# City of Palo Alto (ID # 11607)
## Finance Committee Staff Report

**Report Type: Action Items** **Meeting Date: 10/20/2020**

**Council Priority: Fiscal Sustainability**

**Summary Title: Accept CalPERS Pension Annual Valuation Reports as of June 30, 2019**

**Title: Accept CalPERS Pension Annual Valuation Reports as of June 30, 2019**

**From: City Manager**

**Lead Department: Administrative Services**

**Recommendation**

Staff recommends that the Finance Committee review and discuss the June 30, 2019 CalPERS Annual Valuation reports for the Miscellaneous and Safety Pension Plans and updates on pension funding policy activities.

**Background**

The City of Palo Alto offers its employees and retirees a defined pension benefit plan which is managed and administered by CalPERS, a State of California Pension Trust Program. Staff provides the CalPERS Annual Valuation reports, which are actuarial reports detailing the latest status of the City of Palo Alto pension trust plans for employees and retirees. These reports calculate the actuarially determined contribution from the City to the pension plans. In addition, updates on the rate of return, funding status, and changes to the trust based on various impacts are detailed in each report.

The CalPERS program maintains two pension plans: one for safety employees (sworn fire and police personnel) and another for miscellaneous employees (all other non-safety personnel employed by the City, including field personnel, administrative support, and managers). These Annual Valuation reports provide updated actuarial information for both pension plans as of June 30, 2019.

There are three tiers of benefits within the two plans described above. Table 1 below details the current pension plans and the different benefit levels in each tier. It takes City employees five (5) years of service to vest in any tier of the pension program. Attachment A outlines the number of employees in each tier by pension plan and employee group as of September 2020.

**Table 1: City of Palo Alto Pension Benefit Plans and Tiers**

| | Miscellaneous | Safety: Fire | Safety: Police |
|---|---|---|---|
| **Tier 1** | 2.7%/service year worked; eligibility starting at the age of 55 (2.7% @ 55) | 3.0%/service year worked; eligibility starting at the age of 50 (3.0% @ 50) | 3.0%/service year worked; eligibility starting at the age of 50 (3.0% @ 50) |
| **Tier 2** | Effective July 16, 2010: 2.0%/service year worked, eligibility starting at age 60 (2.0% @ 60) | Effective June 7, 2012: 3.0%/service year worked, eligibility starting at age 55 (3.0% @ 55) | Effective December 6, 2012: 3.0%/service year worked, eligibility starting at age 55 (3.0% @ 55) |
| **Tier 3 "PEPRA"*** | Effective January 1, 2013: 2.0%/service year worked; eligibility starting at age 62 (2.0% at 62) | Effective January 1, 2013: 2.7%/service year worked; eligibility starting at age 57 (2.7% at 57) | Effective January 1, 2013: 2.7%/service year worked; eligibility starting at age 57 (2.7% at 57) |

* Under the California Public Employees' Pension Reform Act (PEPRA), the benefit calculation is limited by a maximum salary of $149,016 in 2019 for both the Miscellaneous and Safety plans, therefore it is calculated based on service years but cannot exceed the $149,016. The final salary calculation is based on the average of the highest three years.

The CalPERS Annual Valuation reports are included in Attachments B and C and provide an actuarial analysis to determine the City's pension liability and annual required contribution for each of the two pension plans (one for miscellaneous employees, one for safety employees). These reports provide an update on the funding status, the results of assumption changes such as rate of return (ROR) which impacts the discount rate assumption, the new fiscal year Actuarial Determined Contribution (ADC) and the projected future ADC as a percentage of payroll. The actuarial analysis is based on current employees' accrued benefits, former employees who have vested but have not yet retired, and retired employees as of June 30, 2019. CalPERS completes their actuarial analysis two years in arrears by practice. This means that the June 30, 2019 valuation report will inform the development of the FY 2022 Adopted Budget.

<u>CalPERS Projected Contribution Levels</u>

CalPERS has two components designated in the annual billing of employer contributions to employee pension accounts. These two components are: 1) the Normal Cost (NC); and 2) the Unfunded Accrued Liability (UAL) payment.

1. The NC reflects the employer contribution for the plan retirement benefits provided to current employees based on the current set of assumptions and is billed as a percentage of payroll.
2. The UAL represents the employer amortization of unfunded accrued liability and is billed as a flat dollar rate. The CalPERS's annual payment is calculated to pay down the City's unfunded accrued pension liability over the amortization timeline. If all actuarial assumptions were realized through the amortization timeline, the City would eliminate its unfunded pension liability after making these annual payments.

With the June 30, 2019 valuation, CalPERS has adopted a new amortization policy that shifts from a 30-year to 20-year amortization, shortening the period over which actuarial gains and losses are amortized. This policy change applies to the amortization of new UAL bases established on or after June 30, 2019. A new UAL base is created each time there is an increase or decrease in unfunded liability due to plan changes, assumption changes, method changes, or plan experience (including investment gains/losses). Additionally, the 5-year ramp-up and ramp-down policy on UAL bases is revised to include only a ramp-up period for investment gains/losses. Previously this included a ramp-up and ramp-down period for gains/losses (investment and non-investment).

The ADC (also referred to as the blended rate) is provided by CalPERS to estimate the total employer contribution and reflects the combined cost of NC and UAL. The ADC for the Miscellaneous Plan is $35.7 million in FY 2022, an increase of $2.3 million (6.9 percent), from an ADC of $33.4 million in FY 2021. The ADC for the Safety Plan is $19.2 million in FY 2022, an increase of $2.5 million (15.0 percent), from an ADC of $16.7 in FY 2021. The ADC will inform the development of the FY 2022 – FY 2031 Long Range Financial Forecast and FY 2022 Adopted Budget.

Tables 2-4 below summarize the projected percentage of payroll required for each plan to fund the ADC and the NC and UAL that make up this rate. Over the next six years, CALPERS estimates that future ADCs will grow from 41.8 percent of payroll in FY 2022 to a peak of 43.7 percent in FY 2025 before tapering to 36.2 percent of payroll by FY 2027 for the Miscellaneous plan. Over the same six-year span, CALPERS estimates that the ADC will grow from 69.6 percent of payroll in FY 2022 to a peak of 74.2 percent in FY 2025 before tapering to 73.2 percent of payroll in 2027 for Safety. It is important to note that CalPERS anticipates a 7.0 return throughout the forecast and does not factor the preliminary 4.7 percent return on investments for the period ending June 30, 2020. If these returns materialize, the losses will likely offset the relief shown in the out-years of the current forecast. Any losses from this period will be realized beginning in the next annual valuation and the FY 2023 Budget. A more detailed discussion of investment returns, including impacts on liability and funded status at various rates, is provided in the next section.

- Table 2 reflects the estimated percentage of payroll necessary for the City of Palo Alto to fund the employer costs, including both the NC and the UAL.
- Table 3 reflects the estimated percentage of payroll for the NC employer contribution.
- Table 4 reflects the estimated employer contribution necessary to pay down the UAL.

### TABLE 2: CalPERS Past and Projected Employer Contribution Rates (blended UAL and Normal Cost)*

| | FY 2020 | FY 2021 | FY 2022 | FY 2023 | FY 2024 | FY 2025 | FY 2026 | FY 2027 |
|---|---|---|---|---|---|---|---|---|
| **Miscellaneous** | 35.6% | 38.4% | **41.8%** | 43.0% | 43.3% | 43.7% | 40.6% | 36.2% |
| **Safety** | 59.4% | 65.3% | **69.6%** | 72.3% | 73.5% | 74.2% | 73.8% | 73.2% |

* The City and labor groups have Memoranda of Agreements (MOAs) that include provisions for employees to accept a greater share of pension costs to curtail the City's growing pension expense – In FY 2021 employees in the Miscellaneous group will pick-up 1% of the employer contribution and employees in the Safety group will pick-up 3% to 4.0% of the employer contribution.

### TABLE 3: CalPERS Past and Projected Normal Cost Employer Rate*

| | FY 2020 | FY 2021 | FY 2022 | FY 2023 | FY 2024 | FY 2025 | FY 2026 | FY 2027 |
|---|---|---|---|---|---|---|---|---|
| **Miscellaneous** | 10.7% | 11.5% | **11.0%** | 10.7% | 10.3% | 10.0% | 9.8% | 9.4% |
| **Safety** | 20.2% | 21.6% | **21.5%** | 21.1% | 20.6% | 20.2% | 19.7% | 19.3% |

* In addition to the employer contributions, employees contribute the employee share of pension costs based on the plan and benefit tier. Miscellaneous employees in Tier 1 contribute 8 percent, Tier 2 contribute 7 percent, and Tier 3 contribute 6.25 percent. Safety employees in Tier 1 contribute 9 percent, Tier 2 contribute 9 percent (Fire) or 11.75 percent (Police), and Tier 3 contribute 9 percent.

### TABLE 4: CalPERS Past and Projected Annual Employer Amortization of Unfunded Accrued Liability ($'s in thousands)

| | FY 2020 | FY 2021 | FY 2022 | FY 2023 | FY 2024 | FY 2025 | FY 2026 | FY 2027 |
|---|---|---|---|---|---|---|---|---|
| **Miscellaneous** | 21,287 | 23,433 | **26,358** | 28,421 | 29,794 | 31,207 | 29,443 | 26,169 |
| **Safety** | 10,019 | 11,211 | **13,283** | 14,545 | 15,449 | 16,211 | 16,670 | 17,083 |
| **TOTAL** | **$31,306** | **$34,644** | **$39,641** | **$42,966** | **$45,243** | **$47,418** | **$46,113** | **$43,252** |
| | | | | | | | | |
| *% Change from Prior Yr* | | *10.7%* | ***14.4%*** | *8.4%* | *5.3%* | *4.8%* | *-2.8%* | *-6.2%* |

CalPERS Projected Unfunded Accrued Pension Liability

Included in the Annual Valuation report is a status of both plans' "funded status." Overall, CalPERS has about 70 percent of the funding it needs for its obligations. This is higher than the City's funded status of 61.3 percent for Safety and 66.1 percent for Miscellaneous. Table 5 details the City's funded status for the Miscellaneous and Safety plans with an assumed future ROR of 7.0 percent effective June 30, 2018 (FY 2021). The total unfunded pension liability increased from $455.6 million as of June 30, 2018 to $477.0 million as of June 30, 2019. This represents an increase of $21.4 million, or 4.7 percent.

**TABLE 5: CalPERS Projected Unfunded Accrued Liability for the City of Palo Alto**

| | As of June 30, 2016 | As of June 30, 2017 | As of June 30, 2018 | As of June 30, 2019 |
|---|---|---|---|---|
| **Miscellaneous** | 261,680,231 | 260,720,776 | 284,856,248 | 294,703,569 |
| **Miscellaneous Funded Status** | 64.2% | 66.3% | 65.8% | 66.1% |
| **Safety** | 143,025,193 | 154,190,990 | 170,712,183 | 182,221,129 |
| **Safety Funded Status** | 63.6% | 63.5% | 62.2% | 61.3% |
| **TOTAL UNFUNDED PENSION LIABILITY** | **$404,705,424** | **$414,911,766** | **$455,568,431** | **$476,924,698** |
| | | | | |
| ***% Change from Prior Year*** | | ***2.5%*** | ***9.8%*** | ***4.7%*** |
| | | | | |
| **Public Agency Retirement Services (PARS) Section 115 Trust Fund Contributions*** | | | | **$32,282,584** |
| **Adjusted TOTAL UNFUNDED PENSION LIABILITY** | | | | **$444,641,114** |
| ***Adjusted % Change from Prior Year*** | | | | ***-2.4%*** |

* In total, the City has contributed $32.3 million in proactive contributions to the City's irrevocable Section 115 Pension Trust Fund (amount excludes investment returns). CalPERS does not consider these amounts in valuation calculations. For illustrative purposes, an adjusted unfunded liability is included and assumes that the PARS Trust is used to reduce the total unfunded liability presented by CalPERS. More discussion of the PARS Trust Fund is included later in this report.

CalPERS recognizes the impacts that varying assumptions may have on a plan's unfunded accrued liability, and thereby the pension plan's funding status, especially the implications of the discount rate assumption. Therefore, in addition to the actuarial assumptions used to develop this Annual Valuation, CalPERS includes an *Analysis of Discount Rate Sensitivity* section in their reports to provide some level of sensitivity analysis of the pension plans. This analysis can be found on page 26 of each respective plan report. Table 6 illustrates CalPERS' analysis of the June 30, 2019 UAL's discount rate sensitivity. For example, at 6.0 percent ROR, the total UAL would increase to $648.7 million, representing a 58.6 percent funded status for Miscellaneous and a 54.3 percent funded status for Safety. This analysis gives an indication of the potential impacts if CalPERS were to realize investment returns ranging from 6.0 percent to 8.0 percent over the long term.

**TABLE 6: CalPERS Sensitivity Analysis (as of June 30, 2019)**

| | 3.25% Discount Rate | 6% Discount Rate | 7% Discount Rate | 8% Discount Rate |
|---|---|---|---|---|
| **Miscellaneous** | $761,467,057 | $405,221,631 | $294,703,569 | $202,913,335 |
| ***Miscellaneous Funded Status*** | *43.0%* | *58.6%* | *66.1%* | *73.9%* |
| **Safety** | $473,047,352 | $243,505,471 | $182,221,129 | $131,641,227 |
| ***Safety Funded Status*** | *37.9%* | *54.3%* | *61.3%* | *68.7%* |
| **TOTAL UNFUNDED PENSION LIABILITY** | **$1.2 billion** | **$649 million** | **$477 million** | **$335 million** |

Proactive Pension Funding

Since 2017, the City has established and maintained an independent and irrevocable Internal Revenue Services (IRS) section 115 pension trust fund administered by Public Agency Retirement Services (PARS). The purpose of the City's PARS trust fund is to proactively set aside funding that can be used to offset the City's growing pension liability. The only way that PARS funding can be spent is towards City's pension costs; it cannot be used for any other purpose. Per City Council direction, the City currently budgets its pension contributions more conservatively than CalPERS and transmits the additional funding to this pension trust fund (CMR 9740).

Table 7 below provides a summary of these supplemental contributions that have been made to date. Through FY 2019, contributions to the PARS trust fund were made on a one-time ("ad-hoc") basis. Beginning in FY 2020, consistent with City Council direction, the City uses a 6.2 percent discount rate for the normal cost portion of the liability. The lower discount rate effectively recalculates the City' costs as though CalPERS were going to achieve the lower rate of return. This contribution is budgeted in all departments across the organization as part of the annual budget process. Additional one-time contributions continue to be made each year if excess revenues or unspent savings are available, subject to City Council approval.

**Table 7: Supplemental Contributions Summary (in millions)**

| | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 | Total |
|---|---|---|---|---|---|---|
| **Budgeted Contributions** | | | | | | |
| ***General Fund*** | - | - | - | *4.0* | *3.0* | *7.0* |
| ***Other Funds*** | - | - | - | *2.2* | *2.0* | *4.2* |
| **Total Budgeted Contributions** | **$-** | **$-** | **$-** | **$6.2** | **$5.0** | **$11.2** |
| | | | | | | |
| **One-time Contributions** | | | | | | |
| ***General Fund*** | *2.1* | *1.4* | *6.6* | *3.5* | *TBD* | *13.6* |
| ***Other Funds**** | - | *2.0* | *1.4* | *4.1* | *TBD* | *7.5* |
| **Total One-time Contributions** | **$2.1** | **$3.4** | **$8.0** | **$7.6** | **TBD** | **$21.1** |
| **TOTAL ALL FUNDS** | **$2.1** | **$3.4** | **$8.0** | **$13.8** | **$5.0** | **$32.3** |
| **CalPERS discount rate (%)** | **7.5** | **7.5** | **7.375** | **7.25** | **7.0** | |

* In FY 2018 & 2020, other funds made "catch-up" contribution to align with General Fund contributions to date.

The FY 2021 Adopted Budget continues the practice to include a normal cost pension expense of 6.2 percent as part of financial planning for all funds. This resulted in budgeted pre-funding costs above required CalPERS levels of $5.0 million ($3.0 million General Fund) in FY 2021. The contributions levels from FY 2020 to FY 2021 decreased by $1.2 million, from $6.2 million to $5.0 million, primarily due to the change in CalPERS discount rate from 7.25 percent to 7.00 percent. As CalPERS has lowered their rates, the gap to meet the 6.2 percent target has narrowed. Approximately $500,000 ($400,000 in the General Fund) of this decrease is due to management concessions and staff freezes in FY 2021 that reduced the associated expense for pensions because normal cost, employee share of pension cost, and supplemental pension contributions are calculated as a percentage of payroll. In total, planned contributions (principal) of $32.3 million to the pension Trust Fund will have been made since inception in FY 2017 through FY 2021 ($21.0 million, or 65 percent of the total, is from the General Fund). The Trust Fund is invested in a moderately conservative portfolio, earning 6.11 percent for the year ending June 30, 2020, a 0.21 percent increase compared to FY 2019.

To calculate the supplemental contribution, staff used a 3rd party software (GovInvest) to model the impact of a 6.2 percent discount rate on the current CalPERS valuation reports. GovInvest allows for comparisons against a baseline scenario that is meant to align with CalPERS projections in order to model alternative parameters. It should be explicitly stated that this analysis is meant to be informative and representational; <u>it is not a replacement for independent actuarial analysis but rather a supplement to it</u>. Staff modeled the impact of lowering the discount rate to 6.2 percent on the normal cost in GovInvest and applied the difference in basis points of percentage between the 'CalPERS' scenario and the 6.2 percent scenario to the City's current budget estimates for pensionable payroll for the miscellaneous and safety groups.

<u>Long-term Financial Planning</u>

The City Council adopted "Fiscal Sustainability" as one of four priorities in 2019, including initiatives to develop a policy that addresses unfunded pension liability. Additionally, the City Council directed Staff to use the 6.2 discount rate for the normal cost of pensions as part of the annual budget process (beginning in FY 2020) and include a base case in the Long Range Financial Forecast that is reflective of the more conservative discount rate.

During FY 2020, Staff returned to the Finance Committee and the City Council to review and discuss the options for a Pension Funding Policy and elements to consider in the establishment of a Pension Funding Policy. Four scenarios were presented that included different timelines, mechanisms, and options available to reach a target funded status of 100 percent. Ultimately, the City Council pursued a policy that strives to achieve a 90 percent funded level over fifteen years (CMR 11407).

Staff anticipates returning to the City Council to formally adopt the Pension Funding Policy and report back on the progress towards meeting these funding goals in the fall of 2020. As part of the development of the FY 2021 – 2031 Long Range Financial Forecast, Staff will update the salary and benefit expense estimates through the next ten years and will refine the calculation methodology for the 6.2 percent contributions. It is anticipated that proactive pension contributions will range from 3 to 4 percent of pensionable payroll, or approximately $5.0 to $6.0 million per year.

**Resource Impact**
The FY 2021 Adopted Operating Budget includes the actuarially determined contribution as calculated by CalPERS and the additional costs associated with using a lower 6.2 percent discount rate.

**Environmental Review**
This report is not a project for the purposes of the California Environmental Quality Act. Environmental review is not required.

**Attachments:**
- Attachment A: City of Palo Alto Pension Plan Benefit Levels Enrollment by Plan and Employee Group
- Attachment B: CalPERS Miscellaneous Annual Valuation Report June 30, 2019
- Attachment C: CalPERS Safety Annual Valuation Report June 30, 2019

Attachment A:

City of Palo Alto Pension Plan Benefit Levels Enrollment by Plan and Employee Group

## Miscellaneous Plans

| Employee Group | Employee Count Sept 2020 | Employee Count Sept 2019 |
|---|---|---|
| **City Council & Council Appointees** | **7** | **7** |
| Tier 1 | 1 | 1 |
| Tier 2 | 2 | 2 |
| Tier 3 | 4 | 4 |
| **Management and Professional** | **192** | **188** |
| Tier 1 | 83 | 86 |
| Tier 2 | 40 | 40 |
| Tier 3 | 69 | 62 |
| **Service Employees' International** | **517** | **528** |
| Tier 1 | 220 | 238 |
| Tier 2 | 55 | 61 |
| Tier 3* | 242 | 229 |
| **Utilities Management** | **44** | **48** |
| Tier 1 | 37 | 44 |
| Tier 2 | 2 | 2 |
| Tier 3 | 5 | 2 |
| **Grand Total Miscellaneous Plans** | **760** | **774** |
| Tier 1 | 341 | 371 |
| Tier 2 | 99 | 105 |
| Tier 3 | 320 | 298 |
| **Tiered Percentage Miscellaneous Plans** | | |
| Tier 1 | 44.9% | 47.9% |
| Tier 2 | 13.0% | 13.6% |
| Tier 3 | 42.1% | 38.5% |

| **Tier Definitions** | |
|---|---|
| Tier 1 | 2.7% @ 55 |
| Tier 2 | 2% @ 60 |
| Tier 3 | 2% @ 62 |

## Safety Plans

| Employee Group | Employee Count Sept 2020 | Employee Count Sept 2019 |
|---|---|---|
| **IAFF** | **84** | **81** |
| Tier 1 | 48 | 59 |
| Tier 2 | 8 | 7 |
| Tier 3 | 28 | 15 |
| **Fire Chief's Association** | **4** | **4** |
| Tier 1 | 4 | 4 |
| Tier 2 | 0 | 0 |
| Tier 3 | 0 | 0 |
| **Fire Management** | **3** | **3** |
| Tier 1 | 3 | 3 |
| Tier 2 | 0 | 0 |
| Tier 3 | 0 | 0 |
| **PAPOA** | **69** | **68** |
| Tier 1 | 36 | 40 |
| Tier 2 | 4 | 5 |
| Tier 3 | 29 | 23 |
| **Police Management Association** | **6** | **7** |
| Tier 1 | 6 | 6 |
| Tier 2 | 0 | 1 |
| Tier 3 | 0 | 0 |
| **Police Management** | **2** | **1** |
| Tier 1 | 1 | 1 |
| Tier 2 | 2 | 0 |
| Tier 3 | 0 | 0 |
| **Grand Total Safety Plans** | **168** | **168** |
| Tier 1 | 98 | 107 |
| Tier 2 | 13 | 12 |
| Tier 3 | 57 | 49 |
| **Tiered Percentage Safety Plans** | | |
| Tier 1 | 58.3% | 63.7% |
| Tier 2 | 7.7% | 7.1% |
| Tier 3 | 33.9% | 29.2% |

| **Tier Definitions** | |
|---|---|
| Tier 1 | 3.0% @ 50 |
| Tier 2 | 3% @ 55 |
| Tier 3 | 2.7% @ 57 |

* Includes Police Trainee and Limited Hourly FTE

ATTACHMENT B

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

**July 2020**

**Miscellaneous Plan of the City of Palo Alto (CalPERS ID: 6373437857)**
**Annual Valuation Report as of June 30, 2019**

Dear Employer,

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

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

**Required Contributions**

The table below shows the minimum required employer contributions and the Employee PEPRA Rate for fiscal year 2021-22 along with an estimate of the required contribution for fiscal year 2022-23. Employee contributions other than cost sharing (whether paid by the employer or the employee) are in addition to the results shown below. **The required employer contributions in this report do not reflect any cost sharing arrangement you may have with your employees.**

| Fiscal Year | Employer Normal Cost Rate | Employer Amortization of Unfunded Accrued Liability | Employee PEPRA Rate |
|---|---|---|---|
| 2021-22 | 10.95% | $26,358,094 | 6.25% |
| *Projected Results* | | | |
| *2022-23* | *10.7%* | *$28,421,000* | *TBD* |

The actual investment return for fiscal year 2019-20 was not known at the time this report was prepared. The projections above assume the investment return for that year would be 7.0 percent. ***To the extent the actual investment return for fiscal year 2019-20 differs from 7.0 percent, the actual contribution requirements for fiscal year 2022-23 will differ from those shown above.*** For additional details regarding the assumptions and methods used for these projections please refer to the "Projected Employer Contributions" in the "Highlights and Executive Summary" section. This section also contains projected required contributions through fiscal year 2026-27.

**Changes from Previous Year's Valuations**

The CalPERS Board of Administration has adopted a new amortization policy effective with the June 30, 2019 actuarial valuation. The new policy shortens the period over which actuarial gains and losses are amortized from 30 years to 20 years with the payments computed as a level dollar amount. In addition, the new policy does not utilize a 5-year ramp-up and ramp-down on UAL bases attributable to assumption and method changes and non-investment gains/losses. The new policy does not utilize a 5-year ramp-down on investment gains/losses. These changes apply only to new UAL bases established on or after June 30, 2019.

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

**Questions**

We understand that you might have some questions about these results. While we are very interested in discussing these results with your agency, in the interest of allowing us to give every public agency their results, we ask that you wait until after August 1, 2020 to contact us with actuarial questions. If you have other questions, you may call the Customer Contact Center at (888)-CalPERS or (**888-225-7377**).

Sincerely,

SCOTT TERANDO
Chief Actuary

# Actuarial Valuation as of June 30, 2019

# for the Miscellaneous Plan of the City of Palo Alto

**(CalPERS ID: 6373437857)**
**(Valuation Rate Plan ID: 8)**

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

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# Actuarial Certification

To the best of our knowledge, this report is complete and accurate and contains sufficient information to disclose, fully and fairly, the funded condition of the Miscellaneous Plan of the City of Palo Alto. This valuation is based on the member and financial data as of June 30, 2019 provided by the various CalPERS databases and the benefits under this plan with CalPERS as of the date this report was produced. It is our opinion that the valuation has been performed in accordance with generally accepted actuarial principles, in accordance with standards of practice prescribed by the Actuarial Standards Board, and that the assumptions and methods are internally consistent and reasonable for this plan, as prescribed by the CalPERS Board of Administration according to provisions set forth in the California Public Employees' Retirement Law.

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

DAVID CLEMENT, ASA, MAAA, EA
Senior Pension Actuary, CalPERS

# Highlights and Executive Summary

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

# Introduction

This report presents the results of the June 30, 2019 actuarial valuation of the Miscellaneous Plan of the City of Palo Alto of the California Public Employees' Retirement System (CalPERS). This actuarial valuation sets the minimum required employer contributions for fiscal year 2021-22.

# Purpose of the Report

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

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

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

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

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

**Assessment and Disclosure of Risk**

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

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

# Required Contributions

| | Fiscal Year |
|---|---|
| **Required Employer Contribution** | **2021-22** |
| **Employer Normal Cost Rate** | **10.95%** |
| ***Plus, Either*** | |
| **1) Monthly Employer Dollar UAL Payment** | **$2,196,508** |
| ***Or*** | |
| **2) Annual UAL Prepayment Option*** | **$25,481,331** |
| **Required PEPRA Member Contribution Rate** | **6.25%** |

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

** Only the UAL portion of the employer contribution can be prepaid* ***(which must be received in full no later than July 31)****. Any prepayment totaling over $5 million requires a 72-hour notice email to FCSD_public_agency_wires@calpers.ca.gov. Plan Normal Cost contributions will be made as part of the payroll reporting process. If there is contractual cost sharing or other change, this amount will change.*

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

*For additional detail regarding the determination of the required contribution for PEPRA members, see "PEPRA Member Contribution Rates" in the "Liabilities and Contributions" section. Required member contributions for Classic members can be found in Appendix B.*

| | Fiscal Year 2020-21 | Fiscal Year 2021-22 |
|---|---|---|
| **Normal Cost Contribution as a Percentage of Payroll** | | |
| Total Normal Cost | 18.831% | 18.21% |
| Employee Contribution[1] | 7.344% | 7.26% |
| Employer Normal Cost[2] | 11.487% | 10.95% |
| Projected Annual Payroll for Contribution Year | $87,177,382 | $85,533,721 |
| **Estimated Employer Contributions Based On Projected Payroll** | | |
| Total Normal Cost | $16,416,373 | $15,575,691 |
| Employee Contribution[1] | 6,402,307 | 6,209,748 |
| Employer Normal Cost[2] | 10,014,066 | 9,365,943 |
| Unfunded Liability Contribution | 23,432,860 | 26,358,094 |
| % of Projected Payroll (illustrative only) | 26.880% | 30.82% |
| Estimated Total Employer Contribution | $33,446,926 | $35,724,037 |
| % of Projected Payroll (illustrative only) | 38.367% | 41.77% |

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

[2] The Employer Normal Cost is a blended rate for all benefit groups in the plan. For a breakout of normal cost by benefit group, see "Normal Cost by Benefit Group" in the "Liabilities and Contributions" section.

# Additional Discretionary Employer Contributions

The minimum required employer contribution towards the Unfunded Accrued Liability (UAL) for this rate plan for the 2021-22 fiscal year is $26,358,094. CalPERS allows employers to make additional discretionary payments (ADPs) at any time and in any amount. These optional payments serve to reduce the UAL and future required contributions and can result in significant long-term savings. Employers can also use ADPs to stabilize annual contributions as a fixed dollar amount, percent of payroll or percent of revenue.

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

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

**Minimum Required Employer Contribution for Fiscal Year 2021-22**

| Estimated Normal Cost | Minimum UAL Payment | ADP | Total UAL Contribution | Estimated Total Contribution |
|---|---|---|---|---|
| $9,365,943 | $26,358,094 | $0 | $26,358,094 | $35,724,037 |

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

| Funding Target | Estimated Normal Cost | Minimum UAL Payment | ADP[1] | Total UAL Contribution | Estimated Total Contribution |
|---|---|---|---|---|---|
| 20 years | $9,365,943 | $26,358,094 | $156,829 | $26,514,923 | $35,880,866 |
| 15 years | $9,365,943 | $26,358,094 | $4,483,158 | $30,841,252 | $40,207,195 |
| 10 years | $9,365,943 | $26,358,094 | $13,635,671 | $39,993,765 | $49,359,708 |
| 5 years | $9,365,943 | $26,358,094 | $42,150,673 | $68,508,767 | $77,874,710 |

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

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

# Plan's Funded Status

| | June 30, 2018 | June 30, 2019 |
|---|---|---|
| 1. Present Value of Projected Benefits | $943,874,610 | $977,761,615 |
| 2. Entry Age Normal Accrued Liability | 831,958,865 | 868,716,440 |
| 3. Market Value of Assets (MVA) | 547,102,617 | 574,012,871 |
| 4. Unfunded Accrued Liability (UAL) [(2) – (3)] | $284,856,248 | $294,703,569 |
| 5. Funded Ratio [(3) / (2)] | 65.8% | 66.1% |

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

# Projected Employer Contributions

The table below shows the required and projected employer contributions (before cost sharing) for the next six fiscal years. The projection assumes that all actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur during the projection period. As of the preparation date of this report, the year to date return for the 2019-20 fiscal year was well below the 7 percent assumed return. Actual contribution rates during this projection period could be significantly higher than the projection shown below. The projected normal cost percentages in the projections below reflect that the normal cost will continue to decline over time as new employees are hired into PEPRA or other lower cost benefit tiers.

| | **Required Contribution** | **Projected Future Employer Contributions (Assumes 7.00% Return for Fiscal Year 2019-20)** | | | | |
|---|---|---|---|---|---|---|
| **Fiscal Year** | **2021-22** | **2022-23** | **2023-24** | **2024-25** | **2025-26** | **2026-27** |
| **Normal Cost %** | 10.95% | 10.7% | 10.3% | 10.0% | 9.8% | 9.4% |
| **UAL Payment** | $26,358,094 | $28,421,000 | $29,794,000 | $31,207,000 | $29,443,000 | $26,169,000 |
| *Total as a % of Payroll** | *41.77%* | *43.0%* | *43.3%* | *43.7%* | *40.6%* | *36.2%* |
| *Projected Payroll* | *$85,533,721* | *$87,885,898* | *$90,302,760* | *$92,786,086* | *$95,337,703* | *$97,959,490* |

*Illustrative only and based on the projected payroll shown.

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

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

# Cost

### Actuarial Determination of Pension Plan Cost

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

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

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

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

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

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

These assumptions reflect CalPERS' best estimate of future experience of the plan and are long term in nature. We recognize that all assumptions will not be realized in any given year. For example, the investment earnings at CalPERS have averaged 5.8 percent over the 20 years ending June 30, 2019, yet individual fiscal year returns have ranged from -23.6 percent to +20.7 percent. In addition, CalPERS reviews all actuarial assumptions by conducting in-depth experience studies every four years, with the most recent experience study completed in 2017.

# Changes since the Prior Year's Valuation

**Benefits**

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

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

**Actuarial Methods and Assumptions**

The CalPERS Board of Administration adopted a new amortization policy effective with this actuarial valuation. The new policy shortens the period over which actuarial gains and losses are amortized from 30 years to 20 years with the payments computed as a level dollar amount. In addition, the new policy does not utilize a 5-year ramp-up and ramp-down on UAL bases attributable to assumption and method changes and non-investment gains/losses. The new policy also does not utilize a 5-year ramp-down on investment gains/losses. These changes will apply only to new UAL bases established on or after June 30, 2019.

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

# Subsequent Events

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

The projected employer contributions on Page 5 are calculated under the assumption that the discount rate remains at 7.0 percent going forward and that the realized rate of return on assets for fiscal year 2019-20 is 7.0 percent.

This actuarial valuation report reflects statutory changes, regulatory changes and CalPERS Board actions through January 2020. Any subsequent changes or actions are not reflected.

# Assets

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

# Reconciliation of the Market Value of Assets

| | | |
|---|---|---|
| 1. | Market Value of Assets as of 6/30/18 including Receivables | $547,102,617 |
| 2. | Change in Receivables for Service Buybacks | (331,733) |
| 3. | Employer Contributions | 25,423,113 |
| 4. | Employee Contributions | 6,666,050 |
| 5. | Benefit Payments to Retirees and Beneficiaries | (40,655,281) |
| 6. | Refunds | (469,108) |
| 7. | Transfers | 0 |
| 8. | Service Credit Purchase (SCP) Payments and Interest | 605,209 |
| 9. | Administrative Expenses | (615,282) |
| 10. | Miscellaneous Adjustments | 1,270 |
| 11. | Investment Return (Net of Investment Expenses) | 36,286,017 |
| 12. | Market Value of Assets as of 6/30/19 including Receivables | $574,012,871 |

# Asset Allocation

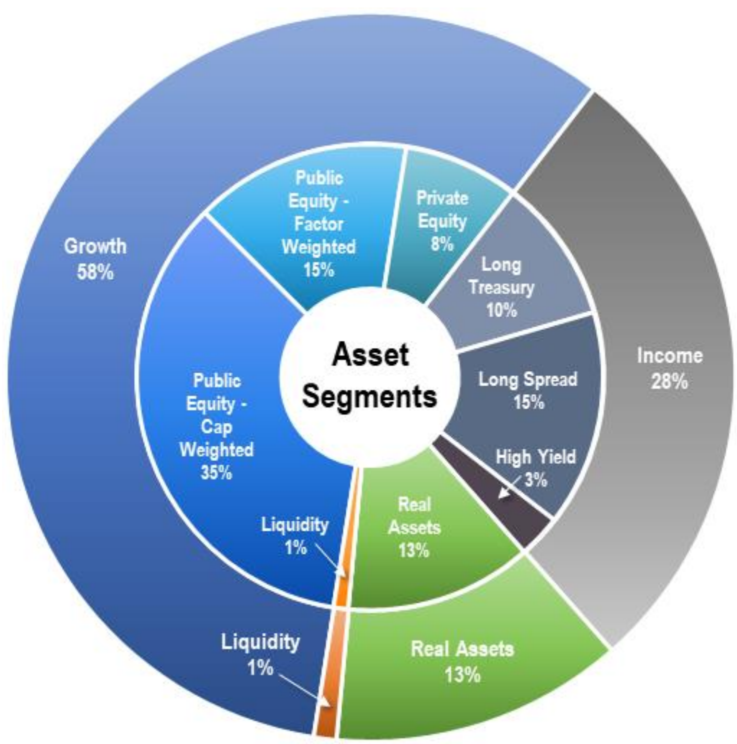
CalPERS adheres to an Asset Allocation Strategy which establishes asset class allocation policy targets and ranges and manages those asset class allocations within their policy ranges. CalPERS Investment Belief No. 6 recognizes that strategic asset allocation is the dominant determinant of portfolio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

The asset allocation shown below reflect the allocation of the Public Employees' Retirement Fund (PERF) in its entirety as of June 30, 2019. The assets for City of Palo Alto Miscellaneous Plan are part of the PERF and are invested accordingly.

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

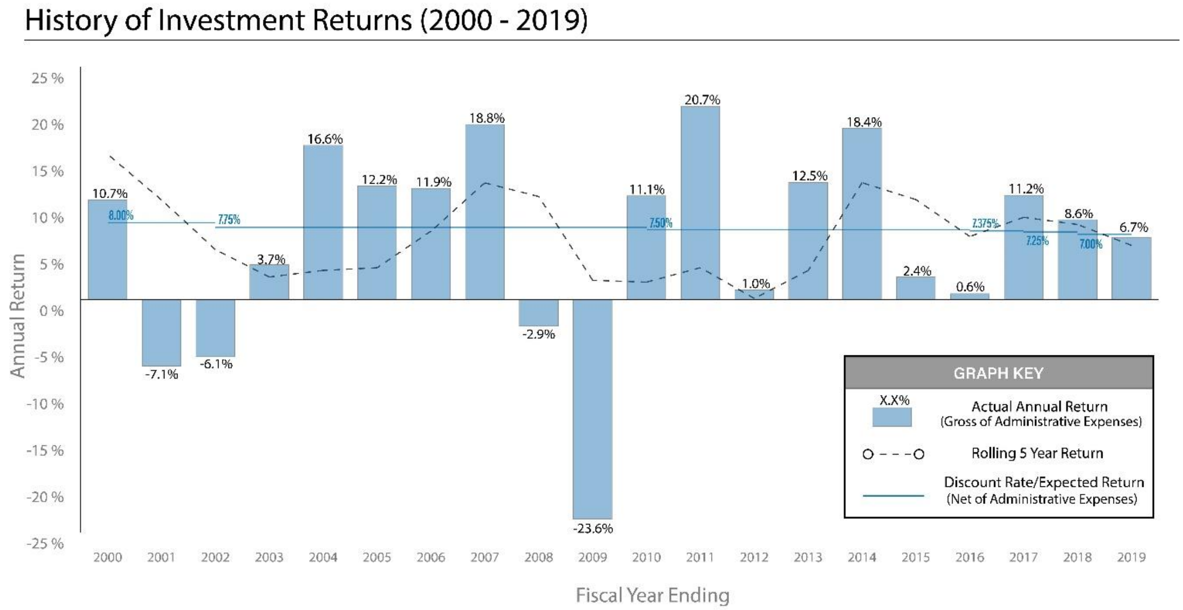
[1] Trust Level includes Multi-Asset Class, Completion Overlay, Risk Mitigation, Absolute Return Strategies, Plan Level Transition and other Total Fund level portfolios.

**Strategic Asset Allocation Policy Targets**



# CalPERS History of Investment Returns

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




The table below shows historical compound annual returns of the Public Employees Retirement Fund for various time periods ending on June 30, 2019 (figures are reported as gross of fees). The compound annual return is the average rate per year compounded over the indicated number of years. It should be recognized that in any given year the rate of return is volatile. The portfolio has an expected volatility of 11.4 percent per year based on the most recent Asset Liability Modelling study. The volatility is a measure of the risk of the portfolio expressed in the standard deviation of the fund's total return distribution, expressed as a percentage. Consequently, when looking at investment returns, it is more instructive to look at returns over longer time horizons.

| History of CalPERS Compound Annual Rates of Return and Volatilities | | | | | |
|---|---|---|---|---|---|
| | **1 year** | **5 year** | **10 year** | **20 year** | **30 year** |
| Compound Annual Return | 6.7% | 5.8% | 9.1% | 5.8% | 8.1% |
| Volatility | – | 4.4% | 6.9% | 10.7% | 9.8% |

# Liabilities and Contributions

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

# Development of Accrued and Unfunded Liabilities

| | June 30, 2018 | June 30, 2019 |
|---|---|---|
| 1. Present Value of Projected Benefits | | |
| a) Active Members | $408,701,538 | $392,796,621 |
| b) Transferred Members | 39,086,313 | 37,712,848 |
| c) Terminated Members | 18,698,038 | 18,441,931 |
| d) Members and Beneficiaries Receiving Payments | 477,388,721 | 528,810,215 |
| e) Total | $943,874,610 | $977,761,615 |
| 2. Present Value of Future Employer Normal Costs | $65,501,935 | $62,657,698 |
| 3. Present Value of Future Employee Contributions | $46,413,810 | $46,387,477 |
| 4. Entry Age Normal Accrued Liability | | |
| a) Active Members [(1a) - (2) - (3)] | $296,785,793 | $283,751,446 |
| b) Transferred Members (1b) | 39,086,313 | 37,712,848 |
| c) Terminated Members (1c) | 18,698,038 | 18,441,931 |
| d) Members and Beneficiaries Receiving Payments (1d) | 477,388,721 | 528,810,215 |
| e) Total | $831,958,865 | $868,716,440 |
| 5. Market Value of Assets (MVA) | $547,102,617 | $574,012,871 |
| 6. Unfunded Accrued Liability (UAL) [(4e) - (5)] | $284,856,248 | $294,703,569 |
| 7. Funded Ratio [(5) / (4e)] | 65.8% | 66.1% |

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

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

| | |
|---|---|
| **1. Total (Gain)/Loss for the Year** | |
| a) Unfunded Accrued Liability (UAL) as of 6/30/18 | $284,856,248 |
| b) Expected Payment on the UAL during 2018-19 | 16,845,251 |
| c) Interest through 6/30/19 [.07 x (1a) - $((1.07)^{½}$ - 1) x (1b)] | 19,360,325 |
| d) Expected UAL before all other changes [(1a) - (1b) + (1c)] | 287,371,322 |
| e) Change due to plan changes | 0 |
| f) Change due to assumption change | 0 |
| g) Change due to method change | 0 |
| h) Expected UAL after all other changes [(1d) + (1e) + (1f) + (1g)] | 287,371,322 |
| i) Actual UAL as of 6/30/19 | 294,703,569 |
| j) Total (Gain)/Loss for 2018-19 [(1i) - (1h)] | $7,332,247 |
| **2. Contribution (Gain)/Loss for the Year** | |
| a) Expected Contribution (Employer and Employee) | $32,944,528 |
| b) Interest on Expected Contributions | 1,133,557 |
| c) Actual Contributions | 32,089,162 |
| d) Interest on Actual Contributions | 1,104,125 |
| e) Expected Contributions with Interest [(2a) + (2b)] | 34,078,085 |
| f) Actual Contributions with Interest [(2c) + (2d)] | 33,193,287 |
| g) Contribution (Gain)/Loss [(2e) - (2f)] | $884,798 |
| **3. Investment (Gain)/Loss for the Year** | |
| a) Market Value of Assets as of 6/30/18 | $547,102,617 |
| b) Prior Fiscal Year Receivables | (1,615,071) |
| c) Current Fiscal Year Receivables | 1,283,337 |
| d) Contributions Received | 32,089,162 |
| e) Benefits and Refunds Paid | (41,124,389) |
| f) Transfers, SCP Payments and Interest, and Miscellaneous Adjustments | 606,479 |
| g) Expected Int. [.07 x (3a + 3b) + $((1.07)^{½}$ - 1) x ((3d) + (3e) + (3f))] | 37,894,112 |
| h) Expected Assets as of 6/30/19 [(3a) + (3b) + (3c) + (3d) + (3e) + (3f) + (3g)] | 576,236,248 |
| i) Market Value of Assets as of 6/30/19 | 574,012,871 |
| j) Investment (Gain)/Loss [(3h) - (3i)] | $2,223,377 |
| **4. Liability (Gain)/Loss for the Year** | |
| a) Total (Gain)/Loss (1j) | $7,332,247 |
| b) Contribution (Gain)/Loss (2g) | 884,798 |
| c) Investment (Gain)/Loss (3j) | 2,223,377 |
| d) Liability (Gain)/Loss [(4a) - (4b) - (4c)] | $4,224,072 |
| **5. Non-Investment (Gain)/Loss for the Year** | |
| a) Contribution (Gain)/Loss (2g) | $884,798 |
| b) Liability (Gain)/Loss (4d) | 4,224,072 |
| c) Non-Investment (Gain)/Loss [(5a) + (5b)] | $5,108,870 |

# Schedule of Amortization Bases

Below is the schedule of the plan's amortization bases. Note that there is a two-year lag between the valuation date and the start of the contribution fiscal year.

- The assets, liabilities, and funded status of the plan are measured as of the valuation date: June 30, 2019.
- The required employer contributions determined by the valuation are for the fiscal year beginning two years after the valuation date: fiscal year 2021-22.

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

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

| Reason for Base | Date Est. | Ramp Level 2021-22 | Ramp Shape | Escala-tion Rate | Amort. Period | Balance 6/30/19 | Expected Payment 2019-20 | Balance 6/30/20 | Expected Payment 2020-21 | Balance 6/30/21 | Minimum Required Payment 2021-22 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Assumption Change | 6/30/03 | No Ramp | | 2.75% | 4 | 11,879,361 | 2,275,477 | 10,357,145 | 2,319,811 | 8,682,514 | 2,383,606 |
| Method Change | 6/30/04 | No Ramp | | 2.75% | 5 | (955,912) | (160,094) | (857,223) | (163,155) | (748,460) | (167,641) |
| Benefit Change | 6/30/05 | No Ramp | | 2.75% | 5 | 21,177,830 | 3,546,810 | 18,991,429 | 3,614,625 | 16,581,832 | 3,714,028 |
| Assumption Change | 6/30/09 | No Ramp | | 2.75% | 10 | 23,544,505 | 2,534,996 | 22,570,400 | 2,578,025 | 21,483,598 | 2,648,920 |
| Special (Gain)/Loss | 6/30/09 | No Ramp | | 2.75% | 20 | 16,764,211 | 1,183,236 | 16,713,757 | 1,198,299 | 16,644,190 | 1,231,252 |
| Special (Gain)/Loss | 6/30/10 | No Ramp | | 2.75% | 21 | 1,390,646 | 95,554 | 1,389,149 | 96,733 | 1,386,328 | 99,393 |
| Assumption Change | 6/30/11 | No Ramp | | 2.75% | 12 | 11,371,730 | 1,089,996 | 11,040,250 | 1,107,534 | 10,667,425 | 1,137,991 |
| Special (Gain)/Loss | 6/30/11 | No Ramp | | 2.75% | 22 | (58,724) | (3,935) | (58,764) | (3,982) | (58,758) | (4,092) |
| Payment (Gain)/Loss | 6/30/12 | No Ramp | | 2.75% | 23 | 3,082,588 | 201,771 | 3,089,656 | 204,105 | 3,094,804 | 209,718 |
| (Gain)/Loss | 6/30/12 | No Ramp | | 2.75% | 23 | 25,986,780 | 1,700,967 | 26,046,361 | 1,720,644 | 26,089,758 | 1,767,962 |
| (Gain)/Loss | 6/30/13 | 100% | Up/Down | 2.75% | 24 | 81,826,984 | 5,488,706 | 81,877,311 | 5,554,310 | 81,863,300 | 5,707,054 |
| Assumption Change | 6/30/14 | 100% | Up/Down | 2.75% | 15 | 45,534,347 | 3,386,584 | 45,218,642 | 4,299,805 | 43,936,194 | 4,418,049 |
| (Gain)/Loss | 6/30/14 | 100% | Up/Down | 2.75% | 25 | (51,223,251) | (2,719,039) | (51,996,283) | (3,438,352) | (52,079,364) | (3,532,907) |
| (Gain)/Loss | 6/30/15 | 100% | Up/Down | 2.75% | 26 | 30,941,729 | 1,234,835 | 31,830,327 | 1,664,856 | 32,336,309 | 2,138,299 |
| Assumption Change | 6/30/16 | 80% | Up/Down | 2.75% | 17 | 13,520,332 | 499,046 | 13,950,538 | 759,535 | 14,141,407 | 1,040,563 |
| (Gain)/Loss | 6/30/16 | 80% | Up/Down | 2.75% | 27 | 34,165,789 | 922,983 | 35,602,653 | 1,399,137 | 36,647,560 | 1,916,817 |
| Assumption Change | 6/30/17 | 60% | Up/Down | 2.75% | 18 | 13,956,543 | 263,619 | 14,660,811 | 534,613 | 15,134,060 | 823,972 |
| (Gain)/Loss | 6/30/17 | 60% | Up/Down | 2.75% | 28 | (18,300,498) | (254,252) | (19,318,533) | (513,519) | (20,139,642) | (791,461) |
| Method Change | 6/30/18 | 40% | Up/Down | 2.75% | 19 | 4,490,712 | (227,382) | 5,040,268 | 93,974 | 5,295,879 | 193,116 |
| Assumption Change | 6/30/18 | 40% | Up/Down | 2.75% | 19 | 23,700,483 | (638,877) | 26,020,376 | 485,140 | 27,339,970 | 996,963 |

# Schedule of Amortization Bases (continued)

| Reason for Base | Date Est. | Ramp Level 2021-22 | Ramp Shape | Escala-tion Rate | Amort. Period | Balance 6/30/19 | Expected Payment 2019-20 | Balance 6/30/20 | Expected Payment 2020-21 | Balance 6/30/21 | Minimum Required Payment 2021-22 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| (Gain)/Loss | 6/30/18 | 40% | Up/Down | 2.75% | 29 | (5,424,863) | 0 | (5,804,603) | (79,278) | (6,128,919) | (162,917) |
| Non-Investment (Gain)/Loss | 6/30/19 | No Ramp | | 0.00% | 20 | 5,108,870 | 0 | 5,466,491 | 0 | 5,849,145 | 533,753 |
| Investment (Gain)/Loss | 6/30/19 | 20% | Up Only | 0.00% | 20 | 2,223,377 | 0 | 2,379,013 | 0 | 2,545,544 | 55,656 |
| **Total** | | | | | | **294,703,569** | **20,421,001** | **294,209,171** | **23,432,860** | **290,564,674** | **26,358,094** |

# Amortization Schedule and Alternatives

The amortization schedule on the previous page shows the minimum contributions required according to the CalPERS amortization policy. Many agencies have expressed interest in paying off the unfunded accrued liabilities more quickly than required. As such, we have provided alternative amortization schedules to help analyze the current amortization schedule and illustrate the potential savings of accelerating unfunded liability payments.

Shown on the following page are future year amortization payments based on 1) the current amortization schedule reflecting the individual bases and remaining periods shown on the previous page, and 2) alternative "fresh start" amortization schedules using two sample periods that would both result in interest savings relative to the current amortization schedule.

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

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

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

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

# Amortization Schedule and Alternatives

| | | | Alternative Schedules | | | |
|---|---|---|---|---|---|---|
| | Current Amortization Schedule | | 15 Year Amortization | | 10 Year Amortization | |
| **Date** | **Balance** | **Payment** | **Balance** | **Payment** | **Balance** | **Payment** |
| **6/30/2021** | 290,564,674 | 26,358,094 | 290,564,674 | 30,841,252 | 290,564,674 | 39,993,765 |
| **6/30/2022** | 283,639,177 | 28,420,907 | 279,001,762 | 30,841,252 | 269,534,329 | 39,993,766 |
| **6/30/2023** | 274,095,103 | 29,794,053 | 266,629,446 | 30,841,252 | 247,031,859 | 39,993,765 |
| **6/30/2024** | 262,462,552 | 31,206,908 | 253,391,068 | 30,841,252 | 222,954,217 | 39,993,766 |
| **6/30/2025** | 248,554,252 | 29,443,130 | 239,226,004 | 30,841,252 | 197,191,139 | 39,993,765 |
| **6/30/2026** | 235,496,839 | 26,168,906 | 224,069,385 | 30,841,252 | 169,624,647 | 39,993,766 |
| **6/30/2027** | 224,912,293 | 26,866,221 | 207,851,803 | 30,841,252 | 140,128,499 | 39,993,766 |
| **6/30/2028** | 212,865,517 | 27,582,711 | 190,498,990 | 30,841,252 | 108,567,621 | 39,993,766 |
| **6/30/2029** | 199,234,326 | 28,318,904 | 171,931,480 | 30,841,253 | 74,797,481 | 39,993,765 |
| **6/30/2030** | 183,887,428 | 29,075,347 | 152,064,243 | 30,841,252 | 38,663,432 | 39,993,765 |
| **6/30/2031** | 166,683,776 | 26,378,124 | 130,806,301 | 30,841,252 | | |
| **6/30/2032** | 151,065,896 | 25,890,331 | 108,060,303 | 30,841,253 | | |
| **6/30/2033** | 134,859,343 | 23,780,506 | 83,722,084 | 30,841,252 | | |
| **6/30/2034** | 119,700,749 | 22,784,737 | 57,680,191 | 30,841,253 | | |
| **6/30/2035** | 104,511,087 | 21,315,281 | 29,815,364 | 30,841,252 | | |
| **6/30/2036** | 89,778,166 | 18,854,524 | | | | |
| **6/30/2037** | 76,559,367 | 17,606,778 | | | | |
| **6/30/2038** | 63,705,929 | 16,276,755 | | | | |
| **6/30/2039** | 51,328,538 | 15,284,803 | | | | |
| **6/30/2040** | 39,110,812 | 14,686,483 | | | | |
| **6/30/2041** | 26,656,754 | 10,174,005 | | | | |
| **6/30/2042** | 17,998,655 | 9,509,421 | | | | |
| **6/30/2043** | 9,421,939 | 8,211,777 | | | | |
| **6/30/2044** | 1,587,146 | 1,641,757 | | | | |
| **6/30/2045** | | | | | | |
| **6/30/2046** | | | | | | |
| **6/30/2047** | | | | | | |
| **6/30/2048** | | | | | | |
| **6/30/2049** | | | | | | |
| **6/30/2050** | | | | | | |
| **Total** | | **515,630,463** | | **462,618,783** | | **399,937,655** |
| **Interest Paid** | | **225,065,789** | | **172,054,109** | | **109,372,981** |
| **Estimated Savings** | | | | **53,011,680** | | **115,692,808** |

# Reconciliation of Required Employer Contributions

**Normal Cost (% of Payroll)**

| | |
|---|---|
| 1. For Period 7/1/20 – 6/30/21 | |
| a) Employer Normal Cost | 11.487% |
| b) Employee Contribution | 7.344% |
| c) Total Normal Cost | 18.831% |
| | |
| 2. Changes since the prior year annual valuation | |
| a) Effect of demographic experience | (0.621%) |
| b) Effect of plan changes | 0.000% |
| c) Effect of assumption changes | 0.000% |
| d) Effect of method changes | 0.000% |
| e) Net effect of the changes above [sum of (a) through (d)] | (0.621%) |
| | |
| 3. For Period 7/1/21 – 6/30/22 | |
| a) Employer Normal Cost | 10.95% |
| b) Employee Contribution | 7.26% |
| c) Total Normal Cost | 18.21% |
| | |
| Employer Normal Cost Change [(3a) – (1a)] | (0.537%) |
| Employee Contribution Change [(3b) – (1b)] | (0.084%) |

**Unfunded Liability Contribution ($)**

| | |
|---|---|
| 1. For Period 7/1/20 – 6/30/21 | 23,432,860 |
| | |
| 2. Changes since the prior year annual valuation | |
| a) Effect of adjustments to prior year's amortization schedule | 0 |
| b) Effect of investment (gain)/loss during prior year[1] | 55,656 |
| c) Effect of non-investment (gain)/loss during prior year | 533,753 |
| d) Effect of plan changes | 0 |
| e) Effect of assumption changes | 0 |
| f) Changes to prior year amortization payments[2] | 2,335,825 |
| g) Effect of changes due to Fresh Start | 0 |
| h) Effect of elimination of amortization base | 0 |
| i) Effect of method change | 0 |
| j) Net effect of the changes above [sum of (a) through (i)] | 2,925,234 |
| | |
| 3. For Period 7/1/21 – 6/30/22 [(1) + (2j)] | 26,358,094 |

The amounts shown for the period 7/1/20 – 6/30/21 may be different if a prepayment of unfunded actuarial liability is made or a plan change became effective after the prior year's actuarial valuation was performed.

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

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

# Employer Contribution History

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

| Fiscal Year | Employer Normal Cost | Unfunded Rate | Unfunded Liability Payment ($) | Additional Discretionary Payments |
|---|---|---|---|---|
| 2013 - 14 | 10.360% | 14.240% | N/A | N/A |
| 2014 - 15 | 10.283% | 15.839% | N/A | N/A |
| 2015 - 16 | 10.358% | 17.336% | N/A | N/A |
| 2016 - 17 | 10.334% | 18.556% | N/A | N/A |
| 2017 - 18 | 10.039% | N/A | 15,765,273 | N/A |
| 2018 - 19 | 10.217% | N/A | 18,392,618 | 0 |
| 2019 - 20 | 10.716% | N/A | 21,287,260 | |
| 2020 - 21 | 11.487% | N/A | 23,432,860 | |
| 2021 - 22 | 10.95% | N/A | 26,358,094 | |

# Funding History

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

| Valuation Date | Accrued Liability | Market Value of Assets (MVA) | Unfunded Liability | Funded Ratio | Annual Covered Payroll |
|---|---|---|---|---|---|
| 06/30/11 | $552,715,631 | $384,056,704 | $168,658,927 | 69.5% | $60,297,783 |
| 06/30/12 | 576,182,013 | 373,592,926 | 202,589,087 | 64.8% | 62,910,810 |
| 06/30/13 | 602,540,178 | 412,227,784 | 190,312,394 | 68.4% | 64,439,680 |
| 06/30/14 | 666,978,627 | 475,566,994 | 191,411,633 | 71.3% | 67,802,942 |
| 06/30/15 | 696,699,220 | 477,031,099 | 219,668,121 | 68.5% | 71,574,823 |
| 06/30/16 | 730,382,476 | 468,702,245 | 261,680,231 | 64.2% | 75,345,962 |
| 06/30/17 | 772,526,669 | 511,805,893 | 260,720,776 | 66.3% | 78,476,098 |
| 06/30/18 | 831,958,865 | 547,102,617 | 284,856,248 | 65.8% | 80,363,405 |
| 06/30/19 | 868,716,440 | 574,012,871 | 294,703,569 | 66.1% | 78,848,216 |

# Normal Cost by Benefit Group

The table below displays the Total Normal Cost broken out by benefit group for Fiscal Year 2021-22. The Total Normal Cost is the annual cost of service accrual for the fiscal year for active employees and can be viewed as the long-term contribution rate for the benefits contracted. Generally, the normal cost for a benefit group subject to more generous benefit provisions will exceed the normal cost for a group with less generous benefits. However, based on the characteristics of the members (particularly when the number of actives is small), this may not be the case. Future measurements of the Total Normal Cost for each group may differ significantly from the current values due to such factors as: changes in the demographics of the group, changes in economic and demographic assumptions, changes in plan benefits or applicable law.

| Rate Plan Identifier | Benefit Group Name | Total Normal Cost FY 2021-22 | Number of Actives | Payroll on 6/30/2019 |
|---|---|---|---|---|
| 8 | Miscellaneous First Level | 21.63% | 378 | $40,955,320 |
| 26004 | Miscellaneous PEPRA Level | 13.23% | 294 | $25,647,981 |
| 30157 | Miscellaneous Second Level | 17.57% | 101 | $12,244,915 |
| | **Plan Total** | **18.21%** | **773** | **$78,848,216** |

Note that if a Benefit Group above has multiple bargaining units, each of which has separately contracted for different benefits such as Employer Paid Member Contributions, then the Normal Cost split does not reflect those differences. Additionally, if a Second Level Benefit Group amended to the same benefit formula as a First Level Benefit Group, their Normal Costs may be dissimilar due to demographic or other population differences. If you have questions in these situations, please consult with your plan actuary.

# PEPRA Member Contribution Rates

The California Public Employees' Pension Reform Act of 2013 ("PEPRA") established new benefit formulas, final compensation period, and contribution requirements for "new" employees (generally those first hired into a CalPERS-covered position on or after January 1, 2013). In accordance with Government Code Section 7522.30(b), "new members … shall have an initial contribution rate of at least 50 percent of the normal cost rate." The normal cost for the plan is dependent on the benefit levels, actuarial assumptions and demographics of the plan, particularly members' entry age into the plan. Should the total normal cost of the plan change by one percent or more from the base total normal cost established for the plan, the new member rate shall be 50 percent of the new normal cost rounded to the nearest quarter percent.

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

| | | Basis for Current Rate | | Rates Effective July 1, 2021 | | | |
|---|---|---|---|---|---|---|---|
| **Rate Plan Identifier** | **Benefit Group Name** | **Total Normal Cost** | **Member Rate** | **Total Normal Cost** | **Change** | **Change Needed** | **Member Rate** |
| 26004 | Miscellaneous PEPRA Level | 12.500% | 6.25% | 13.23% | 0.730% | No | 6.25% |

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

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

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

# Risk Analysis

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

# Future Investment Return Scenarios

Analysis was performed to determine the effects of various future investment returns on required employer contributions. The projections below provide a range of results based on five investment return scenarios assumed to occur during the next four fiscal years (2019-20, 2020-21, 2021-22 and 2022-23). The projections also assume that all other actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur.

For fiscal years 2019-20, 2020-21, 2021-22, and 2022-23 each scenario assumes an alternate fixed annual return. The fixed return assumptions for the five scenarios are 1.0 percent, 4.0 percent, 7.0 percent, 9.0 percent and 12.0 percent.

These alternate investment returns were chosen based on stochastic analysis of possible future investment returns over the four-year period ending June 30, 2023. Using the expected returns and volatility of the asset classes in which the funds are invested, we produced five thousand stochastic outcomes for this period based on the recently completed Asset Liability Management process. We then selected annual returns that approximate the $5^{th}$, $25^{th}$, $50^{th}$, $75^{th}$, and $95^{th}$ percentiles for these outcomes. For example, of all the four-year outcomes generated in the stochastic analysis, approximately 25 percent had an average annual return of 4.0 percent or less.

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

| **Assumed Annual Return From 2019-20 through 2022-23** | **Projected Employer Contributions** | | | |
|---|---|---|---|---|
| | **2022-23** | **2023-24** | **2024-25** | **2025-26** |
| **1.0%** | | | | |
| Normal Cost | 10.7% | 10.3% | 10.0% | 9.8% |
| UAL Contribution | $29,276,000 | $32,361,000 | $36,345,000 | $38,018,000 |
| **4.0%** | | | | |
| Normal Cost | 10.7% | 10.3% | 10.0% | 9.8% |
| UAL Contribution | $28,849,000 | $31,090,000 | $33,828,000 | $33,861,000 |
| **7.0%** | | | | |
| Normal Cost | 10.7% | 10.3% | 10.0% | 9.8% |
| UAL Contribution | $28,421,000 | $29,794,000 | $31,207,000 | $29,443,000 |
| **9.0%** | | | | |
| Normal Cost | 10.9% | 10.9% | 10.9% | 11.0% |
| UAL Contribution | $28,168,000 | $29,120,000 | $29,919,000 | $27,351,000 |
| **12.0%** | | | | |
| Normal Cost | 10.9% | 10.9% | 10.9% | 11.0% |
| UAL Contribution | $27,743,000 | $27,794,000 | $27,160,000 | $22,560,000 |

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

# Discount Rate Sensitivity

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

**Sensitivity to the Real Rate of Return Assumption**

| As of June 30, 2019 | 1% Lower Real Return Rate | Current Assumptions | 1% Higher Real Return Rate |
|---|---|---|---|
| **Discount Rate** | **6.0%** | **7.0%** | **8.0%** |
| Inflation | 2.5% | 2.5% | 2.5% |
| **Real Rate of Return** | **3.5%** | **4.5%** | **5.5%** |
| a) Total Normal Cost | 22.92% | 18.21% | 14.63% |
| b) Accrued Liability | $979,234,502 | $868,716,440 | $776,926,206 |
| c) Market Value of Assets | $574,012,871 | $574,012,871 | $574,012,871 |
| d) Unfunded Liability/(Surplus) [(b) - (c)] | $405,221,631 | $294,703,569 | $202,913,335 |
| e) Funded Status | 58.6% | 66.1% | 73.9% |

**Sensitivity to the Price Inflation Assumption**

| As of June 30, 2019 | 1% Lower Inflation Rate | Current Assumptions | 1% Higher Inflation Rate |
|---|---|---|---|
| **Discount Rate** | **6.0%** | **7.0%** | **8.0%** |
| **Inflation** | **1.5%** | **2.5%** | **3.5%** |
| Real Rate of Return | 4.5% | 4.5% | 4.5% |
| a) Total Normal Cost | 19.46% | 18.21% | 16.74% |
| b) Accrued Liability | $913,648,119 | $868,716,440 | $808,312,473 |
| c) Market Value of Assets | $574,012,871 | $574,012,871 | $574,012,871 |
| d) Unfunded Liability/(Surplus) [(b) - (c)] | $339,635,248 | $294,703,569 | $234,299,602 |
| e) Funded Status | 62.8% | 66.1% | 71.0% |

# Mortality Rate Sensitivity

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

| As of June 30, 2019 | 10% Lower Mortality Rates | Current Assumptions | 10% Higher Mortality Rates |
|---|---|---|---|
| a) Total Normal Cost | 18.53% | 18.21% | 17.91% |
| b) Accrued Liability | $886,993,297 | $868,716,440 | $851,889,362 |
| c) Market Value of Assets | $574,012,871 | $574,012,871 | $574,012,871 |
| d) Unfunded Liability/(Surplus) [(b) - (c)] | $312,980,426 | $294,703,569 | $277,876,491 |
| e) Funded Status | 64.7% | 66.1% | 67.4% |

# Maturity Measures

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

| Ratio of Retiree Accrued Liability to Total Accrued Liability | June 30, 2018 | June 30, 2019 |
|---|---|---|
| 1. Retiree Accrued Liability | 477,388,721 | 528,810,215 |
| 2. Total Accrued Liability | 831,958,865 | 868,716,440 |
| 3. Ratio of Retiree AL to Total AL [(1) / (2)] | 57% | 61% |

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

| Support Ratio | June 30, 2018 | June 30, 2019 |
|---|---|---|
| 1. Number of Actives | 808 | 773 |
| 2. Number of Retirees | 1,129 | 1,194 |
| 3. Support Ratio [(1) / (2)] | 0.72 | 0.65 |

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

**Asset Volatility Ratio**

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

**Liability Volatility Ratio**

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

# Maturity Measures (continued)

| Contribution Volatility | June 30, 2018 | June 30, 2019 |
|---|---|---|
| 1. Market Value of Assets without Receivables | $545,487,546 | $572,729,533 |
| 2. Payroll | 80,363,405 | 78,848,216 |
| 3. Asset Volatility Ratio (AVR) [(1) / (2)] | 6.8 | 7.3 |
| 4. Accrued Liability | $831,958,865 | $868,716,440 |
| 5. Liability Volatility Ratio (LVR) [(4) / (2)] | 10.4 | 11.0 |

# Maturity Measures History

| Valuation Date | Ratio of Retiree Accrued Liability to Total Accrued Liability | Support Ratio | Asset Volatility Ratio | Liability Volatility Ratio |
|---|---|---|---|---|
| 06/30/17 | 57% | 0.74 | 6.5 | 9.8 |
| 06/30/18 | 57% | 0.72 | 6.8 | 10.4 |
| 06/30/19 | 61% | 0.65 | 7.3 | 11.0 |

# Hypothetical Termination Liability

The hypothetical termination liability is an estimate of the financial position of the plan had the contract with CalPERS been terminated as of June 30, 2019. The plan liability on a termination basis is calculated differently from the plan's ongoing funding liability. For this hypothetical termination liability calculation, both compensation and service are frozen as of the valuation date and no future pay increases or service accruals are assumed. This measure of funded status is not appropriate for assessing the need for future employer contributions in the case of an ongoing plan, that is, for an employer that continues to provide CalPERS retirement benefits to active employees.

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

The effective termination discount rate will depend on actual market rates of return for risk-free securities on the date of termination. As market discount rates are variable the table below shows a range for the hypothetical termination liability based on the lowest and highest interest rates observed during an approximate 19-month period from 12 months before the valuation date to 7 months after.

| Market Value of Assets (MVA) | Hypothetical Termination Liability[1,2] @ 1.75% | Funded Status | Unfunded Termination Liability @ 1.75% | Hypothetical Termination Liability[1,2] @ 3.25% | Funded Status | Unfunded Termination Liability @ 3.25% |
|---|---|---|---|---|---|---|
| $574,012,871 | $1,646,864,487 | 34.9% | $1,072,851,616 | $1,335,479,928 | 43.0% | $761,467,057 |

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

2 The current discount rate assumption used for termination valuations is a weighted average of the 10-year and 30-year U.S. Treasury yields where the weights are based on matching asset and liability durations as of the termination date. The discount rates used in the table are based on 20-year Treasury bonds, rounded to the nearest quarter percentage point, which is a good proxy for most plans. The 20-year Treasury yield was 2.31 percent on June 30, 2019, and was 1.83 percent on January 31, 2020.

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

# Plan's Major Benefit Provisions

# Plan's Major Benefit Options

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

| | **Benefit Group** | | | | | | |
|---|---|---|---|---|---|---|---|
| **Member Category** | Misc | Misc | Misc | Misc | Misc | Misc | Misc |
| **Demographics** | | | | | | | |
| Actives | No | Yes | Yes | No | Yes | No | No |
| Transfers/Separated | Yes | Yes | Yes | No | Yes | No | No |
| Receiving | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **Benefit Provision** | | | | | | | |
| Benefit Formula | 2% @ 55 | 2.7% @ 55 | 2% @ 60 | | 2% @ 62 | | |
| Social Security Coverage | No | No | No | | No | | |
| Full/Modified | Full | Full | Full | | Full | | |
| Employee Contribution Rate | | 8.00% | 7.00% | | 6.25% | | |
| Final Average Compensation Period | One Year | One Year | One Year | | Three Year | | |
| Sick Leave Credit | No | No | No | | No | | |
| Non-Industrial Disability | Standard | Standard | Standard | | Standard | | |
| Industrial Disability | No | No | No | | No | | |
| Pre-Retirement Death Benefits | | | | | | | |
| Optional Settlement 2 | No | No | No | | No | | |
| 1959 Survivor Benefit Level | Level 1 | Level 1 | Level 1 | | Level 1 | | |
| Special | No | No | No | | No | | |
| Alternate (firefighters) | No | No | No | | No | | |
| Post-Retirement Death Benefits | | | | | | | |
| Lump Sum | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| Survivor Allowance (PRSA) | No | No | No | No | No | No | No |
| COLA | 2% | 2% | 2% | 2% | 2% | 2% | 2% |

# Plan's Major Benefit Options

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

| | **Benefit Group** | |
|---|---|---|
| **Member Category** | Misc | |
| **Demographics** | | |
| Actives | No | |
| Transfers/Separated | No | |
| Receiving | Yes | |
| **Benefit Provision** | | |
| Benefit Formula | | |
| Social Security Coverage | | |
| Full/Modified | | |
| Employee Contribution Rate | | |
| Final Average Compensation Period | | |
| Sick Leave Credit | | |
| Non-Industrial Disability | | |
| Industrial Disability | | |
| Pre-Retirement Death Benefits | | |
| Optional Settlement 2 | | |
| 1959 Survivor Benefit Level | | |
| Special | | |
| Alternate (firefighters) | | |
| Post-Retirement Death Benefits | | |
| Lump Sum | $500 | |
| Survivor Allowance (PRSA) | No | |
| COLA | 2% | |

# Appendices

- **Appendix A – Actuarial Methods and Assumptions**
- **Appendix B – Principal Plan Provisions**
- **Appendix C – Participant Data**
- **Appendix D – Glossary of Actuarial Terms**

# Appendix A

# Actuarial Methods and Assumptions

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

# Actuarial Data

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

# Actuarial Methods

**Actuarial Cost Method**

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

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

**Amortization of Unfunded Actuarial Accrued Liability**

The excess of the total actuarial accrued liability over the market value of plan assets is called the unfunded actuarial accrued liability (UAL). Funding requirements are determined by adding the normal cost and a payment toward the UAL. The UAL payment is equal to the sum of individual amortization payments, each representing a different source of UAL for a given measurement period.

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

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

Amortization payments are determined as a level percentage of payroll whereby the payment increases each year at an escalation rate. Gains or losses are amortized over a fixed 30-year period with a 5-year ramp up at the beginning and a 5-year ramp down at the end of the amortization period. All changes in liability due to plan amendments (other than golden handshakes) are amortized over a 20-year period with no ramp. Changes in actuarial assumptions or changes in actuarial methodology are amortized over a 20-year period with a 5-year ramp up at the beginning and a 5-year ramp down at the end of the amortization period. Changes in unfunded accrued liability due to a Golden Handshake will be amortized over a period of five years. Bases established prior to June 30, 2013 may be amortized differently. A summary is provided in the following table:

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

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

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

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

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

Exceptions for Inconsistencies

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

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

It should be noted that the actuary may determine that a fresh start is necessary under other circumstances. In all cases of a fresh start, the period is set by the actuary at what is deemed appropriate; however, the period will not be greater than 20 years.

Exceptions for Plans in Surplus

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

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

Exceptions for Small Amounts

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

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

Exceptions for Inactive Plans:

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

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

Exceptions for Inactive Agencies

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

**Asset Valuation Method**

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

**PEPRA Normal Cost Rate Methodology**

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

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

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

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

# Actuarial Assumptions

In 2017, CalPERS completed its most recent asset liability management study incorporating actuarial assumptions and strategic asset allocation. In December 2017, the CalPERS Board of Administration adopted relatively modest changes to the asset allocation that reduced the expected volatility of returns. The adopted asset allocation was expected to have a long-term blended return that continued to support a discount rate assumption of 7.00 percent. The Board also approved several changes to the demographic assumptions that more closely aligned with actual experience.

On December 21, 2016, the CalPERS Board of Administration lowered the discount rate from 7.50 percent to 7.00 percent using a three-year phase-in beginning with the June 30, 2016 actuarial valuations. The minimum employer contributions for fiscal year 2021-22 determined in this valuation were calculated using a discount rate of 7.00 percent. The decision to reduce the discount rate was primarily based on reduced capital market assumptions provided by external investment consultants and CalPERS investment staff. The specific decision adopted by the Board reflected recommendations from CalPERS staff and additional input from employer and employee stakeholder groups. Based on the investment allocation adopted by the Board and capital market assumptions, the reduced discount rate schedule provides a more realistic assumption for the long-term investment return of the fund.

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

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

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

***Economic Assumptions***

**Discount Rate**

The prescribed discount rate assumption, adopted by the Board on December 21, 2016, is 7.00 percent compounded annually (net of investment and administrative expenses) as of June 30, 2019.

**Termination Liability Discount Rate**

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

The hypothetical termination liabilities in this report are calculated using an observed range of market interest rates. This range is based on the lowest and highest 20-year Treasury bond observed during an approximate 19-month period from 12 months before the valuation date to 7 months after. The 20-year Treasury bond has a similar duration to most plan liabilities and serves as a good proxy for the termination discount rate. The 20-year Treasury yield was 2.31 percent on June 30, 2019.

**Salary Growth**

Annual increases vary by category, entry age, and duration of service. A sample of assumed increases are shown below. Wage inflation assumption in the valuation year (2.75% for 2019) is added to these factors for total salary growth.

**Public Agency Miscellaneous**

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

**Public Agency Fire**

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

**Public Agency Police**

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

**Salary Growth** (continued)

**Public Agency County Peace Officers**

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

**Schools**

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

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

**Overall Payroll Growth**

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

**Inflation**

2.50 percent compounded annually.

**Non-valued Potential Additional Liabilities**

The potential liability loss for a cost-of-living increase exceeding the 2.50 percent inflation assumption and any potential liability loss from future member service purchases are not reflected in the valuation.

***<u>Miscellaneous Loading Factors</u>***

**Credit for Unused Sick Leave**

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

**Conversion of Employer Paid Member Contributions (EPMC)**

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

**Norris Decision (Best Factors)**

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

**Termination Liability**

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

## ***Demographic Assumptions***

**Pre-Retirement Mortality**

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

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

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

**Post-Retirement Mortality**

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

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

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

**Marital Status**

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

| Member Category | Percent Married |
|---|---|
| Miscellaneous Member | 70% |
| Local Police | 85% |
| Local Fire | 90% |
| Other Local Safety | 70% |
| School Police | 85% |
| Local County Peace Officers | 75% |

**Age of Spouse**

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

**Terminated Members**

It is assumed that terminated members refund immediately if non-vested. Terminated members who are vested are assumed to retire at age 59 for Miscellaneous members and age 54 for safety members.

**Termination with Refund**

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

**Public Agency Miscellaneous**

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

**Public Agency Safety**

| Duration of Service | Fire | Police | County Peace Officer |
|---|---|---|---|
| 0 | 0.1298 | 0.1013 | 0.1188 |
| 1 | 0.0674 | 0.0636 | 0.0856 |
| 2 | 0.0320 | 0.0271 | 0.0617 |
| 3 | 0.0237 | 0.0258 | 0.0445 |
| 4 | 0.0087 | 0.0245 | 0.0321 |
| 5 | 0.0052 | 0.0086 | 0.0121 |
| 10 | 0.0005 | 0.0053 | 0.0053 |
| 15 | 0.0004 | 0.0027 | 0.0025 |
| 20 | 0.0003 | 0.0017 | 0.0012 |
| 25 | 0.0002 | 0.0012 | 0.0005 |
| 30 | 0.0002 | 0.0009 | 0.0003 |
| 35 | 0.0001 | 0.0009 | 0.0002 |

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

**Schools**

| Duration of Service | Entry Age 20 | Entry Age 25 | Entry Age 30 | Entry Age 35 | Entry Age 40 | Entry Age 45 |
|---|---|---|---|---|---|---|
| 0 | 0.2107 | 0.2107 | 0.1827 | 0.1546 | 0.1375 | 0.1203 |
| 1 | 0.1807 | 0.1807 | 0.1526 | 0.1246 | 0.1105 | 0.0963 |
| 2 | 0.1526 | 0.1526 | 0.1259 | 0.0992 | 0.0878 | 0.0765 |
| 3 | 0.1266 | 0.1266 | 0.1023 | 0.0780 | 0.0691 | 0.0603 |
| 4 | 0.1026 | 0.1026 | 0.0815 | 0.0605 | 0.0537 | 0.0469 |
| 5 | 0.0808 | 0.0808 | 0.0634 | 0.0461 | 0.0409 | 0.0358 |
| 10 | 0.0202 | 0.0202 | 0.0157 | 0.0112 | 0.0087 | 0.0063 |
| 15 | 0.0107 | 0.0107 | 0.0077 | 0.0048 | 0.0034 | 0.0021 |
| 20 | 0.0056 | 0.0056 | 0.0037 | 0.0017 | 0.0016 | 0.0016 |
| 25 | 0.0026 | 0.0026 | 0.0018 | 0.0009 | 0.0012 | 0.0015 |
| 30 | 0.0013 | 0.0013 | 0.0011 | 0.0009 | 0.0012 | 0.0015 |
| 35 | 0.0008 | 0.0008 | 0.0009 | 0.0009 | 0.0012 | 0.0015 |

**Termination with Vested Benefits**

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

**Public Agency Miscellaneous**

| Duration of Service | Entry Age 20 | Entry Age 25 | Entry Age 30 | Entry Age 35 | Entry Age 40 |
|---|---|---|---|---|---|
| 5 | 0.0422 | 0.0422 | 0.0393 | 0.0364 | 0.0344 |
| 10 | 0.0278 | 0.0278 | 0.0271 | 0.0263 | 0.0215 |
| 15 | 0.0192 | 0.0192 | 0.0174 | 0.0156 | 0.0120 |
| 20 | 0.0139 | 0.0139 | 0.0109 | 0.0079 | 0.0047 |
| 25 | 0.0083 | 0.0083 | 0.0048 | 0.0014 | 0.0007 |
| 30 | 0.0015 | 0.0015 | 0.0007 | 0.0000 | 0.0000 |
| 35 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

**Public Agency Safety**

| Duration of Service | Fire | Police | County Peace Officer |
|---|---|---|---|
| 5 | 0.0094 | 0.0163 | 0.0187 |
| 10 | 0.0064 | 0.0126 | 0.0134 |
| 15 | 0.0048 | 0.0082 | 0.0092 |
| 20 | 0.0038 | 0.0065 | 0.0064 |
| 25 | 0.0026 | 0.0058 | 0.0042 |
| 30 | 0.0014 | 0.0056 | 0.0022 |
| 35 | 0.0000 | 0.0000 | 0.0000 |

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

**Schools**

| Duration of Service | Entry Age 20 | Entry Age 25 | Entry Age 30 | Entry Age 35 | Entry Age 40 |
|---|---|---|---|---|---|
| 5 | 0.0405 | 0.0405 | 0.0346 | 0.0288 | 0.0264 |
| 10 | 0.0324 | 0.0324 | 0.0280 | 0.0235 | 0.0211 |
| 15 | 0.0202 | 0.0202 | 0.0179 | 0.0155 | 0.0126 |
| 20 | 0.0144 | 0.0144 | 0.0114 | 0.0083 | 0.0042 |
| 25 | 0.0091 | 0.0091 | 0.0046 | 0.0000 | 0.0000 |
| 30 | 0.0015 | 0.0015 | 0.0007 | 0.0000 | 0.0000 |
| 35 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

**Non-Industrial (Not Job-Related) Disability**

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

| | Miscellaneous | | Fire | Police | County Peace Officer | Schools | |
|---|---|---|---|---|---|---|---|
| Age | Male | Female | Male and Female | Male and Female | Male and Female | Male | Female |
| 20 | 0.0002 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| 25 | 0.0002 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| 30 | 0.0002 | 0.0002 | 0.0001 | 0.0002 | 0.0001 | 0.0001 | 0.0002 |
| 35 | 0.0004 | 0.0007 | 0.0001 | 0.0003 | 0.0004 | 0.0005 | 0.0004 |
| 40 | 0.0010 | 0.0014 | 0.0001 | 0.0004 | 0.0007 | 0.0012 | 0.0008 |
| 45 | 0.0015 | 0.0019 | 0.0002 | 0.0005 | 0.0013 | 0.0020 | 0.0017 |
| 50 | 0.0016 | 0.0020 | 0.0005 | 0.0008 | 0.0018 | 0.0026 | 0.0022 |
| 55 | 0.0016 | 0.0015 | 0.0007 | 0.0013 | 0.0010 | 0.0025 | 0.0018 |
| 60 | 0.0015 | 0.0011 | 0.0007 | 0.0020 | 0.0006 | 0.0022 | 0.0011 |

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

**Industrial (Job-Related) Disability**

Rates vary by age and category.

| Age | Fire | Police | County Peace Officer |
|---|---|---|---|
| 20 | 0.0001 | 0.0000 | 0.0004 |
| 25 | 0.0002 | 0.0017 | 0.0013 |
| 30 | 0.0006 | 0.0048 | 0.0025 |
| 35 | 0.0012 | 0.0079 | 0.0037 |
| 40 | 0.0023 | 0.0110 | 0.0051 |
| 45 | 0.0040 | 0.0141 | 0.0067 |
| 50 | 0.0208 | 0.0185 | 0.0092 |
| 55 | 0.0307 | 0.0479 | 0.0151 |
| 60 | 0.0438 | 0.0602 | 0.0174 |

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

**Service Retirement**

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

**Public Agency Miscellaneous 1.5% @ 65**

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

**Public Agency Miscellaneous 2% @ 60**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.020 | 0.020 | 0.020 | 0.020 | 0.020 | 0.150 |
| 51 | 0.006 | 0.019 | 0.027 | 0.031 | 0.035 | 0.038 |
| 52 | 0.011 | 0.024 | 0.031 | 0.034 | 0.037 | 0.040 |
| 53 | 0.010 | 0.015 | 0.021 | 0.027 | 0.033 | 0.040 |
| 54 | 0.025 | 0.025 | 0.029 | 0.035 | 0.041 | 0.048 |
| 55 | 0.019 | 0.026 | 0.033 | 0.092 | 0.136 | 0.146 |
| 56 | 0.030 | 0.034 | 0.038 | 0.060 | 0.093 | 0.127 |
| 57 | 0.030 | 0.046 | 0.061 | 0.076 | 0.090 | 0.104 |
| 58 | 0.040 | 0.044 | 0.059 | 0.080 | 0.101 | 0.122 |
| 59 | 0.024 | 0.044 | 0.063 | 0.083 | 0.103 | 0.122 |
| 60 | 0.070 | 0.074 | 0.089 | 0.113 | 0.137 | 0.161 |
| 61 | 0.080 | 0.086 | 0.093 | 0.118 | 0.156 | 0.195 |
| 62 | 0.100 | 0.117 | 0.133 | 0.190 | 0.273 | 0.357 |
| 63 | 0.140 | 0.157 | 0.173 | 0.208 | 0.255 | 0.301 |
| 64 | 0.140 | 0.153 | 0.165 | 0.196 | 0.239 | 0.283 |
| 65 | 0.140 | 0.178 | 0.215 | 0.264 | 0.321 | 0.377 |
| 66 | 0.140 | 0.178 | 0.215 | 0.264 | 0.321 | 0.377 |
| 67 | 0.140 | 0.178 | 0.215 | 0.264 | 0.321 | 0.377 |
| 68 | 0.112 | 0.142 | 0.172 | 0.211 | 0.257 | 0.302 |
| 69 | 0.112 | 0.142 | 0.172 | 0.211 | 0.257 | 0.302 |
| 70 | 0.140 | 0.178 | 0.215 | 0.264 | 0.321 | 0.377 |

**Service Retirement**

**Public Agency Miscellaneous 2% @ 55**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.008 | 0.013 | 0.018 | 0.021 | 0.022 | 0.033 |
| 51 | 0.009 | 0.016 | 0.020 | 0.023 | 0.026 | 0.036 |
| 52 | 0.015 | 0.018 | 0.020 | 0.021 | 0.025 | 0.030 |
| 53 | 0.016 | 0.020 | 0.024 | 0.028 | 0.031 | 0.035 |
| 54 | 0.018 | 0.022 | 0.026 | 0.030 | 0.034 | 0.038 |
| 55 | 0.040 | 0.040 | 0.056 | 0.093 | 0.109 | 0.154 |
| 56 | 0.034 | 0.050 | 0.066 | 0.092 | 0.107 | 0.138 |
| 57 | 0.042 | 0.048 | 0.058 | 0.082 | 0.096 | 0.127 |
| 58 | 0.046 | 0.054 | 0.062 | 0.090 | 0.106 | 0.131 |
| 59 | 0.045 | 0.055 | 0.066 | 0.097 | 0.115 | 0.144 |
| 60 | 0.058 | 0.075 | 0.093 | 0.126 | 0.143 | 0.169 |
| 61 | 0.065 | 0.088 | 0.111 | 0.146 | 0.163 | 0.189 |
| 62 | 0.136 | 0.118 | 0.148 | 0.190 | 0.213 | 0.247 |
| 63 | 0.130 | 0.133 | 0.174 | 0.212 | 0.249 | 0.285 |
| 64 | 0.113 | 0.129 | 0.165 | 0.196 | 0.223 | 0.249 |
| 65 | 0.145 | 0.173 | 0.201 | 0.233 | 0.266 | 0.289 |
| 66 | 0.170 | 0.199 | 0.229 | 0.258 | 0.284 | 0.306 |
| 67 | 0.250 | 0.204 | 0.233 | 0.250 | 0.257 | 0.287 |
| 68 | 0.227 | 0.175 | 0.193 | 0.215 | 0.240 | 0.262 |
| 69 | 0.200 | 0.180 | 0.180 | 0.198 | 0.228 | 0.246 |
| 70 | 0.150 | 0.171 | 0.192 | 0.239 | 0.304 | 0.330 |

**Public Agency Miscellaneous 2.5% @ 55**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.008 | 0.014 | 0.020 | 0.026 | 0.033 | 0.050 |
| 51 | 0.008 | 0.015 | 0.023 | 0.030 | 0.037 | 0.059 |
| 52 | 0.009 | 0.016 | 0.023 | 0.030 | 0.037 | 0.061 |
| 53 | 0.014 | 0.021 | 0.028 | 0.035 | 0.042 | 0.063 |
| 54 | 0.014 | 0.022 | 0.030 | 0.039 | 0.047 | 0.068 |
| 55 | 0.020 | 0.038 | 0.055 | 0.073 | 0.122 | 0.192 |
| 56 | 0.025 | 0.047 | 0.069 | 0.091 | 0.136 | 0.196 |
| 57 | 0.030 | 0.048 | 0.065 | 0.083 | 0.123 | 0.178 |
| 58 | 0.035 | 0.054 | 0.073 | 0.093 | 0.112 | 0.153 |
| 59 | 0.035 | 0.054 | 0.073 | 0.092 | 0.131 | 0.183 |
| 60 | 0.044 | 0.072 | 0.101 | 0.130 | 0.158 | 0.197 |
| 61 | 0.050 | 0.078 | 0.105 | 0.133 | 0.161 | 0.223 |
| 62 | 0.055 | 0.093 | 0.130 | 0.168 | 0.205 | 0.268 |
| 63 | 0.090 | 0.124 | 0.158 | 0.192 | 0.226 | 0.279 |
| 64 | 0.080 | 0.112 | 0.144 | 0.175 | 0.207 | 0.268 |
| 65 | 0.120 | 0.156 | 0.193 | 0.229 | 0.265 | 0.333 |
| 66 | 0.132 | 0.172 | 0.212 | 0.252 | 0.292 | 0.366 |
| 67 | 0.132 | 0.172 | 0.212 | 0.252 | 0.292 | 0.366 |
| 68 | 0.120 | 0.156 | 0.193 | 0.229 | 0.265 | 0.333 |
| 69 | 0.120 | 0.156 | 0.193 | 0.229 | 0.265 | 0.333 |
| 70 | 0.120 | 0.156 | 0.193 | 0.229 | 0.265 | 0.333 |

**Service Retirement**

**Public Agency Miscellaneous 2.7% @ 55**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.003 | 0.010 | 0.016 | 0.034 | 0.033 | 0.045 |
| 51 | 0.009 | 0.016 | 0.023 | 0.042 | 0.038 | 0.047 |
| 52 | 0.015 | 0.019 | 0.024 | 0.040 | 0.036 | 0.046 |
| 53 | 0.012 | 0.020 | 0.028 | 0.047 | 0.046 | 0.060 |
| 54 | 0.020 | 0.027 | 0.035 | 0.054 | 0.056 | 0.073 |
| 55 | 0.033 | 0.055 | 0.078 | 0.113 | 0.156 | 0.234 |
| 56 | 0.039 | 0.067 | 0.095 | 0.135 | 0.169 | 0.227 |
| 57 | 0.050 | 0.067 | 0.084 | 0.113 | 0.142 | 0.198 |
| 58 | 0.043 | 0.066 | 0.089 | 0.124 | 0.151 | 0.201 |
| 59 | 0.050 | 0.070 | 0.090 | 0.122 | 0.158 | 0.224 |
| 60 | 0.060 | 0.086 | 0.112 | 0.150 | 0.182 | 0.238 |
| 61 | 0.071 | 0.094 | 0.117 | 0.153 | 0.184 | 0.241 |
| 62 | 0.091 | 0.122 | 0.152 | 0.194 | 0.226 | 0.279 |
| 63 | 0.143 | 0.161 | 0.179 | 0.209 | 0.222 | 0.250 |
| 64 | 0.116 | 0.147 | 0.178 | 0.221 | 0.254 | 0.308 |
| 65 | 0.140 | 0.174 | 0.208 | 0.254 | 0.306 | 0.389 |
| 66 | 0.170 | 0.209 | 0.247 | 0.298 | 0.310 | 0.324 |
| 67 | 0.170 | 0.199 | 0.228 | 0.269 | 0.296 | 0.342 |
| 68 | 0.150 | 0.181 | 0.212 | 0.255 | 0.287 | 0.339 |
| 69 | 0.150 | 0.181 | 0.212 | 0.255 | 0.287 | 0.339 |
| 70 | 0.150 | 0.181 | 0.212 | 0.243 | 0.291 | 0.350 |

**Public Agency Miscellaneous 3% @ 60**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.013 | 0.019 | 0.026 | 0.042 | 0.038 | 0.064 |
| 51 | 0.035 | 0.037 | 0.039 | 0.052 | 0.047 | 0.062 |
| 52 | 0.023 | 0.030 | 0.038 | 0.055 | 0.051 | 0.056 |
| 53 | 0.025 | 0.032 | 0.040 | 0.057 | 0.056 | 0.066 |
| 54 | 0.035 | 0.042 | 0.050 | 0.067 | 0.066 | 0.076 |
| 55 | 0.040 | 0.052 | 0.064 | 0.085 | 0.095 | 0.120 |
| 56 | 0.043 | 0.056 | 0.070 | 0.094 | 0.102 | 0.150 |
| 57 | 0.045 | 0.060 | 0.074 | 0.099 | 0.109 | 0.131 |
| 58 | 0.053 | 0.056 | 0.059 | 0.099 | 0.126 | 0.185 |
| 59 | 0.050 | 0.068 | 0.085 | 0.113 | 0.144 | 0.202 |
| 60 | 0.089 | 0.106 | 0.123 | 0.180 | 0.226 | 0.316 |
| 61 | 0.100 | 0.117 | 0.133 | 0.212 | 0.230 | 0.298 |
| 62 | 0.130 | 0.155 | 0.180 | 0.248 | 0.282 | 0.335 |
| 63 | 0.120 | 0.163 | 0.206 | 0.270 | 0.268 | 0.352 |
| 64 | 0.150 | 0.150 | 0.150 | 0.215 | 0.277 | 0.300 |
| 65 | 0.200 | 0.242 | 0.283 | 0.330 | 0.300 | 0.342 |
| 66 | 0.220 | 0.264 | 0.308 | 0.352 | 0.379 | 0.394 |
| 67 | 0.250 | 0.279 | 0.309 | 0.338 | 0.371 | 0.406 |
| 68 | 0.170 | 0.196 | 0.223 | 0.249 | 0.290 | 0.340 |
| 69 | 0.220 | 0.261 | 0.302 | 0.344 | 0.378 | 0.408 |
| 70 | 0.220 | 0.255 | 0.291 | 0.326 | 0.358 | 0.388 |

**Service Retirement**

**Public Agency Miscellaneous 2% @ 62**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 51 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 52 | 0.005 | 0.008 | 0.012 | 0.015 | 0.019 | 0.031 |
| 53 | 0.007 | 0.011 | 0.014 | 0.018 | 0.021 | 0.032 |
| 54 | 0.007 | 0.011 | 0.015 | 0.019 | 0.023 | 0.034 |
| 55 | 0.010 | 0.019 | 0.028 | 0.036 | 0.061 | 0.096 |
| 56 | 0.014 | 0.026 | 0.038 | 0.050 | 0.075 | 0.108 |
| 57 | 0.018 | 0.029 | 0.039 | 0.050 | 0.074 | 0.107 |
| 58 | 0.023 | 0.035 | 0.048 | 0.060 | 0.073 | 0.099 |
| 59 | 0.025 | 0.038 | 0.051 | 0.065 | 0.092 | 0.128 |
| 60 | 0.031 | 0.051 | 0.071 | 0.091 | 0.111 | 0.138 |
| 61 | 0.038 | 0.058 | 0.079 | 0.100 | 0.121 | 0.167 |
| 62 | 0.044 | 0.074 | 0.104 | 0.134 | 0.164 | 0.214 |
| 63 | 0.077 | 0.105 | 0.134 | 0.163 | 0.192 | 0.237 |
| 64 | 0.072 | 0.101 | 0.129 | 0.158 | 0.187 | 0.242 |
| 65 | 0.108 | 0.141 | 0.173 | 0.206 | 0.239 | 0.300 |
| 66 | 0.132 | 0.172 | 0.212 | 0.252 | 0.292 | 0.366 |
| 67 | 0.132 | 0.172 | 0.212 | 0.252 | 0.292 | 0.366 |
| 68 | 0.120 | 0.156 | 0.193 | 0.229 | 0.265 | 0.333 |
| 69 | 0.120 | 0.156 | 0.193 | 0.229 | 0.265 | 0.333 |
| 70 | 0.120 | 0.156 | 0.193 | 0.229 | 0.265 | 0.333 |

**Service Retirement**

**Public Agency Fire ½ @ 55 and 2% @ 55**

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

**Public Agency Police ½ @ 55 and 2% @ 55**

| Age | Rate | Age | Rate |
|---|---|---|---|
| 50 | 0.0255 | 56 | 0.0692 |
| 51 | 0.0000 | 57 | 0.0511 |
| 52 | 0.0164 | 58 | 0.0724 |
| 53 | 0.0272 | 59 | 0.0704 |
| 54 | 0.0095 | 60 | 0.3000 |
| 55 | 0.1667 | | |

**Service Retirement**

**Public Agency Police 2% @ 50**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.100 |
| 51 | 0.040 | 0.040 | 0.040 | 0.040 | 0.058 | 0.094 |
| 52 | 0.040 | 0.040 | 0.040 | 0.040 | 0.061 | 0.087 |
| 53 | 0.040 | 0.040 | 0.040 | 0.040 | 0.082 | 0.123 |
| 54 | 0.040 | 0.040 | 0.040 | 0.046 | 0.098 | 0.158 |
| 55 | 0.072 | 0.072 | 0.072 | 0.096 | 0.141 | 0.255 |
| 56 | 0.066 | 0.066 | 0.066 | 0.088 | 0.129 | 0.228 |
| 57 | 0.060 | 0.060 | 0.060 | 0.080 | 0.118 | 0.213 |
| 58 | 0.080 | 0.080 | 0.080 | 0.088 | 0.138 | 0.228 |
| 59 | 0.080 | 0.080 | 0.080 | 0.092 | 0.140 | 0.228 |
| 60 | 0.150 | 0.150 | 0.150 | 0.150 | 0.150 | 0.228 |
| 61 | 0.144 | 0.144 | 0.144 | 0.144 | 0.144 | 0.170 |
| 62 | 0.150 | 0.150 | 0.150 | 0.150 | 0.150 | 0.213 |
| 63 | 0.150 | 0.150 | 0.150 | 0.150 | 0.150 | 0.213 |
| 64 | 0.150 | 0.150 | 0.150 | 0.150 | 0.150 | 0.319 |
| 65 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

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

**Service Retirement**

**Public Agency Fire 2% @ 50**

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

**Service Retirement**

**Public Agency Police 3% @ 55**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.035 | 0.035 | 0.035 | 0.035 | 0.070 | 0.090 |
| 51 | 0.028 | 0.028 | 0.028 | 0.029 | 0.065 | 0.101 |
| 52 | 0.032 | 0.032 | 0.032 | 0.039 | 0.066 | 0.109 |
| 53 | 0.028 | 0.028 | 0.028 | 0.043 | 0.075 | 0.132 |
| 54 | 0.038 | 0.038 | 0.038 | 0.074 | 0.118 | 0.333 |
| 55 | 0.070 | 0.070 | 0.070 | 0.120 | 0.175 | 0.340 |
| 56 | 0.060 | 0.060 | 0.060 | 0.110 | 0.165 | 0.330 |
| 57 | 0.060 | 0.060 | 0.060 | 0.110 | 0.165 | 0.320 |
| 58 | 0.080 | 0.080 | 0.080 | 0.100 | 0.185 | 0.350 |
| 59 | 0.090 | 0.090 | 0.095 | 0.130 | 0.185 | 0.350 |
| 60 | 0.150 | 0.150 | 0.150 | 0.150 | 0.185 | 0.350 |
| 61 | 0.120 | 0.120 | 0.120 | 0.120 | 0.160 | 0.350 |
| 62 | 0.150 | 0.150 | 0.150 | 0.150 | 0.200 | 0.350 |
| 63 | 0.150 | 0.150 | 0.150 | 0.150 | 0.200 | 0.400 |
| 64 | 0.150 | 0.150 | 0.150 | 0.150 | 0.175 | 0.350 |
| 65 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

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

**Service Retirement**

**Public Agency Fire 3% @ 55**

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

**Service Retirement**

**Public Agency Police 3% @ 50**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.050 | 0.050 | 0.050 | 0.100 | 0.155 | 0.400 |
| 51 | 0.040 | 0.040 | 0.040 | 0.090 | 0.140 | 0.380 |
| 52 | 0.040 | 0.040 | 0.040 | 0.070 | 0.115 | 0.350 |
| 53 | 0.040 | 0.040 | 0.040 | 0.080 | 0.135 | 0.350 |
| 54 | 0.040 | 0.040 | 0.040 | 0.090 | 0.145 | 0.350 |
| 55 | 0.070 | 0.070 | 0.070 | 0.120 | 0.175 | 0.340 |
| 56 | 0.060 | 0.060 | 0.060 | 0.110 | 0.165 | 0.330 |
| 57 | 0.060 | 0.060 | 0.060 | 0.110 | 0.165 | 0.320 |
| 58 | 0.080 | 0.080 | 0.080 | 0.100 | 0.185 | 0.350 |
| 59 | 0.090 | 0.090 | 0.095 | 0.130 | 0.185 | 0.350 |
| 60 | 0.150 | 0.150 | 0.150 | 0.150 | 0.185 | 0.350 |
| 61 | 0.120 | 0.120 | 0.120 | 0.120 | 0.160 | 0.350 |
| 62 | 0.150 | 0.150 | 0.150 | 0.150 | 0.200 | 0.350 |
| 63 | 0.150 | 0.150 | 0.150 | 0.150 | 0.200 | 0.400 |
| 64 | 0.150 | 0.150 | 0.150 | 0.150 | 0.175 | 0.350 |
| 65 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

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

**Service Retirement**

**Public Agency Fire 3% @ 50**

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

**Service Retirement**

**Public Agency Police 2% @ 57**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.040 | 0.040 | 0.040 | 0.040 | 0.040 | 0.080 |
| 51 | 0.028 | 0.028 | 0.028 | 0.028 | 0.040 | 0.066 |
| 52 | 0.028 | 0.028 | 0.028 | 0.028 | 0.043 | 0.061 |
| 53 | 0.028 | 0.028 | 0.028 | 0.028 | 0.057 | 0.086 |
| 54 | 0.028 | 0.028 | 0.028 | 0.032 | 0.069 | 0.110 |
| 55 | 0.050 | 0.050 | 0.050 | 0.067 | 0.099 | 0.179 |
| 56 | 0.046 | 0.046 | 0.046 | 0.062 | 0.090 | 0.160 |
| 57 | 0.054 | 0.054 | 0.054 | 0.072 | 0.106 | 0.191 |
| 58 | 0.060 | 0.060 | 0.060 | 0.066 | 0.103 | 0.171 |
| 59 | 0.060 | 0.060 | 0.060 | 0.069 | 0.105 | 0.171 |
| 60 | 0.113 | 0.113 | 0.113 | 0.113 | 0.113 | 0.171 |
| 61 | 0.108 | 0.108 | 0.108 | 0.108 | 0.108 | 0.128 |
| 62 | 0.113 | 0.113 | 0.113 | 0.113 | 0.113 | 0.159 |
| 63 | 0.113 | 0.113 | 0.113 | 0.113 | 0.113 | 0.159 |
| 64 | 0.113 | 0.113 | 0.113 | 0.113 | 0.113 | 0.239 |
| 65 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

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

**Service Retirement**

**Public Agency Fire 2% @ 57**

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

**Service Retirement**

**Public Agency Police 2.5% @ 57**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.100 |
| 51 | 0.038 | 0.038 | 0.038 | 0.038 | 0.055 | 0.089 |
| 52 | 0.038 | 0.038 | 0.038 | 0.038 | 0.058 | 0.082 |
| 53 | 0.036 | 0.036 | 0.036 | 0.036 | 0.073 | 0.111 |
| 54 | 0.036 | 0.036 | 0.036 | 0.041 | 0.088 | 0.142 |
| 55 | 0.061 | 0.061 | 0.061 | 0.082 | 0.120 | 0.217 |
| 56 | 0.056 | 0.056 | 0.056 | 0.075 | 0.110 | 0.194 |
| 57 | 0.060 | 0.060 | 0.060 | 0.080 | 0.118 | 0.213 |
| 58 | 0.072 | 0.072 | 0.072 | 0.079 | 0.124 | 0.205 |
| 59 | 0.072 | 0.072 | 0.072 | 0.083 | 0.126 | 0.205 |
| 60 | 0.135 | 0.135 | 0.135 | 0.135 | 0.135 | 0.205 |
| 61 | 0.130 | 0.130 | 0.130 | 0.130 | 0.130 | 0.153 |
| 62 | 0.135 | 0.135 | 0.135 | 0.135 | 0.135 | 0.191 |
| 63 | 0.135 | 0.135 | 0.135 | 0.135 | 0.135 | 0.191 |
| 64 | 0.135 | 0.135 | 0.135 | 0.135 | 0.135 | 0.287 |
| 65 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

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

**Service Retirement**

**Public Agency Fire 2.5% @ 57**

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

**Service Retirement**

**Public Agency Police 2.7% @ 57**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.0500 | 0.0500 | 0.0500 | 0.0500 | 0.0500 | 0.1000 |
| 51 | 0.0400 | 0.0400 | 0.0400 | 0.0400 | 0.0575 | 0.0942 |
| 52 | 0.0380 | 0.0380 | 0.0380 | 0.0380 | 0.0580 | 0.0825 |
| 53 | 0.0380 | 0.0380 | 0.0380 | 0.0380 | 0.0774 | 0.1169 |
| 54 | 0.0380 | 0.0380 | 0.0380 | 0.0437 | 0.0931 | 0.1497 |
| 55 | 0.0684 | 0.0684 | 0.0684 | 0.0912 | 0.1340 | 0.2423 |
| 56 | 0.0627 | 0.0627 | 0.0627 | 0.0836 | 0.1228 | 0.2168 |
| 57 | 0.0600 | 0.0600 | 0.0600 | 0.0800 | 0.1175 | 0.2125 |
| 58 | 0.0800 | 0.0800 | 0.0800 | 0.0880 | 0.1375 | 0.2275 |
| 59 | 0.0800 | 0.0800 | 0.0800 | 0.0920 | 0.1400 | 0.2275 |
| 60 | 0.1500 | 0.1500 | 0.1500 | 0.1500 | 0.1500 | 0.2275 |
| 61 | 0.1440 | 0.1440 | 0.1440 | 0.1440 | 0.1440 | 0.1700 |
| 62 | 0.1500 | 0.1500 | 0.1500 | 0.1500 | 0.1500 | 0.2125 |
| 63 | 0.1500 | 0.1500 | 0.1500 | 0.1500 | 0.1500 | 0.2125 |
| 64 | 0.1500 | 0.1500 | 0.1500 | 0.1500 | 0.1500 | 0.3188 |
| 65 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |

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

**Service Retirement**

**Public Agency Fire 2.7% @ 57**

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

**Service Retirement**

**Schools 2% @ 55**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.004 | 0.007 | 0.011 | 0.012 | 0.013 | 0.015 |
| 51 | 0.004 | 0.008 | 0.011 | 0.014 | 0.016 | 0.017 |
| 52 | 0.005 | 0.010 | 0.014 | 0.016 | 0.018 | 0.021 |
| 53 | 0.006 | 0.012 | 0.016 | 0.020 | 0.022 | 0.025 |
| 54 | 0.008 | 0.017 | 0.023 | 0.027 | 0.031 | 0.034 |
| 55 | 0.021 | 0.042 | 0.058 | 0.069 | 0.077 | 0.086 |
| 56 | 0.019 | 0.037 | 0.053 | 0.062 | 0.069 | 0.078 |
| 57 | 0.019 | 0.038 | 0.054 | 0.064 | 0.071 | 0.079 |
| 58 | 0.022 | 0.045 | 0.062 | 0.074 | 0.082 | 0.092 |
| 59 | 0.025 | 0.049 | 0.069 | 0.082 | 0.090 | 0.101 |
| 60 | 0.033 | 0.066 | 0.092 | 0.109 | 0.121 | 0.135 |
| 61 | 0.037 | 0.072 | 0.101 | 0.119 | 0.133 | 0.149 |
| 62 | 0.066 | 0.131 | 0.184 | 0.218 | 0.242 | 0.271 |
| 63 | 0.064 | 0.126 | 0.178 | 0.209 | 0.233 | 0.261 |
| 64 | 0.059 | 0.117 | 0.163 | 0.193 | 0.215 | 0.240 |
| 65 | 0.080 | 0.158 | 0.221 | 0.261 | 0.291 | 0.326 |
| 66 | 0.081 | 0.160 | 0.224 | 0.265 | 0.296 | 0.330 |
| 67 | 0.070 | 0.139 | 0.194 | 0.229 | 0.255 | 0.286 |
| 68 | 0.063 | 0.124 | 0.173 | 0.205 | 0.228 | 0.255 |
| 69 | 0.066 | 0.130 | 0.183 | 0.216 | 0.241 | 0.270 |
| 70 | 0.071 | 0.140 | 0.196 | 0.231 | 0.258 | 0.289 |

# Miscellaneous

**Internal Revenue Code Section 415**

The limitations on benefits imposed by Internal Revenue Code Section 415 are taken into account in this valuation. Each year the impact of any changes in this limitation since the prior valuation is included and amortized as part of the actuarial gain or loss base. This results in lower contributions for those employers contributing to the Replacement Benefit Fund and protects CalPERS from prefunding expected benefits in excess of limits imposed by federal tax law. The Section 415(b) dollar limit for the 2019 calendar year is $225,000.

**Internal Revenue Code Section 401(a)(17)**

The limitations on compensation imposed by Internal Revenue Code Section 401(a)(17) are taken into account in this valuation. Each year, the impact of any changes in the compensation limitation since the prior valuation is included and amortized as part of the actuarial gain or loss base. The compensation limit for classic members for the 2019 calendar year is $280,000.

# Appendix B

# Principal Plan Provisions

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

# Service Retirement

### Eligibility

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

### Benefit

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

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

**Miscellaneous Plan Formulas**

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

**Safety Plan Formulas**

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

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

**PEPRA Safety Plan Formulas**

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

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

- The *final compensation* is the monthly average of the member's highest 36 or 12 consecutive months' full-time equivalent monthly pay (no matter which CalPERS employer paid this compensation). The standard benefit is 36 months. Employers had the option of providing a final compensation equal to the highest 12 consecutive months for classic plans only. Final compensation must be defined by the highest 36 consecutive months' pay under the 1.5% at 65 formula. PEPRA members have a cap on the annual salary that can be used to calculate final compensation for all new members based on the Social Security contribution and benefit base. For employees that participate in Social Security this cap is $124,180 for 2019 and for those employees that do not participate in Social Security the cap for 2019 is $149,016. Adjustments to the caps are permitted annually based on changes to the CPI for all urban consumers.

- Employees must be covered by Social Security with the 1.5% at 65 formula. Social Security is optional for all other benefit formulas. For employees covered by Social Security, the modified formula is the standard benefit. Under this type of formula, the final compensation is offset by $133.33 (or by one third if the final compensation is less than $400). Employers may contract for the full benefit with Social Security that will eliminate the offset applicable to the final compensation. For employees not covered by Social Security, the full benefit is paid with no offsets.

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

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

# Vested Deferred Retirement

**Eligibility for Deferred Status**

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

**Eligibility to Start Receiving Benefits**

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

**Benefit**

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

# Non-Industrial (Non-Job Related) Disability Retirement

**Eligibility**

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

**Standard Benefit**

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

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

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

**Improved Benefit**

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

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

# Industrial (Job Related) Disability Retirement

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

**Eligibility**

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

**Standard Benefit**

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

**Increased Benefit (75 percent of Final Compensation)**

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

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

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

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

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

# Post-Retirement Death Benefit

**Standard Lump Sum Payment**

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

**Improved Lump Sum Payment**

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

# Form of Payment for Retirement Allowance

**Standard Form of Payment**

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

**Improved Form of Payment (Post-Retirement Survivor Allowance)**

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

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

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

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

# Pre-Retirement Death Benefits

# Basic Death Benefit

This is a standard benefit.

**Eligibility**

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

**Benefit**

The basic death benefit is a lump sum in the amount of the member's accumulated contributions, where interest is credited annually at the greater of 6 percent or the prevailing discount rate through the date of death, plus a lump sum in the amount of one month's salary for each completed year of current service, up to a maximum of six months' salary. For purposes of this benefit, one month's salary is defined as the member's average monthly full-time rate of compensation during the 12 months preceding death.

# 1957 Survivor Benefit

This is a standard benefit.

**Eligibility**

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

**Benefit**

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

# Optional Settlement 2 Death Benefit

This is an optional benefit.

**Eligibility**

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

**Benefit**

The Optional Settlement 2 Death benefit is a monthly allowance equal to the service retirement benefit that the member would have received had the member retired on the date of his or her death and elected 100 percent to continue to the eligible survivor after the member's death. The allowance is payable as long as the surviving spouse lives, at which time it is continued to any unmarried child(ren) under age 18, if applicable. The total amount paid will be at least equal to the basic death benefit.

# Special Death Benefit

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

**Eligibility**

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

**Benefit**

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

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

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

# Alternate Death Benefit for Local Fire Members

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

**Eligibility**

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

**Benefit**

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

# Cost-of-Living Adjustments (COLA)

**Standard Benefit**

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

**Improved Benefit**

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

# Purchasing Power Protection Allowance (PPPA)

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

# Employee Contributions

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

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

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

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

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

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

# Refund of Employee Contributions

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

# 1959 Survivor Benefit

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

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

# Appendix C

# Participant Data

- **Summary of Valuation Data**
- **Active Members**
- **Transferred and Terminated Members**
- **Retired Members and Beneficiaries**

# Summary of Valuation Data

| | June 30, 2018 | June 30, 2019 |
|---|---|---|
| 1. **Active Members** | | |
| a) Counts | 808 | 773 |
| b) Average Attained Age | 46.16 | 45.50 |
| c) Average Entry Age to Rate Plan | 35.31 | 34.82 |
| d) Average Years of Credited Service | 11.05 | 10.81 |
| e) Average Annual Covered Pay | $99,460 | $102,003 |
| f) Annual Covered Payroll | 80,363,405 | 78,848,216 |
| g) Projected Annual Payroll for Contribution Year | 87,177,382 | 85,533,721 |
| h) Present Value of Future Payroll | 647,044,574 | 655,083,871 |
| 2. **Transferred Members** | | |
| a) Counts | 382 | 388 |
| b) Average Attained Age | 45.77 | 45.97 |
| c) Average Years of Credited Service | 3.44 | 3.34 |
| d) Average Annual Covered Pay | $121,467 | $116,675 |
| 3. **Terminated Members** | | |
| a) Counts | 414 | 438 |
| b) Average Attained Age | 47.71 | 47.25 |
| c) Average Years of Credited Service | 3.15 | 3.05 |
| d) Average Annual Covered Pay | $70,599 | $73,181 |
| 4. **Retired Members and Beneficiaries** | | |
| a) Counts | 1,129 | 1,194 |
| b) Average Attained Age | 70.15 | 70.20 |
| c) Average Annual Benefits | $34,217 | $35,868 |
| 5. **Active to Retired Ratio** [(1a) / (4a)] | 0.72 | 0.65 |

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

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

# Active Members

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

**Distribution of Active Members by Age and Service**

| | Years of Service at Valuation Date | | | | | | |
|---|---|---|---|---|---|---|---|
| Attained Age | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25+ | Total |
| 15-24 | 7 | 0 | 0 | 0 | 0 | 0 | 7 |
| 25-29 | 67 | 6 | 0 | 0 | 0 | 0 | 73 |
| 30-34 | 69 | 22 | 1 | 0 | 0 | 0 | 92 |
| 35-39 | 42 | 27 | 19 | 9 | 1 | 0 | 98 |
| 40-44 | 33 | 23 | 17 | 22 | 9 | 2 | 106 |
| 45-49 | 21 | 20 | 15 | 22 | 12 | 7 | 97 |
| 50-54 | 18 | 21 | 14 | 22 | 17 | 19 | 111 |
| 55-59 | 20 | 11 | 24 | 18 | 16 | 29 | 118 |
| 60-64 | 7 | 7 | 19 | 3 | 7 | 8 | 51 |
| 65 and Over | 1 | 2 | 2 | 4 | 1 | 10 | 20 |
| **All Ages** | **285** | **139** | **111** | **100** | **63** | **75** | **773** |

**Distribution of Average Annual Salaries by Age and Service**

| | Years of Service at Valuation Date | | | | | | |
|---|---|---|---|---|---|---|---|
| Attained Age | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25+ | Average Salary |
| 15-24 | $68,029 | $0 | $0 | $0 | $0 | $0 | $68,029 |
| 25-29 | 74,976 | 99,956 | 0 | 0 | 0 | 0 | 77,029 |
| 30-34 | 90,369 | 96,330 | 115,348 | 0 | 0 | 0 | 92,066 |
| 35-39 | 94,443 | 111,074 | 105,600 | 89,556 | 96,491 | 0 | 100,760 |
| 40-44 | 96,417 | 109,281 | 98,532 | 116,644 | 110,197 | 96,642 | 104,920 |
| 45-49 | 120,609 | 93,970 | 115,489 | 115,030 | 128,532 | 127,946 | 114,569 |
| 50-54 | 102,910 | 119,005 | 95,595 | 107,587 | 106,398 | 128,243 | 110,830 |
| 55-59 | 109,158 | 112,774 | 112,783 | 102,768 | 99,035 | 109,212 | 107,898 |
| 60-64 | 84,605 | 113,122 | 104,438 | 90,311 | 81,525 | 117,905 | 101,044 |
| 65 and Over | 59,314 | 123,066 | 132,125 | 67,756 | 90,625 | 105,097 | 99,116 |
| **Average** | **$91,590** | **$107,111** | **$106,512** | **$106,615** | **$106,115** | **$115,825** | **$102,003** |

# Transferred and Terminated Members

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

| | Years of Service at Valuation Date | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Attained Age** | **0-4** | **5-9** | **10-14** | **15-19** | **20-24** | **25+** | **Total** | **Average Salary** |
| 15-24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $0 |
| 25-29 | 19 | 0 | 0 | 0 | 0 | 0 | 19 | 91,264 |
| 30-34 | 31 | 2 | 0 | 0 | 0 | 0 | 33 | 108,623 |
| 35-39 | 54 | 7 | 5 | 0 | 0 | 0 | 66 | 116,830 |
| 40-44 | 50 | 11 | 4 | 2 | 0 | 0 | 67 | 114,462 |
| 45-49 | 45 | 8 | 1 | 4 | 0 | 0 | 58 | 116,013 |
| 50-54 | 51 | 12 | 2 | 2 | 1 | 0 | 68 | 124,266 |
| 55-59 | 31 | 11 | 4 | 1 | 1 | 0 | 48 | 118,509 |
| 60-64 | 15 | 2 | 3 | 0 | 0 | 0 | 20 | 134,365 |
| 65 and Over | 7 | 2 | 0 | 0 | 0 | 0 | 9 | 113,013 |
| **All Ages** | **303** | **55** | **19** | **9** | **2** | **0** | **388** | **$116,675** |

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

| | Years of Service at Valuation Date | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Attained Age** | **0-4** | **5-9** | **10-14** | **15-19** | **20-24** | **25+** | **Total** | **Average Salary** |
| 15-24 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | $65,791 |
| 25-29 | 22 | 0 | 0 | 0 | 0 | 0 | 22 | 75,085 |
| 30-34 | 40 | 6 | 0 | 0 | 0 | 0 | 46 | 80,846 |
| 35-39 | 48 | 6 | 2 | 0 | 0 | 0 | 56 | 70,444 |
| 40-44 | 64 | 6 | 4 | 0 | 0 | 0 | 74 | 80,284 |
| 45-49 | 42 | 16 | 0 | 2 | 1 | 0 | 61 | 84,337 |
| 50-54 | 47 | 17 | 2 | 3 | 0 | 0 | 69 | 72,408 |
| 55-59 | 41 | 5 | 4 | 1 | 0 | 0 | 51 | 65,666 |
| 60-64 | 24 | 7 | 2 | 1 | 0 | 0 | 34 | 65,501 |
| 65 and Over | 19 | 4 | 1 | 0 | 0 | 0 | 24 | 42,247 |
| **All Ages** | **348** | **67** | **15** | **7** | **1** | **0** | **438** | **$73,181** |

# Retired Members and Beneficiaries

**Distribution of Retirees and Beneficiaries by Age and Retirement Type***

| Attained Age | Service Retirement | Non-Industrial Disability | Industrial Disability | Non-Industrial Death | Industrial Death | Death After Retirement | Total |
|---|---|---|---|---|---|---|---|
| Under 30 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 30-34 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| 35-39 | 0 | 0 | 2 | 0 | 0 | 1 | 3 |
| 40-44 | 0 | 0 | 1 | 0 | 0 | 1 | 2 |
| 45-49 | 0 | 1 | 2 | 0 | 0 | 0 | 3 |
| 50-54 | 21 | 4 | 0 | 1 | 0 | 0 | 26 |
| 55-59 | 116 | 12 | 4 | 0 | 0 | 5 | 137 |
| 60-64 | 178 | 10 | 1 | 0 | 0 | 6 | 195 |
| 65-69 | 210 | 8 | 0 | 0 | 0 | 20 | 238 |
| 70-74 | 201 | 10 | 2 | 0 | 0 | 17 | 230 |
| 75-79 | 146 | 6 | 2 | 0 | 0 | 22 | 176 |
| 80-84 | 71 | 3 | 0 | 0 | 0 | 13 | 87 |
| 85 and Over | 59 | 4 | 0 | 0 | 0 | 31 | 94 |
| **All Ages** | **1,002** | **58** | **14** | **1** | **0** | **119** | **1,194** |

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

| Attained Age | Service Retirement | Non-Industrial Disability | Industrial Disability | Non-Industrial Death | Industrial Death | Death After Retirement | Average |
|---|---|---|---|---|---|---|---|
| Under 30 | $0 | $0 | $0 | $0 | $0 | $13,887 | $13,887 |
| 30-34 | 0 | 0 | 0 | 0 | 0 | 13,083 | 13,083 |
| 35-39 | 0 | 0 | 288 | 0 | 0 | 12,279 | 4,285 |
| 40-44 | 0 | 0 | 243 | 0 | 0 | 108,000 | 54,122 |
| 45-49 | 0 | 9,460 | 280 | 0 | 0 | 0 | 3,340 |
| 50-54 | 16,544 | 14,354 | 0 | 17,209 | 0 | 0 | 16,233 |
| 55-59 | 38,291 | 13,206 | 840 | 0 | 0 | 22,739 | 34,433 |
| 60-64 | 44,226 | 15,470 | 12,194 | 0 | 0 | 14,690 | 41,678 |
| 65-69 | 44,611 | 20,037 | 0 | 0 | 0 | 27,799 | 42,372 |
| 70-74 | 39,833 | 17,818 | 9,862 | 0 | 0 | 19,021 | 37,077 |
| 75-79 | 33,387 | 22,780 | 1,981 | 0 | 0 | 27,935 | 31,987 |
| 80-84 | 34,605 | 16,575 | 0 | 0 | 0 | 24,537 | 32,479 |
| 85 and Over | 27,003 | 20,040 | 0 | 0 | 0 | 20,911 | 24,698 |
| **All Ages** | **$38,883** | **$16,984** | **$2,901** | **$17,209** | **$0** | **$23,725** | **$35,868** |

# Retired Members and Beneficiaries (continued)

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

| Years Retired | Service Retirement | Non-Industrial Disability | Industrial Disability | Non-Industrial Death | Industrial Death | Death After Retirement | Total |
|---|---|---|---|---|---|---|---|
| Under 5 Yrs | 261 | 1 | 1 | 1 | 0 | 37 | 301 |
| 5-9 | 245 | 6 | 6 | 0 | 0 | 29 | 286 |
| 10-14 | 230 | 15 | 3 | 0 | 0 | 24 | 272 |
| 15-19 | 135 | 9 | 2 | 0 | 0 | 12 | 158 |
| 20-24 | 66 | 13 | 2 | 0 | 0 | 8 | 89 |
| 25-29 | 48 | 9 | 0 | 0 | 0 | 8 | 65 |
| 30 and Over | 17 | 5 | 0 | 0 | 0 | 1 | 23 |
| **All Years** | **1,002** | **58** | **14** | **1** | **0** | **119** | **1,194** |

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

| Years Retired | Service Retirement | Non-Industrial Disability | Industrial Disability | Non-Industrial Death | Industrial Death | Death After Retirement | Average |
|---|---|---|---|---|---|---|---|
| Under 5 Yrs | $39,136 | $24,435 | $312 | $17,209 | $0 | $22,542 | $36,846 |
| 5-9 | 44,094 | 11,049 | 276 | 0 | 0 | 31,543 | 41,209 |
| 10-14 | 44,565 | 16,984 | 10,634 | 0 | 0 | 20,865 | 40,578 |
| 15-19 | 34,541 | 19,664 | 1,817 | 0 | 0 | 21,395 | 32,281 |
| 20-24 | 29,504 | 22,252 | 1,557 | 0 | 0 | 15,431 | 26,552 |
| 25-29 | 16,500 | 12,543 | 0 | 0 | 0 | 18,434 | 16,190 |
| 30 and Over | 17,114 | 12,092 | 0 | 0 | 0 | 46,079 | 17,281 |
| **All Years** | **$38,883** | **$16,984** | **$2,901** | **$17,209** | **$0** | **$23,725** | **$35,868** |

* Counts of members do not include alternate payees receiving benefits while the member is still working. Therefore, the total counts may not match information on C-1 of the report. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

# Appendix D

# Glossary of Actuarial Terms

# Glossary of Actuarial Terms

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

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

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

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

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

Generally, in an actuarial valuation, the separate bases consist of changes in unfunded liability due to contract amendments, actuarial assumption changes, method changes, and/or gains and losses.

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

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

**Discount Rate**
The assumed long-term rate of return on plan assets. This is the rate at which projected cash flows are discounted to the valuation date to determine Accrued Liability. This assumption is called "investment return" in earlier CalPERS reports and "actuarial interest rate" in Section 20014 of the California Public Employees' Retirement Law (PERL).

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

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

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

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

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

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

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

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

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

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

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

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

**July 2020**

**Safety Plan of the City of Palo Alto (CalPERS ID: 6373437857)**
**Annual Valuation Report as of June 30, 2019**

Dear Employer,

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

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

## Required Contributions

The table below shows the minimum required employer contributions and the Employee PEPRA Rate for fiscal year 2021-22 along with an estimate of the required contribution for fiscal year 2022-23. Employee contributions other than cost sharing (whether paid by the employer or the employee) are in addition to the results shown below. **The required employer contributions in this report do not reflect any cost sharing arrangement you may have with your employees.**

| Fiscal Year | Employer Normal Cost Rate | Employer Amortization of Unfunded Accrued Liability | Employee PEPRA Rate |
|---|---|---|---|
| 2021-22 | 21.52% | $13,282,515 | 11.75% |
| *Projected Results* | | | |
| *2022-23* | *21.1%* | *$14,545,000* | *TBD* |

The actual investment return for fiscal year 2019-20 was not known at the time this report was prepared. The projections above assume the investment return for that year would be 7.0 percent. ***To the extent the actual investment return for fiscal year 2019-20 differs from 7.0 percent, the actual contribution requirements for fiscal year 2022-23 will differ from those shown above.*** For additional details regarding the assumptions and methods used for these projections please refer to the "Projected Employer Contributions" in the "Highlights and Executive Summary" section. This section also contains projected required contributions through fiscal year 2026-27.

## Changes from Previous Year's Valuations

The CalPERS Board of Administration has adopted a new amortization policy effective with the June 30, 2019 actuarial valuation. The new policy shortens the period over which actuarial gains and losses are amortized from 30 years to 20 years with the payments computed as a level dollar amount. In addition, the new policy does not utilize a 5-year ramp-up and ramp-down on UAL bases attributable to assumption and method changes and non-investment gains/losses. The new policy does not utilize a 5-year ramp-down on investment gains/losses. These changes apply only to new UAL bases established on or after June 30, 2019.

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

**Questions**

We understand that you might have some questions about these results. While we are very interested in discussing these results with your agency, in the interest of allowing us to give every public agency their results, we ask that you wait until after August 1, 2020 to contact us with actuarial questions. If you have other questions, you may call the Customer Contact Center at (888)-CalPERS or (**888-225-7377**).

Sincerely,

SCOTT TERANDO
Chief Actuary

# Actuarial Valuation as of June 30, 2019

# for the Safety Plan of the City of Palo Alto

**(CalPERS ID: 6373437857)**
**(Valuation Rate Plan ID: 5080)**

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

# Table of Contents

# Actuarial Certification

To the best of our knowledge, this report is complete and accurate and contains sufficient information to disclose, fully and fairly, the funded condition of the Safety Plan of the City of Palo Alto. This valuation is based on the member and financial data as of June 30, 2019 provided by the various CalPERS databases and the benefits under this plan with CalPERS as of the date this report was produced. It is our opinion that the valuation has been performed in accordance with generally accepted actuarial principles, in accordance with standards of practice prescribed by the Actuarial Standards Board, and that the assumptions and methods are internally consistent and reasonable for this plan, as prescribed by the CalPERS Board of Administration according to provisions set forth in the California Public Employees' Retirement Law.

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

DAVID CLEMENT, ASA, MAAA, EA
Senior Pension Actuary, CalPERS

# Highlights and Executive Summary

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

# Introduction

This report presents the results of the June 30, 2019 actuarial valuation of the Safety Plan of the City of Palo Alto of the California Public Employees' Retirement System (CalPERS). This actuarial valuation sets the minimum required employer contributions for fiscal year 2021-22.

# Purpose of the Report

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

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

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

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

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

**Assessment and Disclosure of Risk**

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

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

# Required Contributions

| | Fiscal Year |
|---|---|
| **Required Employer Contribution** | **2021-22** |
| **Employer Normal Cost Rate** | **21.52%** |
| ***Plus, Either*** | |
| **1) Monthly Employer Dollar UAL Payment** | **$1,106,876** |
| ***Or*** | |
| **2) Annual UAL Prepayment Option*** | **$12,840,692** |
| **Required PEPRA Member Contribution Rate** | **11.75%** |

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

** Only the UAL portion of the employer contribution can be prepaid **(which must be received in full no later than July 31)**. Any prepayment totaling over $5 million requires a 72-hour notice email to FCSD_public_agency_wires@calpers.ca.gov. Plan Normal Cost contributions will be made as part of the payroll reporting process. If there is contractual cost sharing or other change, this amount will change.*

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

*For additional detail regarding the determination of the required contribution for PEPRA members, see "PEPRA Member Contribution Rates" in the "Liabilities and Contributions" section. Required member contributions for Classic members can be found in Appendix B.*

| | Fiscal Year 2020-21 | Fiscal Year 2021-22 |
|---|---|---|
| **Normal Cost Contribution as a Percentage of Payroll** | | |
| Total Normal Cost | 30.913% | 31.17% |
| Employee Contribution[1] | 9.347% | 9.65% |
| Employer Normal Cost[2] | 21.566% | 21.52% |
| Projected Annual Payroll for Contribution Year | $25,615,376 | $27,649,475 |
| **Estimated Employer Contributions Based On Projected Payroll** | | |
| Total Normal Cost | $7,918,482 | $8,618,341 |
| Employee Contribution[1] | 2,394,269 | 2,668,174 |
| Employer Normal Cost[2] | 5,524,213 | 5,950,167 |
| Unfunded Liability Contribution | 11,210,740 | 13,282,515 |
| % of Projected Payroll (illustrative only) | 43.766% | 48.04% |
| Estimated Total Employer Contribution | $16,734,953 | $19,232,682 |
| % of Projected Payroll (illustrative only) | 65.332% | 69.56% |

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

[2] The Employer Normal Cost is a blended rate for all benefit groups in the plan. For a breakout of normal cost by benefit group, see "Normal Cost by Benefit Group" in the "Liabilities and Contributions" section.

# Additional Discretionary Employer Contributions

The minimum required employer contribution towards the Unfunded Accrued Liability (UAL) for this rate plan for the 2021-22 fiscal year is $13,282,515. CalPERS allows employers to make additional discretionary payments (ADPs) at any time and in any amount. These optional payments serve to reduce the UAL and future required contributions and can result in significant long-term savings. Employers can also use ADPs to stabilize annual contributions as a fixed dollar amount, percent of payroll or percent of revenue.

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

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

## Minimum Required Employer Contribution for Fiscal Year 2021-22

| Estimated Normal Cost | Minimum UAL Payment | ADP | Total UAL Contribution | Estimated Total Contribution |
|---|---|---|---|---|
| $5,950,167 | $13,282,515 | $0 | $13,282,515 | $19,232,682 |

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

| Funding Target | Estimated Normal Cost | Minimum UAL Payment | ADP[1] | Total UAL Contribution | Estimated Total Contribution |
|---|---|---|---|---|---|
| 20 years | $5,950,167 | $13,282,515 | $3,718,751 | $17,001,266 | $22,951,433 |
| 15 years | $5,950,167 | $13,282,515 | $6,492,777 | $19,775,292 | $25,725,459 |
| 10 years | $5,950,167 | $13,282,515 | $12,361,333 | $25,643,848 | $31,594,015 |
| 5 years | $5,950,167 | $13,282,515 | $30,645,042 | $43,927,557 | $49,877,724 |

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

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

## Plan's Funded Status

| | June 30, 2018 | June 30, 2019 |
|---|---|---|
| 1. Present Value of Projected Benefits | $516,421,166 | $540,115,883 |
| 2. Entry Age Normal Accrued Liability | 451,111,924 | 471,338,133 |
| 3. Market Value of Assets (MVA) | 280,399,741 | 289,117,004 |
| 4. Unfunded Accrued Liability (UAL) [(2) – (3)] | $170,712,183 | $182,221,129 |
| 5. Funded Ratio [(3) / (2)] | 62.2% | 61.3% |

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

## Projected Employer Contributions

The table below shows the required and projected employer contributions (before cost sharing) for the next six fiscal years. The projection assumes that all actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur during the projection period. As of the preparation date of this report, the year to date return for the 2019-20 fiscal year was well below the 7 percent assumed return. Actual contribution rates during this projection period could be significantly higher than the projection shown below. The projected normal cost percentages in the projections below reflect that the normal cost will continue to decline over time as new employees are hired into PEPRA or other lower cost benefit tiers.

| | **Required Contribution** | **Projected Future Employer Contributions (Assumes 7.00% Return for Fiscal Year 2019-20)** | | | | |
|---|---|---|---|---|---|---|
| **Fiscal Year** | **2021-22** | **2022-23** | **2023-24** | **2024-25** | **2025-26** | **2026-27** |
| **Normal Cost %** | 21.52% | 21.1% | 20.6% | 20.2% | 19.7% | 19.3% |
| **UAL Payment** | $13,282,515 | $14,545,000 | $15,449,000 | $16,211,000 | $16,670,000 | $17,083,000 |
| *Total as a % of Payroll** | *69.56%* | *72.3%* | *73.5%* | *74.2%* | *73.8%* | *73.2%* |
| *Projected Payroll* | *$27,649,475* | *$28,409,835* | *$29,191,106* | *$29,993,861* | *$30,818,693* | *$31,666,207* |

*Illustrative only and based on the projected payroll shown.

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

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

# Cost

**Actuarial Determination of Pension Plan Cost**

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

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

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

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

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

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

These assumptions reflect CalPERS' best estimate of future experience of the plan and are long term in nature. We recognize that all assumptions will not be realized in any given year. For example, the investment earnings at CalPERS have averaged 5.8 percent over the 20 years ending June 30, 2019, yet individual fiscal year returns have ranged from -23.6 percent to +20.7 percent. In addition, CalPERS reviews all actuarial assumptions by conducting in-depth experience studies every four years, with the most recent experience study completed in 2017.

# Changes since the Prior Year's Valuation

**Benefits**

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

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

**Actuarial Methods and Assumptions**

The CalPERS Board of Administration adopted a new amortization policy effective with this actuarial valuation. The new policy shortens the period over which actuarial gains and losses are amortized from 30 years to 20 years with the payments computed as a level dollar amount. In addition, the new policy does not utilize a 5-year ramp-up and ramp-down on UAL bases attributable to assumption and method changes and non-investment gains/losses. The new policy also does not utilize a 5-year ramp-down on investment gains/losses. These changes will apply only to new UAL bases established on or after June 30, 2019.

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

# Subsequent Events

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

The projected employer contributions on Page 5 are calculated under the assumption that the discount rate remains at 7.0 percent going forward and that the realized rate of return on assets for fiscal year 2019-20 is 7.0 percent.

This actuarial valuation report reflects statutory changes, regulatory changes and CalPERS Board actions through January 2020. Any subsequent changes or actions are not reflected.

# Assets

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

# Reconciliation of the Market Value of Assets

| | | |
|---|---|---|
| 1. | Market Value of Assets as of 6/30/18 including Receivables | $280,399,741 |
| 2. | Change in Receivables for Service Buybacks | (83,869) |
| 3. | Employer Contributions | 12,369,833 |
| 4. | Employee Contributions | 3,193,688 |
| 5. | Benefit Payments to Retirees and Beneficiaries | (24,665,415) |
| 6. | Refunds | (91,807) |
| 7. | Transfers | 0 |
| 8. | Service Credit Purchase (SCP) Payments and Interest | 115,569 |
| 9. | Administrative Expenses | (315,338) |
| 10. | Miscellaneous Adjustments | 653 |
| 11. | Investment Return (Net of Investment Expenses) | 18,193,947 |
| 12. | Market Value of Assets as of 6/30/19 including Receivables | $289,117,004 |

# Asset Allocation

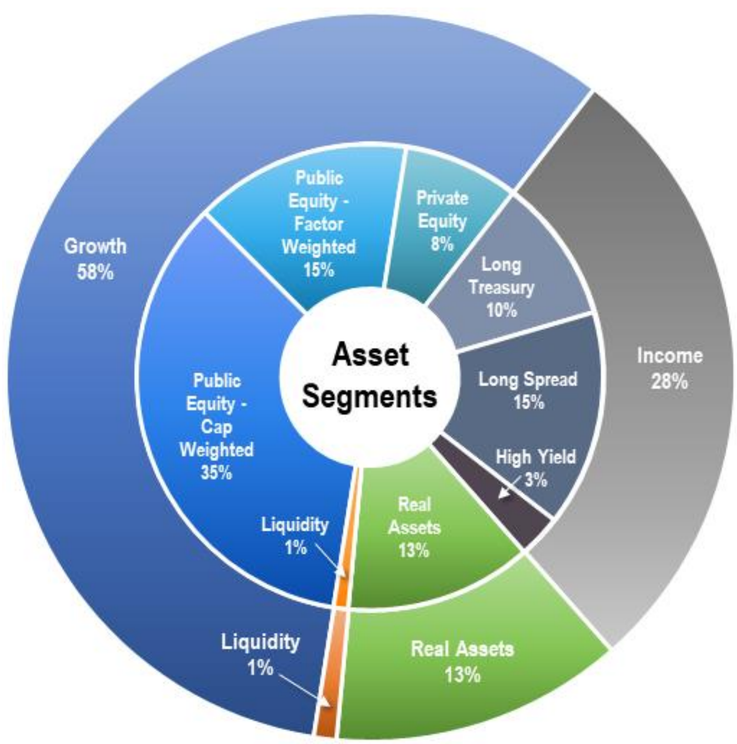
CalPERS adheres to an Asset Allocation Strategy which establishes asset class allocation policy targets and ranges and manages those asset class allocations within their policy ranges. CalPERS Investment Belief No. 6 recognizes that strategic asset allocation is the dominant determinant of portfolio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

The asset allocation shown below reflect the allocation of the Public Employees' Retirement Fund (PERF) in its entirety as of June 30, 2019. The assets for City of Palo Alto Safety Plan are part of the PERF and are invested accordingly.

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

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

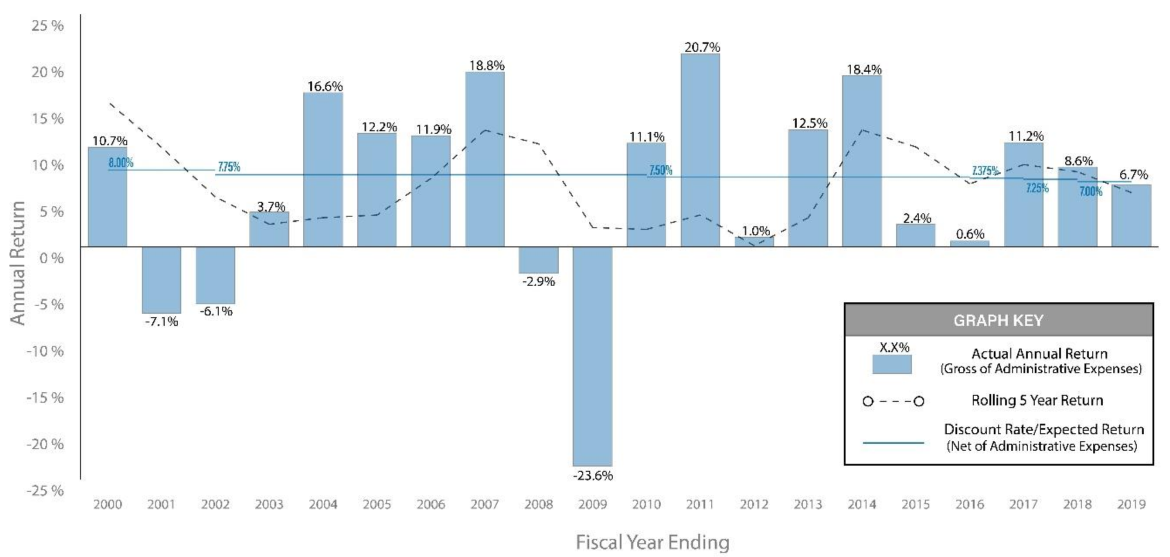
**Strategic Asset Allocation Policy Targets**



# CalPERS History of Investment Returns

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

History of Investment Returns (2000 - 2019)




The table below shows historical compound annual returns of the Public Employees Retirement Fund for various time periods ending on June 30, 2019 (figures are reported as gross of fees). The compound annual return is the average rate per year compounded over the indicated number of years. It should be recognized that in any given year the rate of return is volatile. The portfolio has an expected volatility of 11.4 percent per year based on the most recent Asset Liability Modelling study. The volatility is a measure of the risk of the portfolio expressed in the standard deviation of the fund's total return distribution, expressed as a percentage. Consequently, when looking at investment returns, it is more instructive to look at returns over longer time horizons.

| History of CalPERS Compound Annual Rates of Return and Volatilities | | | | | |
|---|---|---|---|---|---|
| | **1 year** | **5 year** | **10 year** | **20 year** | **30 year** |
| Compound Annual Return | 6.7% | 5.8% | 9.1% | 5.8% | 8.1% |
| Volatility | – | 4.4% | 6.9% | 10.7% | 9.8% |

# Liabilities and Contributions

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

# Development of Accrued and Unfunded Liabilities

| | June 30, 2018 | June 30, 2019 |
|---|---|---|
| 1. Present Value of Projected Benefits | | |
| a) Active Members | $171,136,068 | $190,843,454 |
| b) Transferred Members | 9,367,648 | 10,711,205 |
| c) Terminated Members | 3,140,488 | 3,368,570 |
| d) Members and Beneficiaries Receiving Payments | 332,776,962 | 335,192,654 |
| e) Total | $516,421,166 | $540,115,883 |
| 2. Present Value of Future Employer Normal Costs | $44,061,667 | $45,282,263 |
| 3. Present Value of Future Employee Contributions | $21,247,575 | $23,495,487 |
| 4. Entry Age Normal Accrued Liability | | |
| a) Active Members [(1a) - (2) - (3)] | $105,826,826 | $122,065,704 |
| b) Transferred Members (1b) | 9,367,648 | 10,711,205 |
| c) Terminated Members (1c) | 3,140,488 | 3,368,570 |
| d) Members and Beneficiaries Receiving Payments (1d) | 332,776,962 | 335,192,654 |
| e) Total | $451,111,924 | $471,338,133 |
| 5. Market Value of Assets (MVA) | $280,399,741 | $289,117,004 |
| 6. Unfunded Accrued Liability (UAL) [(4e) - (5)] | $170,712,183 | $182,221,129 |
| 7. Funded Ratio [(5) / (4e)] | 62.2% | 61.3% |

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

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

| | |
|---|---|
| **1. Total (Gain)/Loss for the Year** | |
| a) Unfunded Accrued Liability (UAL) as of 6/30/18 | $170,712,183 |
| b) Expected Payment on the UAL during 2018-19 | 7,787,624 |
| c) Interest through 6/30/19 [.07 x (1a) - $((1.07)^{1/2}$ - 1) x (1b)] | 11,681,898 |
| d) Expected UAL before all other changes [(1a) - (1b) + (1c)] | 174,606,457 |
| e) Change due to plan changes | 0 |
| f) Change due to assumption change | 0 |
| g) Change due to method change | 0 |
| h) Expected UAL after all other changes [(1d) + (1e) + (1f) + (1g)] | 174,606,457 |
| i) Actual UAL as of 6/30/19 | 182,221,129 |
| j) Total (Gain)/Loss for 2018-19 [(1i) - (1h)] | $7,614,672 |
| **2. Contribution (Gain)/Loss for the Year** | |
| a) Expected Contribution (Employer and Employee) | $15,376,789 |
| b) Interest on Expected Contributions | 529,085 |
| c) Actual Contributions | 15,563,521 |
| d) Interest on Actual Contributions | 535,510 |
| e) Expected Contributions with Interest [(2a) + (2b)] | 15,905,874 |
| f) Actual Contributions with Interest [(2c) + (2d)] | 16,099,031 |
| g) Contribution (Gain)/Loss [(2e) - (2f)] | ($193,157) |
| **3. Investment (Gain)/Loss for the Year** | |
| a) Market Value of Assets as of 6/30/18 | $280,399,741 |
| b) Prior Fiscal Year Receivables | (490,763) |
| c) Current Fiscal Year Receivables | 406,894 |
| d) Contributions Received | 15,563,521 |
| e) Benefits and Refunds Paid | (24,757,221) |
| f) Transfers, SCP Payments and Interest, and Miscellaneous Adjustments | 116,223 |
| g) Expected Int. [.07 x (3a + 3b) + $((1.07)^{1/2}$ - 1) x ((3d) + (3e) + (3f))] | 19,281,290 |
| h) Expected Assets as of 6/30/19 [(3a) + (3b) + (3c) + (3d) + (3e) + (3f) + (3g)] | 290,519,685 |
| i) Market Value of Assets as of 6/30/19 | 289,117,004 |
| j) Investment (Gain)/Loss [(3h) - (3i)] | $1,402,680 |
| **4. Liability (Gain)/Loss for the Year** | |
| a) Total (Gain)/Loss (1j) | $7,614,672 |
| b) Contribution (Gain)/Loss (2g) | (193,157) |
| c) Investment (Gain)/Loss (3j) | 1,402,680 |
| d) Liability (Gain)/Loss [(4a) - (4b) - (4c)] | $6,405,149 |
| **5. Non-Investment (Gain)/Loss for the Year** | |
| a) Contribution (Gain)/Loss (2g) | ($193,157) |
| b) Liability (Gain)/Loss (4d) | 6,405,149 |
| c) Non-Investment (Gain)/Loss [(5a) + (5b)] | $6,211,992 |

# Schedule of Amortization Bases

Below is the schedule of the plan's amortization bases. Note that there is a two-year lag between the valuation date and the start of the contribution fiscal year.

- The assets, liabilities, and funded status of the plan are measured as of the valuation date: June 30, 2019.
- The required employer contributions determined by the valuation are for the fiscal year beginning two years after the valuation date: fiscal year 2021-22.

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

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

| Reason for Base | Date Est. | Ramp Level 2021-22 | Ramp Shape | Escala-tion Rate | Amort. Period | Balance 6/30/19 | Expected Payment 2019-20 | Balance 6/30/20 | Expected Payment 2020-21 | Balance 6/30/21 | Minimum Required Payment 2021-22 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Fresh Start | 6/30/04 | No Ramp | | 2.75% | 15 | (904,751) | (75,515) | (889,970) | (76,632) | (872,999) | (78,739) |
| Benefit Change | 6/30/05 | No Ramp | | 2.75% | 5 | 114,143 | 19,116 | 102,359 | 19,482 | 89,372 | 20,018 |
| Assumption Change | 6/30/09 | No Ramp | | 2.75% | 10 | 6,760,500 | 727,891 | 6,480,799 | 740,246 | 6,168,739 | 760,603 |
| Special (Gain)/Loss | 6/30/09 | No Ramp | | 2.75% | 20 | 8,962,167 | 632,560 | 8,935,194 | 640,612 | 8,898,003 | 658,229 |
| Special (Gain)/Loss | 6/30/10 | No Ramp | | 2.75% | 21 | 4,287,015 | 294,570 | 4,282,400 | 298,204 | 4,273,703 | 306,405 |
| Assumption Change | 6/30/11 | No Ramp | | 2.75% | 12 | 5,836,352 | 559,422 | 5,666,226 | 568,423 | 5,474,880 | 584,055 |
| Special (Gain)/Loss | 6/30/11 | No Ramp | | 2.75% | 22 | 2,439,506 | 163,472 | 2,441,175 | 165,425 | 2,440,940 | 169,974 |
| Payment (Gain)/Loss | 6/30/12 | No Ramp | | 2.75% | 23 | 1,580,384 | 103,444 | 1,584,008 | 104,641 | 1,586,647 | 107,518 |
| (Gain)/Loss | 6/30/12 | No Ramp | | 2.75% | 23 | 45,233,036 | 2,960,732 | 45,336,744 | 2,994,983 | 45,412,282 | 3,077,345 |
| (Gain)/Loss | 6/30/13 | 100% | Up/Down | 2.75% | 24 | 45,392,048 | 3,044,761 | 45,419,966 | 3,081,154 | 45,412,193 | 3,165,885 |
| Assumption Change | 6/30/14 | 100% | Up/Down | 2.75% | 15 | 21,778,351 | 1,619,749 | 21,627,354 | 2,056,528 | 21,013,980 | 2,113,082 |
| (Gain)/Loss | 6/30/14 | 100% | Up/Down | 2.75% | 25 | (29,943,623) | (1,589,471) | (30,395,515) | (2,009,961) | (30,444,081) | (2,065,235) |
| (Gain)/Loss | 6/30/15 | 100% | Up/Down | 2.75% | 26 | 16,069,319 | 641,301 | 16,530,804 | 864,629 | 16,793,581 | 1,110,507 |
| Assumption Change | 6/30/16 | 80% | Up/Down | 2.75% | 17 | 7,167,703 | 264,566 | 7,395,773 | 402,662 | 7,496,960 | 551,647 |
| (Gain)/Loss | 6/30/16 | 80% | Up/Down | 2.75% | 27 | 18,279,518 | 493,818 | 19,048,275 | 748,572 | 19,607,325 | 1,025,543 |
| Assumption Change | 6/30/17 | 60% | Up/Down | 2.75% | 18 | 9,195,185 | 173,688 | 9,659,184 | 352,226 | 9,970,981 | 542,869 |
| (Gain)/Loss | 6/30/17 | 60% | Up/Down | 2.75% | 28 | (1,063,234) | (14,772) | (1,122,380) | (29,835) | (1,170,085) | (45,983) |
| Method Change | 6/30/18 | 40% | Up/Down | 2.75% | 19 | 3,087,468 | (21,190) | 3,325,510 | 62,003 | 3,494,159 | 127,416 |
| Assumption Change | 6/30/18 | 40% | Up/Down | 2.75% | 19 | 13,174,875 | (313,118) | 14,421,008 | 268,874 | 15,152,353 | 552,537 |
| (Gain)/Loss | 6/30/18 | 40% | Up/Down | 2.75% | 29 | (2,839,505) | 0 | (3,038,270) | (41,496) | (3,208,025) | (85,275) |

# Schedule of Amortization Bases (continued)

| Reason for Base | Date Est. | Ramp Level 2021-22 | Ramp Shape | Escala-tion Rate | Amort. Period | Balance 6/30/19 | Expected Payment 2019-20 | Balance 6/30/20 | Expected Payment 2020-21 | Balance 6/30/21 | Minimum Required Payment 2021-22 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Non-Investment (Gain)/Loss | 6/30/19 | No Ramp | | 0.00% | 20 | 6,211,992 | 0 | 6,646,831 | 0 | 7,112,109 | 649,002 |
| Investment (Gain)/Loss | 6/30/19 | 20% | Up Only | 0.00% | 20 | 1,402,680 | 0 | 1,500,868 | 0 | 1,605,929 | 35,112 |
| **Total** | | | | | | **182,221,129** | **9,685,024** | **184,958,343** | **11,210,740** | **186,308,946** | **13,282,515** |

# Amortization Schedule and Alternatives

The amortization schedule on the previous page shows the minimum contributions required according to the CalPERS amortization policy. Many agencies have expressed interest in paying off the unfunded accrued liabilities more quickly than required. As such, we have provided alternative amortization schedules to help analyze the current amortization schedule and illustrate the potential savings of accelerating unfunded liability payments.

Shown on the following page are future year amortization payments based on 1) the current amortization schedule reflecting the individual bases and remaining periods shown on the previous page, and 2) alternative "fresh start" amortization schedules using two sample periods that would both result in interest savings relative to the current amortization schedule.

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

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

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

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

# Amortization Schedule and Alternatives

| | Current Amortization Schedule | | Alternative Schedules: 20 Year Amortization | | Alternative Schedules: 15 Year Amortization | |
|---|---|---|---|---|---|---|
| **Date** | **Balance** | **Payment** | **Balance** | **Payment** | **Balance** | **Payment** |
| **6/30/2021** | 186,308,946 | 13,282,515 | 186,308,946 | 17,001,266 | 186,308,946 | 19,775,292 |
| **6/30/2022** | 185,611,031 | 14,544,923 | 181,764,326 | 17,001,266 | 178,894,851 | 19,775,292 |
| **6/30/2023** | 183,558,418 | 15,449,025 | 176,901,583 | 17,001,266 | 170,961,769 | 19,775,292 |
| **6/30/2024** | 180,426,911 | 16,210,793 | 171,698,448 | 17,001,266 | 162,473,372 | 19,775,292 |
| **6/30/2025** | 176,288,219 | 16,669,988 | 166,131,093 | 17,001,266 | 153,390,787 | 19,775,291 |
| **6/30/2026** | 171,384,825 | 17,082,811 | 160,174,023 | 17,001,266 | 143,672,422 | 19,775,292 |
| **6/30/2027** | 165,711,165 | 17,529,913 | 153,799,958 | 17,001,266 | 133,273,770 | 19,775,291 |
| **6/30/2028** | 159,177,862 | 17,989,311 | 146,979,709 | 17,001,267 | 122,147,214 | 19,775,292 |
| **6/30/2029** | 151,712,023 | 18,461,343 | 139,682,041 | 17,001,266 | 110,241,798 | 19,775,291 |
| **6/30/2030** | 143,235,302 | 18,946,354 | 131,873,538 | 17,001,267 | 97,503,004 | 19,775,292 |
| **6/30/2031** | 133,663,512 | 18,447,059 | 123,518,438 | 17,001,266 | 83,872,493 | 19,775,291 |
| **6/30/2032** | 123,938,171 | 18,362,104 | 114,578,482 | 17,001,266 | 69,287,847 | 19,775,291 |
| **6/30/2033** | 113,619,934 | 17,450,363 | 105,012,729 | 17,001,266 | 53,682,276 | 19,775,292 |
| **6/30/2034** | 103,522,531 | 17,110,018 | 94,777,374 | 17,001,267 | 36,984,314 | 19,775,291 |
| **6/30/2035** | 93,070,366 | 16,473,822 | 83,825,543 | 17,001,267 | 19,117,496 | 19,775,292 |
| **6/30/2036** | 82,544,634 | 15,397,886 | 72,107,084 | 17,001,266 | | |
| **6/30/2037** | 72,395,062 | 14,781,725 | 59,568,334 | 17,001,267 | | |
| **6/30/2038** | 62,172,380 | 14,120,650 | 46,151,870 | 17,001,267 | | |
| **6/30/2039** | 51,917,932 | 13,637,395 | 31,796,254 | 17,001,267 | | |
| **6/30/2040** | 41,445,558 | 13,420,498 | 16,435,744 | 17,001,266 | | |
| **6/30/2041** | 30,464,477 | 10,720,553 | | | | |
| **6/30/2042** | 21,507,565 | 10,084,591 | | | | |
| **6/30/2043** | 12,581,511 | 9,249,934 | | | | |
| **6/30/2044** | 3,894,010 | 2,256,558 | | | | |
| **6/30/2045** | 1,832,389 | 1,008,317 | | | | |
| **6/30/2046** | 917,644 | 949,218 | | | | |
| **6/30/2047** | | | | | | |
| **6/30/2048** | | | | | | |
| **6/30/2049** | | | | | | |
| **6/30/2050** | | | | | | |
| **Total** | | **359,637,667** | | **340,025,327** | | **296,629,374** |
| **Interest Paid** | | **173,328,721** | | **153,716,381** | | **110,320,428** |
| **Estimated Savings** | | | | **19,612,340** | | **63,008,293** |

# Reconciliation of Required Employer Contributions

**Normal Cost (% of Payroll)**

| | |
|---|---|
| 1. For Period 7/1/20 – 6/30/21 | |
| a) Employer Normal Cost | 21.566% |
| b) Employee Contribution | 9.347% |
| c) Total Normal Cost | 30.913% |
| | |
| 2. Changes since the prior year annual valuation | |
| a) Effect of demographic experience | 0.257% |
| b) Effect of plan changes | 0.000% |
| c) Effect of assumption changes | 0.000% |
| d) Effect of method changes | 0.000% |
| e) Net effect of the changes above [sum of (a) through (d)] | 0.257% |
| | |
| 3. For Period 7/1/21 – 6/30/22 | |
| a) Employer Normal Cost | 21.52% |
| b) Employee Contribution | 9.65% |
| c) Total Normal Cost | 31.17% |
| | |
| Employer Normal Cost Change [(3a) – (1a)] | (0.046%) |
| Employee Contribution Change [(3b) – (1b)] | 0.303% |

**Unfunded Liability Contribution ($)**

| | |
|---|---|
| 1. For Period 7/1/20 – 6/30/21 | 11,210,740 |
| | |
| 2. Changes since the prior year annual valuation | |
| a) Effect of adjustments to prior year's amortization schedule | 0 |
| b) Effect of investment (gain)/loss during prior year[1] | 35,112 |
| c) Effect of non-investment (gain)/loss during prior year | 649,002 |
| d) Effect of plan changes | 0 |
| e) Effect of assumption changes | 0 |
| f) Changes to prior year amortization payments[2] | 1,387,661 |
| g) Effect of changes due to Fresh Start | 0 |
| h) Effect of elimination of amortization base | 0 |
| i) Effect of method change | 0 |
| j) Net effect of the changes above [sum of (a) through (i)] | 2,071,775 |
| | |
| 3. For Period 7/1/21 – 6/30/22 [(1) + (2j)] | 13,282,515 |

The amounts shown for the period 7/1/20 – 6/30/21 may be different if a prepayment of unfunded actuarial liability is made or a plan change became effective after the prior year's actuarial valuation was performed.

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

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

# Employer Contribution History

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

| Fiscal Year | Employer Normal Cost | Unfunded Rate | Unfunded Liability Payment ($) | Additional Discretionary Payments |
|---|---|---|---|---|
| 2013 - 14 | 18.658% | 14.786% | N/A | N/A |
| 2014 - 15 | 18.874% | 20.654% | N/A | N/A |
| 2015 - 16 | 18.627% | 23.305% | N/A | N/A |
| 2016 - 17 | 18.977% | 26.449% | N/A | N/A |
| 2017 - 18 | 18.900% | N/A | 7,127,885 | N/A |
| 2018 - 19 | 19.397% | N/A | 8,421,191 | 0 |
| 2019 - 20 | 20.194% | N/A | 10,019,332 | |
| 2020 - 21 | 21.566% | N/A | 11,210,740 | |
| 2021 - 22 | 21.52% | N/A | 13,282,515 | |

# Funding History

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

| Valuation Date | Accrued Liability | Market Value of Assets (MVA) | Unfunded Liability | Funded Ratio | Annual Covered Payroll |
|---|---|---|---|---|---|
| 06/30/11 | $313,183,690 | $225,015,089 | $88,168,601 | 71.8% | $22,774,462 |
| 06/30/12 | 327,608,300 | 215,605,457 | 112,002,843 | 65.8% | 20,919,846 |
| 06/30/13 | 338,666,499 | 233,417,363 | 105,249,136 | 68.9% | 21,258,082 |
| 06/30/14 | 367,478,634 | 264,145,000 | 103,333,634 | 71.9% | 21,274,021 |
| 06/30/15 | 377,934,524 | 259,169,591 | 118,764,933 | 68.6% | 21,186,275 |
| 06/30/16 | 392,911,774 | 249,886,581 | 143,025,193 | 63.6% | 21,268,028 |
| 06/30/17 | 422,062,152 | 267,871,162 | 154,190,990 | 63.5% | 23,485,510 |
| 06/30/18 | 451,111,924 | 280,399,741 | 170,712,183 | 62.2% | 23,613,222 |
| 06/30/19 | 471,338,133 | 289,117,004 | 182,221,129 | 61.3% | 25,488,331 |

# Normal Cost by Benefit Group

The table below displays the Total Normal Cost broken out by benefit group for Fiscal Year 2021-22. The Total Normal Cost is the annual cost of service accrual for the fiscal year for active employees and can be viewed as the long-term contribution rate for the benefits contracted. Generally, the normal cost for a benefit group subject to more generous benefit provisions will exceed the normal cost for a group with less generous benefits. However, based on the characteristics of the members (particularly when the number of actives is small), this may not be the case. Future measurements of the Total Normal Cost for each group may differ significantly from the current values due to such factors as: changes in the demographics of the group, changes in economic and demographic assumptions, changes in plan benefits or applicable law.

| Rate Plan Identifier | Benefit Group Name | Total Normal Cost FY 2021-22 | Number of Actives | Payroll on 6/30/2019 |
|---|---|---|---|---|
| 5080 | Safety Police First Level | 35.35% | 47 | $8,350,876 |
| 25006 | Safety Fire PEPRA Level | 19.89% | 24 | $2,766,692 |
| 25007 | Safety Police PEPRA Level | 27.21% | 23 | $3,009,023 |
| 30705 | Safety Fire First Level | 27.62% | 3 | $468,590 |
| 30706 | Safety Fire Second Level | 31.73% | 59 | $8,951,272 |
| 30707 | Safety Fire Third Level | 28.90% | 7 | $979,600 |
| 30708 | Safety Police Second Level | 40.64% | 6 | $962,278 |
| | **Plan Total** | **31.17%** | **169** | **$25,488,331** |

Note that if a Benefit Group above has multiple bargaining units, each of which has separately contracted for different benefits such as Employer Paid Member Contributions, then the Normal Cost split does not reflect those differences. Additionally, if a Second Level Benefit Group amended to the same benefit formula as a First Level Benefit Group, their Normal Costs may be dissimilar due to demographic or other population differences. If you have questions in these situations, please consult with your plan actuary.

# PEPRA Member Contribution Rates

The California Public Employees' Pension Reform Act of 2013 ("PEPRA") established new benefit formulas, final compensation period, and contribution requirements for "new" employees (generally those first hired into a CalPERS-covered position on or after January 1, 2013). In accordance with Government Code Section 7522.30(b), "new members … shall have an initial contribution rate of at least 50 percent of the normal cost rate." The normal cost for the plan is dependent on the benefit levels, actuarial assumptions and demographics of the plan, particularly members' entry age into the plan. Should the total normal cost of the plan change by one percent or more from the base total normal cost established for the plan, the new member rate shall be 50 percent of the new normal cost rounded to the nearest quarter percent.

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

| | | **Basis for Current Rate** | | **Rates Effective July 1, 2021** | | | |
|---|---|---|---|---|---|---|---|
| **Rate Plan Identifier** | **Benefit Group Name** | **Total Normal Cost** | **Member Rate** | **Total Normal Cost** | **Change** | **Change Needed** | **Member Rate** |
| 25006 | Safety Fire PEPRA Level | 23.540% | 11.75% | 23.14% | (0.400%) | No | 11.75% |
| 25007 | Safety Police PEPRA Level | 23.540% | 11.75% | 23.14% | (0.400%) | No | 11.75% |

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

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

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

# Risk Analysis

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

# Future Investment Return Scenarios

Analysis was performed to determine the effects of various future investment returns on required employer contributions. The projections below provide a range of results based on five investment return scenarios assumed to occur during the next four fiscal years (2019-20, 2020-21, 2021-22 and 2022-23). The projections also assume that all other actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur.

For fiscal years 2019-20, 2020-21, 2021-22, and 2022-23 each scenario assumes an alternate fixed annual return. The fixed return assumptions for the five scenarios are 1.0 percent, 4.0 percent, 7.0 percent, 9.0 percent and 12.0 percent.

These alternate investment returns were chosen based on stochastic analysis of possible future investment returns over the four-year period ending June 30, 2023. Using the expected returns and volatility of the asset classes in which the funds are invested, we produced five thousand stochastic outcomes for this period based on the recently completed Asset Liability Management process. We then selected annual returns that approximate the 5th, 25th, 50th, 75th, and 95th percentiles for these outcomes. For example, of all the four-year outcomes generated in the stochastic analysis, approximately 25 percent had an average annual return of 4.0 percent or less.

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

| **Assumed Annual Return From 2019-20 through 2022-23** | **Projected Employer Contributions** | | | |
|---|---|---|---|---|
| | **2022-23** | **2023-24** | **2024-25** | **2025-26** |
| **1.0%** | | | | |
| Normal Cost | 21.1% | 20.6% | 20.2% | 19.7% |
| UAL Contribution | $14,973,000 | $16,727,000 | $18,756,000 | $20,899,000 |
| **4.0%** | | | | |
| Normal Cost | 21.1% | 20.6% | 20.2% | 19.7% |
| UAL Contribution | $14,759,000 | $16,094,000 | $17,509,000 | $18,850,000 |
| **7.0%** | | | | |
| Normal Cost | 21.1% | 20.6% | 20.2% | 19.7% |
| UAL Contribution | $14,545,000 | $15,449,000 | $16,211,000 | $16,670,000 |
| **9.0%** | | | | |
| Normal Cost | 21.5% | 21.5% | 21.5% | 21.6% |
| UAL Contribution | $14,413,000 | $15,109,000 | $15,577,000 | $15,651,000 |
| **12.0%** | | | | |
| Normal Cost | 21.5% | 21.5% | 21.5% | 21.6% |
| UAL Contribution | $14,200,000 | $14,448,000 | $14,209,000 | $13,286,000 |

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

# Discount Rate Sensitivity

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

**Sensitivity to the Real Rate of Return Assumption**

| As of June 30, 2019 | 1% Lower Real Return Rate | Current Assumptions | 1% Higher Real Return Rate |
|---|---|---|---|
| **Discount Rate** | **6.0%** | **7.0%** | **8.0%** |
| Inflation | 2.5% | 2.5% | 2.5% |
| **Real Rate of Return** | **3.5%** | **4.5%** | **5.5%** |
| a) Total Normal Cost | 39.03% | 31.17% | 25.13% |
| b) Accrued Liability | $532,622,475 | $471,338,133 | $420,758,231 |
| c) Market Value of Assets | $289,117,004 | $289,117,004 | $289,117,004 |
| d) Unfunded Liability/(Surplus) [(b) - (c)] | $243,505,471 | $182,221,129 | $131,641,227 |
| e) Funded Status | 54.3% | 61.3% | 68.7% |

**Sensitivity to the Price Inflation Assumption**

| As of June 30, 2019 | 1% Lower Inflation Rate | Current Assumptions | 1% Higher Inflation Rate |
|---|---|---|---|
| **Discount Rate** | **6.0%** | **7.0%** | **8.0%** |
| **Inflation** | **1.5%** | **2.5%** | **3.5%** |
| Real Rate of Return | 4.5% | 4.5% | 4.5% |
| a) Total Normal Cost | 33.34% | 31.17% | 28.69% |
| b) Accrued Liability | $496,836,082 | $471,338,133 | $439,814,495 |
| c) Market Value of Assets | $289,117,004 | $289,117,004 | $289,117,004 |
| d) Unfunded Liability/(Surplus) [(b) - (c)] | $207,719,078 | $182,221,129 | $150,697,491 |
| e) Funded Status | 58.2% | 61.3% | 65.7% |

# Mortality Rate Sensitivity

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

| As of June 30, 2019 | 10% Lower Mortality Rates | Current Assumptions | 10% Higher Mortality Rates |
|---|---|---|---|
| a) Total Normal Cost | 31.63% | 31.17% | 30.73% |
| b) Accrued Liability | $480,063,834 | $471,338,133 | $463,284,960 |
| c) Market Value of Assets | $289,117,004 | $289,117,004 | $289,117,004 |
| d) Unfunded Liability/(Surplus) [(b) - (c)] | $190,946,830 | $182,221,129 | $174,167,956 |
| e) Funded Status | 60.2% | 61.3% | 62.4% |

# Maturity Measures

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

| Ratio of Retiree Accrued Liability to Total Accrued Liability | June 30, 2018 | June 30, 2019 |
|---|---|---|
| 1. Retiree Accrued Liability | 332,776,962 | 335,192,654 |
| 2. Total Accrued Liability | 451,111,924 | 471,338,133 |
| 3. Ratio of Retiree AL to Total AL [(1) / (2)] | 74% | 71% |

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

| Support Ratio | June 30, 2018 | June 30, 2019 |
|---|---|---|
| 1. Number of Actives | 167 | 169 |
| 2. Number of Retirees | 430 | 430 |
| 3. Support Ratio [(1) / (2)] | 0.39 | 0.39 |

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

**Asset Volatility Ratio**

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

**Liability Volatility Ratio**

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

# Maturity Measures (continued)

| Contribution Volatility | June 30, 2018 | June 30, 2019 |
|---|---|---|
| 1. Market Value of Assets without Receivables | $279,908,979 | $288,710,111 |
| 2. Payroll | 23,613,222 | 25,488,331 |
| 3. Asset Volatility Ratio (AVR) [(1) / (2)] | 11.9 | 11.3 |
| 4. Accrued Liability | $451,111,924 | $471,338,133 |
| 5. Liability Volatility Ratio (LVR) [(4) / (2)] | 19.1 | 18.5 |

# Maturity Measures History

| Valuation Date | Ratio of Retiree Accrued Liability to Total Accrued Liability | Support Ratio | Asset Volatility Ratio | Liability Volatility Ratio |
|---|---|---|---|---|
| 06/30/17 | 72% | 0.40 | 11.4 | 18.0 |
| 06/30/18 | 74% | 0.39 | 11.9 | 19.1 |
| 06/30/19 | 71% | 0.39 | 11.3 | 18.5 |

# Hypothetical Termination Liability

The hypothetical termination liability is an estimate of the financial position of the plan had the contract with CalPERS been terminated as of June 30, 2019. The plan liability on a termination basis is calculated differently from the plan's ongoing funding liability. For this hypothetical termination liability calculation, both compensation and service are frozen as of the valuation date and no future pay increases or service accruals are assumed. This measure of funded status is not appropriate for assessing the need for future employer contributions in the case of an ongoing plan, that is, for an employer that continues to provide CalPERS retirement benefits to active employees.

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

The effective termination discount rate will depend on actual market rates of return for risk-free securities on the date of termination. As market discount rates are variable the table below shows a range for the hypothetical termination liability based on the lowest and highest interest rates observed during an approximate 19-month period from 12 months before the valuation date to 7 months after.

| Market Value of Assets (MVA) | Hypothetical Termination Liability[1,2] @ 1.75% | Funded Status | Unfunded Termination Liability @ 1.75% | Hypothetical Termination Liability[1,2] @ 3.25% | Funded Status | Unfunded Termination Liability @ 3.25% |
|---|---|---|---|---|---|---|
| $289,117,004 | $949,176,678 | 30.5% | $660,059,674 | $762,164,356 | 37.9% | $473,047,352 |

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

[2] The current discount rate assumption used for termination valuations is a weighted average of the 10-year and 30-year U.S. Treasury yields where the weights are based on matching asset and liability durations as of the termination date. The discount rates used in the table are based on 20-year Treasury bonds, rounded to the nearest quarter percentage point, which is a good proxy for most plans. The 20-year Treasury yield was 2.31 percent on June 30, 2019, and was 1.83 percent on January 31, 2020.

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

# Plan’s Major Benefit Provisions

# Plan's Major Benefit Options

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

| | Benefit Group | | | | | | |
|---|---|---|---|---|---|---|---|
| **Member Category** | Police | Fire | Fire | Police | Fire | Fire | Police |
| **Demographics** | | | | | | | |
| Actives | Yes | Yes | Yes | Yes | No | Yes | Yes |
| Transfers/Separated | Yes | Yes | Yes | Yes | No | Yes | Yes |
| Receiving | Yes | Yes | Yes | No | Yes | No | No |
| **Benefit Provision** | | | | | | | |
| Benefit Formula | 3% @ 50 | 3% @ 50 | 3% @ 50 | 2.7% @ 57 | | 3% @ 55 | 3% @ 55 |
| Social Security Coverage | No | No | No | No | | No | No |
| Full/Modified | Full | Full | Full | Full | | Full | Full |
| Employee Contribution Rate | 9.00% | 9.00% | 9.00% | 11.75% | | 9.00% | 9.00% |
| Final Average Compensation Period | One Year | One Year | One Year | Three Year | | Three Year | Three Year |
| Sick Leave Credit | No | No | No | No | | No | No |
| Non-Industrial Disability | Standard | Standard | Standard | Standard | | Standard | Standard |
| Industrial Disability | Standard | Standard | Standard | Standard | | Standard | Standard |
| Pre-Retirement Death Benefits | | | | | | | |
| Optional Settlement 2 | No | Yes | Yes | No | | Yes | No |
| 1959 Survivor Benefit Level | Level 1 | Level 1 | Level 1 | Level 1 | | Level 1 | Level 1 |
| Special | Yes | Yes | Yes | Yes | | Yes | Yes |
| Alternate (firefighters) | No | No | No | No | | No | No |
| Post-Retirement Death Benefits | | | | | | | |
| Lump Sum | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| Survivor Allowance (PRSA) | No | No | No | No | No | No | No |
| COLA | 2% | 2% | 2% | 2% | 2% | 2% | 2% |

# Plan's Major Benefit Options

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

| | Benefit Group | | | | | | |
|---|---|---|---|---|---|---|---|
| **Member Category** | Police | Fire | Fire | Fire | Fire | Fire | Police |
| **Demographics** | | | | | | | |
| Actives | No | Yes | No | No | No | No | No |
| Transfers/Separated | No | Yes | No | No | No | No | No |
| Receiving | Yes | No | Yes | Yes | Yes | Yes | Yes |
| **Benefit Provision** | | | | | | | |
| Benefit Formula | | 2.7% @ 57 | | | | | |
| Social Security Coverage | | No | | | | | |
| Full/Modified | | Full | | | | | |
| Employee Contribution Rate | | 11.75% | | | | | |
| Final Average Compensation Period | | Three Year | | | | | |
| Sick Leave Credit | | No | | | | | |
| Non-Industrial Disability | | Standard | | | | | |
| Industrial Disability | | Standard | | | | | |
| Pre-Retirement Death Benefits | | | | | | | |
| Optional Settlement 2 | | Yes | | | | | |
| 1959 Survivor Benefit Level | | Level 1 | | | | | |
| Special | | Yes | | | | | |
| Alternate (firefighters) | | No | | | | | |
| Post-Retirement Death Benefits | | | | | | | |
| Lump Sum | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| Survivor Allowance (PRSA) | No | No | No | No | No | No | No |
| COLA | 2% | 2% | 2% | 2% | 2% | 2% | 2% |

# Plan's Major Benefit Options

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

| | Benefit Group | | | |
|---|---|---|---|---|
| **Member Category** | Police | Police | Police | |
| **Demographics** | | | | |
| Actives | No | No | No | |
| Transfers/Separated | No | No | No | |
| Receiving | Yes | Yes | Yes | |
| **Benefit Provision** | | | | |
| Benefit Formula | | | | |
| Social Security Coverage | | | | |
| Full/Modified | | | | |
| Employee Contribution Rate | | | | |
| Final Average Compensation Period | | | | |
| Sick Leave Credit | | | | |
| Non-Industrial Disability | | | | |
| Industrial Disability | | | | |
| Pre-Retirement Death Benefits | | | | |
| Optional Settlement 2 | | | | |
| 1959 Survivor Benefit Level | | | | |
| Special | | | | |
| Alternate (firefighters) | | | | |
| Post-Retirement Death Benefits | | | | |
| Lump Sum | $500 | $500 | $500 | |
| Survivor Allowance (PRSA) | No | No | No | |
| COLA | 2% | 2% | 2% | |

# Appendices

- **Appendix A – Actuarial Methods and Assumptions**
- **Appendix B – Principal Plan Provisions**
- **Appendix C – Participant Data**
- **Appendix D – Glossary of Actuarial Terms**

# Appendix A

# Actuarial Methods and Assumptions

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

# Actuarial Data

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

# Actuarial Methods

**Actuarial Cost Method**

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

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

**Amortization of Unfunded Actuarial Accrued Liability**

The excess of the total actuarial accrued liability over the market value of plan assets is called the unfunded actuarial accrued liability (UAL). Funding requirements are determined by adding the normal cost and a payment toward the UAL. The UAL payment is equal to the sum of individual amortization payments, each representing a different source of UAL for a given measurement period.

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

<u>Prior Policy (Bases Established prior to June 30, 2019)</u>

Amortization payments are determined as a level percentage of payroll whereby the payment increases each year at an escalation rate. Gains or losses are amortized over a fixed 30-year period with a 5-year ramp up at the beginning and a 5-year ramp down at the end of the amortization period. All changes in liability due to plan amendments (other than golden handshakes) are amortized over a 20-year period with no ramp. Changes in actuarial assumptions or changes in actuarial methodology are amortized over a 20-year period with a 5-year ramp up at the beginning and a 5-year ramp down at the end of the amortization period. Changes in unfunded accrued liability due to a Golden Handshake will be amortized over a period of five years. Bases established prior to June 30, 2013 may be amortized differently. A summary is provided in the following table:

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

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

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

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

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

Exceptions for Inconsistencies

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

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

It should be noted that the actuary may determine that a fresh start is necessary under other circumstances. In all cases of a fresh start, the period is set by the actuary at what is deemed appropriate; however, the period will not be greater than 20 years.

Exceptions for Plans in Surplus

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

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

Exceptions for Small Amounts

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

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

Exceptions for Inactive Plans:

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

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

Exceptions for Inactive Agencies

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

**Asset Valuation Method**

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

**PEPRA Normal Cost Rate Methodology**

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

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

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

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

# Actuarial Assumptions

In 2017, CalPERS completed its most recent asset liability management study incorporating actuarial assumptions and strategic asset allocation. In December 2017, the CalPERS Board of Administration adopted relatively modest changes to the asset allocation that reduced the expected volatility of returns. The adopted asset allocation was expected to have a long-term blended return that continued to support a discount rate assumption of 7.00 percent. The Board also approved several changes to the demographic assumptions that more closely aligned with actual experience.

On December 21, 2016, the CalPERS Board of Administration lowered the discount rate from 7.50 percent to 7.00 percent using a three-year phase-in beginning with the June 30, 2016 actuarial valuations. The minimum employer contributions for fiscal year 2021-22 determined in this valuation were calculated using a discount rate of 7.00 percent. The decision to reduce the discount rate was primarily based on reduced capital market assumptions provided by external investment consultants and CalPERS investment staff. The specific decision adopted by the Board reflected recommendations from CalPERS staff and additional input from employer and employee stakeholder groups. Based on the investment allocation adopted by the Board and capital market assumptions, the reduced discount rate schedule provides a more realistic assumption for the long-term investment return of the fund.

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

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

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

***Economic Assumptions***

**Discount Rate**

The prescribed discount rate assumption, adopted by the Board on December 21, 2016, is 7.00 percent compounded annually (net of investment and administrative expenses) as of June 30, 2019.

**Termination Liability Discount Rate**

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

The hypothetical termination liabilities in this report are calculated using an observed range of market interest rates. This range is based on the lowest and highest 20-year Treasury bond observed during an approximate 19-month period from 12 months before the valuation date to 7 months after. The 20-year Treasury bond has a similar duration to most plan liabilities and serves as a good proxy for the termination discount rate. The 20-year Treasury yield was 2.31 percent on June 30, 2019.

**Salary Growth**

Annual increases vary by category, entry age, and duration of service. A sample of assumed increases are shown below. Wage inflation assumption in the valuation year (2.75% for 2019) is added to these factors for total salary growth.

**Public Agency Miscellaneous**

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

**Public Agency Fire**

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

**Public Agency Police**

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

**Salary Growth** (continued)

**Public Agency County Peace Officers**

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

**Schools**

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

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

**Overall Payroll Growth**

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

**Inflation**

2.50 percent compounded annually.

**Non-valued Potential Additional Liabilities**

The potential liability loss for a cost-of-living increase exceeding the 2.50 percent inflation assumption and any potential liability loss from future member service purchases are not reflected in the valuation.

***Miscellaneous Loading Factors***

**Credit for Unused Sick Leave**

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

**Conversion of Employer Paid Member Contributions (EPMC)**

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

**Norris Decision (Best Factors)**

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

**Termination Liability**

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

***Demographic Assumptions***

**Pre-Retirement Mortality**

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

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

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

**Post-Retirement Mortality**

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

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

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

**Marital Status**

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

| Member Category | Percent Married |
|---|---|
| Miscellaneous Member | 70% |
| Local Police | 85% |
| Local Fire | 90% |
| Other Local Safety | 70% |
| School Police | 85% |
| Local County Peace Officers | 75% |

**Age of Spouse**

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

**Terminated Members**

It is assumed that terminated members refund immediately if non-vested. Terminated members who are vested are assumed to retire at age 59 for Miscellaneous members and age 54 for safety members.

**Termination with Refund**

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

**Public Agency Miscellaneous**

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

**Public Agency Safety**

| Duration of Service | Fire | Police | County Peace Officer |
|---|---|---|---|
| 0 | 0.1298 | 0.1013 | 0.1188 |
| 1 | 0.0674 | 0.0636 | 0.0856 |
| 2 | 0.0320 | 0.0271 | 0.0617 |
| 3 | 0.0237 | 0.0258 | 0.0445 |
| 4 | 0.0087 | 0.0245 | 0.0321 |
| 5 | 0.0052 | 0.0086 | 0.0121 |
| 10 | 0.0005 | 0.0053 | 0.0053 |
| 15 | 0.0004 | 0.0027 | 0.0025 |
| 20 | 0.0003 | 0.0017 | 0.0012 |
| 25 | 0.0002 | 0.0012 | 0.0005 |
| 30 | 0.0002 | 0.0009 | 0.0003 |
| 35 | 0.0001 | 0.0009 | 0.0002 |

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

**Schools**

| Duration of Service | Entry Age 20 | Entry Age 25 | Entry Age 30 | Entry Age 35 | Entry Age 40 | Entry Age 45 |
|---|---|---|---|---|---|---|
| 0 | 0.2107 | 0.2107 | 0.1827 | 0.1546 | 0.1375 | 0.1203 |
| 1 | 0.1807 | 0.1807 | 0.1526 | 0.1246 | 0.1105 | 0.0963 |
| 2 | 0.1526 | 0.1526 | 0.1259 | 0.0992 | 0.0878 | 0.0765 |
| 3 | 0.1266 | 0.1266 | 0.1023 | 0.0780 | 0.0691 | 0.0603 |
| 4 | 0.1026 | 0.1026 | 0.0815 | 0.0605 | 0.0537 | 0.0469 |
| 5 | 0.0808 | 0.0808 | 0.0634 | 0.0461 | 0.0409 | 0.0358 |
| 10 | 0.0202 | 0.0202 | 0.0157 | 0.0112 | 0.0087 | 0.0063 |
| 15 | 0.0107 | 0.0107 | 0.0077 | 0.0048 | 0.0034 | 0.0021 |
| 20 | 0.0056 | 0.0056 | 0.0037 | 0.0017 | 0.0016 | 0.0016 |
| 25 | 0.0026 | 0.0026 | 0.0018 | 0.0009 | 0.0012 | 0.0015 |
| 30 | 0.0013 | 0.0013 | 0.0011 | 0.0009 | 0.0012 | 0.0015 |
| 35 | 0.0008 | 0.0008 | 0.0009 | 0.0009 | 0.0012 | 0.0015 |

**Termination with Vested Benefits**

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

**Public Agency Miscellaneous**

| Duration of Service | Entry Age 20 | Entry Age 25 | Entry Age 30 | Entry Age 35 | Entry Age 40 |
|---|---|---|---|---|---|
| 5 | 0.0422 | 0.0422 | 0.0393 | 0.0364 | 0.0344 |
| 10 | 0.0278 | 0.0278 | 0.0271 | 0.0263 | 0.0215 |
| 15 | 0.0192 | 0.0192 | 0.0174 | 0.0156 | 0.0120 |
| 20 | 0.0139 | 0.0139 | 0.0109 | 0.0079 | 0.0047 |
| 25 | 0.0083 | 0.0083 | 0.0048 | 0.0014 | 0.0007 |
| 30 | 0.0015 | 0.0015 | 0.0007 | 0.0000 | 0.0000 |
| 35 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

**Public Agency Safety**

| Duration of Service | Fire | Police | County Peace Officer |
|---|---|---|---|
| 5 | 0.0094 | 0.0163 | 0.0187 |
| 10 | 0.0064 | 0.0126 | 0.0134 |
| 15 | 0.0048 | 0.0082 | 0.0092 |
| 20 | 0.0038 | 0.0065 | 0.0064 |
| 25 | 0.0026 | 0.0058 | 0.0042 |
| 30 | 0.0014 | 0.0056 | 0.0022 |
| 35 | 0.0000 | 0.0000 | 0.0000 |

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

**Schools**

| Duration of Service | Entry Age 20 | Entry Age 25 | Entry Age 30 | Entry Age 35 | Entry Age 40 |
|---|---|---|---|---|---|
| 5 | 0.0405 | 0.0405 | 0.0346 | 0.0288 | 0.0264 |
| 10 | 0.0324 | 0.0324 | 0.0280 | 0.0235 | 0.0211 |
| 15 | 0.0202 | 0.0202 | 0.0179 | 0.0155 | 0.0126 |
| 20 | 0.0144 | 0.0144 | 0.0114 | 0.0083 | 0.0042 |
| 25 | 0.0091 | 0.0091 | 0.0046 | 0.0000 | 0.0000 |
| 30 | 0.0015 | 0.0015 | 0.0007 | 0.0000 | 0.0000 |
| 35 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

**Non-Industrial (Not Job-Related) Disability**

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

| | Miscellaneous | | Fire | Police | County Peace Officer | Schools | |
|---|---|---|---|---|---|---|---|
| Age | Male | Female | Male and Female | Male and Female | Male and Female | Male | Female |
| 20 | 0.0002 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| 25 | 0.0002 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| 30 | 0.0002 | 0.0002 | 0.0001 | 0.0002 | 0.0001 | 0.0001 | 0.0002 |
| 35 | 0.0004 | 0.0007 | 0.0001 | 0.0003 | 0.0004 | 0.0005 | 0.0004 |
| 40 | 0.0010 | 0.0014 | 0.0001 | 0.0004 | 0.0007 | 0.0012 | 0.0008 |
| 45 | 0.0015 | 0.0019 | 0.0002 | 0.0005 | 0.0013 | 0.0020 | 0.0017 |
| 50 | 0.0016 | 0.0020 | 0.0005 | 0.0008 | 0.0018 | 0.0026 | 0.0022 |
| 55 | 0.0016 | 0.0015 | 0.0007 | 0.0013 | 0.0010 | 0.0025 | 0.0018 |
| 60 | 0.0015 | 0.0011 | 0.0007 | 0.0020 | 0.0006 | 0.0022 | 0.0011 |

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

**Industrial (Job-Related) Disability**

Rates vary by age and category.

| Age | Fire | Police | County Peace Officer |
|---|---|---|---|
| 20 | 0.0001 | 0.0000 | 0.0004 |
| 25 | 0.0002 | 0.0017 | 0.0013 |
| 30 | 0.0006 | 0.0048 | 0.0025 |
| 35 | 0.0012 | 0.0079 | 0.0037 |
| 40 | 0.0023 | 0.0110 | 0.0051 |
| 45 | 0.0040 | 0.0141 | 0.0067 |
| 50 | 0.0208 | 0.0185 | 0.0092 |
| 55 | 0.0307 | 0.0479 | 0.0151 |
| 60 | 0.0438 | 0.0602 | 0.0174 |

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

**Service Retirement**

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

**Public Agency Miscellaneous 1.5% @ 65**

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

**Public Agency Miscellaneous 2% @ 60**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.020 | 0.020 | 0.020 | 0.020 | 0.020 | 0.150 |
| 51 | 0.006 | 0.019 | 0.027 | 0.031 | 0.035 | 0.038 |
| 52 | 0.011 | 0.024 | 0.031 | 0.034 | 0.037 | 0.040 |
| 53 | 0.010 | 0.015 | 0.021 | 0.027 | 0.033 | 0.040 |
| 54 | 0.025 | 0.025 | 0.029 | 0.035 | 0.041 | 0.048 |
| 55 | 0.019 | 0.026 | 0.033 | 0.092 | 0.136 | 0.146 |
| 56 | 0.030 | 0.034 | 0.038 | 0.060 | 0.093 | 0.127 |
| 57 | 0.030 | 0.046 | 0.061 | 0.076 | 0.090 | 0.104 |
| 58 | 0.040 | 0.044 | 0.059 | 0.080 | 0.101 | 0.122 |
| 59 | 0.024 | 0.044 | 0.063 | 0.083 | 0.103 | 0.122 |
| 60 | 0.070 | 0.074 | 0.089 | 0.113 | 0.137 | 0.161 |
| 61 | 0.080 | 0.086 | 0.093 | 0.118 | 0.156 | 0.195 |
| 62 | 0.100 | 0.117 | 0.133 | 0.190 | 0.273 | 0.357 |
| 63 | 0.140 | 0.157 | 0.173 | 0.208 | 0.255 | 0.301 |
| 64 | 0.140 | 0.153 | 0.165 | 0.196 | 0.239 | 0.283 |
| 65 | 0.140 | 0.178 | 0.215 | 0.264 | 0.321 | 0.377 |
| 66 | 0.140 | 0.178 | 0.215 | 0.264 | 0.321 | 0.377 |
| 67 | 0.140 | 0.178 | 0.215 | 0.264 | 0.321 | 0.377 |
| 68 | 0.112 | 0.142 | 0.172 | 0.211 | 0.257 | 0.302 |
| 69 | 0.112 | 0.142 | 0.172 | 0.211 | 0.257 | 0.302 |
| 70 | 0.140 | 0.178 | 0.215 | 0.264 | 0.321 | 0.377 |

**Service Retirement**

**Public Agency Miscellaneous 2% @ 55**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.008 | 0.013 | 0.018 | 0.021 | 0.022 | 0.033 |
| 51 | 0.009 | 0.016 | 0.020 | 0.023 | 0.026 | 0.036 |
| 52 | 0.015 | 0.018 | 0.020 | 0.021 | 0.025 | 0.030 |
| 53 | 0.016 | 0.020 | 0.024 | 0.028 | 0.031 | 0.035 |
| 54 | 0.018 | 0.022 | 0.026 | 0.030 | 0.034 | 0.038 |
| 55 | 0.040 | 0.040 | 0.056 | 0.093 | 0.109 | 0.154 |
| 56 | 0.034 | 0.050 | 0.066 | 0.092 | 0.107 | 0.138 |
| 57 | 0.042 | 0.048 | 0.058 | 0.082 | 0.096 | 0.127 |
| 58 | 0.046 | 0.054 | 0.062 | 0.090 | 0.106 | 0.131 |
| 59 | 0.045 | 0.055 | 0.066 | 0.097 | 0.115 | 0.144 |
| 60 | 0.058 | 0.075 | 0.093 | 0.126 | 0.143 | 0.169 |
| 61 | 0.065 | 0.088 | 0.111 | 0.146 | 0.163 | 0.189 |
| 62 | 0.136 | 0.118 | 0.148 | 0.190 | 0.213 | 0.247 |
| 63 | 0.130 | 0.133 | 0.174 | 0.212 | 0.249 | 0.285 |
| 64 | 0.113 | 0.129 | 0.165 | 0.196 | 0.223 | 0.249 |
| 65 | 0.145 | 0.173 | 0.201 | 0.233 | 0.266 | 0.289 |
| 66 | 0.170 | 0.199 | 0.229 | 0.258 | 0.284 | 0.306 |
| 67 | 0.250 | 0.204 | 0.233 | 0.250 | 0.257 | 0.287 |
| 68 | 0.227 | 0.175 | 0.193 | 0.215 | 0.240 | 0.262 |
| 69 | 0.200 | 0.180 | 0.180 | 0.198 | 0.228 | 0.246 |
| 70 | 0.150 | 0.171 | 0.192 | 0.239 | 0.304 | 0.330 |

**Public Agency Miscellaneous 2.5% @ 55**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.008 | 0.014 | 0.020 | 0.026 | 0.033 | 0.050 |
| 51 | 0.008 | 0.015 | 0.023 | 0.030 | 0.037 | 0.059 |
| 52 | 0.009 | 0.016 | 0.023 | 0.030 | 0.037 | 0.061 |
| 53 | 0.014 | 0.021 | 0.028 | 0.035 | 0.042 | 0.063 |
| 54 | 0.014 | 0.022 | 0.030 | 0.039 | 0.047 | 0.068 |
| 55 | 0.020 | 0.038 | 0.055 | 0.073 | 0.122 | 0.192 |
| 56 | 0.025 | 0.047 | 0.069 | 0.091 | 0.136 | 0.196 |
| 57 | 0.030 | 0.048 | 0.065 | 0.083 | 0.123 | 0.178 |
| 58 | 0.035 | 0.054 | 0.073 | 0.093 | 0.112 | 0.153 |
| 59 | 0.035 | 0.054 | 0.073 | 0.092 | 0.131 | 0.183 |
| 60 | 0.044 | 0.072 | 0.101 | 0.130 | 0.158 | 0.197 |
| 61 | 0.050 | 0.078 | 0.105 | 0.133 | 0.161 | 0.223 |
| 62 | 0.055 | 0.093 | 0.130 | 0.168 | 0.205 | 0.268 |
| 63 | 0.090 | 0.124 | 0.158 | 0.192 | 0.226 | 0.279 |
| 64 | 0.080 | 0.112 | 0.144 | 0.175 | 0.207 | 0.268 |
| 65 | 0.120 | 0.156 | 0.193 | 0.229 | 0.265 | 0.333 |
| 66 | 0.132 | 0.172 | 0.212 | 0.252 | 0.292 | 0.366 |
| 67 | 0.132 | 0.172 | 0.212 | 0.252 | 0.292 | 0.366 |
| 68 | 0.120 | 0.156 | 0.193 | 0.229 | 0.265 | 0.333 |
| 69 | 0.120 | 0.156 | 0.193 | 0.229 | 0.265 | 0.333 |
| 70 | 0.120 | 0.156 | 0.193 | 0.229 | 0.265 | 0.333 |

**Service Retirement**

**Public Agency Miscellaneous 2.7% @ 55**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.003 | 0.010 | 0.016 | 0.034 | 0.033 | 0.045 |
| 51 | 0.009 | 0.016 | 0.023 | 0.042 | 0.038 | 0.047 |
| 52 | 0.015 | 0.019 | 0.024 | 0.040 | 0.036 | 0.046 |
| 53 | 0.012 | 0.020 | 0.028 | 0.047 | 0.046 | 0.060 |
| 54 | 0.020 | 0.027 | 0.035 | 0.054 | 0.056 | 0.073 |
| 55 | 0.033 | 0.055 | 0.078 | 0.113 | 0.156 | 0.234 |
| 56 | 0.039 | 0.067 | 0.095 | 0.135 | 0.169 | 0.227 |
| 57 | 0.050 | 0.067 | 0.084 | 0.113 | 0.142 | 0.198 |
| 58 | 0.043 | 0.066 | 0.089 | 0.124 | 0.151 | 0.201 |
| 59 | 0.050 | 0.070 | 0.090 | 0.122 | 0.158 | 0.224 |
| 60 | 0.060 | 0.086 | 0.112 | 0.150 | 0.182 | 0.238 |
| 61 | 0.071 | 0.094 | 0.117 | 0.153 | 0.184 | 0.241 |
| 62 | 0.091 | 0.122 | 0.152 | 0.194 | 0.226 | 0.279 |
| 63 | 0.143 | 0.161 | 0.179 | 0.209 | 0.222 | 0.250 |
| 64 | 0.116 | 0.147 | 0.178 | 0.221 | 0.254 | 0.308 |
| 65 | 0.140 | 0.174 | 0.208 | 0.254 | 0.306 | 0.389 |
| 66 | 0.170 | 0.209 | 0.247 | 0.298 | 0.310 | 0.324 |
| 67 | 0.170 | 0.199 | 0.228 | 0.269 | 0.296 | 0.342 |
| 68 | 0.150 | 0.181 | 0.212 | 0.255 | 0.287 | 0.339 |
| 69 | 0.150 | 0.181 | 0.212 | 0.255 | 0.287 | 0.339 |
| 70 | 0.150 | 0.181 | 0.212 | 0.243 | 0.291 | 0.350 |

**Public Agency Miscellaneous 3% @ 60**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.013 | 0.019 | 0.026 | 0.042 | 0.038 | 0.064 |
| 51 | 0.035 | 0.037 | 0.039 | 0.052 | 0.047 | 0.062 |
| 52 | 0.023 | 0.030 | 0.038 | 0.055 | 0.051 | 0.056 |
| 53 | 0.025 | 0.032 | 0.040 | 0.057 | 0.056 | 0.066 |
| 54 | 0.035 | 0.042 | 0.050 | 0.067 | 0.066 | 0.076 |
| 55 | 0.040 | 0.052 | 0.064 | 0.085 | 0.095 | 0.120 |
| 56 | 0.043 | 0.056 | 0.070 | 0.094 | 0.102 | 0.150 |
| 57 | 0.045 | 0.060 | 0.074 | 0.099 | 0.109 | 0.131 |
| 58 | 0.053 | 0.056 | 0.059 | 0.099 | 0.126 | 0.185 |
| 59 | 0.050 | 0.068 | 0.085 | 0.113 | 0.144 | 0.202 |
| 60 | 0.089 | 0.106 | 0.123 | 0.180 | 0.226 | 0.316 |
| 61 | 0.100 | 0.117 | 0.133 | 0.212 | 0.230 | 0.298 |
| 62 | 0.130 | 0.155 | 0.180 | 0.248 | 0.282 | 0.335 |
| 63 | 0.120 | 0.163 | 0.206 | 0.270 | 0.268 | 0.352 |
| 64 | 0.150 | 0.150 | 0.150 | 0.215 | 0.277 | 0.300 |
| 65 | 0.200 | 0.242 | 0.283 | 0.330 | 0.300 | 0.342 |
| 66 | 0.220 | 0.264 | 0.308 | 0.352 | 0.379 | 0.394 |
| 67 | 0.250 | 0.279 | 0.309 | 0.338 | 0.371 | 0.406 |
| 68 | 0.170 | 0.196 | 0.223 | 0.249 | 0.290 | 0.340 |
| 69 | 0.220 | 0.261 | 0.302 | 0.344 | 0.378 | 0.408 |
| 70 | 0.220 | 0.255 | 0.291 | 0.326 | 0.358 | 0.388 |

**Service Retirement**

**Public Agency Miscellaneous 2% @ 62**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 51 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 52 | 0.005 | 0.008 | 0.012 | 0.015 | 0.019 | 0.031 |
| 53 | 0.007 | 0.011 | 0.014 | 0.018 | 0.021 | 0.032 |
| 54 | 0.007 | 0.011 | 0.015 | 0.019 | 0.023 | 0.034 |
| 55 | 0.010 | 0.019 | 0.028 | 0.036 | 0.061 | 0.096 |
| 56 | 0.014 | 0.026 | 0.038 | 0.050 | 0.075 | 0.108 |
| 57 | 0.018 | 0.029 | 0.039 | 0.050 | 0.074 | 0.107 |
| 58 | 0.023 | 0.035 | 0.048 | 0.060 | 0.073 | 0.099 |
| 59 | 0.025 | 0.038 | 0.051 | 0.065 | 0.092 | 0.128 |
| 60 | 0.031 | 0.051 | 0.071 | 0.091 | 0.111 | 0.138 |
| 61 | 0.038 | 0.058 | 0.079 | 0.100 | 0.121 | 0.167 |
| 62 | 0.044 | 0.074 | 0.104 | 0.134 | 0.164 | 0.214 |
| 63 | 0.077 | 0.105 | 0.134 | 0.163 | 0.192 | 0.237 |
| 64 | 0.072 | 0.101 | 0.129 | 0.158 | 0.187 | 0.242 |
| 65 | 0.108 | 0.141 | 0.173 | 0.206 | 0.239 | 0.300 |
| 66 | 0.132 | 0.172 | 0.212 | 0.252 | 0.292 | 0.366 |
| 67 | 0.132 | 0.172 | 0.212 | 0.252 | 0.292 | 0.366 |
| 68 | 0.120 | 0.156 | 0.193 | 0.229 | 0.265 | 0.333 |
| 69 | 0.120 | 0.156 | 0.193 | 0.229 | 0.265 | 0.333 |
| 70 | 0.120 | 0.156 | 0.193 | 0.229 | 0.265 | 0.333 |

**Service Retirement**

**Public Agency Fire ½ @ 55 and 2% @ 55**

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

**Public Agency Police ½ @ 55 and 2% @ 55**

| Age | Rate | Age | Rate |
|---|---|---|---|
| 50 | 0.0255 | 56 | 0.0692 |
| 51 | 0.0000 | 57 | 0.0511 |
| 52 | 0.0164 | 58 | 0.0724 |
| 53 | 0.0272 | 59 | 0.0704 |
| 54 | 0.0095 | 60 | 0.3000 |
| 55 | 0.1667 | | |

**Service Retirement**

**Public Agency Police 2% @ 50**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.100 |
| 51 | 0.040 | 0.040 | 0.040 | 0.040 | 0.058 | 0.094 |
| 52 | 0.040 | 0.040 | 0.040 | 0.040 | 0.061 | 0.087 |
| 53 | 0.040 | 0.040 | 0.040 | 0.040 | 0.082 | 0.123 |
| 54 | 0.040 | 0.040 | 0.040 | 0.046 | 0.098 | 0.158 |
| 55 | 0.072 | 0.072 | 0.072 | 0.096 | 0.141 | 0.255 |
| 56 | 0.066 | 0.066 | 0.066 | 0.088 | 0.129 | 0.228 |
| 57 | 0.060 | 0.060 | 0.060 | 0.080 | 0.118 | 0.213 |
| 58 | 0.080 | 0.080 | 0.080 | 0.088 | 0.138 | 0.228 |
| 59 | 0.080 | 0.080 | 0.080 | 0.092 | 0.140 | 0.228 |
| 60 | 0.150 | 0.150 | 0.150 | 0.150 | 0.150 | 0.228 |
| 61 | 0.144 | 0.144 | 0.144 | 0.144 | 0.144 | 0.170 |
| 62 | 0.150 | 0.150 | 0.150 | 0.150 | 0.150 | 0.213 |
| 63 | 0.150 | 0.150 | 0.150 | 0.150 | 0.150 | 0.213 |
| 64 | 0.150 | 0.150 | 0.150 | 0.150 | 0.150 | 0.319 |
| 65 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

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

**Service Retirement**

**Public Agency Fire 2% @ 50**

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

**Service Retirement**

**Public Agency Police 3% @ 55**

| Age | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.035 | 0.035 | 0.035 | 0.035 | 0.070 | 0.090 |
| 51 | 0.028 | 0.028 | 0.028 | 0.029 | 0.065 | 0.101 |
| 52 | 0.032 | 0.032 | 0.032 | 0.039 | 0.066 | 0.109 |
| 53 | 0.028 | 0.028 | 0.028 | 0.043 | 0.075 | 0.132 |
| 54 | 0.038 | 0.038 | 0.038 | 0.074 | 0.118 | 0.333 |
| 55 | 0.070 | 0.070 | 0.070 | 0.120 | 0.175 | 0.340 |
| 56 | 0.060 | 0.060 | 0.060 | 0.110 | 0.165 | 0.330 |
| 57 | 0.060 | 0.060 | 0.060 | 0.110 | 0.165 | 0.320 |
| 58 | 0.080 | 0.080 | 0.080 | 0.100 | 0.185 | 0.350 |
| 59 | 0.090 | 0.090 | 0.095 | 0.130 | 0.185 | 0.350 |
| 60 | 0.150 | 0.150 | 0.150 | 0.150 | 0.185 | 0.350 |
| 61 | 0.120 | 0.120 | 0.120 | 0.120 | 0.160 | 0.350 |
| 62 | 0.150 | 0.150 | 0.150 | 0.150 | 0.200 | 0.350 |
| 63 | 0.150 | 0.150 | 0.150 | 0.150 | 0.200 | 0.400 |
| 64 | 0.150 | 0.150 | 0.150 | 0.150 | 0.175 | 0.350 |
| 65 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

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

**Service Retirement**

**Public Agency Fire 3% @ 55**

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

**Service Retirement**

**Public Agency Police 3% @ 50**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.050 | 0.050 | 0.050 | 0.100 | 0.155 | 0.400 |
| 51 | 0.040 | 0.040 | 0.040 | 0.090 | 0.140 | 0.380 |
| 52 | 0.040 | 0.040 | 0.040 | 0.070 | 0.115 | 0.350 |
| 53 | 0.040 | 0.040 | 0.040 | 0.080 | 0.135 | 0.350 |
| 54 | 0.040 | 0.040 | 0.040 | 0.090 | 0.145 | 0.350 |
| 55 | 0.070 | 0.070 | 0.070 | 0.120 | 0.175 | 0.340 |
| 56 | 0.060 | 0.060 | 0.060 | 0.110 | 0.165 | 0.330 |
| 57 | 0.060 | 0.060 | 0.060 | 0.110 | 0.165 | 0.320 |
| 58 | 0.080 | 0.080 | 0.080 | 0.100 | 0.185 | 0.350 |
| 59 | 0.090 | 0.090 | 0.095 | 0.130 | 0.185 | 0.350 |
| 60 | 0.150 | 0.150 | 0.150 | 0.150 | 0.185 | 0.350 |
| 61 | 0.120 | 0.120 | 0.120 | 0.120 | 0.160 | 0.350 |
| 62 | 0.150 | 0.150 | 0.150 | 0.150 | 0.200 | 0.350 |
| 63 | 0.150 | 0.150 | 0.150 | 0.150 | 0.200 | 0.400 |
| 64 | 0.150 | 0.150 | 0.150 | 0.150 | 0.175 | 0.350 |
| 65 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

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

**Service Retirement**

**Public Agency Fire 3% @ 50**

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

**Service Retirement**

**Public Agency Police 2% @ 57**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.040 | 0.040 | 0.040 | 0.040 | 0.040 | 0.080 |
| 51 | 0.028 | 0.028 | 0.028 | 0.028 | 0.040 | 0.066 |
| 52 | 0.028 | 0.028 | 0.028 | 0.028 | 0.043 | 0.061 |
| 53 | 0.028 | 0.028 | 0.028 | 0.028 | 0.057 | 0.086 |
| 54 | 0.028 | 0.028 | 0.028 | 0.032 | 0.069 | 0.110 |
| 55 | 0.050 | 0.050 | 0.050 | 0.067 | 0.099 | 0.179 |
| 56 | 0.046 | 0.046 | 0.046 | 0.062 | 0.090 | 0.160 |
| 57 | 0.054 | 0.054 | 0.054 | 0.072 | 0.106 | 0.191 |
| 58 | 0.060 | 0.060 | 0.060 | 0.066 | 0.103 | 0.171 |
| 59 | 0.060 | 0.060 | 0.060 | 0.069 | 0.105 | 0.171 |
| 60 | 0.113 | 0.113 | 0.113 | 0.113 | 0.113 | 0.171 |
| 61 | 0.108 | 0.108 | 0.108 | 0.108 | 0.108 | 0.128 |
| 62 | 0.113 | 0.113 | 0.113 | 0.113 | 0.113 | 0.159 |
| 63 | 0.113 | 0.113 | 0.113 | 0.113 | 0.113 | 0.159 |
| 64 | 0.113 | 0.113 | 0.113 | 0.113 | 0.113 | 0.239 |
| 65 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

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

**Service Retirement**

**Public Agency Fire 2% @ 57**

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

**Service Retirement**

**Public Agency Police 2.5% @ 57**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.100 |
| 51 | 0.038 | 0.038 | 0.038 | 0.038 | 0.055 | 0.089 |
| 52 | 0.038 | 0.038 | 0.038 | 0.038 | 0.058 | 0.082 |
| 53 | 0.036 | 0.036 | 0.036 | 0.036 | 0.073 | 0.111 |
| 54 | 0.036 | 0.036 | 0.036 | 0.041 | 0.088 | 0.142 |
| 55 | 0.061 | 0.061 | 0.061 | 0.082 | 0.120 | 0.217 |
| 56 | 0.056 | 0.056 | 0.056 | 0.075 | 0.110 | 0.194 |
| 57 | 0.060 | 0.060 | 0.060 | 0.080 | 0.118 | 0.213 |
| 58 | 0.072 | 0.072 | 0.072 | 0.079 | 0.124 | 0.205 |
| 59 | 0.072 | 0.072 | 0.072 | 0.083 | 0.126 | 0.205 |
| 60 | 0.135 | 0.135 | 0.135 | 0.135 | 0.135 | 0.205 |
| 61 | 0.130 | 0.130 | 0.130 | 0.130 | 0.130 | 0.153 |
| 62 | 0.135 | 0.135 | 0.135 | 0.135 | 0.135 | 0.191 |
| 63 | 0.135 | 0.135 | 0.135 | 0.135 | 0.135 | 0.191 |
| 64 | 0.135 | 0.135 | 0.135 | 0.135 | 0.135 | 0.287 |
| 65 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

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

**Service Retirement**

**Public Agency Fire 2.5% @ 57**

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

**Service Retirement**

**Public Agency Police 2.7% @ 57**

| | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| Age | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.0500 | 0.0500 | 0.0500 | 0.0500 | 0.0500 | 0.1000 |
| 51 | 0.0400 | 0.0400 | 0.0400 | 0.0400 | 0.0575 | 0.0942 |
| 52 | 0.0380 | 0.0380 | 0.0380 | 0.0380 | 0.0580 | 0.0825 |
| 53 | 0.0380 | 0.0380 | 0.0380 | 0.0380 | 0.0774 | 0.1169 |
| 54 | 0.0380 | 0.0380 | 0.0380 | 0.0437 | 0.0931 | 0.1497 |
| 55 | 0.0684 | 0.0684 | 0.0684 | 0.0912 | 0.1340 | 0.2423 |
| 56 | 0.0627 | 0.0627 | 0.0627 | 0.0836 | 0.1228 | 0.2168 |
| 57 | 0.0600 | 0.0600 | 0.0600 | 0.0800 | 0.1175 | 0.2125 |
| 58 | 0.0800 | 0.0800 | 0.0800 | 0.0880 | 0.1375 | 0.2275 |
| 59 | 0.0800 | 0.0800 | 0.0800 | 0.0920 | 0.1400 | 0.2275 |
| 60 | 0.1500 | 0.1500 | 0.1500 | 0.1500 | 0.1500 | 0.2275 |
| 61 | 0.1440 | 0.1440 | 0.1440 | 0.1440 | 0.1440 | 0.1700 |
| 62 | 0.1500 | 0.1500 | 0.1500 | 0.1500 | 0.1500 | 0.2125 |
| 63 | 0.1500 | 0.1500 | 0.1500 | 0.1500 | 0.1500 | 0.2125 |
| 64 | 0.1500 | 0.1500 | 0.1500 | 0.1500 | 0.1500 | 0.3188 |
| 65 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |

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

**Service Retirement**

**Public Agency Fire 2.7% @ 57**

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

**Service Retirement**

**Schools 2% @ 55**

| Age | Duration of Service | | | | | |
|---|---|---|---|---|---|---|
| | 5 Years | 10 Years | 15 Years | 20 Years | 25 Years | 30 Years |
| 50 | 0.004 | 0.007 | 0.011 | 0.012 | 0.013 | 0.015 |
| 51 | 0.004 | 0.008 | 0.011 | 0.014 | 0.016 | 0.017 |
| 52 | 0.005 | 0.010 | 0.014 | 0.016 | 0.018 | 0.021 |
| 53 | 0.006 | 0.012 | 0.016 | 0.020 | 0.022 | 0.025 |
| 54 | 0.008 | 0.017 | 0.023 | 0.027 | 0.031 | 0.034 |
| 55 | 0.021 | 0.042 | 0.058 | 0.069 | 0.077 | 0.086 |
| 56 | 0.019 | 0.037 | 0.053 | 0.062 | 0.069 | 0.078 |
| 57 | 0.019 | 0.038 | 0.054 | 0.064 | 0.071 | 0.079 |
| 58 | 0.022 | 0.045 | 0.062 | 0.074 | 0.082 | 0.092 |
| 59 | 0.025 | 0.049 | 0.069 | 0.082 | 0.090 | 0.101 |
| 60 | 0.033 | 0.066 | 0.092 | 0.109 | 0.121 | 0.135 |
| 61 | 0.037 | 0.072 | 0.101 | 0.119 | 0.133 | 0.149 |
| 62 | 0.066 | 0.131 | 0.184 | 0.218 | 0.242 | 0.271 |
| 63 | 0.064 | 0.126 | 0.178 | 0.209 | 0.233 | 0.261 |
| 64 | 0.059 | 0.117 | 0.163 | 0.193 | 0.215 | 0.240 |
| 65 | 0.080 | 0.158 | 0.221 | 0.261 | 0.291 | 0.326 |
| 66 | 0.081 | 0.160 | 0.224 | 0.265 | 0.296 | 0.330 |
| 67 | 0.070 | 0.139 | 0.194 | 0.229 | 0.255 | 0.286 |
| 68 | 0.063 | 0.124 | 0.173 | 0.205 | 0.228 | 0.255 |
| 69 | 0.066 | 0.130 | 0.183 | 0.216 | 0.241 | 0.270 |
| 70 | 0.071 | 0.140 | 0.196 | 0.231 | 0.258 | 0.289 |

# Miscellaneous

**Internal Revenue Code Section 415**

The limitations on benefits imposed by Internal Revenue Code Section 415 are taken into account in this valuation. Each year the impact of any changes in this limitation since the prior valuation is included and amortized as part of the actuarial gain or loss base. This results in lower contributions for those employers contributing to the Replacement Benefit Fund and protects CalPERS from prefunding expected benefits in excess of limits imposed by federal tax law. The Section 415(b) dollar limit for the 2019 calendar year is $225,000.

**Internal Revenue Code Section 401(a)(17)**

The limitations on compensation imposed by Internal Revenue Code Section 401(a)(17) are taken into account in this valuation. Each year, the impact of any changes in the compensation limitation since the prior valuation is included and amortized as part of the actuarial gain or loss base. The compensation limit for classic members for the 2019 calendar year is $280,000.

# Appendix B

# Principal Plan Provisions

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

# Service Retirement

**Eligibility**

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

**Benefit**

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

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

**Miscellaneous Plan Formulas**

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

**Safety Plan Formulas**

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

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

**PEPRA Safety Plan Formulas**

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

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

- The *final compensation* is the monthly average of the member's highest 36 or 12 consecutive months' full-time equivalent monthly pay (no matter which CalPERS employer paid this compensation). The standard benefit is 36 months. Employers had the option of providing a final compensation equal to the highest 12 consecutive months for classic plans only. Final compensation must be defined by the highest 36 consecutive months' pay under the 1.5% at 65 formula. PEPRA members have a cap on the annual salary that can be used to calculate final compensation for all new members based on the Social Security contribution and benefit base. For employees that participate in Social Security this cap is $124,180 for 2019 and for those employees that do not participate in Social Security the cap for 2019 is $149,016. Adjustments to the caps are permitted annually based on changes to the CPI for all urban consumers.

- Employees must be covered by Social Security with the 1.5% at 65 formula. Social Security is optional for all other benefit formulas. For employees covered by Social Security, the modified formula is the standard benefit. Under this type of formula, the final compensation is offset by $133.33 (or by one third if the final compensation is less than $400). Employers may contract for the full benefit with Social Security that will eliminate the offset applicable to the final compensation. For employees not covered by Social Security, the full benefit is paid with no offsets.

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

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

# Vested Deferred Retirement

**Eligibility for Deferred Status**

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

**Eligibility to Start Receiving Benefits**

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

**Benefit**

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

# Non-Industrial (Non-Job Related) Disability Retirement

**Eligibility**

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

**Standard Benefit**

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

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

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

**Improved Benefit**

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

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

# Industrial (Job Related) Disability Retirement

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

**Eligibility**

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

**Standard Benefit**

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

**Increased Benefit (75 percent of Final Compensation)**

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

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

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

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

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

# Post-Retirement Death Benefit

**Standard Lump Sum Payment**

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

**Improved Lump Sum Payment**

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

# Form of Payment for Retirement Allowance

**Standard Form of Payment**

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

**Improved Form of Payment (Post-Retirement Survivor Allowance)**

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

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

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

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

# Pre-Retirement Death Benefits

# Basic Death Benefit

This is a standard benefit.

**Eligibility**

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

**Benefit**

The basic death benefit is a lump sum in the amount of the member's accumulated contributions, where interest is credited annually at the greater of 6 percent or the prevailing discount rate through the date of death, plus a lump sum in the amount of one month's salary for each completed year of current service, up to a maximum of six months' salary. For purposes of this benefit, one month's salary is defined as the member's average monthly full-time rate of compensation during the 12 months preceding death.

# 1957 Survivor Benefit

This is a standard benefit.

**Eligibility**

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

**Benefit**

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

# Optional Settlement 2 Death Benefit

This is an optional benefit.

**Eligibility**

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

**Benefit**

The Optional Settlement 2 Death benefit is a monthly allowance equal to the service retirement benefit that the member would have received had the member retired on the date of his or her death and elected 100 percent to continue to the eligible survivor after the member's death. The allowance is payable as long as the surviving spouse lives, at which time it is continued to any unmarried child(ren) under age 18, if applicable. The total amount paid will be at least equal to the basic death benefit.

# Special Death Benefit

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

**Eligibility**

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

**Benefit**

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

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

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

# Alternate Death Benefit for Local Fire Members

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

**Eligibility**

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

**Benefit**

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

# Cost-of-Living Adjustments (COLA)

**Standard Benefit**

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

**Improved Benefit**

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

# Purchasing Power Protection Allowance (PPPA)

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

# Employee Contributions

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

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

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

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

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

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

# Refund of Employee Contributions

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

# 1959 Survivor Benefit

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

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

# Appendix C

# Participant Data

- **Summary of Valuation Data**
- **Active Members**
- **Transferred and Terminated Members**
- **Retired Members and Beneficiaries**

# Summary of Valuation Data

| | June 30, 2018 | June 30, 2019 |
|---|---|---|
| 1. **Active Members** | | |
| a) Counts | 167 | 169 |
| b) Average Attained Age | 41.89 | 41.90 |
| c) Average Entry Age to Rate Plan | 30.65 | 30.41 |
| d) Average Years of Credited Service | 11.44 | 11.72 |
| e) Average Annual Covered Pay | $141,397 | $150,819 |
| f) Annual Covered Payroll | 23,613,222 | 25,488,331 |
| g) Projected Annual Payroll for Contribution Year | 25,615,376 | 27,649,475 |
| h) Present Value of Future Payroll | 223,983,606 | 236,905,356 |
| 2. **Transferred Members** | | |
| a) Counts | 61 | 59 |
| b) Average Attained Age | 42.92 | 43.49 |
| c) Average Years of Credited Service | 3.74 | 4.11 |
| d) Average Annual Covered Pay | $124,058 | $130,854 |
| 3. **Terminated Members** | | |
| a) Counts | 48 | 50 |
| b) Average Attained Age | 41.94 | 42.27 |
| c) Average Years of Credited Service | 2.84 | 2.81 |
| d) Average Annual Covered Pay | $89,042 | $90,415 |
| 4. **Retired Members and Beneficiaries** | | |
| a) Counts | 430 | 430 |
| b) Average Attained Age | 68.22 | 69.11 |
| c) Average Annual Benefits | $57,369 | $58,574 |
| 5. **Active to Retired Ratio** [(1a) / (4a)] | 0.39 | 0.39 |

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

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

# Active Members

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

**Distribution of Active Members by Age and Service**

| | Years of Service at Valuation Date | | | | | | |
|---|---|---|---|---|---|---|---|
| **Attained Age** | **0-4** | **5-9** | **10-14** | **15-19** | **20-24** | **25+** | **Total** |
| 15-24 | 3 | 0 | 0 | 0 | 0 | 0 | 3 |
| 25-29 | 11 | 2 | 0 | 0 | 0 | 0 | 13 |
| 30-34 | 15 | 8 | 2 | 0 | 0 | 0 | 25 |
| 35-39 | 4 | 15 | 13 | 0 | 0 | 0 | 32 |
| 40-44 | 4 | 8 | 8 | 7 | 2 | 0 | 29 |
| 45-49 | 1 | 3 | 5 | 10 | 11 | 0 | 30 |
| 50-54 | 1 | 1 | 1 | 8 | 8 | 6 | 25 |
| 55-59 | 2 | 0 | 0 | 4 | 1 | 2 | 9 |
| 60-64 | 0 | 0 | 1 | 1 | 0 | 0 | 2 |
| 65 and Over | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| **All Ages** | **41** | **37** | **30** | **30** | **22** | **9** | **169** |

**Distribution of Average Annual Salaries by Age and Service**

| | Years of Service at Valuation Date | | | | | | |
|---|---|---|---|---|---|---|---|
| **Attained Age** | **0-4** | **5-9** | **10-14** | **15-19** | **20-24** | **25+** | **Average Salary** |
| 15-24 | $87,023 | $0 | $0 | $0 | $0 | $0 | $87,023 |
| 25-29 | 112,362 | 136,866 | 0 | 0 | 0 | 0 | 116,132 |
| 30-34 | 119,486 | 139,794 | 160,826 | 0 | 0 | 0 | 129,291 |
| 35-39 | 130,435 | 147,036 | 174,818 | 0 | 0 | 0 | 156,247 |
| 40-44 | 152,272 | 153,384 | 152,493 | 181,063 | 214,315 | 0 | 163,868 |
| 45-49 | 140,113 | 141,908 | 179,032 | 160,222 | 165,591 | 0 | 162,824 |
| 50-54 | 148,594 | 151,021 | 145,285 | 144,766 | 152,389 | 178,154 | 155,642 |
| 55-59 | 141,484 | 0 | 0 | 156,790 | 159,398 | 193,876 | 161,920 |
| 60-64 | 0 | 0 | 154,844 | 191,551 | 0 | 0 | 173,198 |
| 65 and Over | 0 | 0 | 0 | 0 | 0 | 153,718 | 153,718 |
| **Average** | **$121,752** | **$145,985** | **$166,984** | **$161,550** | **$164,939** | **$178,932** | **$150,819** |

# Transferred and Terminated Members

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

| | Years of Service at Valuation Date | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Attained Age | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25+ | Total | Average Salary |
| 15-24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $0 |
| 25-29 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 121,669 |
| 30-34 | 7 | 1 | 0 | 0 | 0 | 0 | 8 | 138,895 |
| 35-39 | 5 | 4 | 2 | 0 | 0 | 0 | 11 | 131,729 |
| 40-44 | 10 | 1 | 0 | 0 | 0 | 0 | 11 | 112,782 |
| 45-49 | 9 | 2 | 1 | 1 | 0 | 0 | 13 | 152,855 |
| 50-54 | 5 | 5 | 0 | 0 | 0 | 0 | 10 | 122,328 |
| 55-59 | 2 | 0 | 1 | 0 | 0 | 0 | 3 | 114,671 |
| 60-64 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 121,889 |
| 65 and Over | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **All Ages** | **40** | **14** | **4** | **1** | **0** | **0** | **59** | **$130,854** |

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

| | Years of Service at Valuation Date | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Attained Age | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25+ | Total | Average Salary |
| 15-24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $0 |
| 25-29 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 100,708 |
| 30-34 | 7 | 1 | 0 | 0 | 0 | 0 | 8 | 89,738 |
| 35-39 | 8 | 1 | 1 | 0 | 0 | 0 | 10 | 93,770 |
| 40-44 | 10 | 3 | 1 | 0 | 0 | 0 | 14 | 94,830 |
| 45-49 | 3 | 2 | 1 | 0 | 0 | 0 | 6 | 91,802 |
| 50-54 | 4 | 1 | 0 | 0 | 0 | 0 | 5 | 89,316 |
| 55-59 | 4 | 0 | 0 | 0 | 0 | 0 | 4 | 52,335 |
| 60-64 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 129,374 |
| 65 and Over | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **All Ages** | **38** | **9** | **3** | **0** | **0** | **0** | **50** | **$90,415** |

# Retired Members and Beneficiaries

**Distribution of Retirees and Beneficiaries by Age and Retirement Type***

| Attained Age | Service Retirement | Non-Industrial Disability | Industrial Disability | Non-Industrial Death | Industrial Death | Death After Retirement | Total |
|---|---|---|---|---|---|---|---|
| Under 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 30-34 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 35-39 | 0 | 0 | 3 | 0 | 0 | 0 | 3 |
| 40-44 | 0 | 0 | 4 | 0 | 0 | 0 | 4 |
| 45-49 | 0 | 0 | 7 | 0 | 0 | 0 | 7 |
| 50-54 | 25 | 1 | 7 | 0 | 0 | 0 | 33 |
| 55-59 | 38 | 0 | 21 | 0 | 1 | 0 | 60 |
| 60-64 | 45 | 2 | 17 | 0 | 2 | 1 | 67 |
| 65-69 | 32 | 0 | 16 | 0 | 0 | 3 | 51 |
| 70-74 | 27 | 1 | 19 | 0 | 0 | 7 | 54 |
| 75-79 | 31 | 0 | 19 | 0 | 0 | 13 | 63 |
| 80-84 | 23 | 1 | 18 | 0 | 0 | 8 | 50 |
| 85 and Over | 17 | 0 | 11 | 0 | 0 | 10 | 38 |
| **All Ages** | **238** | **5** | **142** | **0** | **3** | **42** | **430** |

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

| Attained Age | Service Retirement | Non-Industrial Disability | Industrial Disability | Non-Industrial Death | Industrial Death | Death After Retirement | Average |
|---|---|---|---|---|---|---|---|
| Under 30 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| 30-34 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 35-39 | 0 | 0 | 57,662 | 0 | 0 | 0 | 57,662 |
| 40-44 | 0 | 0 | 46,939 | 0 | 0 | 0 | 46,939 |
| 45-49 | 0 | 0 | 53,915 | 0 | 0 | 0 | 53,915 |
| 50-54 | 76,572 | 88 | 63,982 | 0 | 0 | 0 | 71,584 |
| 55-59 | 91,935 | 0 | 71,033 | 0 | 55,866 | 0 | 84,018 |
| 60-64 | 78,627 | 18,559 | 76,450 | 0 | 38,716 | 70,341 | 74,966 |
| 65-69 | 76,932 | 0 | 49,786 | 0 | 0 | 39,037 | 66,186 |
| 70-74 | 59,408 | 18,414 | 49,583 | 0 | 0 | 22,839 | 50,452 |
| 75-79 | 51,178 | 0 | 37,217 | 0 | 0 | 40,806 | 44,827 |
| 80-84 | 50,227 | 15,045 | 36,322 | 0 | 0 | 13,451 | 38,633 |
| 85 and Over | 32,440 | 0 | 25,734 | 0 | 0 | 33,216 | 30,703 |
| **All Ages** | **$68,509** | **$14,133** | **$51,831** | **$0** | **$44,433** | **$31,371** | **$58,574** |

# Retired Members and Beneficiaries (continued)

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

| Years Retired | Service Retirement | Non-Industrial Disability | Industrial Disability | Non-Industrial Death | Industrial Death | Death After Retirement | Total |
|---|---|---|---|---|---|---|---|
| Under 5 Yrs | 40 | 1 | 13 | 0 | 0 | 14 | 68 |
| 5-9 | 57 | 0 | 20 | 0 | 0 | 3 | 80 |
| 10-14 | 40 | 1 | 17 | 0 | 1 | 7 | 66 |
| 15-19 | 37 | 0 | 16 | 0 | 0 | 11 | 64 |
| 20-24 | 20 | 1 | 18 | 0 | 1 | 3 | 43 |
| 25-29 | 28 | 0 | 12 | 0 | 0 | 3 | 43 |
| 30 and Over | 16 | 2 | 46 | 0 | 1 | 1 | 66 |
| **All Years** | **238** | **5** | **142** | **0** | **3** | **42** | **430** |

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

| Years Retired | Service Retirement | Non-Industrial Disability | Industrial Disability | Non-Industrial Death | Industrial Death | Death After Retirement | Average |
|---|---|---|---|---|---|---|---|
| Under 5 Yrs | $77,215 | $2,172 | $54,673 | $0 | $0 | $20,313 | $60,087 |
| 5-9 | 90,603 | 0 | 97,494 | 0 | 0 | 18,881 | 89,636 |
| 10-14 | 62,271 | 88 | 66,009 | 0 | 55,866 | 41,087 | 59,948 |
| 15-19 | 69,841 | 0 | 61,024 | 0 | 0 | 43,123 | 63,045 |
| 20-24 | 42,714 | 34,945 | 48,330 | 0 | 49,456 | 27,081 | 43,950 |
| 25-29 | 55,666 | 0 | 45,344 | 0 | 0 | 37,167 | 51,495 |
| 30 and Over | 35,266 | 16,730 | 25,800 | 0 | 27,977 | 21,857 | 27,793 |
| **All Years** | **$68,509** | **$14,133** | **$51,831** | **$0** | **$44,433** | **$31,371** | **$58,574** |

* Counts of members do not include alternate payees receiving benefits while the member is still working. Therefore, the total counts may not match information on C-1 of the report. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

# Appendix D

# Glossary of Actuarial Terms

# Glossary of Actuarial Terms

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

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

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

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

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

Generally, in an actuarial valuation, the separate bases consist of changes in unfunded liability due to contract amendments, actuarial assumption changes, method changes, and/or gains and losses.

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

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

**Discount Rate**
The assumed long-term rate of return on plan assets. This is the rate at which projected cash flows are discounted to the valuation date to determine Accrued Liability. This assumption is called "investment return" in earlier CalPERS reports and "actuarial interest rate" in Section 20014 of the California Public Employees' Retirement Law (PERL).

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

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

**Fresh Start**

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

**Funded Status**

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

**GASB 68**

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

**New Member (under PEPRA)**

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

**Normal Cost**

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

**Pension Actuary**

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

**PEPRA**

The California Public Employees' Pension Reform Act of 2013

**Present Value of Benefits (PVB)**

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

**Unfunded Accrued Liability (UAL)**

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