

Schools Pool Actuarial Valuation

As of June 30, 2019



Required Contributions for Fiscal Year
July 1, 2020 through June 30, 2021



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Actuarial Certification



October 2020

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 Schools Pool. This valuation is based on the member and financial data as of June 30, 2019 provided by various CalPERS databases and benefits under this plan 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 this plan, as prescribed by the CalPERS Board of Administration according to provisions set forth in the California Public Employees' 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.

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Highlights and Executive Summary

Introduction

This is the actuarial valuation report as of June 30, 2019 for the Schools Pool. This actuarial valuation determines the funded status as of June 30, 2019 and sets forth the Schools Pool employer and employee contribution rates for fiscal year July 1, 2020 through June 30, 2021.

The Schools Pool provides retirement benefits to members employed by school districts and community college districts in California. It generally does not cover non-classified members as they are covered by a separate retirement system - the California State Teachers' Retirement System, also known as CalSTRS.

Purpose of Report

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

- Set forth the assets and accrued liabilities of the Schools Pool as of June 30, 2019.
- Determine the required employer contribution rate for fiscal year July 1, 2020 through June 30, 2021.
- Determine the required employee contribution rate for fiscal year July 1, 2020 through June 30, 2021 for school employees subject to the Public Employees' Pension Reform Act of 2013 (PEPRA).
- Provide actuarial information as of June 30, 2019 to the CalPERS Board of Administration (the 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 a Cost-Sharing Multiple-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.

Assessment and Disclosure of Risk

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

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

Highlights and Executive Summary

Required Contribution Rates

Required Employer Contribution Rates

The actuarially determined employer contribution rate for fiscal year July 1, 2020 through June 30, 2021 is shown in the table below. For comparison purposes, the corresponding contribution rate for fiscal year July 1, 2019 through June 30, 2020 is also provided. The expected contribution amounts are also shown in the table.

| | Fiscal Year 2019-20 | Fiscal Year 2020-21 |
|---|------------------------|------------------------|
| 1) Contribution as a Percentage of Payroll | | |
| a) Total Normal Cost | 15.992% | 16.47% |
| b) Employee Contribution ¹ | 7.000% | 7.00% |
| c) Employer Normal Cost [(1a) – (1b)] | 8.992% | 9.47% |
| d) Unfunded Liability Contribution Rate | 11.741% | 14.13% |
| e) Actuarially Determined Contribution Rate [(1c) + (1d)] | 20.733% | 23.60% |
| f) State Contribution (Section 20825.2) | (1.012%) | (2.90%) |
| g) Required Employer Rate [(1e) + (1f)] | 19.721% | 20.70% |
| Projected Annual Payroll for Contribution Year | \$14,234,498,153 | \$14,844,455,960 |
| 2) Contribution in Projected Dollars | | |
| a) Total Normal Cost | \$2,276,380,945 | \$2,444,881,896 |
| b) Employee Contribution ¹ | 996,414,871 | 1,039,111,917 |
| c) Employer Normal Cost [(2a) – (2b)] | 1,279,966,074 | 1,405,769,979 |
| d) Unfunded Liability Contribution | 1,671,277,588 | 2,097,873,789 |
| e) Actuarially Determined Contribution [(2c) + (2d)] | \$2,951,243,662 | \$ 3,503,643,768 |
| f) State Contribution (Section 20825.2) | (144,000,000) | (430,000,000) |
| g) Required Employer Contribution [(2e) + (2f)] | \$2,807,243,662 | \$3,073,643,768 |

(1) For classic members, this is the percentage specified in the Public Employees Retirement Law, net of any reduction from the use of a modified formula or other factors. For PEPRA members the member contribution rate is based on 50% of the total normal cost. A development of PEPRA member contribution rates can be found in Appendix D.

The payroll used to calculate the expected dollar contribution is payroll reported for the fiscal year ending on the valuation date projected forward two years using the annual payroll growth assumption in effect on the valuation date. For example, expected fiscal year 2020-21 contributions are based on fiscal year 2018-19 reported payroll increased by 2.75% per year for two years. Actual contribution amounts will be based on actual payroll during the associated fiscal year and will differ from the expected contributions shown in the table above.

The supporting exhibit in this report entitled “Reconciliation of Employer Contributions” provides explanations of the changes in required contribution rates and expected contribution amounts from fiscal year 2019-20 to fiscal year 2020-21.

Reasons for Change in Employer Contributions for the Schools Pool

Overall, the actuarially determined contributions for the Schools Pool are expected to increase by \$552.4 million between fiscal year 2019-20 and fiscal year 2020-21. The increase is driven by a few factors as discussed below.

CalPERS employs an amortization and smoothing policy that spreads some rate increases or decreases over a 5-year period by utilizing a 5-year ramp in the amortization schedule of some bases. This means that only one-fifth of the total anticipated rate change caused by each unfunded liability source subject to a ramp is realized in the year it is first reflected in the valuation, culminating in the full increase in the fifth year. As a result, in any given valuation the employer contribution rate can change significantly due to events that were first reflected in the previous four valuations. A complete description of the actuarial methods used in the June 30, 2019 valuation is provided in Appendix A.

On December 21, 2016, the board lowered the discount rate from 7.50% to 7.00% using a 3-year phase-in beginning with the June 30, 2017 actuarial valuation for the Schools Pool. The employer contribution rates for fiscal year 2020-21 were calculated using a discount rate of 7.00%, down from 7.25% the prior year.

Highlights and Executive Summary

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 the 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, 2019 valuation, an inflation rate of 2.50% was used, down from 2.625% the prior year. The impact on required contributions of these assumption changes is approximately \$148.7 million, which includes the increase in normal cost and year one of the 5-year phase-in of the increase in unfunded liability, to be paid over 20 years.

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

| Reason for Change | (Millions) | Percent of Payroll |
|--|-------------------|--------------------|
| Prior Year Contributions | | |
| Employer Normal Cost | \$ 1,280.0 | 8.99% |
| Unfunded Liability Contribution | 1,671.3 | 11.74% |
| Total Required Contributions | \$ 2,951.3 | 20.73% |
| Change in Employer Normal Cost | | |
| Assumption Changes 6/30/2019 | \$ 95.0 | 0.64% |
| Experience | (24.0) | (0.16%) |
| Payroll Growth | 54.8 | 0.00% |
| Total | \$ 125.8 | 0.48% |
| Change in Unfunded Liability Contribution | | |
| Phase-in from Prior Years (5-year ramps) | \$ 300.8 | 2.11% |
| 2.875% Increase on Prior Years Bases | 56.7 | 0.00% |
| Re-amortization of Prior Years Bases (7.00%/2.75%) | (24.0) | (0.18%) |
| 2019 Assumption Change (1 st year of 5-year ramp) | 53.7 | 0.38% |
| 2019 Investment Loss (1 st year of 5-year ramp) | 12.4 | 0.09% |
| 2019 Non-Investment Loss | 27.0 | 0.19% |
| Payroll Growth 2018-19 | 0.0 | (0.20%) |
| Total | \$ 426.6 | 2.39% |
| Current Year Contributions | | |
| Employer Normal Cost | \$ 1,405.8 | 9.47% |
| Unfunded Liability Contribution | 2,097.9 | 14.13% |
| Total Required Contributions | \$ 3,503.7 | 23.60% |

Highlights and Executive Summary

PEPRA Member Contribution Rates

With the enactment of PEPRA, new members hired on or after January 1, 2013 are subject to PEPRA and are required to contribute 50% of the total annual normal cost of their pension benefit as determined by the actuary. PEPRA school members currently contribute 7.00% of salary. The contribution rate for the school members not subject to PEPRA, i.e. classic members, is set by statute and is also currently 7.00% of salary.

Current law contains a provision that requires a change in the PEPRA member contribution rate when the total normal cost changes by more than 1% of payroll. When a change is triggered, the member contribution rate is adjusted to half the normal cost rounded to the nearest quarter of 1%. The current PEPRA member contribution rate of 7.00% is based on a total normal cost of 14.07% of payroll. The change of discount rate and plan demographics have increased the total normal cost for PEPRA members from 14.07% to 14.86% of payroll this year. The total normal cost for PEPRA members has not changed by more than 1% since the last time the member contribution rate was established. As a result, no adjustment to the PEPRA member contribution rate is permitted. The member contribution rate for the PEPRA members will remain at 7.00% through the 2020-21 fiscal year.

Note that as of June 30, 2019, there are 145,891 active PEPRA members in the Schools Pool, which represents 44% of the total active population of the Schools Pool. The total payroll for active PEPRA members is \$4,992 million which accounts for 36% of the total Schools Pool's payroll.

The table below shows the determination of the PEPRA member contribution rate based on 50% of the Total Normal Cost on June 30, 2019.

| Plan | Basis for Current Rate | | Rates Effective July 1, 2020 | | | |
|---------|--------------------------------|-------------|--------------------------------|--------|---------------|-------------|
| | Total Normal Cost ¹ | Member Rate | Total Normal Cost ² | Change | Change Needed | Member Rate |
| Schools | 14.07% | 7.00% | 14.86% | 0.79% | No | 7.00% |

(1) As of June 30, 2017, valuation date

(2) As of June 30, 2019, valuation date

Projected Future Contribution Rates

The table on the following page shows the required and projected employer contribution rates for the next six fiscal years. Projected results reflect a 4.7% investment return reduced for estimated administrative expenses for fiscal year 2019-20 and the anticipated decrease in normal cost due to new hires entering under the PEPRA benefit formula. Projected rates also reflect the additional \$904 million contributed by the State in July 2019 pursuant to Senate Bill 90 (SB 90), which was subsequently amended by Assembly Bill 84/Senate Bill 111. For more information, please see "Changes Since the Prior Year's Valuation". 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.

In addition to increases in the Schools Pool employer contribution rate, active PEPRA members may also see their contribution rate rise in the future if the change in normal cost is more than 1%. However, in this projection the PEPRA member contribution rate is assumed to remain at 7.00%. The PEPRA normal cost will be reassessed each year in the future to determine whether a change in the PEPRA member contribution rate is warranted.

Highlights and Executive Summary

The following table also shows the classic member employee contribution rate and the estimated PEPRA members employee contribution rate for the future.

| Valuation Date | Fiscal Year Impact | Projected Employer Contribution Rate Without AB 84/SB 111 (As Percentage of Payroll) | Effect of AB 84/SB 111 | Projected Employer Contribution Rate (As Percentage of Payroll) | Classic Member Contribution Rate | Estimated PEPRA Member Contribution Rate |
|----------------|--------------------|--|------------------------|---|----------------------------------|--|
| 6/30/2020 | 2021-22 | 25.2% | (2.2%) | 23.0% | 7.00% | 7.00% |
| 6/30/2021 | 2022-23 | 26.3% | | 26.3% | 7.00% | 7.00% |
| 6/30/2022 | 2023-24 | 27.3% | | 27.3% | 7.00% | 7.00% |
| 6/30/2023 | 2024-25 | 27.8% | | 27.8% | 7.00% | 7.00% |
| 6/30/2024 | 2025-26 | 27.8% | | 27.8% | 7.00% | 7.00% |
| 6/30/2025 | 2026-27 | 27.6% | | 27.6% | 7.00% | 7.00% |

Under the amortization policy in effect for this valuation, changes in the Unfunded Accrued Liability (UAL) due to investment gains or losses (return relative to the 7.00% assumption) are amortized using a 5-year ramp up. For more information, please see "Amortization of Unfunded Actuarial Accrued Liability" under "Actuarial Methods" in Appendix A. This method attempts to smooth employer costs from year to year by phasing in the impact of unanticipated changes in the UAL over a 5-year period. As a result of this methodology, dramatic changes in 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 rate impact of the increase in the UAL is phased in.

Scenario analysis was performed to determine the effects of various investment returns on future employer contribution rates for three years beyond the estimated 2021-22 employer rates shown above. That information is available in the "Risk Analysis" section of this report.

Plan's Funded Status

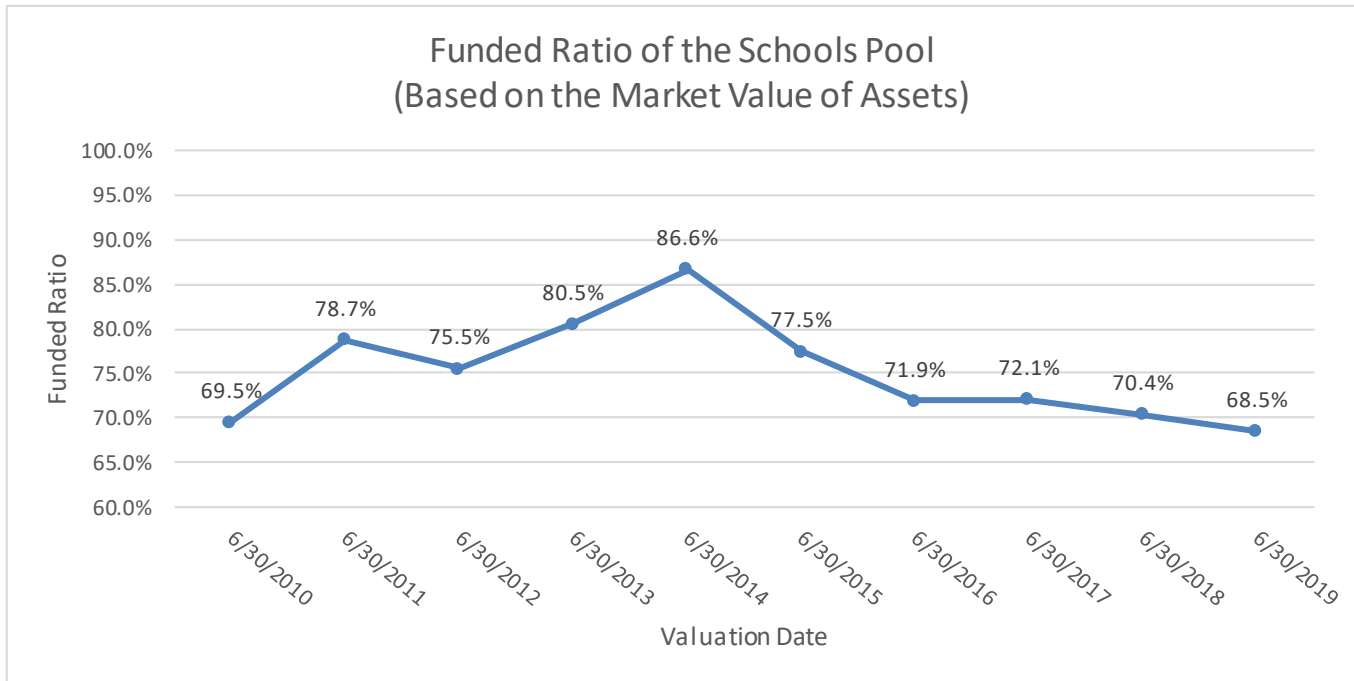
The funded status of a pension plan is defined as the ratio of assets to accrued liabilities. Plans with a lower funded ratio, all other things being equal, are more costly to maintain and more at risk of not being able to meet their future benefit obligations. From June 30, 2018 to June 30, 2019 the funded status for the Schools Pool decreased by 1.9%. This was primarily due to increases in liability resulting from the decrease in the discount rate assumption from 7.25% to 7.00%, and by the investment return in 2018-19 being less than expected.

The table below shows the development of the funded status of the plan using the market value of assets on June 30, 2019.

| | June 30, 2018 | June 30, 2019 |
|--|-------------------|--------------------|
| 1) Present Value of Projected Benefits | \$108,834,435,399 | \$ 117,831,940,799 |
| 2) Entry Age Normal Accrued Liability | 92,070,935,513 | 99,528,448,210 |
| 3) Market Value of Assets (MVA) | 64,846,338,847 | 68,177,143,705 |
| 4) Unfunded Liability [(2) - (3)] | \$27,224,596,666 | \$ 31,351,304,505 |
| 5) Funded Ratio [(3) / (2)] | 70.4% | 68.5% |

Highlights and Executive Summary

The graph below shows the funded status of the Schools Pool for the past ten years based on the market value of assets.



Changes Since the Prior Year's Valuation

Additional State Contributions to the Schools Pool

On June 27, 2019, the Governor approved Senate Bill 90, which added Section 20825.2 to the Government Code. This statute appropriated \$904 million from the General Fund for payments relating to school employers' contributions and unfunded liabilities. Subsequently, due to budget challenges caused by the COVID-19 pandemic, the State modified the application of the \$904 million payment via the enactment of Assembly Bill 84/ Senate Bill 111. Under the statute as it reads as of the publication of this report, \$144 million of the \$904 million State contribution is deemed to satisfy a portion of the 2019-20 required contribution on behalf of school employers, \$430 million will satisfy a portion of the 2020-21 required employer contribution, and \$330 million will satisfy a portion of the 2021-22 required employer contribution. This additional payment is reflected in this valuation report.

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% to 7.00% using a 3-year phase-in beginning with the June 30, 2017 actuarial valuations. As a result, the employer contributions for fiscal year 2020-21 were calculated using a discount rate of 7.00%, down from 7.25% 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. An inflation rate of 2.50% was used for the June 30, 2019 valuation, down from 2.625% the prior year.

On February 14, 2018, the board adopted a new amortization policy effective with this actuarial valuation, first affecting School employer contributions for fiscal year 2020-21. The new policy generally accelerates the recognition of new sources of Unfunded Accrued Liability by amortizing experience gains and losses over 20 years instead of 30 years, determining payments as a level dollar amount instead of a level percentage of payroll, and eliminating the 5-year ramps (phase-in and phase-out) for all amortization bases except the ramp-up for investment gains and losses. The new policy applies only to amortization bases established on or after June 30, 2019; it does not alter the payments for amortization bases established in prior valuations. There is one exception to the new policy for the School Pool where the impact of the discount rate change from 7.25% to 7.00% in the June 30, 2019 valuation was amortized under the old policy.

Highlights and Executive Summary

A complete description of the actuarial methods and assumptions used in the June 30, 2019 valuation can 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 Funding Risk Mitigation Policy which is designed to reduce funding risk over time. The policy established a mechanism whereby when CalPERS investments significantly outperform the discount rate, it will trigger adjustments to the strategic asset allocation targets, the expected investment return, and the discount rate. A minimum excess investment return of 2.00% above the existing discount rate is necessary to cause a funding risk mitigation event. More details on the Funding Risk Mitigation Policy can be found on our website.

Subsequent Events

This actuarial valuation report reflects statutory and regulatory changes and fund investment return through June 2020 and board actions through September 2020. Except as stated in this report, to the best of our knowledge, there have been no other subsequent events that could materially affect current or future certifications rendered in this report.

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Assets

Reconciliation of Market Value of Assets

| | |
|--|-------------------------|
| 1) Market Value of Assets as of June 30, 2018 Including Receivables | \$64,846,338,847 |
| 2) Receivables for Service Buybacks as of June 30, 2018 | 103,840,033 |
| 3) Market Value of Assets as of June 30, 2018 [(1) - (2)] | \$64,742,498,814 |
| 4) Employer Contributions | 2,527,725,523 |
| 5) Employee Contributions | 980,898,905 |
| 6) Benefit Payments to Retirees and Beneficiaries | (4,245,515,331) |
| 7) Refunds | (101,910,364) |
| 8) Administrative Expense | (72,801,846) |
| 9) Transfers and Miscellaneous Adjustments | 31,437,554 |
| 10) Investment Return | 4,208,783,696 |
| 11) Market Value of Assets as of June 30, 2019 Excluding Receivables [(3) + (4) + (5) + (6) + (7) + (8) + (9) + (10)] | \$68,071,116,951 |
| 12) Receivables for Service Buybacks as of June 30, 2019 | 106,026,754 |
| 13) Market Value of Assets as of June 30, 2019 Including Receivables [(11) + (12)] | \$68,177,143,705 |

Assets

Asset Allocation

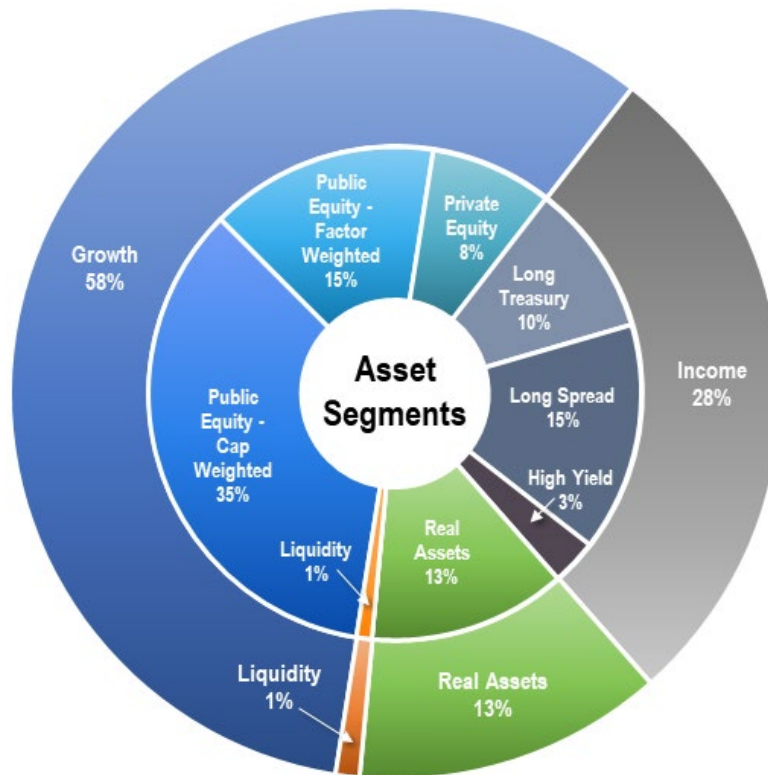
CalPERS adheres to an Asset Allocation Strategy which establishes asset class allocation policy targets and ranges and manages those asset class allocations within their policy ranges. CalPERS Investment Beliefs No. 6 recognizes that strategic asset allocation is the dominant determinant of portfolio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

The asset allocation shown below reflect the values of the Public Employees Retirement Fund (PERF) in its entirety as of June 30, 2019. The assets of the Schools Pool are part of the PERF and are invested accordingly.

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

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

Strategic Asset Allocation Policy Targets

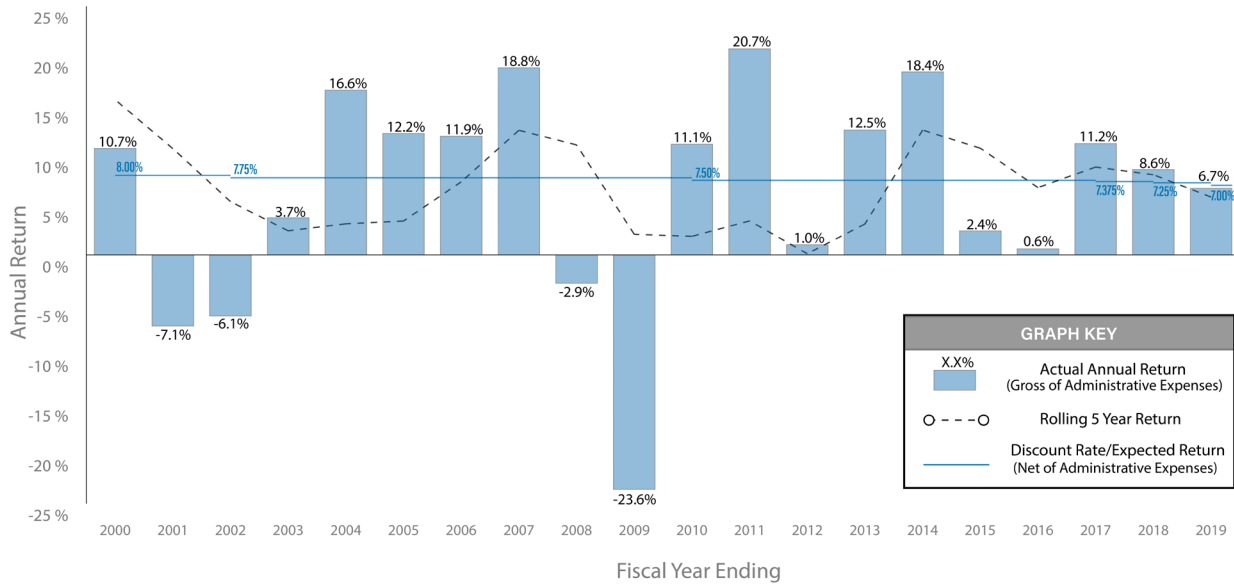


Assets

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 2000, the figures are reported as gross of fees.

History of Investment Returns (2000 - 2019)



The table below shows historical compound annual returns of the PERF for various time periods ending on June 30, 2019 (figures are reported as gross of fees). The compound annual return is the average rate per year compounded over the indicated number of years. It should be recognized that in any given year the rate of return is volatile. The portfolio has an expected volatility of 11.4% per year based on the most recent Asset Liability Modeling 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 Rates of Return and Volatilities

| | 1 Year | 5 Year | 10 Year | 20 Year | 30 Year |
|------------------------|--------|--------|---------|---------|---------|
| Compound Annual Return | 6.7% | 5.8% | 9.1% | 5.8% | 8.1% |
| Volatility | — | 4.4% | 6.9% | 10.7% | 9.8% |

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Liabilities and Employer Contributions

Accrued and Unfunded Liabilities

Participant Information

| | June 30, 2018 | June 30, 2019 |
|--|--------------------------|--------------------------|
| Members Included in the Valuation¹ | | |
| Active Members | 323,707 | 329,726 |
| Transfers from Schools | 19,666 | 19,894 |
| Vested Terminations ² | 183,033 | 194,708 |
| Receiving Payments | 233,733 | 241,057 |
| Total | 760,139 | 785,385 |
| | | |
| Average Entry Age of Active Members | 36.0 | 36.0 |
| Average Age of Active Members | 46.4 | 46.2 |
| Average Age of Retired Members | 72.6 ³ | 72.7 |
| | | |
| Average Pay | \$41,550 | \$42,643 |
| | | |
| Covered Payroll in Fiscal Year | \$13,450,005,563 | \$14,060,495,460 |
| Projected Payroll for Contribution Rate | \$14,234,498,153 | \$14,844,455,960 |
| | | |
| 1) Present Value of Projected Benefits | | |
| a) Active Members | \$52,838,094,303 | \$57,398,302,952 |
| b) Transferred Members | 6,597,320,327 | 6,217,869,630 |
| c) Terminated Members | 2,665,235,600 | 3,026,709,219 |
| d) Members and Beneficiaries Receiving Payments | 46,733,785,169 | 51,189,058,998 |
| e) Total | \$108,834,435,399 | \$117,831,940,799 |
| | | |
| 2) Present Value of Future Employer Normal Costs | \$9,034,315,973 | \$10,105,260,707 |
| | | |
| 3) Present Value of Future Employee Normal Costs | \$7,729,183,913 | \$8,198,231,882 |
| | | |
| 4) Entry Age Normal Accrued Liability | | |
| a) Active Members [(1a) – (2) – (3)] | \$36,074,594,417 | \$39,094,810,363 |
| b) Transferred Members (1b) | 6,597,320,327 | 6,217,869,630 |
| c) Terminated Members (1c) | 2,665,235,600 | 3,026,709,219 |
| d) Members and Beneficiaries Receiving Payments (1d) | 46,733,785,169 | 51,189,058,998 |
| e) Total | \$92,070,935,513 | \$99,528,448,210 |
| | | |
| 5) Market Value of Assets (MVA) | \$64,846,338,847 | \$68,177,143,705 |
| 6) Unfunded Liability/(Surplus) [(4e) – (5)] | \$27,224,596,666 | \$31,351,304,505 |
| 7) Funded Status [(5) / (4e)] | 70.4% | 68.5% |

- (1) Counts are of unique members included in the valuation. Multiple records may exist for members with service in more than one benefit group. This does not result in double counting liabilities.
- (2) Includes non-vested terminated participants with employee contributions remaining in the plan.
- (3) Reflected a correction of average age 71.6 in the 2018 report.

Liabilities and Employer Contributions

Schedule of Amortization Bases

The schedule below shows the development of payments on the amortization bases used to determine the employer contribution rate. Each row of the 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 schedule also shows 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 2020-21. 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 year.

- The assets, liabilities, and funded status of the plan are measured as of the valuation date, June 30, 2019.
- The required employer contributions determined by the valuation are for the fiscal year beginning one year after the valuation date, fiscal year 2020-21.

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 well in advance of the start of the fiscal year.

The Unfunded Accrued Liability (UAL) is used to determine the employer contribution and therefore must be rolled forward 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.

| Reason for Base | Date Established | Remaining Amortization Period | Balance on 6/30/2019 | Expected Payment in 2019-20 | Amount Remaining on 6/30/2020 | Scheduled Payment for Fiscal Year 2020-21 | Payment as Percentage of Payroll |
|----------------------------|------------------|-------------------------------|-------------------------|-----------------------------|-------------------------------|---|----------------------------------|
| Fresh Start (Gain/Loss) | 6/30/2004 | 15 | \$2,719,275,637 | \$236,163,872 | \$2,665,335,123 | \$240,396,478 | 1.62% |
| Assumption Change | 6/30/2009 | 10 | 904,537,104 | 103,970,400 | 860,306,883 | 106,075,553 | 0.72% |
| Gain/Loss | 6/30/2009 | 20 | 860,651,826 | 62,367,448 | 856,384,064 | 63,350,933 | 0.43% |
| Gain/Loss | 6/30/2010 | 21 | 420,677,640 | 29,620,220 | 419,485,681 | 30,075,186 | 0.20% |
| Assumption Change | 6/30/2011 | 12 | 1,251,115,685 | 126,420,426 | 1,207,923,477 | 128,860,101 | 0.87% |
| Gain/Loss | 6/30/2011 | 22 | (924,652,567) | (63,381,691) | (923,815,716) | (64,329,745) | -0.43% |
| Gain/Loss | Various | 24 | (336,549,672) | (21,975,843) | (337,376,160) | (22,287,349) | -0.15% |
| Gain/Loss | 6/30/2014 | 25 | 4,349,739,263 | 291,068,869 | 4,353,137,032 | 295,303,697 | 1.99% |
| Assumption Change | 6/30/2015 | 16 | 4,943,000,830 | 366,751,166 | 4,909,640,532 | 466,853,805 | 3.14% |
| Gain/Loss | 6/30/2015 | 26 | 4,266,373,888 | 225,929,760 | 4,331,316,499 | 286,416,480 | 1.93% |
| Gain/Loss | 6/30/2016 | 27 | 5,236,101,883 | 208,470,932 | 5,386,985,006 | 281,761,310 | 1.90% |
| Assumption Change | 6/30/2017 | 18 | 1,514,568,195 | 55,772,406 | 1,562,896,543 | 85,091,665 | 0.57% |
| Gain/Loss | 6/30/2017 | 28 | (388,984,757) | (10,483,691) | (405,369,276) | (15,930,469) | -0.11% |
| Method Change | 6/30/2018 | 19 | 1,321,724,299 | 24,908,810 | 1,388,479,127 | 50,631,468 | 0.34% |
| Assumption Change | 6/30/2018 | 19 | 2,259,760,140 | 42,586,745 | 2,373,891,278 | 86,564,932 | 0.58% |
| (Gain)/Loss | 6/30/2018 | 29 | (498,691,144) | (6,912,241) | (526,449,446) | (13,993,905) | -0.09% |
| Assumption Change | 6/30/2019 | 20 | 2,598,287,567 | (94,553,844) | 2,877,974,953 | 53,658,781 | 0.36% |
| Investment (Gain)/Loss | 6/30/2019 | 20 | 529,094,443 | - | 566,131,054 | 12,377,877 | 0.08% |
| Non-Investment (Gain)/Loss | 6/30/2019 | 20 | 325,274,245 | 50,459,784 | 295,847,436 | 26,996,991 | 0.18% |
| Total | | | \$31,351,304,505 | \$1,627,183,528 | \$31,862,724,090 | \$2,097,873,789 | 14.13% |

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.

| | |
|---|-----------------------|
| 1) Total (Gain)/Loss for the Year | |
| a) Unfunded Accrued Liability (UAL) as of June 30, 2018Z | \$27,224,596,666 |
| b) Expected Payment on the UAL during 2018-19 | 1,255,032,731 |
| c) Interest through June 30, 2019 $[(.0725 \times (1a) - ((1.0725)^{1/2} - 1) \times (1b))]$ | 1,929,084,315 |
| d) Expected UAL before Other Changes $[(1a) - (1b) + (1c)]$ | \$27,898,648,250 |
| e) Change Due to Plan Changes | - |
| f) Change Due to Assumptions Changes | 2,598,287,567 |
| g) Change Due to Method Changes | - |
| h) Expected UAL After All Other Changes $[(1d) + (1e) + (1f) + (1g)]$ | \$30,496,935,817 |
| i) Actual Unfunded Accrued Liability as of June 30, 2019 | 31,351,304,505 |
| j) Total (Gain)/Loss for 2018-19 [(1i) - (1h)] | \$854,368,688 |
| 2) Contribution (Gain)/Loss for the Year | |
| a) Expected Contribution with interest (Employer and Employee) | \$3,591,258,677 |
| b) Actual Contributions with interest | 3,633,586,750 |
| c) Contribution (Gain)/Loss for 2018-19 [(2a) - (2b)] | (\$42,328,073) |
| 3) Asset (Gain)/Loss for the Year | |
| a) Market Value of Assets as of June 30, 2018 | \$64,846,338,847 |
| b) Prior Fiscal Year Receivables | (103,840,033) |
| c) Current Fiscal Year Receivables | 106,026,754 |
| d) Contributions Received | 3,508,624,428 |
| e) Benefits and Refunds Paid | (4,347,425,695) |
| f) Transfers and Miscellaneous Adjustments | 31,437,554 |
| g) Expected Interest $[0.0725 \times (3a + 3b) + ((1.0725)^{1/2} - 1) \times ((3d) + (3e) + (3f))]$ | 4,665,076,293 |
| h) Expected Assets as of June 30, 2018 $[(3a) + (3b) + (3c) + (3d) + (3e) + (3f) + (3g)]$ | 68,706,238,148 |
| i) Market Value of Assets as of June 30, 2019 | 68,177,143,705 |
| j) Asset (Gain)/Loss for 2018-19 [(3h) - (3i)] | \$529,094,443 |
| 4) Liability (Gain)/Loss for the Year | |
| a) Total (Gain)/Loss (1j) | \$854,368,688 |
| b) Contribution (Gain)/Loss (2c) | (42,328,073) |
| c) Asset (Gain)/Loss (3j) | 529,094,443 |
| d) Liability (Gain)/Loss for 2018-19 [(4a) - (4b) - (4c)] | \$367,602,318 |

Reconciliation of Employer Contributions

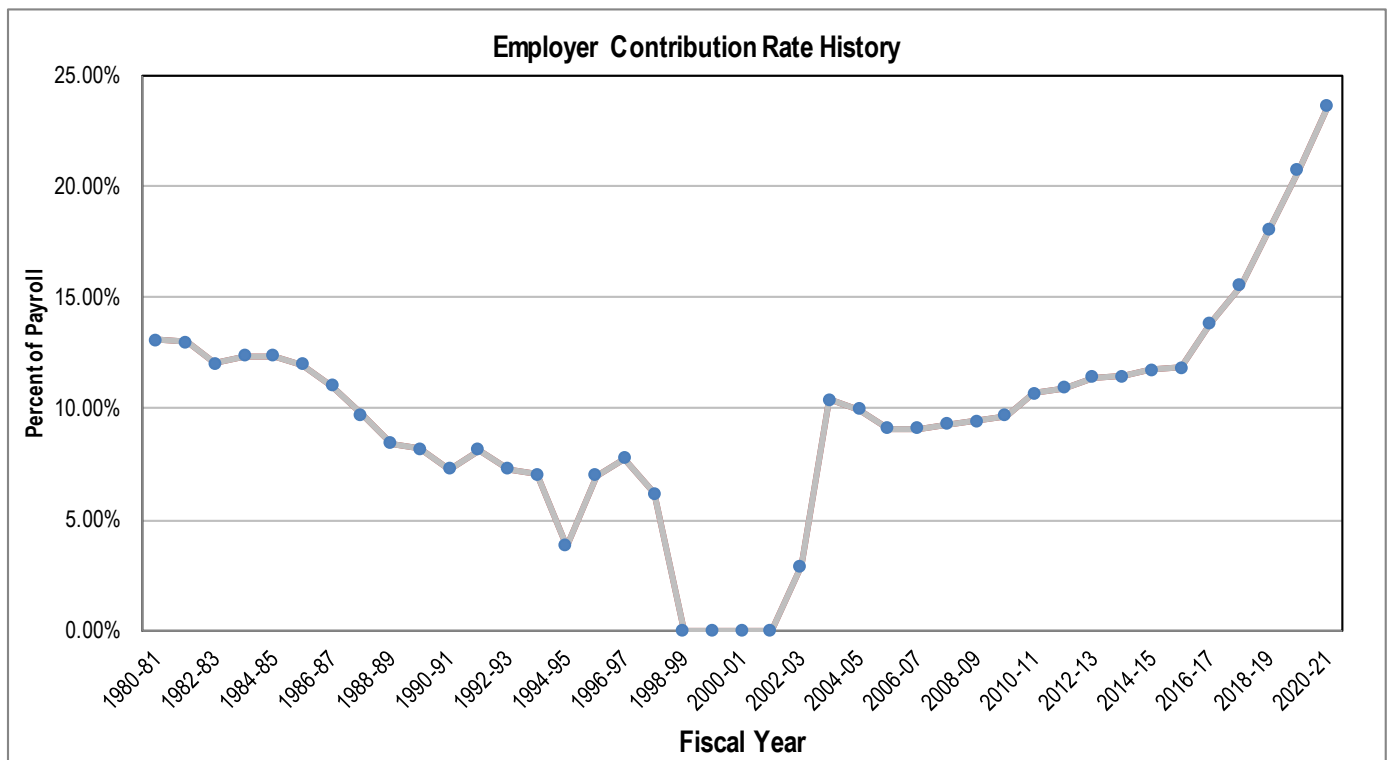
| | Percentage of Projected Payroll | Estimated \$ Based on Projected Payroll |
|---|---------------------------------|---|
| 1) Total contribution for 7/1/19-6/30/20 | 27.73% | \$3,947,658,531 |
| 2) Effect of changes since the prior year annual valuation | | |
| a) Effect of unexpected changes in demographics and financial results | 0.08% | 12,377,877 |
| b) Effect of plan changes | 0.02% | 0 |
| c) Effect of changes in assumptions | 1.16% | 124,637,871 |
| d) Effect of changes in method | 0.00% | 0 |
| e) Effect of progression of amortization bases and change in payroll | 1.61% | 455,132,432 |
| f) Net effect of the changes above [sum of a through e] | 2.87% | 595,097,152 |
| 3) Total contribution for 7/1/20 - 6/30/21 [(1) + (2f)] | 30.60% | \$4,542,755,685 |
| 4) Employee Contribution for 7/1/20 - 6/30/21 | 7.00% | 1,039,111,917 |
| 5) Employer Contribution for 7/1/20 - 6/30/21 [(3) - (4)] | 23.60% | \$3,503,643,768 |

Liabilities and Employer Contributions

History of Employer Contribution Rates

The table below provides a 25-year history of contribution rates for the Schools Pool. In cases where the contribution rate changed during a fiscal year, the entry shown is the weighted average of the rates effective during the fiscal year.

| Fiscal Year | Valuation Date | Employer Normal Cost | Unfunded Liability Contribution/(Credit) | Total Employer Contribution |
|-------------|----------------|----------------------|--|-----------------------------|
| 2020 - 2021 | 6/30/2019 | 9.47% | 14.13% | 23.60% |
| 2019 - 2020 | 6/30/2018 | 8.992% | 11.741% | 20.733% |
| 2018 - 2019 | 6/30/2017 | 8.739% | 9.323% | 18.062% |
| 2017 - 2018 | 6/30/2016 | 8.103% | 7.428% | 15.531% |
| 2016 - 2017 | 6/30/2015 | 8.242% | 5.646% | 13.888% |
| 2015 - 2016 | 6/30/2014 | 7.621% | 4.226% | 11.847% |
| 2014 - 2015 | 6/30/2013 | 7.814% | 3.957% | 11.771% |
| 2013 - 2014 | 6/30/2012 | 7.313% | 4.129% | 11.442% |
| 2012 - 2013 | 6/30/2011 | 7.415% | 4.002% | 11.417% |
| 2011 - 2012 | 6/30/2010 | 7.132% | 3.791% | 10.923% |
| 2010 - 2011 | 6/30/2009 | 7.173% | 3.534% | 10.707% |
| 2009 - 2010 | 6/30/2008 | 7.410% | 2.299% | 9.709% |
| 2008 - 2009 | 6/30/2007 | 7.414% | 2.014% | 9.428% |
| 2007 - 2008 | 6/30/2006 | 7.421% | 1.885% | 9.306% |
| 2006 - 2007 | 6/30/2005 | 7.398% | 1.726% | 9.124% |
| 2005 - 2006 | 6/30/2004 | 7.399% | 1.717% | 9.116% |
| 2004 - 2005 | 6/30/2003 | 7.393% | 2.559% | 9.952% |
| 2003 - 2004 | 6/30/2002 | 9.396% | 1.024% | 10.420% |
| 2002 - 2003 | 6/30/2001 | 9.329% | (6.435%) | 2.894% |
| 2001 - 2002 | 6/30/2000 | 9.082% | (9.082%) | 0.000% |
| 2000 - 2001 | 6/30/1999 | 6.914% | (6.914%) | 0.000% |
| 1999 - 2000 | 6/30/1998 | 6.867% | (6.867%) | 0.000% |
| 1998 - 1997 | 6/30/1997 | 6.829% | (6.829%) | 0.000% |
| 1997 - 1998 | 6/30/1996 | 7.582% | (1.410%) | 6.172% |
| 1996 - 1997 | 6/30/1995 | 7.576% | 0.211% | 7.787% |



Liabilities and Employer Contributions

History of Funded Status and Funding Progress (dollars in millions)

Shown below is a 30-year history of funding status for the Schools Pool. 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.

| Valuation Date | Actuarial Accrued Liabilities | Market Value of Assets | Unfunded Liabilities/(Surplus) | Funded Ratio | Projected Payroll for Contribution | Unfunded/(Surplus) as a % of Payroll |
|----------------|-------------------------------|------------------------|--------------------------------|--------------|------------------------------------|--------------------------------------|
| 6/30/2019 | \$99,528 | \$68,177 | \$31,351 | 68.5% | \$14,844 | 211.2% |
| 6/30/2018 | 92,071 | 64,846 | 27,225 | 70.4% | 14,234 | 191.3% |
| 6/30/2017 | 84,416 | 60,865 | 23,551 | 72.1% | 13,683 | 172.1% |
| 6/30/2016 | 77,544 | 55,785 | 21,759 | 71.9% | 13,022 | 167.1% |
| 6/30/2015 | 73,325 | 56,814 | 16,511 | 77.5% | 12,098 | 136.5% |
| 6/30/2014 | 65,600 | 56,838 | 8,761 | 86.6% | 11,294 | 77.6% |
| 6/30/2013 | 61,487 | 49,482 | 12,005 | 80.5% | 10,424 | 115.2% |
| 6/30/2012 | 59,439 | 44,854 | 14,585 | 75.5% | 10,242 | 142.4% |
| 6/30/2011 | 58,358 | 45,901 | 12,457 | 78.7% | 10,540 | 118.2% |
| 6/30/2010 | 55,307 | 38,435 | 16,872 | 69.5% | 11,283 | 149.5% |
| 6/30/2009 | 52,493 | 34,146 | 18,347 | 65.0% | 11,110 | 165.1% |
| 6/30/2008 | 48,538 | 45,548 | 2,990 | 93.8% | 11,138 | 26.8% |
| 6/30/2007 | 44,810 | 48,293 | (3,483) | 107.8% | 10,250 | (34.0%) |
| 6/30/2006 | 41,409 | 40,852 | 556 | 98.7% | 9,881 | 5.6% |
| 6/30/2005 | 38,368 | 36,898 | 1,469 | 96.2% | 9,223 | 15.9% |
| 6/30/2004 | 35,933 | 32,828 | 3,104 | 91.4% | 9,069 | 34.2% |
| 6/30/2003 | 33,793 | 28,182 | 5,611 | 83.4% | 9,079 | 61.8% |
| 6/30/2002 | 31,271 | 27,690 | 3,581 | 88.5% | 8,344 | 42.9% |
| 6/30/2001 | 27,946 | 30,308 | (2,361) | 108.4% | 7,912 | (29.8%) |
| 6/30/2000 | 25,474 | 33,295 | (7,821) | 130.7% | 7,053 | (110.9%) |
| 6/30/1999 | 21,216 | 30,918 | (9,702) | 145.7% | 5,961 | (162.8%) |
| 6/30/1998 | 19,499 | 27,874 | (8,374) | 142.9% | 5,445 | (153.8%) |
| 6/30/1997 | 17,583 | 23,499 | (5,916) | 133.6% | 4,907 | (120.5%) |
| 6/30/1996 | 17,572 | 19,706 | (2,135) | 112.1% | 5,146 | (41.5%) |
| 6/30/1995 | 16,422 | 17,314 | (892) | 105.4% | 5,351 | (16.7%) |
| 6/30/1994 | 15,136 | 15,373 | (238) | 101.6% | 5,140 | (4.6%) |
| 6/30/1993 | 13,575 | 14,956 | (1,381) | 110.2% | 4,853 | (28.4%) |
| 6/30/1992 | 12,856 | 13,816 | (960) | 107.5% | 4,883 | (19.7%) |
| 6/30/1991 | 12,022 | 13,301 | (1,298) | 110.8% | 4,850 | (26.8%) |
| 6/30/1990 | 11,249 | 9,298 | 1,951 | 82.7% | 4,393 | 44.4% |

Risk Analysis

- 20 Future Investment Return Scenarios
- 21 Discount Rate Sensitivity
- 21 Mortality Rate Sensitivity
- 22 Maturity Measures
- 22 Maturity Measures History

Risk Analysis

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 Future Contribution Rates”, the projections below provide a range of results based on five hypothetical investment return scenarios over the three following fiscal years (2020-21, 2021-22, and 2022-23). 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%, 4.0%, 7.0%, 9.0% and 12.0%. For example, of all the four-year outcomes generated in the stochastic analysis, approximately 25% had an average annual return of 4.0% or less.

On February 14, 2018, the board adopted a new amortization policy effective with the June 30, 2019 actuarial valuation, first affecting the Schools Pool 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 in the following section.

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

The table below shows the projected contribution rates for 2021-22 through 2024-25 for the Schools Pool. These projections reflect a 4.7% investment return reduced for estimated administrative expenses for 2019-20 and the five different scenarios from 2020-21 through 2022-23.

| Assumed Annual Return From 2021-22 through 2024-25 | Projected Employer Contributions | | | |
|--|----------------------------------|---------|---------|---------|
| | 2021-22 | 2022-23 | 2023-24 | 2024-25 |
| 1.0% | 25.21% | 27.0% | 29.1% | 31.4% |
| 4.0% | 25.21% | 26.6% | 28.2% | 29.6% |
| Assumed 7.0% | 25.21% | 26.3% | 27.3% | 27.8% |
| 9.0% | 25.21% | 26.4% | 27.3% | 27.6% |
| 12.0% | 25.21% | 26.1% | 26.3% | 25.7% |

The projections above reflect potential impact of CalPERS’ Funding Risk Mitigation Policy.

The projected normal cost percentages do reflect that the normal cost will decline over time as new employees are hired into PEPRA or other lower cost benefit tiers.

Risk Analysis

Discount Rate Sensitivity

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

| As of June 30, 2019 | Sensitivity to the Real Rate of Return Assumption | | |
|---|---|---------------------|----------------------------|
| | 1% Lower Real Return Rate | Current Assumptions | 1% Higher Real Return Rate |
| Discount Rate | 6.0% | 7.0% | 8.0% |
| Inflation | 2.5% | 2.5% | 2.5% |
| Real Rate of Return | 3.5% | 4.5% | 5.5% |
| a) Total Normal Cost Rate | 20.74% | 16.47% | 13.28% |
| b) Accrued Liability | \$112,733,800,848 | \$99,528,448,210 | \$88,580,205,147 |
| c) Market Value of Assets | \$68,177,143,705 | \$68,177,143,705 | \$68,177,143,705 |
| d) Unfunded Accrued Liability/(Surplus) [(b) – (c)] | \$44,556,657,143 | \$31,351,304,505 | \$20,403,061,442 |
| e) Funded Status | 60.5% | 68.5% | 77.0% |

| As of June 30, 2019 | Sensitivity to the Price Inflation Assumption | | |
|---|---|---------------------|--------------------------|
| | 1% Lower Inflation Rate | Current Assumptions | 1% Higher Inflation Rate |
| Discount Rate | 6.0% | 7.0% | 8.0% |
| Inflation | 1.5% | 2.5% | 3.5% |
| Real Rate of Return | 4.5% | 4.5% | 4.5% |
| a) Total Normal Cost Rate | 17.60% | 16.47% | 15.01% |
| b) Accrued Liability | \$104,646,459,618 | \$99,528,448,210 | \$91,713,814,861 |
| c) Market Value of Assets | \$68,177,143,705 | \$68,177,143,705 | \$68,177,143,705 |
| d) Unfunded Accrued Liability/(Surplus) [(b) – (c)] | \$36,469,315,913 | \$31,351,304,505 | \$23,536,671,156 |
| e) Funded Status | 65.1% | 68.5% | 74.3% |

Risk Analysis

Mortality Rate Sensitivity

The following table shows how June 30, 2019 valuation results would differ under two alternate longevity scenarios, namely assuming rates of mortality are 10% lower or 10% higher than our current mortality assumptions. This type of analysis highlights the impact on the plan of improving or worsening mortality over the long-term.

| As of June 30, 2019 | Sensitivity to the Mortality Assumption | | |
|---|---|---------------------|----------------------------|
| | 10% Lower Mortality Rates | Current Assumptions | 10% Higher Mortality Rates |
| a) Total Normal Cost Rate | 16.75% | 16.47% | 16.22% |
| b) Accrued Liability | \$101,699,192,970 | \$99,528,448,210 | \$97,534,362,499 |
| c) Market Value of Assets | \$68,177,143,705 | \$68,177,143,705 | \$68,177,143,705 |
| d) Unfunded Accrued Liability/(Surplus) [(b) – (c)] | \$33,522,049,265 | \$31,351,304,505 | \$29,357,218,794 |
| e) Funded Status | 67.0% | 68.5% | 69.9% |

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, 2018 | | | June 30, 2019 | | |
|--------------|---------------------------|-------------------------|-------|---------------------------|-------------------------|-------|
| | Retiree Accrued Liability | Total Accrued Liability | Ratio | Retiree Accrued Liability | Total Accrued Liability | Ratio |
| Schools Pool | 46,733,785,169 | 92,070,935,513 | 51% | 51,189,058,998 | 99,528,448,210 | 51% |

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

| Plan | June 30, 2018 | | | June 30, 2019 | | |
|--------------|-------------------|--------------------|---------------|-------------------|--------------------|---------------|
| | Number of Actives | Number of Retirees | Support Ratio | Number of Actives | Number of Retirees | Support Ratio |
| Schools Pool | 323,707 | 233,733 | 1.38 | 329,726 | 241,057 | 1.37% |

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

Risk Analysis

Volatility Ratios

The actuarial calculations supplied in this communication are based on 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 returns.

Asset Volatility Ratio (AVR)

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

Liability Volatility Ratio (LVR)

Also shown in the table below is the liability volatility ratio (LVR), which is the ratio of accrued liability to payroll. Plans that have a higher LVR experience more volatile employer rates due to changes in liability. For example, a plan with an LVR of 12 is expected to have twice the contribution volatility of a plan with an LVR of 6 when there is a change in liability, such as when there is a change in actuarial assumptions. It should be noted that this ratio indicates a longer-term potential for contribution volatility, since the AVR, described above, will tend to move closer to the LVR as the funded status approaches 100%.

Contribution Volatility

| Market Value of Assets without Receivables | Annual Covered Payroll | Asset Volatility Ratio | Accrued Liability | Liability Volatility Ratio |
|--|------------------------|------------------------|-------------------|----------------------------|
| (1) | (2) | (1) ÷ (2) | (3) | (3) ÷ (2) |
| \$68,071,116,951 | \$14,060,495,460 | 4.8 | \$99,528,448,210 | 7.1 |

Maturity Measures History

| Valuation Date | Ratio of Retiree Accrued Liability to Total Accrued Liability | Support Ratio | Asset Volatility Ratio | Liability Volatility Ratio |
|----------------|---|---------------|------------------------|----------------------------|
| 06/30/2017 | 50% | 1.41 | 4.7 | 6.5 |
| 06/30/2018 | 51% | 1.38 | 4.8 | 6.8 |
| 06/30/2019 | 51% | 1.37 | 4.8 | 7.1 |

Appendices

A-1 Appendix A – Statement of Actuarial Methods and Assumptions

B-1 Appendix B – Principal Plan Provisions

C-1 Appendix C – Participant Data

D-1 Appendix D – Normal Cost Information

E-1 Appendix E – Glossary of Actuarial Terms

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

Actuarial Methods

Actuarial Cost Method

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

The actuarial accrued liability for active members is then calculated as the portion of the total cost of the plan allocated to prior years. The actuarial accrued liability for members currently receiving benefits and for members entitled to deferred benefits is equal to the present value of the benefits expected to be paid. Normal costs are not applicable for these members.

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) are amortized over a 20-year period with no ramp. 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:

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

Appendix A - Statement of Actuarial Methods and Assumptions

Actuarial Methods (continued)

The 5-year ramp up means that the payments in the first four years of the amortization period are 20%, 40%, 60% and 80% 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 this actuarial valuation (first affecting Schools Pool plan employer contributions for fiscal year 2020-21). The new policy generally accelerates the recognition of new sources of Unfunded Accrued Liability by amortizing experience gains/losses over 20 years instead of 30 years, determining payments as a level dollar amount instead of a level percentage of payroll, and eliminating the 5-year ramps (phase-in and phase-out) for all amortization bases except the ramp-up for investment gains/losses. The new policy applies only to amortization bases established on or after June 30, 2019; it does not alter the payments for amortization bases already in existence upon implementation. There is one exception to the new policy for the School Pool where the impact of the discount rate change from 7.25% to 7.00% in the June 30, 2019 valuation was amortized under the old policy.

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 fresh start, the period is set by the actuary at what is deemed appropriate; however, the period will not be greater than 30 years.

Asset Valuation Method

The Actuarial Value of Assets is set equal to the Market Value of Assets. The direct rate smoothing technique described under “Amortization of Unfunded Actuarial Accrued Liability” is used to determine employer contribution rates.

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.

PEPRA Normal Cost Rate Methodology

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.

Appendix A - Statement of Actuarial Methods and Assumptions

Actuarial Methods (continued)

Purchasing Power Protection Act (PPPA) Method

PPPA benefits are cost-of-living adjustments intended to maintain the individual's current retirement benefit at 75% 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.

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

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 2019 of \$225,000, up from the 2018 limit of \$220,000 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 2019 of \$280,000, up from the 2018 limit of \$275,000 used in the prior valuation.

Appendix A - Statement of Actuarial Methods and Assumptions

Actuarial Assumptions

In 2017, CalPERS completed its most recent asset liability management study incorporating actuarial assumptions and strategic asset allocation. In December 2017, the board adopted relatively modest changes to the asset allocation that reduced the expected volatility of returns. The adopted asset allocation was expected to have a long-term blended return that continued to support a discount rate assumption of 7.00%. 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, 2018 valuation to set the fiscal year 2019-20 contribution for the state plans.

On December 21, 2016, the board lowered the discount rate from 7.50% to 7.00% using a three-year phase-in beginning with the June 30, 2017 actuarial valuations for the Schools Pool. The minimum employer contributions for fiscal year 2020-21 determined in the June 30, 2019 valuation were calculated using a discount rate of 7.00%. 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 7.00% 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 report represent estimates of future experience rather than observations of estimates inherent in market data.

Appendix A - Statement of Actuarial Methods and Assumptions

Economic Assumptions

Discount Rate

The discount rate is 7.00% compounded annually (net of expenses) as of June 30, 2019, (reduced from 7.25% in the prior valuation).

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% for 2019) is added to these factors for total salary growth.

| Duration of Service | Entry Age | | |
|---------------------|-----------|-------|-------|
| | 20 | 30 | 40 |
| 0 | 4.28% | 4.19% | 3.80% |
| 3 | 3.54% | 3.32% | 2.80% |
| 5 | 2.62% | 2.34% | 1.80% |
| 10 | 1.71% | 1.54% | 1.13% |
| 15 | 1.52% | 1.34% | 0.98% |
| 20 | 1.35% | 1.17% | 0.86% |
| 25 | 1.20% | 1.03% | 0.76% |
| 30 | 0.87% | 0.71% | 0.48% |

Overall Payroll Growth

The payroll growth rate is 2.75% compounded annually (used in projecting the payroll over which unfunded accrued liability is amortized). The payroll growth rate was reduced from 2.825% in the prior valuation.

Inflation

The inflation rate is 2.5% compounded annually. The inflation rate was reduced from 2.625 in the prior valuation.

Demographic Assumptions

Post-Retirement Mortality

Rates vary by age, type of retirement, and gender. See sample rates in table below.

| Age | Healthy Recipients | | Non-Industrial Disabled (Not Job-Related) | | Industrial Disabled (Job-Related) | |
|-----|--------------------|---------|---|---------|-----------------------------------|---------|
| | 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 | 0.02184 | 0.01607 | 0.01112 |
| 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 |

Appendix A - Statement of Actuarial Methods and Assumptions

Demographic Assumptions (continued)

Marital Status

For active members 85% are assumed to be married upon retirement.

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 for Schools Pool members.

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 |
| 5 | 0.0808 | 0.0808 | 0.0634 | 0.0461 | 0.0409 |
| 6 | 0.0618 | 0.0618 | 0.0482 | 0.0345 | 0.0305 |
| 7 | 0.0462 | 0.0462 | 0.0359 | 0.0255 | 0.0223 |
| 8 | 0.0343 | 0.0343 | 0.0266 | 0.0189 | 0.0161 |
| 9 | 0.0258 | 0.0258 | 0.0200 | 0.0143 | 0.0117 |
| 10 | 0.0202 | 0.0202 | 0.0157 | 0.0112 | 0.0087 |
| 14 | 0.0117 | 0.0117 | 0.0087 | 0.0056 | 0.0040 |
| 15 | 0.0107 | 0.0107 | 0.0077 | 0.0048 | 0.0034 |
| 19 | 0.0065 | 0.0065 | 0.0043 | 0.0021 | 0.0019 |
| 20 | 0.0056 | 0.0056 | 0.0037 | 0.0017 | 0.0016 |
| 24 | 0.0030 | 0.0030 | 0.0020 | 0.0009 | 0.0012 |
| 25 | 0.0026 | 0.0026 | 0.0018 | 0.0009 | 0.0012 |
| 29 | 0.0015 | 0.0015 | 0.0012 | 0.0009 | 0.0012 |
| 30 | 0.0013 | 0.0013 | 0.0011 | 0.0009 | 0.0012 |

Appendix A - Statement of Actuarial Methods and Assumptions

Demographic Assumptions (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 |
| 5 | 0.0405 | 0.0405 | 0.0346 | 0.0288 | 0.0264 |
| 6 | 0.0404 | 0.0404 | 0.0343 | 0.0281 | 0.0261 |
| 7 | 0.0395 | 0.0395 | 0.0333 | 0.0272 | 0.0253 |
| 8 | 0.0377 | 0.0377 | 0.0319 | 0.0261 | 0.0241 |
| 9 | 0.0353 | 0.0353 | 0.0301 | 0.0249 | 0.0227 |
| 10 | 0.0324 | 0.0324 | 0.0280 | 0.0235 | 0.0211 |
| 14 | 0.0219 | 0.0219 | 0.0196 | 0.0172 | 0.0141 |
| 15 | 0.0202 | 0.0202 | 0.0179 | 0.0155 | 0.0126 |
| 19 | 0.0154 | 0.0154 | 0.0125 | 0.0095 | 0.0057 |
| 20 | 0.0144 | 0.0144 | 0.0114 | 0.0083 | 0.0042 |
| 24 | 0.0102 | 0.0102 | 0.0059 | 0.0017 | 0.0008 |
| 25 | 0.0091 | 0.0091 | 0.0046 | — | — |
| 29 | 0.0029 | 0.0029 | 0.0015 | — | — |
| 30 | 0.0015 | 0.0015 | 0.0007 | — | — |

- 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.

| Attained Age | Non-Industrial Death (Not Job-Related) | | Non-Industrial Disability (Not Job-Related) | |
|--------------|--|---------|---|---------|
| | Male | Female | Male | Female |
| 20 | 0.00022 | 0.00007 | 0.00010 | 0.00011 |
| 25 | 0.00029 | 0.00011 | 0.00010 | 0.00011 |
| 30 | 0.00038 | 0.00016 | 0.00011 | 0.00016 |
| 35 | 0.00049 | 0.00027 | 0.00053 | 0.00043 |
| 40 | 0.00064 | 0.00037 | 0.00119 | 0.00081 |
| 45 | 0.00080 | 0.00054 | 0.00195 | 0.00168 |
| 50 | 0.00116 | 0.00079 | 0.00261 | 0.00224 |
| 55 | 0.00172 | 0.00120 | 0.00246 | 0.00180 |
| 60 | 0.00255 | 0.00166 | 0.00221 | 0.00109 |

Appendix A - Statement of Actuarial Methods and Assumptions

Demographic Assumptions (continued)

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 | 0.0040 | 0.0070 | 0.0110 | 0.0120 | 0.0130 | 0.0150 | 0.0180 |
| 52 | 0.0050 | 0.0100 | 0.0140 | 0.0160 | 0.0180 | 0.0210 | 0.0240 |
| 54 | 0.0080 | 0.0170 | 0.0230 | 0.0270 | 0.0310 | 0.0340 | 0.0400 |
| 56 | 0.0190 | 0.0370 | 0.0530 | 0.0620 | 0.0690 | 0.0780 | 0.0910 |
| 58 | 0.0220 | 0.0450 | 0.0620 | 0.0740 | 0.0820 | 0.0920 | 0.1080 |
| 60 | 0.0330 | 0.0660 | 0.0920 | 0.1090 | 0.1210 | 0.1350 | 0.1580 |
| 62 | 0.0660 | 0.1310 | 0.1840 | 0.2180 | 0.2420 | 0.2710 | 0.3180 |
| 65 | 0.0800 | 0.1580 | 0.2210 | 0.2610 | 0.2910 | 0.3260 | 0.3830 |
| 70 | 0.0710 | 0.1400 | 0.1960 | 0.2310 | 0.2580 | 0.2890 | 0.3380 |
| 75 | 0.0670 | 0.1320 | 0.1840 | 0.2180 | 0.2430 | 0.2720 | 0.3200 |

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 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 52 | 0.0040 | 0.0070 | 0.0100 | 0.0110 | 0.0130 | 0.0150 | 0.0170 |
| 54 | 0.0050 | 0.0110 | 0.0150 | 0.0180 | 0.0200 | 0.0220 | 0.0260 |
| 56 | 0.0130 | 0.0260 | 0.0370 | 0.0430 | 0.0480 | 0.0550 | 0.0640 |
| 58 | 0.0170 | 0.0340 | 0.0470 | 0.0560 | 0.0620 | 0.0690 | 0.0810 |
| 60 | 0.0260 | 0.0530 | 0.0740 | 0.0870 | 0.0970 | 0.1080 | 0.1260 |
| 62 | 0.0530 | 0.1050 | 0.1470 | 0.1740 | 0.1940 | 0.2170 | 0.2540 |
| 65 | 0.0720 | 0.1420 | 0.1990 | 0.2350 | 0.2620 | 0.2930 | 0.3450 |
| 70 | 0.0710 | 0.1400 | 0.1960 | 0.2310 | 0.2580 | 0.2890 | 0.3380 |
| 75 | 0.0670 | 0.1320 | 0.1840 | 0.2180 | 0.2430 | 0.2720 | 0.3200 |

Miscellaneous Loading Factors

Credit for Unused Sick Leave

Total years of service is increased by 1% 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 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.

Appendix B – Principal Plan Provisions

The following is a description of the principal plan provisions used in calculating costs and liabilities. Many of the statements in this summary are general in nature but are intended to provide an easy to understand summary of the Public Employees' Retirement Law. The law itself governs in all situations.

Service Retirement

Eligibility

A classic CalPERS school member becomes eligible for Service Retirement upon attainment of age 50 with at least 5 years of credited service (total service across all CalPERS employers, and with certain other Retirement Systems with which CalPERS has reciprocity agreements). PEPRA school members become eligible for Service Retirement upon attainment of age 52 with at least 5 years of service.

Benefit

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

- The benefit factor for classic members comes from the **2% at 55** 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% @ 62 Factor |
|----------------|----------------|----------------|
| 50 | 1.100% | N/A |
| 51 | 1.280% | N/A |
| 52 | 1.460% | 1.000% |
| 53 | 1.640% | 1.100% |
| 54 | 1.820% | 1.200% |
| 55 | 2.000% | 1.300% |
| 59 | 2.064% | 1.400% |
| 57 | 2.126% | 1.500% |
| 58 | 2.188% | 1.600% |
| 59 | 2.250% | 1.700% |
| 60 | 2.314% | 1.800% |
| 61 | 2.376% | 1.900% |
| 62 | 2.438% | 2.000% |
| 63 | 2.500% | 2.100% |
| 64 | 2.500% | 2.200% |
| 65 | 2.500% | 2.300% |
| 66 | 2.500% | 2.400% |
| 67 & Up | 2.500% | 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.

Appendix B – Principal Plan Provisions

Service Retirement (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 new PEPRAs hired after January 1, 2013 final compensation is based on the monthly average of the member's highest 36 consecutive months' full-time equivalent monthly pay. PEPRAs have a cap on the annual salary that can be used to calculate final compensation for all new members based on the Social Security Contribution and Benefit Base. For employees that participate in Social Security this cap is \$124,180 for 2019 and for those employees that do not participate in social security the cap for 2019 is \$149,016. Adjustments to the caps are permitted annually based on changes to the CPI for All Urban Consumers.
- The employees in this plan may or may not be covered by Social Security. For employees with service prior to January 1, 2001 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 PEPRAs, 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 5 years of credited service (total service across all CalPERS employers, and with certain other Retirement Systems with which CalPERS has reciprocity agreements).

Eligibility to Start Receiving Benefits

The CalPERS classic member becomes eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for Deferred Status and upon attainment of age 50. PEPRAs school members become eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for Deferred Status and upon attainment of age 52.

Benefit

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

Non-Industrial (Non-Job Related) Disability Retirement

Eligibility

A CalPERS member is eligible for Non-Industrial Disability Retirement if he or she becomes disabled and has at least 5 years of credited service (total service across all 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% 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% of Final Compensation.

Appendix B – Principal Plan Provisions

Non-Industrial (Non-Job Related) Disability Retirement (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% 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 (50% for service not covered by Social Security). This additional benefit is often referred to as post retirement survivor allowance (PRSA) or simply as *survivor continuance*.

In other words, 25% of the allowance (or 50% for service not covered by Social Security), 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. This benefit will not be discontinued in the event the spouse remarries.

The remaining 75% of the retirement allowance (or 50% for service not covered by Social Security), which may be referred to as the *option portion* of the benefit, is paid to the retiree as an annuity for as long as he or she is alive. Or, the retiree may choose to provide for some of this *option portion* to be paid to any designated beneficiary after the retiree's death. Benefit options applicable to the *option portion* are the same as those offered with the standard form. The reduction is calculated in the same manner but is applied only to the *option portion*.

Pre-Retirement Death Benefits

Basic Death Benefit

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 currently credited at 7.00% per year. In addition, a lump sum in the amount of six months' salary is paid. 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.

Appendix B – Principal Plan Provisions

Pre-Retirement Death Benefits (continued)

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 members and age 52 for PEPRA school 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.

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%. Annual adjustments are calculated by first determining the lesser of 1) 2% 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% (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% (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% 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% of accumulated member contributions. If this amount of member contributions were insufficient to provide for PPPA payments, the 75% 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 contribution schedule is as follows:

The percentage contributed below the monthly compensation breakpoint is 0%. The monthly compensation breakpoint is \$0. The percentage contributed above the monthly compensation breakpoint is 7% for both classic and PEPRA members.

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% interest.

1959 Survivor Benefits Program

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

Appendix C – Participant Data

Source of the Participant Data

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 Test and Adjustments

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 Schools Pool.

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 the plan with those from the prior valuation,
- Pension amounts for each retiree and beneficiary receiving payments were compared with the pension amounts from the prior valuation,
- Checks for invalid ages and dates, and
- Reasonableness checks on various key data elements such as service and salary.

As the result of the tests on the data, number of adjustments were determined to be necessary. These included:

- Dates of hire and dates of entry were adjusted where necessary to be consistent with the service fields, the date of birth and each other, and
- The annual earnings rate for most school members were overwritten with the annualized earnings based on their yearly contributions.

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 2.5% 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

Appendix C - Participant Data

Reconciliation of Participants

| | Active | Transfer | Terminated | Receiving | Total |
|--------------------------------------|----------------|---------------|----------------|----------------|----------------|
| As of June 30, 2018 | 323,707 | 19,666 | 183,033 | 233,733 | 760,139 |
| Retirements | (9,783) | (1,023) | (1,639) | 12,425 | (20) |
| Industrial Disabilities | (3) | (36) | (7) | 48 | 2 |
| Ordinary Disabilities | (112) | (17) | (56) | 203 | 18 |
| Deaths ¹ | (392) | (25) | (233) | (7,562) | (8,212) |
| New Survivors | - | - | - | 1,957 | 1,957 |
| Non-Vested Terminations ² | (15,064) | (569) | 15,633 | 0 | 0 |
| Vested Terminations | (4,291) | (447) | 4,740 | (2) | 0 |
| Refunds of Contributions | (1,944) | (108) | (4,147) | 0 | (6,199) |
| Transfers | (1,271) | 2,375 | (1,082) | (22) | 0 |
| Redeposits/Rehires | 4,449 | (271) | (4,136) | (42) | 0 |
| First Year in Status | 34,186 | 158 | 2,588 | 0 | 36,932 |
| Data Corrections ³ | 244 | 191 | 14 | 319 | 768 |
| As of June 30, 2019 | 329,726 | 19,894 | 194,708 | 241,057 | 785,385 |

(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 Service

| Attained Age | Years of Service at Valuation Date | | | | | | Total | Payroll |
|--------------|------------------------------------|---------------|---------------|---------------|---------------|---------------|----------------|-------------------------|
| | 0 - 4 | 5 - 9 | 10 - 14 | 15 - 19 | 20-24 | 25+ | | |
| 15 - 24 | 12,097 | 46 | - | - | - | - | 12,143 | \$320,584,636 |
| 25 - 29 | 27,840 | 2,026 | 30 | - | - | - | 29,896 | 953,171,213 |
| 30 - 34 | 23,825 | 7,126 | 1,940 | 34 | - | - | 32,925 | 1,266,321,096 |
| 35 - 39 | 19,921 | 7,830 | 6,097 | 1,862 | 58 | 3 | 35,771 | 1,548,858,442 |
| 40 - 44 | 17,398 | 7,246 | 6,670 | 4,629 | 1,454 | 37 | 37,434 | 1,682,422,760 |
| 45 - 49 | 16,354 | 8,187 | 7,199 | 5,596 | 3,261 | 853 | 41,450 | 1,873,613,255 |
| 50 - 54 | 13,930 | 8,971 | 8,453 | 6,622 | 4,248 | 3,233 | 45,457 | 2,091,256,731 |
| 55 - 59 | 10,864 | 8,512 | 9,315 | 7,836 | 4,987 | 5,066 | 46,580 | 2,181,975,219 |
| 60 - 64 | 6,124 | 5,605 | 6,761 | 6,134 | 4,131 | 3,861 | 32,616 | 1,498,624,496 |
| 65 and over | 2,997 | 2,868 | 3,243 | 2,692 | 1,856 | 1,798 | 15,454 | 643,667,612 |
| Total | 151,350 | 58,417 | 49,708 | 35,405 | 19,995 | 14,851 | 329,726 | \$14,060,495,460 |

Counts are of unique members included in the valuation. Multiple records may exist for members with service in more than one benefit group. This does not result in double counting liabilities.

Distribution of Average Annual Salaries by Age and Service

| Attained Age | Years of Service at Valuation Date | | | | | | Average Salary |
|----------------|------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | 0 - 4 | 5 - 9 | 10 - 14 | 15 - 19 | 20 - 24 | 25+ | |
| 15 - 24 | \$26,330 | \$44,906 | \$0 | \$0 | \$0 | \$0 | \$26,401 |
| 25 - 29 | 30,906 | 44,953 | 56,113 | 0 | 0 | 0 | 31,883 |
| 30 - 34 | 34,811 | 46,039 | 54,966 | 65,554 | 0 | 0 | 38,461 |
| 35 - 39 | 35,860 | 47,388 | 55,835 | 63,427 | 77,743 | 138,205 | 43,299 |
| 40 - 44 | 34,437 | 44,858 | 54,552 | 63,072 | 68,416 | 79,856 | 44,944 |
| 45 - 49 | 33,098 | 42,418 | 52,102 | 59,344 | 66,542 | 71,376 | 45,202 |
| 50 - 54 | 32,374 | 39,733 | 47,806 | 56,550 | 64,786 | 71,154 | 46,005 |
| 55 - 59 | 32,071 | 37,423 | 45,386 | 54,257 | 62,325 | 70,326 | 46,844 |
| 60 - 64 | 31,166 | 35,892 | 43,675 | 51,623 | 58,763 | 65,241 | 45,948 |
| 65 and over | 25,450 | 31,723 | 41,392 | 49,025 | 54,775 | 60,369 | 41,651 |
| Average | \$32,571 | \$41,627 | \$49,169 | \$56,281 | \$62,586 | \$68,076 | \$42,643 |

Appendix C - Participant Data

Transferred and Terminated Participants

Distribution by Age and Service – Transfers to Other CalPERS Plans

| Attained Age | Years of Service at Valuation Date | | | | | | Total | Average Salary |
|--------------|------------------------------------|--------------|------------|------------|-----------|-----------|---------------|-----------------|
| | 0 - 4 | 5 - 9 | 10 - 14 | 15 - 19 | 20-24 | 25+ | | |
| 15 - 24 | 149 | 0 | 0 | 0 | 0 | 0 | 149 | \$42,763 |
| 25 - 29 | 1,039 | 28 | 0 | 0 | 0 | 0 | 1,067 | 48,762 |
| 30 - 34 | 1,874 | 147 | 16 | 0 | 0 | 0 | 2,037 | 50,312 |
| 35 - 39 | 2,236 | 284 | 71 | 8 | 0 | 0 | 2,599 | 62,118 |
| 40 - 44 | 2,292 | 385 | 122 | 38 | 2 | 0 | 2,839 | 76,696 |
| 45 - 49 | 2,244 | 434 | 157 | 53 | 12 | 2 | 2,902 | 86,095 |
| 50 - 54 | 2,048 | 458 | 183 | 68 | 22 | 6 | 2,785 | 84,127 |
| 55 - 59 | 1,958 | 510 | 198 | 74 | 27 | 10 | 2,777 | 80,558 |
| 60 - 64 | 1,345 | 315 | 122 | 38 | 14 | 3 | 1,837 | 76,141 |
| 65 and over | 662 | 157 | 59 | 20 | 3 | 1 | 902 | 67,498 |
| Total | 15,847 | 2,718 | 928 | 299 | 80 | 22 | 19,894 | \$72,820 |

Counts are of unique members included in the valuation. Multiple records may exist for members with service in more than one benefit group. This does not result in double counting liabilities.

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

| Attained Age | Years of Service at Valuation Date | | | | | | Total | Average Salary |
|--------------|------------------------------------|---------------|--------------|--------------|------------|------------|----------------|-----------------|
| | 0 - 4 | 5 - 9 | 10 - 14 | 15 - 19 | 20-24 | 25+ | | |
| 15 - 24 | 4,119 | 3 | - | - | - | - | 4,122 | \$30,414 |
| 25 - 29 | 17,131 | 128 | 3 | - | - | - | 17,262 | 31,872 |
| 30 - 34 | 23,418 | 1,260 | 71 | - | - | - | 24,749 | 33,109 |
| 35 - 39 | 25,191 | 2,509 | 445 | 49 | - | - | 28,194 | 34,823 |
| 40 - 44 | 21,518 | 2,460 | 796 | 189 | 16 | 1 | 24,980 | 38,717 |
| 45 - 49 | 19,205 | 2,597 | 915 | 315 | 77 | 11 | 23,120 | 39,830 |
| 50 - 54 | 17,108 | 2,799 | 1,047 | 421 | 128 | 58 | 21,561 | 40,214 |
| 55 - 59 | 16,687 | 2,839 | 1,033 | 340 | 120 | 68 | 21,087 | 39,092 |
| 60 - 64 | 13,798 | 2,136 | 647 | 220 | 80 | 66 | 16,947 | 38,176 |
| 65 and over | 11,018 | 1,130 | 325 | 116 | 58 | 39 | 12,686 | 35,553 |
| Total | 169,193 | 17,861 | 5,282 | 1,650 | 479 | 243 | 194,708 | \$36,743 |

Counts are of unique members included in the valuation. Multiple records may exist for members with service in more than one benefit group. This does not result in double counting liabilities.

Appendix C - Participant Data

Retired Members and Beneficiaries

Number of Retirees and Beneficiaries - by Age and Retirement Type

| Attained Age | Service Retirement | Non-Industrial Disability | Industrial Disability | Non-Industrial Death | Industrial Death | Death After Retirement | Total |
|--------------|--------------------|---------------------------|-----------------------|----------------------|------------------|------------------------|----------------|
| Under 30 | - | - | - | 3 | 1 | 204 | 208 |
| 30 - 34 | - | 3 | 4 | - | - | 160 | 167 |
| 35 - 39 | - | 26 | 17 | 2 | - | 208 | 253 |
| 40 - 44 | - | 94 | 45 | 2 | - | 250 | 391 |
| 45 - 49 | - | 245 | 52 | 14 | - | 328 | 639 |
| 50 - 54 | 1,264 | 692 | 96 | 41 | - | 542 | 2,635 |
| 55 - 59 | 9,934 | 1,348 | 139 | 94 | 3 | 974 | 12,492 |
| 60 - 64 | 29,140 | 1,879 | 175 | 180 | 3 | 1,567 | 32,944 |
| 65 - 74 | 47,939 | 2,060 | 188 | 197 | - | 2,478 | 52,862 |
| 70 - 74 | 44,577 | 1,800 | 141 | 161 | 3 | 3,413 | 50,095 |
| 75 - 79 | 29,586 | 1,475 | 84 | 114 | 1 | 3,724 | 34,984 |
| 80 - 84 | 19,718 | 928 | 23 | 68 | 3 | 3,971 | 24,711 |
| 85 and over | 20,858 | 743 | 15 | 50 | 2 | 7,008 | 28,676 |
| Total | 203,016 | 11,293 | 979 | 926 | 16 | 24,827 | 241,057 |

Counts are of unique members included in the valuation. Multiple records may exist for members with service in more than one benefit group. This does not result in double counting liabilities.

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

Annual Amounts Including PPPA Payments

| Attained Age | Service Retirement | Non-Industrial Disability | Industrial Disability | Non-Industrial Death | Industrial Death | Death After Retirement | Total |
|--------------|------------------------|---------------------------|-----------------------|----------------------|------------------|------------------------|------------------------|
| Under 30 | \$0 | \$0 | \$0 | \$13,537 | \$4 | \$1,074,162 | \$1,087,703 |
| 30 - 34 | 0 | 11,041 | 2,409 | 0 | 0 | 882,303 | 895,753 |
| 35 - 39 | 0 | 277,246 | 3,753 | 19,731 | 0 | 1,550,778 | 1,851,508 |
| 40 - 44 | 0 | 987,110 | 36,991 | 16,662 | 0 | 2,161,368 | 3,202,131 |
| 45 - 49 | 0 | 2,945,068 | 47,421 | 130,926 | 0 | 3,039,486 | 6,162,901 |
| 50 - 54 | 11,963,526 | 8,685,496 | 166,432 | 366,886 | 0 | 4,999,714 | 26,182,054 |
| 55 - 59 | 193,364,572 | 16,761,562 | 297,479 | 998,461 | 1,362 | 10,312,194 | 221,735,630 |
| 60 - 64 | 648,369,733 | 24,515,058 | 356,211 | 1,964,671 | 4,342 | 19,723,501 | 694,933,517 |
| 65 - 69 | 1,029,265,095 | 26,244,496 | 544,099 | 1,708,147 | 0 | 31,081,466 | 1,088,843,303 |
| 70 - 74 | 911,577,854 | 22,242,734 | 422,202 | 1,471,068 | 4,981 | 44,287,088 | 980,005,927 |
| 75 - 79 | 564,730,187 | 17,324,877 | 298,506 | 914,157 | 148 | 46,405,094 | 629,672,969 |
| 80 - 84 | 327,829,901 | 9,797,926 | 30,409 | 513,869 | 4,586 | 45,522,844 | 383,699,535 |
| 85 and over | 281,429,669 | 6,923,317 | 141,027 | 407,548 | 138 | 71,131,460 | 360,033,159 |
| Total | \$3,968,530,538 | \$136,715,931 | \$2,346,939 | \$8,525,663 | \$15,561 | \$282,171,458 | \$4,398,306,090 |

Appendix C - Participant Data

Retired Members and Beneficiaries (continued)

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

| Years Retired | Service Retirement | Non-Industrial Disability | Industrial Disability | Non-Industrial Death | Industrial Death | Death After Retirement | Total |
|---------------|--------------------|---------------------------|-----------------------|----------------------|------------------|------------------------|----------------|
| Under 5 Years | 58,545 | 1,126 | 203 | 267 | - | 8,810 | 68,951 |
| 5 – 9 | 48,025 | 1,755 | 181 | 212 | 2 | 6,233 | 56,408 |
| 10 – 14 | 35,870 | 1,626 | 162 | 212 | 1 | 4,181 | 42,052 |
| 15 – 19 | 27,667 | 2,291 | 168 | 131 | 1 | 2,688 | 32,946 |
| 20 – 24 | 15,804 | 2,153 | 102 | 49 | 2 | 1,500 | 19,610 |
| 25 – 29 | 9,953 | 1,341 | 78 | 29 | 2 | 867 | 12,270 |
| 30 and over | 7,152 | 1,001 | 85 | 26 | 8 | 548 | 8,820 |
| Total | 203,016 | 11,293 | 979 | 926 | 16 | 24,827 | 241,057 |

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

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

Allowance Amounts Including PPPA Payments

| Years Retired | Service Retirement | Non-Industrial Disability | Industrial Disability | Non-Industrial Death | Industrial Death | Death After Retirement | Total |
|---------------|------------------------|---------------------------|-----------------------|----------------------|------------------|------------------------|------------------------|
| Under 5 Years | \$1,339,157,004 | \$14,897,209 | \$489,864 | \$2,745,050 | \$0 | \$110,256,749 | \$1,467,545,876 |
| 5 – 9 | 993,821,513 | 23,243,140 | 662,614 | 2,014,979 | 884 | 73,295,396 | 1,093,038,526 |
| 10 – 14 | 704,735,721 | 21,453,033 | 428,521 | 1,981,334 | 575 | 46,273,604 | 774,872,788 |
| 15 – 19 | 531,917,344 | 30,306,112 | 445,797 | 999,329 | 316 | 27,280,133 | 590,949,031 |
| 20 – 24 | 212,580,224 | 24,117,920 | 96,579 | 346,498 | 6,292 | 13,783,803 | 250,931,316 |
| 25 – 29 | 126,963,314 | 14,558,699 | 180,209 | 224,004 | 3,727 | 7,384,840 | 149,314,793 |
| 30 and over | 59,355,419 | 8,139,818 | 43,355 | 214,469 | 3,767 | 3,896,932 | 71,653,760 |
| Total | \$3,968,530,539 | \$136,715,931 | \$2,346,939 | \$8,525,663 | \$15,561 | \$282,171,457 | \$4,398,306,090 |

Appendix C - Participant Data

Retired Members and Beneficiaries (continued)

Number Counts and Benefits - by Year of Retirement

| Year Retired | Total Retirements | Total Benefits | Average Benefits |
|------------------|-------------------|------------------------|------------------|
| 2019* | 7,403 | \$154,294,999 | \$20,842 |
| 2018 | 14,499 | 312,763,640 | 21,571 |
| 2017 | 14,845 | 332,832,759 | 22,421 |
| 2016 | 12,863 | 268,095,913 | 20,842 |
| 2015 | 12,723 | 256,630,209 | 20,171 |
| 2014 | 11,743 | 228,425,177 | 19,452 |
| 2013 | 11,255 | 208,370,458 | 18,514 |
| 2012 | 11,262 | 211,879,396 | 18,814 |
| 2011 | 10,873 | 207,426,257 | 19,077 |
| 2010 | 11,445 | 230,910,937 | 20,176 |
| 2009 | 10,373 | 212,096,718 | 20,447 |
| 2008 | 8,540 | 166,898,356 | 19,543 |
| 2007 | 8,150 | 154,114,521 | 18,910 |
| 2006 | 8,291 | 148,169,439 | 17,871 |
| 2005 | 8,297 | 147,384,109 | 17,764 |
| 2004 | 8,416 | 151,737,158 | 18,030 |
| 2003 | 8,517 | 163,398,286 | 19,185 |
| 2002 | 6,534 | 122,771,056 | 18,790 |
| 2001 | 5,706 | 105,080,295 | 18,416 |
| 2000 | 6,784 | 119,116,329 | 17,558 |
| 1999 | 3,851 | 48,894,076 | 12,696 |
| 1998 | 4,514 | 59,512,631 | 13,184 |
| 1997 | 3,966 | 49,593,731 | 12,505 |
| 1996 | 3,688 | 46,191,552 | 12,525 |
| 1995 | 3,609 | 45,518,528 | 12,613 |
| 1994 | 3,185 | 40,259,565 | 12,640 |
| 1993 | 2,966 | 38,751,745 | 13,065 |
| 1992 | 2,710 | 34,890,235 | 12,875 |
| 1991 | 2,313 | 28,497,153 | 12,320 |
| 1990 and earlier | 11,736 | 103,800,862 | 8,845 |
| Total | 241,057 | \$4,398,306,090 | \$18,246 |

* The numbers for 2019 are for 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 members with service in more than one benefit group. This does not result in double counting liabilities.

Appendix D – Normal Cost Information

Normal Cost Chart

The normal cost is determined using the Entry Age Cost method. 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. FAC means Final Average Compensation.

| Schools | Total Normal Cost | Employee Contribution ¹ | Range of Breakpoints | Average Effective Member Rate | Employer Normal Cost |
|------------------------------|-------------------|------------------------------------|----------------------|-------------------------------|----------------------|
| Schools 2% @ 62 – 3 Year FAC | 14.86% | 7.00% | -- | 7.00% | 7.86% |
| Schools 2% @ 55 – 1 Year FAC | 17.38% | 7.00% | -- | 7.00% | 10.38% |

(1) Employee contribution rates are based on rates in effect at the valuation date.

Development of PEPRA Member Contribution Rates

The table below shows the determination of the Member contribution rate based on 50% of the Total Normal Cost on June 30, 2019.

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

| Plan | Basis for Current Rate | | Effective July 1, 2020 | | | |
|---------|--------------------------------|-------------|--------------------------------|--------|---------------|-------------|
| | Total Normal Cost ¹ | Member Rate | Total Normal Cost ² | Change | Change Needed | Member Rate |
| Schools | 14.07% | 7.00% | 14.86% | 0.79% | No | 7.00% |

(1) As of June 30, 2017, valuation date

(2) As of June 30, 2019, valuation date

Appendix E – Glossary of Actuarial Terms

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

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

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

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

Amortization Bases: Separate payment schedules for different portions of the Unfunded Liability. The total Unfunded Liability of a plan can be segregated by "cause," creating "bases" and each such base will be separately amortized and paid for over a specific period. 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 Assumption: The actuarial assumption that was called "investment return" in earlier CalPERS reports or "actuarial interest rate" in Section 20014 of the California Public Employees' Retirement Law (PERL).

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

Appendix E – Glossary of Actuarial Terms

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

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

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

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

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

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

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

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

PEPRA: The California Public Employees' Pension Reform Act of 2013

Present Value of Benefits (PVB): The total dollars needed as of the valuation date to fund all benefits earned in the past or expected to be earned in the future for *current* members.

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

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California Public Employees' Retirement System A Component Unit of the State of California

