443	242,391	1,298,891	666,051	68,002,566
55-59	91,543,699	156,483	26,080,113	286,204	1,246,127	2,500,229	121,812,855
60-64	80,030,881	107,444	30,924,332	491,189	394,673	3,919,099	115,867,619
65-69	39,713,536	272,788	28,308,797	533,289	284,403	5,641,188	74,754,001
70-74	34,536,329	225,336	44,031,641	324,634	450,134	8,634,406	88,202,480
75-79	24,209,494	118,640	30,186,972	258,412	434,307	10,393,661	65,601,487
80-84	8,353,508	59,319	14,482,563	75,215	352,749	7,157,008	30,480,361
85 and Over	5,754,710	82,268	7,577,558	69,810	168,031	7,566,823	21,219,200
Total	$334,416,972	$1,209,190	$204,191,427	$2,369,972	$6,891,851	$47,174,877	$596,254,289

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Retired Members and Beneficiaries (continued)

Number of Retirees and Beneficiaries - by Years Retired and Retirement Type

California Highway Patrol – As of June 30, 2018

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 5 Years	1,060	7	284	4	15	444	1,814
5 - 9	1,038	3	310	2	19	324	1,696
10 - 14	785	5	460	6	19	199	1,474
15 - 19	514	6	623	13	6	169	1,331
20 - 24	400	8	509	4	14	91	1,026
25 - 29	166	4	476	3	8	56	713
30 and over	148	9	806	7	59	75	1,104
Total	4,111	42	3,468	39	140	1,358	9,158

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Annual Allowance Amounts for Retirees and Beneficiaries - by Years Retired and Retirement Type

California Highway Patrol – Annual Amounts Including PPPA Payments – As of June 30, 2018

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 5 Years	$104,133,074	$169,445	$25,099,862	$367,043	$1,098,702	$17,578,842	$148,446,969
5 - 9	100,901,890	96,409	27,779,638	108,746	1,336,773	12,945,763	143,169,219
10 - 14	63,194,270	357,674	37,807,622	405,742	1,387,738	6,328,216	109,481,263
15 - 19	32,688,133	190,907	44,488,779	962,053	300,268	5,167,246	83,797,386
20 - 24	20,730,972	195,975	26,110,077	208,458	701,136	2,320,797	50,267,416
25 - 29	7,125,894	47,861	19,734,999	127,072	345,141	1,248,802	28,629,769
30 and over	5,642,740	150,919	23,170,450	190,856	1,722,092	1,585,210	32,462,267
Total	$334,416,972	$1,209,190	$204,191,427	$2,369,972	$6,891,851	$47,174,877	$596,254,289

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Retired Members and Beneficiaries (continued)

Number Counts and Benefits - by Year of Retirement – As of June 30, 2018

State Miscellaneous Tier 1

Year Retired	Total Retirement	Total Benefits	Average Benefits
2018[1]	3,813	$114,829,900	$30,115
2017	10,291	355,600,842	34,555
2016	9,890	325,302,734	32,892
2015	9,882	321,694,336	32,554
2014	9,833	316,022,685	32,139
2013	8,496	258,453,257	30,421
2012	9,209	296,434,539	32,190
2011	9,160	291,728,919	31,848
2010	9,836	344,485,501	35,023
2009	8,526	310,223,729	36,386
2008	7,263	251,625,909	34,645
2007	6,921	225,249,093	32,546
2006	6,531	196,847,570	30,140
2005	7,288	237,683,004	32,613
2004	8,260	288,104,117	34,879
2003	5,780	182,097,568	31,505
2002	5,596	182,672,725	32,643
2001	5,561	200,171,550	35,996
2000	6,989	255,622,702	36,575
1999	2,811	65,313,085	23,235
1998	3,772	98,733,247	26,175
1997	3,629	95,188,415	26,230
1996	3,338	90,141,970	27,005
1995	2,878	79,660,476	27,679
1994	2,850	75,463,454	26,478
1993	2,085	44,197,899	21,198
1992	3,042	86,213,213	28,341
1991	2,976	95,487,415	32,086
1990	1,628	37,157,798	22,824
1989 and Earlier	10,605	185,039,971	17,448
Total	188,739	$5,907,447,619	$31,300

State Miscellaneous Tier 2

Year Retired	Total Retirement	Total Benefits	Average Benefits
2018[1]	172	$857,609	$4,986
2017	338	2,239,812	6,627
2016	371	2,534,436	6,831
2015	371	2,831,799	7,633
2014	400	3,075,593	7,689
2013	407	3,162,472	7,770
2012	446	3,209,082	7,195
2011	326	2,492,499	7,646
2010	219	1,627,089	7,430
2009	187	1,331,702	7,121
2008	154	1,434,582	9,315
2007	137	1,279,439	9,339
2006	129	984,475	7,632
2005	150	1,324,419	8,829
2004	133	1,252,013	9,414
2003	144	1,553,027	10,785
2002	157	1,582,498	10,080
2001	192	1,563,282	8,142
2000	217	2,248,292	10,361
1999	229	2,699,062	11,786
1998	294	3,710,796	12,622
1997	273	3,946,937	14,458
1996	224	3,186,554	14,226
1995	161	2,722,848	16,912
1994	94	1,617,862	17,211
1993	99	1,586,085	16,021
1992	88	1,462,300	16,617
1991	100	1,641,006	16,410
1990	45	730,180	16,226
1989 and Earlier	162	2,441,809	15,073
Total	6,419	$62,329,560	$9,710

(1) The numbers for 2018 represent the first 6 months of the calendar year only.

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Retired Members and Beneficiaries (continued)

Number Counts and Benefits - by Year of Retirement – As of June 30, 2018 (continued)

State Industrial

Year Retired	Total Retirement	Total Benefits	Average Benefits
2018[1]	351	$4,498,569	$12,816
2017	929	13,068,926	14,068
2016	945	13,276,901	14,050
2015	935	12,596,469	13,472
2014	887	11,192,309	12,618
2013	780	9,856,233	12,636
2012	898	12,703,097	14,146
2011	820	10,894,963	13,287
2010	938	13,684,120	14,589
2009	774	10,823,600	13,984
2008	616	8,434,303	13,692
2007	505	6,830,006	13,525
2006	533	6,759,221	12,681
2005	526	7,724,232	14,685
2004	621	8,701,553	14,012
2003	430	5,229,981	12,163
2002	413	5,319,029	12,879
2001	382	5,368,793	14,054
2000	482	6,914,139	14,345
1999	181	1,894,971	10,469
1998	254	2,467,548	9,715
1997	216	2,226,488	10,308
1996	171	1,721,807	10,069
1995	161	1,695,171	10,529
1994	136	1,322,981	9,728
1993	105	910,292	8,669
1992	124	1,777,009	14,331
1991	99	1,381,540	13,955
1990	66	533,099	8,077
1989 and Earlier	364	4,099,037	11,261
Total	14,642	$193,906,387	$13,243

State Safety

Year Retired	Total Retirement	Total Benefits	Average Benefits
2018[1]	655	$16,602,085	$25,347
2017	1,598	42,380,732	26,521
2016	1,639	43,392,377	26,475
2015	1,581	40,254,264	25,461
2014	1,599	38,204,311	23,893
2013	1,492	36,898,629	24,731
2012	1,605	39,011,779	24,306
2011	1,498	37,608,512	25,106
2010	1,616	45,436,722	28,117
2009	1,339	34,667,397	25,891
2008	1,051	24,434,938	23,249
2007	967	20,342,371	21,037
2006	904	16,353,247	18,090
2005	951	18,173,466	19,110
2004	972	18,935,008	19,480
2003	711	13,188,992	18,550
2002	673	12,067,933	17,932
2001	637	11,626,736	18,252
2000	712	13,249,653	18,609
1999	348	5,345,330	15,360
1998	367	5,289,814	14,414
1997	312	5,114,058	16,391
1996	257	3,997,414	15,554
1995	212	3,015,230	14,223
1994	222	3,316,869	14,941
1993	125	2,154,131	17,233
1992	196	3,612,084	18,429
1991	164	2,356,025	14,366
1990	105	1,822,995	17,362
1989 and Earlier	1,241	25,152,390	20,268
Total	25,749	$584,005,492	$22,681

(1) The numbers for 2018 represent the first 6 months of the calendar year only.

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Retired Members and Beneficiaries (continued)

Number Counts and Benefits - by Year of Retirement – As of June 30, 2018 (continued)

State Peace Officers and Firefighters

Year Retired	Total Retirement	Total Benefits	Average Benefits
2018[1]	838	$43,272,389	$51,638
2017	2,184	120,618,997	55,228
2016	2,129	114,336,928	53,705
2015	2,346	132,119,339	56,317
2014	2,290	122,581,545	53,529
2013	2,189	115,082,681	52,573
2012	2,489	141,195,958	56,728
2011	2,207	121,309,658	54,966
2010	2,387	141,922,753	59,457
2009	2,130	136,229,157	63,957
2008	1,539	96,043,702	62,407
2007	1,718	109,813,408	63,919
2006	1,920	118,848,207	61,900
2005	1,213	64,514,205	53,186
2004	1,376	68,815,779	50,011
2003	1,133	54,802,422	48,369
2002	1,254	62,160,185	49,570
2001	1,131	54,823,857	48,474
2000	1,443	76,022,916	52,684
1999	562	19,151,921	34,078
1998	639	22,519,549	35,242
1997	643	24,550,386	38,181
1996	568	23,655,050	41,646
1995	488	20,340,631	41,682
1994	443	16,502,443	37,252
1993	413	16,180,037	39,177
1992	474	19,505,796	41,151
1991	415	18,742,045	45,162
1990	239	7,954,850	33,284
1989 and Earlier	1,147	37,902,618	33,045
Total	39,947	$2,121,519,412	$53,108

California Highway Patrol

Year Retired	Total Retirement	Total Benefits	Average Benefits
2018[1]	134	$8,549,803	$63,805
2017	409	36,750,962	89,856
2016	366	28,804,703	78,701
2015	396	33,657,289	84,993
2014	304	24,464,937	80,477
2013	312	23,793,480	76,261
2012	371	30,625,322	82,548
2011	369	31,473,600	85,294
2010	381	33,155,561	87,022
2009	351	31,412,131	89,493
2008	276	22,733,022	82,366
2007	270	20,591,611	76,265
2006	315	22,943,992	72,838
2005	349	27,177,514	77,873
2004	268	18,618,631	69,473
2003	197	11,760,459	59,698
2002	278	18,354,574	66,024
2001	296	20,795,025	70,253
2000	410	26,675,432	65,062
1999	148	7,078,098	47,825
1998	184	8,859,018	48,147
1997	222	10,893,138	49,068
1996	243	13,183,691	54,254
1995	202	9,944,800	49,232
1994	176	7,519,372	42,724
1993	202	8,979,528	44,453
1992	154	6,020,107	39,092
1991	159	7,091,896	44,603
1990	91	3,487,888	38,328
1989 and Earlier	1,325	40,858,706	30,837
Total	9,158	$596,254,289	$65,107

(1) The numbers for 2018 represent the first 6 months of the calendar year only.

Counts of members do not include alternate payees receiving benefits while the member is still working. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

Appendix D – Normal Cost Information

Normal Cost Chart

The normal cost is determined using the Entry Age Cost method using a 7.00 percent discount rate. Some important features of this method are that the costs are dependent upon a member's entry age in the plan and benefit level of the plan. In general, the lower the entry age, the lower the total normal cost. Note that future costs may vary as the entry age of the members change or with changes to actuarial assumptions or methods. FAC means Final Average Compensation.

	State Plans	Total Normal Cost	Employee Contribution[2]	Range of Breakpoints[3]	Average Effect Member Rate[4,5]	Employer Normal Cost
PEPRA	State Miscellaneous (Including CSU) - 2% @ 62	15.2%	7.25% - 11%	$0 - $513	7.3%	7.9%
	State Miscellaneous - 2nd Tier 2% @ 62[5]	11.1%	3.75%	$0	3.4%	7.7%
	State Industrial - 2% @ 62	15.7%	6% - 11%	$317 - $513	7.9%	7.8%
	State Safety - 2% @ 57	19.7%	11%	$317	10.4%	9.3%
	State POFF - 2.5% @ 57	24.3%	11% - 13%	$0 - $863	11.0%	13.3%
	State POFF - 2.7% @ 57	23.8%	13%	$863	10.3%	13.5%
	CHP - 2.7% @ 57	23.6%	11.5%	$863	10.2%	13.4%
CLASSIC	State Miscellaneous - 2% @ 60 & 3 Year FAC	16.6%	5% - 11%	$317 - $513	6.7%	9.9%
	State Miscellaneous - 2% @ 55[1]	17.6%	5% - 11%	$317 - $513	6.9%	10.7%
	State Miscellaneous - 2nd Tier 2% @ 55[5]	12.6%	3.75%	$0	3.4%	9.2%
	State Industrial - 2% @ 60 & 3 Year FAC	17.7%	5% - 11%	$317 - $513	8.3%	9.4%
	State Industrial - 2% @ 55[1]	19.5%	5% - 11%	$317 - $513	8.1%	11.4%
	State Industrial - 2nd Tier 2% @ 55[5]	15.2%	3.75%	$0	3.4%	11.8%
	State Safety - 2% @ 55 & 3 Year FAC	21.0%	11%	$317	10.5%	10.5%
	State Safety - 2.5% @ 60 & 3 Year FAC	22.6%	11%	$317	10.6%	12.0%
	State Safety - 2.5% @ 55[1]	25.3%	11%	$317	10.5%	14.8%
	State POFF - 2.5% @ 55 & 3 Year FAC	28.8%	8% - 13%	$238 - $863	11.0%	17.8%
	State POFF - 3% @ 55 & 3 Year FAC	31.2%	8% - 13%	$238 - $863	11.1%	20.1%
	State POFF - 3% @ 50[1]	31.5%	8% - 13%	$238 - $863	11.6%	19.9%
	CHP - 3% @ 55 & 3 Year FAC	29.3%	11.5%	$863	10.4%	18.9%
	CHP - 3% @ 50[1]	31.0%	11.5%	$863	10.5%	20.5%
BLENDED	State Miscellaneous	16.813%	3.75% - 11%	$0 - $513	6.9%	9.9%
	State Industrial	18.261%	3.75% - 11%	$0 - $513	8.0%	10.3%
	State Safety	23.186%	11%	$317	10.5%	12.7%
	State POFF	29.894%	8% - 13%	$0 - $863	11.5%	18.4%
	CHP	29.848%	11.5%	$863	10.5%	19.3%

(1) Most current employees' benefits are based on a final one-year compensation period while new hires' benefits are based on a final three-year compensation period.
(2) Employee contribution rates are based on rates in effect at the valuation date.
(3) Employees make contributions to the pension plan based only on salaries earned above the breakpoint.
(4) The average effective member rate was calculated based on data as of June 30, 2018 and is reflective of the breakpoint and the different contribution rates paid by members within the same plans. For example, a member earning $6,000 a month with an 8 percent contribution rate and a breakpoint of $513 will pay $438.96 and have an effective contribution rate of 7.316 percent of salary. This is calculated as ($6,000 – $513) × 8% divided by $6,000.
(5) Reflects the total normal cost assuming members with Tier 2 service convert to Tier 1 benefits.

Appendix D – Normal Cost Information

Development of PEPRA Member Contribution Rates

PEPRA members are required to contribute at least 50 percent of the total annual normal cost of their pension benefit. As per Government Code Section 7522.30, State employees are excluded from this requirement except for employees of the Legislature, California State University (CSU), and the judicial branch.

It is preferable to determine normal cost using a large active population ongoing so that this rate remains relatively stable. The total PEPRA normal cost will be calculated using all active members within a State plan (including classic members) until the number of members covered under the PEPRA formula meets or exceeds 25 percent of the active population. Once that condition is met, the total PEPRA normal cost will be based on the active PEPRA population in the plan.

Should the total normal cost of the plan change by one percent or more from the base total normal cost established for the plan, the new member rate shall be 50 percent of the new normal cost rounded to the nearest quarter percent.

The table below shows the determination of the member contribution rates effective July 1, 2019, based on 50 percent of the total normal cost for each respective plan as of June 30, 2018.

	Basis for Current Rate		Rates Effective July 1, 2019			
Plan	Total Normal Cost	Member Rate	Total Normal Cost	Change	Change Needed	Member Rate
State Miscellaneous – CSU, Legislature and Judicial	14.61%	7.25%	15.18%	0.57%	No	7.25%
State POFF – CSU, Legislature and Judicial	22.04%	11.00%	24.09%	2.05%	Yes	12.00%

Development of State Bargaining Units 9, 10, and 16 Member Contribution Rates

Pursuant to Government Code Sections 20683.4 through 20683.72, members of State Bargaining Units ("BU") 9, 10, and 16 are required to contribute at least 50 percent of the total annual normal cost of their pension benefit. The total normal cost is remeasured annually as part of the actuarial valuation. If the total normal cost of the category changes[1] by one percent or more from the total normal cost determined as of June 30, 2015, the new member rate shall be 50 percent of the new normal cost rounded to the nearest quarter percent. Subsequently, if the total normal cost of the category changes[1] by one percent or more from the basis at that time, 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 member contribution rates effective July 1, 2019, based on 50 percent of the total normal cost for each respective plan as of June 30, 2018.

	Basis for Current Rate (June 30, 2015)		Rates Effective July 1, 2019			
	Total Normal Cost	Member Rate	Total Normal Cost	Change	Change Needed	Member Rate
BU 9						
State Miscellaneous[2]	15.48%	8.0%	16.88%	1.40%	Yes	8.5%
State Industrial[2]	18.02%	9.0%	18.26%	0.24%	No	9.0%
State Safety	21.73%	11.0%	23.19%	1.46%	Yes	11.5%
BU 10						
State Miscellaneous[2]	15.48%	8.0%	16.88%	1.40%	Yes	8.5%
State Industrial[2]	18.02%	9.0%	18.26%	0.24%	No	9.0%
State Safety	21.73%	11.0%	23.19%	1.46%	Yes	11.5%
BU 16						
State Miscellaneous[2]	15.48%	10.0%	16.88%	1.40%	No	10.0%
State Industrial[2]	18.02%	10.0%	18.26%	0.24%	No	10.0%
State Safety	21.73%	11.0%	23.19%	1.46%	Yes	11.5%

(1) For BU 9, the member rate will be adjusted only if the Total Normal Cost increases by one percent or more and the annual increase in member rate is limited to 0.5 percent. For BU 10, the member rate will be adjusted if the Total Normal Cost increases or decreases by one percent or more and the annual change in member rate is limited to 1.0 percent. For BU 16, the member rate will initially be adjusted if the Total Normal Cost increases by one percent or more; subsequently, the member rate will be adjusted if the Total Normal Cost increases or decreases by one percent or more.

(2) The member rate shown here is for a member who participates in Social Security. If there are any members of these groups who do not participate in Social Security, the member rate is currently 1 percent higher than the rate shown here.

Appendix E – Employer Rate for Fiscal Year 2019-20 Adjusted for Advance Payment

Senate Bill 90 (SB 90), approved by the Governor in June 2019, established Government Code Section 20825.1 and directed the State to contribute an additional $2.5 billion to the State plans. The contribution was made July 29, 2019 and allocated among plans as follows:

Plan	Additional Contribution Pursuant to SB 90
State Miscellaneous	$848,057,000
State Industrial	82,930,000
State Safety	184,427,000
State Peace Officers & Firefighters	1,384,586,000
California Highway Patrol	0

According to direction from the Department of Finance, a portion of the $2.5 billion contribution was an advance payment of the required employer contribution for Fiscal Year 2019-20 and the remainder went toward paying down the Unfunded Accrued Liability. The allocation provided by the Department of Finance is as follows:

Plan	Advance Payment Portion	Pay Down of Unfunded Accrued Liability Portion	Total Additional Contribution
State Miscellaneous	$32,384,208	$815,672,792	$848,057,000
State Industrial	3,166,795	79,763,205	82,930,000
State Safety	7,042,595	177,384,405	184,427,000
State Peace Officers & Firefighters	52,872,296	1,331,713,704	1,384,586,000
California Highway Patrol	0	0	0

The advance payment served to reduce the employer contribution rate for the remainder of the fiscal year. Rates that reflect the advance payment are shown in the table below:

Plan	Actuarially Required Employer Contribution for 2019-20	Additional Statutory Contribution to Offset Increased Member Contributions	Total Employer Contribution for 2019-20	Reduction due to Gov. Code Section 20825.1	Remaining Employer Contribution for 2019-20
State Miscellaneous	30.977%	0.098%	31.075%	(0.258%)	30.817%
State Industrial	20.823%	0.881%	21.704%	(0.441%)	21.263%
State Safety	21.526%	1.182%	22.708%	(0.296%)	22.412%
State Peace Officers & Firefighters	47.198%	1.647%	48.845%	(1.463%)	47.382%
California Highway Patrol	57.811%	1.319%	59.130%	(0.000%)	59.130%

Appendix F – Glossary of Actuarial Terms

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

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

Actuarial Methods: Procedures employed by actuaries to achieve certain funding goals of a pension plan. Actuarial methods include cost method, amortization policy and determination of asset value on which funding requirements are based.

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

Generally, in an actuarial valuation, the separate bases consist of changes in unfunded liability due to contract amendments, actuarial assumption changes, actuarial methodology changes, and/or gains and losses. Amortization methodology is determined by Board policy.

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 future cash flows are discounted to the valuation date to determine Accrued Liability. This assumption is called "investment return" in earlier CalPERS reports or "actuarial interest rate" in Section 20014 of the California Public Employees' Retirement Law (PERL).

Entry Age: The earliest age at which a plan member begins to accrue benefits under a defined benefit pension plan or risk pool. In most cases, this is the same as the date of hire.

Entry Age Normal Cost Method: An actuarial cost method designed to fund a member's total plan benefit over the course of his or her career. This method is designed to yield a rate expressed as a level percentage of payroll.

(The assumed retirement age less the entry age is the amount of time required to fund a member's total benefit. Generally, the older a member on the date of hire, the greater the entry age normal cost. This is mainly because there is less time to earn investment income to fund the future benefits.)

Glossary of Actuarial Terms (continued)

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

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

GASB 68: Statement No. 68 of the Governmental Accounting Standards Board. The accounting standard governing a state or local governmental employer's accounting and financial reporting for pensions. GASB 68 replaced 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, was not a member of another public retirement system prior to that date, and is not subject to reciprocity with another public retirement system.

Normal Cost: The annual cost of service accrual for a given fiscal year for active employees. The normal cost as a percentage of payroll can 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 and expected to be earned in the future for current members.

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

Actuarial Office
P.O. Box 942709 Sacramento, CA 94229-2709
TTY - (877) 249-7442
(888) 225-7377
FAX (916) 795-2744

Available online at CalPERS' Website

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