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July 2019

Safety Plan of the City of Pacific Grove
(CalPERS ID: 5070575563)
Annual Valuation Report as of June 30, 2018

Dear Employer,

Attached to this letter, you will find the June 30, 2018 actuarial valuation report of your CalPERS pension plan. **Provided in this report is the determination of the minimum required employer contributions for Fiscal Year 2020-21**. In addition, the report 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.

Because this plan is in a risk pool, the following valuation report has been separated into two sections:

- Section 1 contains specific information for the plan including the development of the current and projected employer contributions, and
- Section 2 contains the Risk Pool Actuarial Valuation appropriate to the plan as of June 30, 2018.

Section 2 can be found on the CalPERS website (www.calpers.ca.gov). From the home page, go to "*Forms & Publications*" and select "*View All*". In the search box, enter "*Risk Pool*" and from the results list download the Miscellaneous or Safety Risk Pool Actuarial Valuation Report as appropriate.

Your June 30, 2018 actuarial valuation report contains important actuarial information about your pension plan at CalPERS. Your assigned CalPERS staff actuary, whose signature appears in the Actuarial Certification section on page 1, is available to discuss the report with you after August 1, 2019.

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% 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 Contribution

The exhibit below displays the minimum employer contributions, before any cost sharing, for Fiscal Year 2020-21 along with estimates of the required contributions for Fiscal Year 2021-22. Member contributions other than cost sharing (whether paid by the employer or the employee) are in addition to the results shown below. **The employer contributions in this report do not reflect any cost sharing arrangements you may have with your employees**.

Fiscal Year	Employer Normal Cost Rate	Employer Amortization of Unfunded Accrued Liability
2020-21	23.674%	$1,821,383
Projected Results		
2021-22	*23.7%*	*$2,059,000*

The actual investment return for Fiscal Year 2018-19 was not known at the time this report was prepared. The projections above assume the investment return for that year would be 7.00 percent. ***If the actual investment return for Fiscal Year 2018-19 differs from 7.00 percent, the actual contribution requirements for the projected years 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 2025-26.

Changes from Previous Year's Valuation

CalPERS continues to strive to provide comprehensive risk assessments regarding plan funding and sustainability consistent with the Board of Administration's pension and investment beliefs. Your report this year includes new metrics on plan maturity in recognition of the fact that most pension plans at CalPERS are maturing as anticipated. As plans mature, they become more sensitive to risks than plans that are less mature. The "Risk Analysis" section of your report will help you understand how your plan is affected by investment return volatility and other economic assumptions. We have included plan sensitivity analysis with respect to longevity and inflation to further that discussion and encourage you to review our most recent Annual Review of Funding Levels and Risks report on our website that takes a holistic view of the system.

Upcoming Change for June 30, 2019 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 using a level dollar amount. In addition, the new policy removes the 5-year ramp-up and ramp-down on Unfunded Accrued Liability (UAL) bases attributable to assumption changes and non-investment gains/losses. The new policy removes the 5-year ramp-down on investment gains/losses. These changes will apply only to new UAL bases established on or after June 30, 2019.

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

Further descriptions of general changes are included in the "Highlights and Executive Summary "section and in Appendix A, "Statement of Actuarial Data, Methods and Assumptions "of the Section 2 report.

We understand that you might have a number of questions about these results. While we are very interested in discussing these results with your agency, in the interest of allowing us to give every public agency their results, we ask that you wait until after August 1 2019 to contact us with actuarial questions.

If you have other questions, please call our customer contact center at (888) CalPERS or (**888-225-7377**).

Sincerely,

SCOTT TERANDO
Chief Actuary

Actuarial Valuation as of June 30, 2018

for the Safety Plan of the City of Pacific Grove

(CalPERS ID: 5070575563)

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

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Section 1

CALIFORNIA PUBLIC EMPLOYEES' RETIREMENT SYSTEM

Plan Specific Information for the Safety Plan of the City of Pacific Grove

(CalPERS ID: 5070575563)
(Valuation Rate Plan ID: 348)

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Actuarial Certification

Section 1 of this report is based on the member and financial data contained in our records as of June 30, 2018 which was provided by your agency and the benefit provisions under your contract with CalPERS. Section 2 of this report is based on the member and financial data as of June 30, 2018 provided by employers participating in the Safety Risk Pool to which the plan belongs and benefit provisions under the CalPERS contracts for those agencies.

As set forth in Section 2 of this report, the pool actuaries have certified that, in their opinion, the valuation of the risk pool containing your Safety Plan has been performed in accordance with generally accepted actuarial principles consistent with standards of practice prescribed by the Actuarial Standards Board, and that the assumptions and methods are internally consistent and reasonable for the risk pool as of the date of this valuation and as prescribed by the CalPERS Board of Administration according to provisions set forth in the California Public Employees' Retirement Law.

Having relied upon the information set forth in Section 2 of this report and based on the census and benefit provision information for the plan, it is my opinion as the plan actuary that Unfunded Accrued Liability amortization bases as of June 30, 2018 and employer contribution as of July 1, 2020, have been properly and accurately determined in accordance with the principles and standards stated above.

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

ALEX GRUNDER, ASA, MAAA
Associate Pension Actuary, CalPERS
Plan Actuary

Highlights and Executive Summary

- **Introduction**
- **Purpose of Section 1**
- **Required Employer Contributions**
- **Plan's Funded Status**
- **Projected Employer Contributions**
- **Changes Since the Prior Year's Valuation**
- **Subsequent Events**

Introduction

This report presents the results of the June 30, 2018 actuarial valuation of the Safety Plan of the City of Pacific Grove of the California Public Employees' Retirement System (CalPERS). This actuarial valuation sets the required employer contributions for Fiscal Year 2020-21.

Purpose of Section 1

This Section 1 report for the Safety Plan of the City of Pacific Grove of the California Public Employees' Retirement System (CalPERS) was prepared by the plan actuary in order to:

- Set forth the assets and accrued liabilities of this plan as of June 30, 2018;
- Determine the minimum required employer contribution for this plan for the fiscal year July 1, 2020 through June 30, 2021; and
- Provide actuarial information as of June 30, 2018 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 GASB Statement No. 68 for a Cost Sharing Employer Defined Benefit Pension Plan. A separate accounting valuation report for such purposes is available from CalPERS and details for ordering are available on our website.

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

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

California Actuarial Advisory Panel Recommendations

This report includes all the basic disclosure elements as described in the *Model Disclosure Elements for Actuarial Valuation Reports* recommended in 2011 by the California Actuarial Advisory Panel (CAAP), with the exception of including the original base amounts of the various components of the unfunded liability in the Schedule of Amortization Bases shown on page 10.

Additionally, this report includes the following "Enhanced Risk Disclosures" also recommended by the CAAP in the Model Disclosure Elements document and consistent with the recommendations of Actuarial Standard of Practice No. 51:

- A "Scenario Test," projecting future results under different investment income scenarios.
- A "Sensitivity Analysis," showing the impact on current valuation results using alternative discount rates of 6.0 percent and 8.0 percent.
- A "Sensitivity Analysis," showing the impact on current valuation results using a 1.0 percent plus or minus change in the inflation rate.
- A "Sensitivity Analysis," showing the impact on current valuation results assuming post-retirement rates of mortality are 10 percent lower or 10 percent higher than our current mortality assumptions adopted in 2017. This type of analysis highlights the impact on the plan of improving or worsening mortality over the long-term.
- Plan maturity measures which indicate how sensitive a plan may be to the risks noted above.

Required Employer Contributions

Required Employer Contributions		Fiscal Year 2020-21
Employer Normal Cost Rate		**23.674%**
Plus, Either		
1) Monthly Employer Dollar UAL Payment	**$**	**151,781.92**
Or		
2) Annual UAL Prepayment Option*	**$**	**1,760,797**

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

** Only the UAL portion of the employer contribution can be prepaid **(which must be received in full no later than July 31)**. 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.

		Fiscal Year 2019-20		Fiscal Year 2020-21
Development of Normal Cost as a Percentage of Payroll[1]				
Base Total Normal Cost for Formula		29.696%		31.427%
Surcharge for Class 1 Benefits[2]				
a) FAC 1		1.220%		1.237%
Phase out of Normal Cost Difference[3]		0.000%		0.000%
Plan's Total Normal Cost		30.916%		32.664%
Formula's Expected Employee Contribution Rate		8.989%		8.990%
Employer Normal Cost Rate		21.927%		23.674%
Projected Payroll for the Contribution Fiscal Year	$	1,303,282	$	1,732,439
Estimated Employer Contributions Based on Projected Payroll				
Plan's Estimated Employer Normal Cost	$	285,771	$	410,138
Plan's Payment on Amortization Bases[4]		1,621,681		1,821,383
% of Projected Payroll (illustrative only)		124.431%		105.134%
Estimated Total Employer Contribution	$	1,907,452	$	2,231,521
% of Projected Payroll (illustrative only)		146.358%		128.808%

[1] The results shown for Fiscal Year 2019-20 reflect the prior year valuation and may not take into account any lump sum payment, side fund payoff, or rate adjustment made after April 30, 2018.

[2] Section 2 of this report contains a list of Class 1 benefits and corresponding surcharges for each benefit.

[3] The normal cost difference is phased out over a five-year period. The phase out of normal cost difference is 100 percent for the first year of pooling, and is incrementally reduced by 20 percent of the original normal cost difference for each subsequent year. This is non-zero only for plans that joined a pool within the past 5 years. Most plans joined a pool June 30, 2003, when risk pooling was implemented.

[4] See page 10 for a breakdown of the Amortization Bases.

Plan's Funded Status

	June 30, 2017	June 30, 2018
1. Present Value of Projected Benefits (PVB)	$ 78,212,163	$ 82,227,913
2. Entry Age Normal Accrued Liability (AL)	75,101,444	77,600,494
3. Plan's Market Value of Assets (MVA)	51,499,786	50,997,256
4. Unfunded Accrued Liability (UAL) [(2) - (3)]	23,601,658	26,603,238
5. Funded Ratio [(3) / (2)]	68.6%	65.7%

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

Projected Employer Contributions

The table below shows projected employer contributions (before cost sharing) for the next six fiscal years. Projected results reflect the adopted changes to the discount rate described in Appendix A, "Statement of Actuarial Data, Methods and Assumptions" of the Section 2 report. The projections also assume that all actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur during the projection period.

	Required Contribution	**Projected Future Employer Contributions (Assumes 7.00% Return for Fiscal Year 2018-19)**				
Fiscal Year	**2020-21**	**2021-22**	**2022-23**	**2023-24**	**2024-25**	**2025-26**
Normal Cost %	23.674%	23.7%	23.7%	23.7%	23.7%	23.7%
UAL Payment	$1,821,383	$2,059,000	$2,255,000	$2,379,000	$2,504,000	$2,573,000

Changes in the UAL due to actuarial gains or losses as well as changes in actuarial assumptions or methods are amortized using a 5-year ramp up. For more information, please see "Amortization of the Unfunded Actuarial Accrued Liability" under "Actuarial Methods" in Appendix A of Section 2. This method phases in the impact of unanticipated changes in UAL over a 5-year period and attempts to minimize employer cost volatility from year to year. As a result of this methodology, dramatic changes in the required employer contributions in any one year are less likely. However, required contributions can change gradually and significantly over the next five years. In years where there is a large increase in UAL the relatively small amortization payments during the ramp up period could result in a funded ratio that is projected to decrease initially while the contribution impact of the increase in the UAL is phased in.

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

Changes Since the Prior Year's Valuation

Benefits

None. 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 of Section 2 for a summary of the plan provisions used in this valuation.

Actuarial Methods and Assumptions

In December of 2016 the CalPERS Board of Administration lowered the discount rate from 7.50 percent to 7.00 percent using a three-year phase-in beginning with the June 30, 2016 actuarial valuation. The minimum employer contributions for Fiscal Year 2020-21 determined in this valuation were calculated using a discount rate of 7.00 percent, payroll growth of 2.75 percent and an inflation rate of 2.50 percent. The projected employer contributions on Page 5 are calculated under the assumption that the discount rate remains at 7.00 percent going forward and that furthermore the realized rate of return on assets for Fiscal Year 2018-19 is 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 assumption provides a more realistic assumption for the long-term investment return of the fund.

CalPERS has implemented a new actuarial valuation software system for the June 30, 2018 valuation. With this new system we have refined and improved some of our calculation methodology. Any difference in liability between the old software and new software calculations is captured as a method change line item.

Subsequent Events

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

For inactive employers the new amortization policy imposes a maximum amortization period of 15 years for all unfunded accrued liabilities effective June 30, 2018. Furthermore, the plan actuary has the ability to shorten the amortization period on any valuation date based on the life expectancy of plan members and projected cash flow needs to the plan. The impact of this has been reflected in the current valuation results.

The contribution requirements determined in this actuarial valuation report are based on demographic and financial information as of June 30, 2018. Changes in the value of assets subsequent to that date are not reflected. Investment returns below the assumed rate of return will increase the required contribution, while investment returns above the assumed rate of return will decrease the required contribution.

This actuarial valuation report reflects statutory changes, regulatory changes and CalPERS Board actions through January 2019. Any subsequent changes or actions are not reflected.

Assets and Liabilities

- **Breakdown of Entry Age Normal Accrued Liability**
- **Allocation of Plan's Share of Pool's Experience/Assumption Change**
- **Development of Plan's Share of Pool's Market Value of Assets**
- **Schedule of Plan's Amortization Bases**
- **Amortization Schedule and Alternatives**
- **Employer Contribution History**
- **Funding History**

Breakdown of Entry Age Normal Accrued Liability

Active Members	$	5,864,257
Transferred Members		5,121,866
Terminated Members		436,976
Members and Beneficiaries Receiving Payments		66,177,395
Total	$	77,600,494

Allocation of Plan's Share of Pool's Experience/Assumption Change

It is the policy of CalPERS to ensure equity within the risk pools by allocating the pool's experience gains/losses and assumption changes in a manner that treats each employer equitably and maintains benefit security for the members of the System while minimizing substantial variations in employer contributions. The Pool's experience gains/losses and impact of assumption/method changes is allocated to the plan as follows:

1.	Plan's Accrued Liability	$	77,600,494
2.	Projected UAL balance at 6/30/18		24,227,958
3.	Pool's Accrued Liability[1]		22,716,935,494
4.	Sum of Pool's Individual Plan UAL Balances at 6/30/18[1]		5,835,345,753
5.	Pool's 2017/18 Investment & Asset (Gain)/Loss[1]		(166,826,991)
6.	Pool's 2017/18 Other (Gain)/Loss[1]		79,829,358
7.	Plan's Share of Pool's Asset (Gain)/Loss: [(1) - (2)] ÷ [(3) - (4)] × (5)		(527,437)
8.	Plan's Share of Pool's Other (Gain)/Loss: (1) ÷ (3) × (6)		272,695
9.	Plan's New (Gain)/Loss as of 6/30/2018: (7) + (8)		(254,742)
10.	Increase in Pool's Accrued Liability due to Change in Assumptions[1]		623,352,408
11.	Plan's Share of Pool's Change in Assumptions: (1) ÷ (3) × (10)		2,129,357
12.	Increase in Pool's Accrued Liability due to Change in Method[1]		146,565,925
13.	Plan's Share of Pool's Change in Method: (1) ÷ (3) × (12)		500,666

[1] Does not include plans that transferred to Pool on the valuation date.

Development of the Plan's Share of Pool's Market Value of Assets

14.	Plan's UAL: (2) + (9) + (11) + (13)	$	26,603,238
15.	Plan's Share of Pool's MVA: (1) - (14)	$	**50,997,256**

Schedule of Plan's Amortization Bases

On the next page 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, 2018.
- The required employer contributions determined by the valuation are for the fiscal year beginning two years after the valuation date: Fiscal Year 2020-21.

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.

Schedule of Plan's Amortization Bases

									Amounts for Fiscal 2020-21	
Reason for Base	**Date Established**	**Ramp Up/Down 2020-21**	**Escalat-ion Rate**	**Amorti-zation Period**	**Balance 6/30/18**	**Payment 2018-19**	**Balance 6/30/19**	**Payment 2019-20**	**Balance 6/30/20**	**Scheduled Payment for 2020-21**
SHARE OF PRE-2013 POOL UAL	06/30/13	No Ramp	2.750%	17	$8,725,069	$675,106	$8,637,489	$693,458	$8,524,795	$703,421
NON-ASSET (GAIN)/LOSS	06/30/13	100% →	2.750%	25	$(109,539)	$(5,808)	$(111,199)	$(7,459)	$(111,267)	$(7,548)
ASSET (GAIN)/LOSS	06/30/13	100% →	2.750%	25	$9,636,745	$510,974	$9,782,762	$656,198	$9,788,779	$664,041
NON-ASSET (GAIN)/LOSS	06/30/14	100% →	2.750%	26	$81,516	$3,250	$83,860	$4,451	$85,126	$5,629
ASSET (GAIN)/LOSS	06/30/14	100% →	2.750%	26	$(6,449,459)	$(257,098)	$(6,634,977)	$(352,199)	$(6,735,108)	$(445,372)
ASSUMPTION CHANGE	06/30/14	100% →	2.750%	16	$4,316,680	$237,479	$4,373,197	$325,253	$4,342,876	$412,961
NON-ASSET (GAIN)/LOSS	06/30/15	80% ↗	2.750%	27	$(13,726)	$(370)	$(14,304)	$(571)	$(14,715)	$(770)
ASSET (GAIN)/LOSS	06/30/15	80% ↗	2.750%	27	$3,608,316	$97,366	$3,760,182	$150,063	$3,868,168	$202,321
NON-ASSET (GAIN)/LOSS	06/30/16	60% ↗	2.750%	28	$(715,512)	$(9,929)	$(755,327)	$(20,405)	$(787,093)	$(30,932)
ASSET (GAIN)/LOSS	06/30/16	60% ↗	2.750%	28	$4,143,432	$57,497	$4,373,997	$118,163	$4,557,948	$179,121
ASSUMPTION CHANGE	06/30/16	60% ↗	2.750%	18	$1,310,898	$24,737	$1,377,073	$50,829	$1,420,890	$77,360
NON-ASSET (GAIN)/LOSS	06/30/17	40% ↗	2.750%	29	$50,836	$0	$54,395	$756	$57,421	$1,526
ASSET (GAIN)/LOSS	06/30/17	40% ↗	2.750%	29	$(1,876,322)	$0	$(2,007,665)	$(27,893)	$(2,119,349)	$(56,336)
ASSUMPTION CHANGE	06/30/17	40% ↗	2.750%	19	$1,519,024	$(17,066)	$1,643,009	$31,036	$1,725,916	$62,936
NON-ASSET (GAIN)/LOSS	06/30/18	20% ↗	2.750%	30	$272,695	$0	$291,784	$0	$312,209	$4,264
ASSET (GAIN)/LOSS	06/30/18	20% ↗	2.750%	30	$(527,437)	$0	$(564,358)	$0	$(603,863)	$(8,247)
ASSUMPTION CHANGE	06/30/18	20% ↗	2.750%	20	$2,129,357	$(20,906)	$2,300,036	$(21,480)	$2,483,258	$46,299
METHOD CHANGE	06/30/18	20% ↗	2.750%	20	$500,666	$(483)	$536,211	$(496)	$574,259	$10,707
TOTAL					**$26,603,239**	**$1,294,749**	**$27,126,165**	**$1,599,704**	**$27,370,250**	**$1,821,383**

The (gain)/loss bases are the plan's allocated share of the risk pool's (gain)/loss for the fiscal year as disclosed in "Allocation of Plan's Share of Pool's Experience/Assumption Change" earlier in this section. These (gain)/loss bases will be amortized according to Board policy over 30 years with a 5-year ramp-up.

If the total Unfunded Liability is negative (i.e., plan has a surplus), the scheduled payment is $0, because the minimum required contribution under PEPRA must be at least equal to the normal cost.

Amortization Schedule and Alternatives

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

Shown on the following page are future year amortization payments based on: 1) the current amortization schedule reflecting the individual bases and remaining periods shown on the previous page, and 2) alternate "fresh start" amortization schedules using two sample periods that would both result in interest savings relative to the current amortization schedule. Note that the payments under each alternate scenario increase by 2.75 percent for each year into the future.

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

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

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

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

Amortization Schedule and Alternatives

	Current Amortization Schedule		Alternate Schedules			
			15 Year Amortization		10 Year Amortization	
Date	**Balance**	**Payment**	**Balance**	**Payment**	**Balance**	**Payment**
6/30/2020	27,370,250	1,821,383	27,370,250	2,468,625	27,370,250	3,374,743
6/30/2021	27,402,114	2,059,151	26,732,602	2,536,512	25,795,306	3,467,548
6/30/2022	27,190,259	2,255,422	25,980,096	2,606,266	24,014,118	3,562,906
6/30/2023	26,760,550	2,379,373	25,102,761	2,677,938	22,009,608	3,660,886
6/30/2024	26,172,546	2,503,906	24,089,873	2,751,581	19,763,431	3,761,560
6/30/2025	25,414,563	2,572,764	22,929,907	2,827,250	17,255,883	3,865,003
6/30/2026	24,532,295	2,643,515	21,610,470	2,904,999	14,465,805	3,971,290
6/30/2027	23,515,083	2,716,211	20,118,248	2,984,887	11,370,477	4,080,501
6/30/2028	22,351,468	2,790,907	18,438,935	3,066,971	7,945,507	4,192,715
6/30/2029	21,029,134	2,867,657	16,557,161	3,151,313	4,164,715	4,308,014
6/30/2030	19,534,845	2,946,518	14,456,419	3,237,974		
6/30/2031	17,854,383	3,027,547	12,118,982	3,327,018		
6/30/2032	15,972,470	2,996,432	9,525,816	3,418,511		
6/30/2033	13,991,010	2,961,317	6,656,488	3,512,520		
6/30/2034	11,907,170	2,884,304	3,489,063	3,609,115		
6/30/2035	9,757,125	2,753,544				
6/30/2036	7,591,836	2,525,422				
6/30/2037	5,510,948	1,298,063				
6/30/2038	4,553,987	1,147,563				
6/30/2039	3,685,718	1,030,981				
6/30/2040	2,877,262	961,258				
6/30/2041	2,084,338	755,591				
6/30/2042	1,448,652	697,631				
6/30/2043	828,423	541,872				
6/30/2044	325,896	282,295				
6/30/2045	56,701	58,651				
6/30/2046						
6/30/2047						
6/30/2048						
6/30/2049						
Totals		**51,479,280**		**45,081,479**		**38,245,166**
Interest Paid		**24,109,031**		**17,711,230**		**10,874,916**
Estimated Savings				**6,397,801**		**13,234,115**

Employer Contribution History

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

Fiscal Year	Employer Normal Cost	Unfunded Liability Payment ($)
2016 - 17	19.536%	$880,155
2017 - 18	19.723%	$1,073,121
2018 - 19	20.556%	$1,333,203
2019 - 20	21.927%	$1,621,681
2020 - 21	23.674%	$1,821,383

Funding History

The funding history below shows the plan's actuarial accrued liability, share of the pool's market value of assets, share of the pool's unfunded liability, funded ratio, and annual covered payroll.

Valuation Date	Accrued Liability (AL)	Share of Pool's Market Value of Assets (MVA)	Plan's Share of Pool's Unfunded Liability	Funded Ratio	Annual Covered Payroll
06/30/2011	$ 62,199,112	$ 48,955,216	$ 13,243,896	78.7%	$ 2,348,818
06/30/2012	64,389,977	47,401,126	16,988,851	73.6%	2,105,104
06/30/2013	67,347,865	52,144,284	15,203,581	77.4%	1,761,000
06/30/2014	71,813,026	57,225,820	14,587,206	79.7%	1,413,366
06/30/2015	72,406,827	53,994,946	18,411,881	74.6%	1,284,628
06/30/2016	73,300,948	50,198,381	23,102,567	68.5%	1,080,713
06/30/2017	75,101,444	51,499,786	23,601,658	68.6%	1,197,041
06/30/2018	77,600,494	50,997,256	26,603,238	65.7%	1,597,028

Risk Analysis

- **Future Investment Return Scenarios**
- **Discount Rate Sensitivity**
- **Mortality Rate Sensitivity**
- **Inflation Rate Sensitivity**
- **Maturity Measures**
- **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 (2018-19, 2019-20, 2020-21 and 2021-22). 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 2018-19, 2019-20, 2020-21, and 2021-22, 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, 2022. 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 most recently completed Asset Liability Management process. We then selected annual returns that approximate the 5th, 25th, 50th, 75th, and 95th percentiles for these outcomes. For example, of all the 4-year outcomes generated in the stochastic analysis, approximately 25 percent of them had an average annual return of 4.0 percent or less.

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

Assumed Annual Return From 2019-20 through 2021-22	Projected Employer Contributions			
	2021-22	2022-23	2023-24	2024-25
1.0%				
Normal Cost	23.7%	23.7%	23.7%	23.7%
UAL Contribution	$2,135,000	$2,484,000	$2,835,000	$3,264,000
4.0%				
Normal Cost	23.7%	23.7%	23.7%	23.7%
UAL Contribution	$2,097,000	$2,371,000	$2,612,000	$2,895,000
7.0%				
Normal Cost	23.7%	23.7%	23.7%	23.7%
UAL Contribution	$2,059,000	$2,255,000	$2,379,000	$2,504,000
9.0%				
Normal Cost	24.1%	24.5%	25.0%	25.4%
UAL Contribution	$2,037,000	$2,195,000	$2,264,000	$2,312,000
12.0%				
Normal Cost	24.1%	24.5%	25.0%	25.4%
UAL Contribution	$1,999,000	$2,078,000	$2,019,000	$1,888,000

In addition, the projections above reflect the recent changes to the new amortization policy effective with the June 30, 2019 valuation. The projections above incorporate the impact of the CalPERS risk mitigation policy which reduces the discount rate when investment returns are above specified trigger points.

Discount Rate Sensitivity

Shown below are various valuation results as of June 30, 2018 assuming alternate discount rates. 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 percent increase or decrease to the 7.0 percent assumption. This analysis shows the potential plan impacts if the PERF were to realize investment returns of 6.0 percent or 8.0 percent over the long-term.

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

Sensitivity Analysis				
As of June 30, 2018	**Plan's Total Normal Cost**	**Accrued Liability**	**Unfunded Accrued Liability**	**Funded Status**
7.0% (current discount rate)	32.664%	$77,600,494	$26,603,238	65.7%
6.0%	41.172%	$87,186,559	$36,189,303	58.5%
8.0%	26.192%	$69,669,846	$18,672,590	73.2%

Mortality Rate Sensitivity

The following table looks at the change in the June 30, 2018 plan costs and funded ratio under two different longevity scenarios, namely assuming post-retirement rates of mortality are 10 percent lower or 10 percent higher than our current mortality assumptions adopted in 2017. This type of analysis highlights the impact on the plan of improving or worsening mortality over the long-term.

As of June 30, 2018	Current Mortality	10% Lower Mortality Rates	10% Higher Mortality Rates
a) Accrued Liability	$77,600,494	$78,956,335	$76,347,081
b) Market Value of Assets	$50,997,256	$50,997,256	$50,997,256
c) Unfunded Liability (Surplus) [(a)-(b)]	$26,603,238	$27,959,079	$25,349,825
d) Funded Status	65.7%	64.6%	66.8%

A 10 percent increase (decrease) in assumed mortality rates over the long-term would result in approximately a 1.1 percent increase (decrease) to the funded ratio.

Inflation Rate Sensitivity

The following analysis looks at the change in the June 30, 2018 plan costs and funded ratio under two different inflation rate scenarios, namely assuming the liability inflation rate is 1 percent lower or 1 percent higher than the current valuation inflation rate assumption of 2.50%, while holding the discount rate fixed at 7.0%. This type of analysis highlights the impact on the plan of increased or decreased inflation of active salaries and retiree COLAs over the long-term.

As of June 30, 2018	Current Inflation Rate	-1% Inflation Rate	+1% Inflation Rate
a) Accrued Liability	$77,600,494	$73,132,747	$81,009,370
b) Market Value of Assets	$50,997,256	$50,997,256	$50,997,256
c) Unfunded Liability (Surplus) [(a)-(b)]	$26,603,238	$22,135,491	$30,012,114
d) Funded Status	65.7%	69.7%	63.0%

A decrease of 1 percent in the liability inflation rate (2.50 percent to 1.50 percent) reduces the Accrued Liability by 5.8 percent. However, a 1 percent increase in the liability inflation rate (2.50 percent to 3.50 percent) increases the Accrued Liability by 4.4 percent.

Maturity Measures

As pension plans mature they become much more sensitive to risks than plans that are less mature. 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 starts increasing. A mature plan will often have a ratio above 0.60 to 0.65. For both CalPERS and other retirement systems in the United States, these ratios have been steadily increasing in recent years.

Ratio of Retiree Accrued Liability to Total Accrued Liability	June 30, 2017	June 30, 2018
1. Retired Accrued Liability	64,434,388	66,177,395
2. Total Accrued Liability	75,101,444	77,600,494
3. Ratio of Retiree AL to Total AL [(1) / (2)]	0.86	0.85

Another way to look at the maturity level of CalPERS and its plans is to look at the ratio of actives to retirees. 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 starts declining. 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, 2017	June 30, 2018
1. Number of Actives	9	12
2. Number of Retirees	112	116
3. Support Ratio [(1) / (2)]	0.08	0.10

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

Asset Volatility Ratio (AVR)

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

Liability Volatility Ratio (LVR)

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

Contribution Volatility		**June 30, 2017**		**June 30, 2018**
1. Market Value of Assets	$	51,499,786	$	50,997,256
2. Payroll		1,197,041		1,597,028
3. Asset Volatility Ratio (AVR) [(1) / (2)]		43.0		31.9
4. Accrued Liability	$	75,101,444	$	77,600,494
5. Liability Volatility Ratio (LVR) [(4) / (2)]		62.7		48.6
6. Accrued Liability (7.00% discount rate)		77,134,675		77,600,494
7. Projected Liability Volatility Ratio [(6) / (2)]		64.4		48.6

Hypothetical Termination Liability

The hypothetical termination liability is an estimate of the financial position of the plan had the contract with CalPERS been terminated as of June 30, 2018. The plan liability on a termination basis is calculated differently compared to the plan's ongoing funding liability. For the 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 funding risk is limited. However, this asset allocation has a lower expected rate of return than the PERF and consequently, a lower discount rate is assumed. The lower discount rate for the Terminated Agency Pool results in higher liabilities for terminated plans.

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

Market Value of Assets (MVA)	Hypothetical Termination Liability[1,2] @ 2.50%	Funded Status	Unfunded Termination Liability @ 2.50%	Hypothetical Termination Liability[1,2] @ 3.25%	Funded Status	Unfunded Termination Liability @ 3.25%
$50,997,256	$139,486,742	36.6%	$88,489,486	$128,687,888	39.6%	$77,690,632

[1] The hypothetical liabilities calculated above include a 5 percent mortality contingency load in accordance with Board policy. Other actuarial assumptions can be found in Appendix A of the Section 2 report.

[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 2.91 percent on June 30, 2018, and was 2.83 percent on January 31, 2019.

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.

Participant Data

The table below shows a summary of your plan's member data upon which this valuation is based:

		June 30, 2017		June 30, 2018
Reported Payroll	$	1,197,041	$	1,597,028
Projected Payroll for Contribution Purposes	$	1,303,282	$	1,732,439
Number of Members				
Active		9		12
Transferred		29		23
Separated		11		9
Retired		112		116

List of Class 1 Benefit Provisions

This plan has the additional Class 1 Benefit Provisions:

- One Year Final Compensation (FAC 1)

Plan's Major Benefit Options

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

	Benefit Group						
Member Category	Police	Fire	Fire	Fire	Police	Police	Police
Demographics							
Actives	Yes	No	No	No	No	No	No
Transfers/Separated	Yes	Yes	No	No	No	No	No
Receiving	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Benefit Provision							
Benefit Formula	3% @ 50	3% @ 50	1/2 @ 55	2% @ 50	1/2 @ 55	1/2 @ 55	2% @ 50
Social Security Coverage	No	No	No	No	No	No	No
Full/Modified	Full	Full	Full	Full	Full	Full	Full
Employee Contribution Rate	9.00%						
Final Average Compensation Period	One Year	One Year	One Year	One Year	One Year	Three Year	One Year
Sick Leave Credit	Yes	Yes	Yes	Yes	Yes	No	Yes
Non-Industrial Disability	Standard	Standard	Standard	Standard	Standard	Standard	Standard
Industrial Disability	Standard	Standard	Standard	Standard	Standard	Standard	Standard
Pre-Retirement Death Benefits							
Optional Settlement 2	Yes	Yes	No	No	No	No	No
1959 Survivor Benefit Level	Level 4	Level 4	Level 4	Level 4	Level 4	No	Level 4
Special	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Alternate (firefighters)	No	No	No	No	No	No	No
Post-Retirement Death Benefits							
Lump Sum	$500	$500	$500	$500	$500	$500	$500
Survivor Allowance (PRSA)	No	No	No	No	No	No	No
COLA	2%	2%	2%	2%	2%	2%	2%

Section 2

CALIFORNIA PUBLIC EMPLOYEES' RETIREMENT SYSTEM

Section 2 may be found on the CalPERS website (www.calpers.ca.gov) in the Forms and Publications section