

Judges' Retirement System II

Actuarial Valuation

As of June 30, 2017



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Actuarial Certification



February 2018

To the best of our knowledge, this report is complete and accurate and contains sufficient information to fully and fairly disclose the actuarial funded condition of the Judges' Retirement System II. This valuation is based on the member and financial data as of June 30, 2017 provided by the various CalPERS databases and the benefits under this plan with CalPERS as of the date this report was produced. In our opinion, this valuation has been performed in accordance with generally accepted actuarial principles, and in accordance with the standards of practice prescribed by the Actuarial Standards Board. The assumptions and methods are internally consistent and reasonable for this plan, as prescribed by the CalPERS Board of Administration according to provisions set forth in the California Public Employee's Retirement Law.

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

A handwritten signature in black ink, appearing to read "Jean Fannjiang".

Jean Fannjiang, ASA, MAAA
Senior Pension Actuary, CalPERS

A handwritten signature in black ink, appearing to read "Scott Terando".

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

Highlights and Executive Summary

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Highlights and Executive Summary

INTRODUCTION

This is the actuarial valuation report as of June 30, 2017 for the Judges' Retirement System II. The actuarial valuation is used to set the Fiscal Year 2018-19 required employer contribution rates. The System began on November 9, 1994 to provide retirement and ancillary benefits to judges elected or appointed on or after that date. The employer contribution rate from the inception of the plan until June 30, 1996 was set by State statute. Subsequently, the employer contribution rate was determined through an actuarial valuation process.

On January 1, 2013, the Public Employees' Pension Reform Act of 2013 (PEPRA) took effect. For more information on PEPRA, please refer to the CalPERS website.

PURPOSE OF REPORT

This actuarial valuation of the Judges' Retirement System II of the State of California was performed by CalPERS staff actuaries as of June 30, 2017 in order to:

- Set forth the assets, accrued liabilities, and funded status of this plan as of June 30, 2017.
- Establish the Required Employer Contribution and the Minimum Employer Contribution for the system for the fiscal year July 1, 2018 through June 30, 2019.
- Provide actuarial information as of June 30, 2017, 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. The measurements shown in this actuarial valuation may not be applicable for other purposes.

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).

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

- A "Deterministic Stress Test," projecting future results under different investment income scenarios
- A "Sensitivity Analysis," showing the impact on current valuation results using a 1 percent plus or minus change in the discount rate.

Highlights and Executive Summary (continued)

REQUIRED EMPLOYER CONTRIBUTION

This actuarial valuation sets forth the employer contribution rate for the fiscal year July 1, 2018 through June 30, 2019. The following table shows the Actuarially Determined Employer Contribution. The Actuarially Determined Employer Contribution is shown in dollars and as a percentage of projected payroll.

Actuarially Determined Employer Contribution

	Fiscal Year 2017/18	Fiscal Year 2018/19
1) Contribution in Projected Dollars		
a) Total Normal Cost	\$103,261,569	\$101,053,247
b) Employee Contribution	25,839,379	27,117,549
c) Employer Normal Cost [(1a) - (1b)]	\$77,422,190	\$73,935,698
d) Unfunded Accrued Liability Payment	1,758,683	1,926,552
e) Actuarially Determined Employer Contribution [(1c) + (1d)]	\$79,180,873	\$75,862,250
Projected Annual Payroll for Contribution Year	\$299,830,339	\$307,629,600
2) Contribution as a Percentage of Payroll		
a) Total Normal Cost	34.440%	32.849%
b) Employee Contribution ¹	8.618%	8.815%
c) Employer Normal Cost [(2a) - (2b)]	25.822%	24.034%
d) Unfunded Accrued Liability Payment	0.587%	0.626%
e) Actuarially Determined Employer Contribution [(2c) + (2d)]	26.409%	24.660%
MINIMUM EMPLOYER CONTRIBUTION RATE²	26.409%	24.660%

(1) This is the expected average contribution rate between Classic and PEPRAs members.

(2) The Minimum Employer Contribution Rate under PEPRAs is the greater of the Actuarially Determined Employer Contribution or the Employer Normal Cost.

PLAN'S FUNDED STATUS

The table below summarizes the funded status of the Judges' Retirement System II as of June 30.

	June 30, 2016	June 30, 2017
1) Present Value of Projected Benefits	\$1,972,774,938	\$2,027,435,645
2) Entry Age Normal Accrued Liability	1,272,750,990	1,365,862,092
3) Market Value of Assets (MVA)	1,172,952,527	1,356,099,297
4) Unfunded Accrued Liability [(2) - (3)]	\$99,798,463	\$9,762,795
5) Funded Ratio [(3) / (2)]	92.2%	99.3%

This measure of funded status is an assessment of the need for future employer contributions. The Unfunded Accrued Liability, if positive, 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. This measure of funded status is not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the employer's benefit obligations.

Highlights and Executive Summary (continued)

CHANGES SINCE THE PRIOR YEAR'S VALUATION

Actuarial Assumptions

Consistent with the decision made by the CalPERS Board of Administration for plans participating in the Public Employees' Retirement Fund (PERF), the mortality assumption was changed in this valuation. The mortality table used in last year's valuation was developed from February 2014 experience study and includes 20 years of projected on-going mortality improvement using the Scale BB table published by the Society of Actuaries. The new mortality table used in this valuation was developed from the December 2017 experience study and includes 15 years of projected on-going mortality improvement using 90 percent of Scale MP 2016 published by the Society of Actuaries.

The inflation assumption is reduced from 2.75 percent to 2.5 percent. The assumptions for individual Salary increases and overall Payroll Growth are reduced from 3.0 percent to 2.75 percent. The Overall Payroll Growth assumption is used in projecting the payroll over which the unfunded liability is amortized.

A complete description of the actuarial methods and assumptions used in the June 30, 2017 valuation may be found in Appendix A of this report.

Plan Provisions

No changes were made since the prior valuation. A complete description of the principal plan provisions used in the June 30, 2017 valuation may be found in Appendix B of this report.

SUBSEQUENT EVENTS

Plan Data

In the case of Robert M. Mallano, et al. v. John Chiang, Controller of the State of California (SCO), the Judges' Retirement System (JRS), and the Judges' Retirement System II (JRS II), the judge issued a Statement of Decision which orders judicial salary increases to be given to the judges for the fiscal years 2008-09, 2009-10, 2010-11 and 2013-14 plus 10 percent interest per annum for each year that the judicial salaries were not increased within those fiscal years. The increases and amounts owed have not been calculated yet. We anticipate the impact of this lawsuit to be reflected in the valuation following the decision.

Assets

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Assets

RECONCILIATION OF THE MARKET VALUE OF ASSETS

The following displays the change in the Market Value of Assets from the prior valuation date to June 30, 2017.

	Market Value
Beginning Balance as of June 30, 2016	\$1,172,952,527
Prior Period Adjustment	0
Adjusted Beginning Balance as of June 30, 2016	\$1,172,952,527
Member Contributions	\$25,075,835
Employer Contributions	67,102,134
Benefit Payments	(22,325,743)
Refunds	(80,660)
Administration Costs	(1,682,346)
Investment Earnings ¹	115,057,550
Ending Balance as of June 30, 2017	<u>\$1,356,099,297</u>

(1) Net Fund return for the 2016-2017 fiscal year is 9.39%.

ASSET ALLOCATION

Shown below is the Market Value of Assets, by asset type, as of the valuation date.

	June 30, 2017
Cash	\$4,121,584
Investments at Market Value	
Short-Term Investments	\$78,787,288
Global Equity Securities	768,394,915
Global Debt Securities	529,938,434
Real Assets	—
Private Equity	—
Securities Lending Collateral	17,979,310
Capital Assets, Net & Other Assets	—
Subtotal of Investments	\$1,395,099,947
Accounts Receivable	
Members	\$632,350
Employers	6,537,157
Investment Sales & Other	27,936,924
Interest & Dividends	4,808,833
Due from Other Funds	149,151
Note Receivable	—
Other Program	2,877
Subtotal of Accounts Receivable	\$40,067,292
Liabilities (Included Security Lending Collateral)	(83,189,526)
Fund Balance at Market Value on 6/30/2017	<u>\$1,356,099,297</u>

Liabilities and Required Employer Contributions

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Liabilities and Required Employer Contributions

COMPARISON OF CURRENT AND PRIOR YEAR RESULTS

Shown below are the comparisons of key valuation results for the current valuation date compared to corresponding values from the prior valuation date.

	June 30, 2016	June 30, 2017
1) Members Included in the Valuation		
a) Active Members	1,488	1,511
b) Inactive Members	2	1
c) Receiving Payments	120	161
d) Total	1,610	1,673
2) Payroll		
a) Covered Annual Payroll	\$282,618,851	\$291,383,167
b) Projected Covered Annual Payroll	299,830,339	307,629,600
c) Average Covered Annual Payroll [(2a) / (1a)]	\$189,932	\$192,841
3) Age and Service for Actives		
a) Average Attained Age for Actives	58.87	59.16
b) Average Service for Actives	9.57	9.86
4) Present Value of Benefits at Valuation Date		
a) Active Members	\$1,827,249,187	\$1,819,438,532
b) Inactive Members	983,312	648,377
c) Receiving Benefits	144,542,439	207,348,736
d) Total	\$1,972,774,938	\$2,027,435,645
5) Present Value of Future Employee Contributions	\$185,717,288	\$189,561,612
6) Present Value of Future Employer Normal Cost	\$514,306,660	\$472,011,941
7) Accrued Actuarial Liability		
a) Active Members	\$1,127,225,239	\$1,157,864,979
b) Inactive Members	983,312	648,377
c) Receiving Benefits	144,542,439	207,348,736
d) Total	\$1,272,750,990	\$1,365,862,092
8) Assets		
a) Market Value of Assets	\$1,172,952,527	\$1,356,099,297
b) Unfunded Accrued Actuarial Liability [(7d) - (8a)]	\$99,798,463	\$9,762,795
c) Funded Ratio [(8a) / (7d)]	92.2%	99.3%

Liabilities and Required Employer Contributions (continued)

(GAIN)/LOSS ANALYSIS

Shown below is an analysis of the (Gain)/Loss for the fiscal year ending on the valuation date. The Gain or Loss is shown separately for contributions, assets, and liabilities.

1) Total (Gain)/Loss for the Year	
a) Unfunded Accrued Liability (UAL) as of 6/30/16	\$99,798,463
b) Expected Payment on UAL During 2016/2017	(8,209,846)
c) Interest through 6/30/17 [$1.0650 \times 1a - ((1.0650)^{1/2} - 1) \times 1b$]	6,749,520
d) Expected UAL Before All Other Changes [$1a - 1b + 1c$]	\$114,757,829
e) Change Due to Revised Actuarial Methods	—
f) Change Due to New Actuarial Assumptions	(43,081,651)
g) Expected UAL After All Changes [$1d + 1e + 1f$]	\$71,676,178
h) Actual Unfunded Accrued Liability as of 6/30/17	9,762,795
i) Total (Gain)/Loss for 2016/2017 [1h - 1g]	(\$61,913,383)
2) Contribution (Gain)/Loss for the Year	
a) Expected Contribution (Employer and Employee)	\$92,044,104
b) Interest on Expected Contributions [$((1.0650)^{1/2} - 1) \times 2a$]	2,944,341
c) Actuarial Contribution	92,177,969
d) Interest on Actual Contributions [$((1.0650)^{1/2} - 1) \times 2c$]	2,948,623
e) Contribution (Gain)/Loss [(2a + 2b) - (2c + 2d)]	(\$138,147)
3) Asset (Gain)/Loss for the Year	
a) Market Value of Assets as of 6/30/16	\$1,172,952,527
b) Contributions Received	92,177,969
c) Benefits, Refunds Paid and Administrative Costs	(24,088,749)
d) Expected Interest [$0.0650 \times 3a + ((1.0650)^{1/2} - 1) \times (3b + 3c)$]	78,419,978
e) Expected Assets as of 6/30/17 [$3a + 3b + 3c + 3d$]	1,319,461,725
f) Actual Market Value of Assets as of 6/30/17	1,356,099,297
g) Asset (Gain)/Loss [3e - 3f]	(\$36,637,572)
4) Liability (Gain)/Loss for the Year	
a) Total (Gain)/Loss (1i)	(\$61,913,383)
b) Contribution (Gain)/Loss (2e)	(138,147)
c) Asset (Gain)/Loss (3g)	(36,637,572)
d) Liability (Gain)/Loss [4a - 4b - 4c]	(\$25,137,664)

Liabilities and Required Employer Contributions (continued)

SCHEDULE OF AMORTIZATION BASES

There is a one-year lag between the valuation date and the start of the contribution fiscal year.

- The assets, liabilities, and funded status of the plan are measured as of the valuation date: June 30, 2017.
- The required employer contributions determined by the valuation are for the fiscal year beginning one year after the valuation date: Fiscal Year 2018-19.

This one-year lag is necessary due to the amount of time needed to extract and test the membership and financial data, and the need to provide 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 one year from the valuation date to the first day of the fiscal year for which the contribution is being determined. The UAL is rolled forward one year by subtracting the expected payment on the UAL for the prior fiscal year and adjusting for interest. The expected payment on the UAL for the prior fiscal year is equal to the Expected Employer Contribution for that fiscal year minus the Expected Normal Cost for the year. The Employer Contribution for the prior fiscal year is determined by the actuarial valuation one year ago. The Normal Cost Rate for the prior fiscal year is assumed to be the same as the rate determined by the current valuation. All expected dollar amounts are determined by multiplying the rate by the expected payroll for the applicable fiscal year, based on payroll as of the valuation date.

The schedule below shows the development of the proposed payment on the Amortization Bases. Please refer to Appendix A for an explanation of how amortization periods are determined.

Reason For Base	Date Established	Amortization Period	Balance on 6/30/17	Expected Payment on UAL 17-18	Balance on 6/30/18	Scheduled Payment Fiscal Year 2018-2019	% of Projected Payroll
Fresh Start	6/30/2017	2	\$9,762,795	\$6,520,849	\$3,667,936	\$1,926,552	0.626%
Total			\$9,762,795	\$6,520,849	\$3,667,936	\$1,926,552	0.626%

The Judges' Retirement System II funded status increased from 92.2 percent as of June 30, 2016 to 99.3 percent as of June 30, 2017. The result of the funded status increase was mainly due to the asset gains derived from the market earned 9.39 percent higher than the actuarial discount rate assumption of 6.5 percent during the Fiscal Year 2016-17 and the liability gains derived from changing of the actuarial assumptions in this valuation. Since the Unfunded Accrued Liability would be paid off in less than two years, a decision of fresh start of all bases was made.

RECONCILIATION OF REQUIRED EMPLOYER CONTRIBUTIONS

This table illustrates how the Actuarially Determined Employer Contribution is calculated and, more importantly, why the Actuarially Determined Employer Contribution differs this year from the previous year.

	Percentage of Projected Payroll	Estimated \$ Based on Projected Payroll
1) 2017-18 Actuarially Determined Employer Contribution (from prior year annual report)	26.409%	\$79,180,873
2) Effect of Changes Since the Prior Annual Valuation		
a) Effect of Change in Payroll	—	\$2,059,707
b) Effect of (Gain)/Loss	0.071%	220,529
c) Effect of Plan Changes	—	—
d) Effect of Method Changes	—	—
e) Effect of Assumption Changes	(1.820%)	(5,598,859)
f) Net Effect of Changes [Sum of a - e]	(1.749%)	(\$3,318,623)
3) 2018-19 Actuarially Determined Employer Contribution¹	24.660%	\$75,862,250

(1) The rate of 24.660% is the Actuarially Determined Employer Contribution which is equal to the Minimum Employer Contribution Rate under PEPRA.

Liabilities and Required Employer Contributions (continued)

REQUIRED EMPLOYER CONTRIBUTION RATE HISTORY

This table provides the 10-year history of Actuarially Determined Employer Contributions for the Judges' Retirement System II.

Fiscal Year	Actuarially Determined Employer Contribution	Minimum Employer Contribution Rate
2018-19	24.660%	24.660%
2017-18	26.409%	26.409%
2016-17	23.142%	23.185%
2015-16	21.866%	23.370%
2014-15	24.615%	24.615%
2013-14	22.687%	22.687%
2012-13	22.837%	N/A
2011-12	23.441%	N/A
2010-11	24.041%	N/A
2009-10	20.358%	N/A

FUNDING HISTORY

The Funding History below shows the recent history of the Actuarial Accrued Liability, the Market Value of Assets, Funded Ratio and the Annual Covered Payroll.

Valuation Date	Entry Age Normal Accrued Liability	Market Value of Assets (MVA)	Funded Ratio (MVA)	Projected Annual Covered Payroll
6/30/17	\$1,365,862,092	\$1,356,099,297	99.3%	\$307,629,600
6/30/16	1,272,750,990	1,172,952,527	92.2%	299,830,339
6/30/15	1,081,824,423	1,084,141,932	100.2%	289,305,463
6/30/14	950,642,328	1,013,839,948	106.6%	266,907,427
6/30/13	837,197,578	795,966,486	95.1%	256,724,949
6/30/12	702,732,271	655,383,900	93.3%	244,788,249
6/30/11	609,562,110	575,978,052	94.5%	243,635,717
6/30/10	520,687,470	422,100,782	81.1%	226,710,927
6/30/09	450,547,115	315,576,578	70.0%	211,942,734
6/30/08	366,513,989	325,451,000	88.8%	190,413,674

TOTAL NORMAL COST BY GROUP

The Public Employees' Pension Reform Act of 2013 requires that new employees pay at least 50 percent of the total annual normal cost and that current employees approach the same goal through collective bargaining. Please refer to the CalPERS website for more details.

The following table illustrates the normal cost by employee group. The Employee Contribution for the PEPRA group will change if the Total Normal Cost for the PEPRA group changes by 1 percent or more from the Base Total Normal Cost Rate. The Base Total Normal Cost Rate for PEPRA members was 33.562 percent. The new updated Total PEPRA Normal Cost is 32.104 percent. This results in the new PEPRA member contribution as 16.00 percent for the Fiscal Year 2018/19

	Fiscal Year 2017/18	Fiscal Year 2018/19
Total Classic Normal Cost	34.333%	32.677%
Classic Employee Contribution	8.000%	8.000%
Total PEPRA Normal Cost	33.562%	32.104%
PEPRA Employee Contribution	16.750%	16.000%

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RISK ANALYSIS

VOLATILITY RATIOS

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

Asset Volatility Ratio

Plans that have higher asset to payroll ratios produce more volatile employer rates due to investment return. For example, a plan with an asset to payroll ratio of 8 may experience twice the contribution volatility due to investment return volatility than a plan with an asset to payroll ratio of 4. Below we have shown your asset volatility ratio, a measure of the plan's current rate 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

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

Rate Volatility	As of June 30, 2017
1) Market Value of Assets	\$1,356,099,297
2) Payroll	\$291,383,167
3) Asset Volatility Ratio [(1) / (2)]	4.7
4) Accrued Liability	\$1,365,862,092
5) Liability Volatility Ratio [(4) / (2)]	4.7

ANALYSIS OF FUTURE INVESTMENT RETURN SCENARIOS

The final investment return of the fund for the fiscal year 2017-18 will not be available until October 2018. Due to the timeline of this valuation, it is determined that for the purposes of projecting the employer contribution rate for 2019-20, the actuarial assumed rate of return 6.5 percent is used as the estimated investment return for fiscal year 2017-18. This estimated return is anticipated to neither increase nor decrease the employer contribution rate for fiscal year 2019-20.

The investment return realized during a fiscal year first affects the contribution rate for the fiscal year one year later. Specifically, the investment return for 2017-18 will first be reflected in the June 30, 2018 actuarial valuation that will be used to set the 2019-20 employer contribution rates, the 2018-19 investment return will first be reflected in the June 30, 2019 actuarial valuation that will be used to set the 2020-21 employer contribution rates and so forth.

Based on a 6.5 percent investment return for fiscal year 2017-18 and assuming that all other actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur between now and the beginning of the fiscal year 2019-20, the effect on the 2019-20 Employer Rate is as follows:

Estimated 2019-20 Employer Rate	Estimated Increase in Employer Rate Between 2018-19 and 2019-20
24.7%	0.0%

Risk Analysis (continued)

ANALYSIS OF FUTURE INVESTMENT RETURN SCENARIOS (CONTINUED)

As part of this report, a sensitivity analysis was performed to determine the effects of various investment returns during fiscal years 2018-19, 2019-20, and 2020-21 on the 2020-21, 2021-22, and 2022-23 Minimum Employer Contribution Rates. Once again, the projected rate increases assume that all other actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur.

The five alternate annual investment returns are negative 5.0 percent, 1.5 percent, 6.5 percent, 10.0 percent and 16.0 percent.

Alternate investment returns were chosen based on stochastic analysis of possible future investment returns from July 1, 2018 through June 30, 2021. Using the expected returns and volatility of the asset classes in which the funds are invested, we produced ten thousand stochastic outcomes for this period. We then selected annual returns that approximate the 5th, 25th, 50th, 75th, and 95th percentiles for these outcomes. For example, of all of the three year outcomes generated in the stochastic analysis, approximately 25 percent of them had an average annual return of 1.5 percent or less.

Required contributions outside of this range are also possible. In particular, while it is unlikely that investment returns will average less than negative 5.0 percent or greater than 16.0 percent over this three year period, the possibility of a single investment return less than negative 5.0 percent or greater than 16.0 percent in any given year is much greater.

The table below shows the estimated changes in the Employer rate for 2020-21, 2021-22, and 2022-23 fiscal years under the five different scenarios.

2018-2021 Investment Return Scenario	Estimated Actuarially Determined Employer Contribution/Minimum Employer Rate			Total Estimated Increase in Minimum Employer Rate Between 2020-21 and 2022-23
	2020-21	2021-22	2022-23	
(5.00%) (5 th Percentile)	24.8%	26.3%	28.5%	3.7%
1.50% (25 th Percentile)	24.4%	25.0%	26.1%	1.7%
6.50%	24.0%	24.0%	24.0%	0.0%
10.00% (75 th Percentile)	24.0%	24.0%	24.0%	0.0%
16.00% (95 th Percentile)	24.0%	24.0%	24.0%	0.0%

For the 6.5 percent return scenario, the plan would be fully funded. For the 75th and 95th percentile, the plan would be in surplus. The projected rates reflect the Minimum Employer Contribution Rate according to PEPRA.

ANALYSIS OF DISCOUNT RATE SENSITIVITY

The following analysis looks at the 2018-19 employer contribution rates under two different discount rate scenarios. Shown below are the employer contribution rates assuming discount rates that are 1 percent lower and 1 percent higher than the current valuation discount rate. This analysis gives an indication of the potential required employer contribution rates if the fund were to realize investment returns of 5.50 percent or 7.50 percent over the long-term.

This type of analysis gives the reader a sense of the long-term risk to the employer contribution rates.

2018-19 Employer Contribution Rate			
As of June 30, 2017	5.50% Discount Rate (-1%)	6.50% Return (Assumed Rate)	7.50% Discount Rate (+1%)
Total Normal Cost	30.429%	24.034%	18.991%
UAL Payment	1.692%	0.626%	(0.408%)
Actuarially Determined Employer Contribution	32.121%	24.660%	18.583%
Minimum Employer Contribution Rate	32.121%	24.660%	18.991%

The table above includes the impact of G.C. Section 7522.22 (PEPRA). The minimum contribution shown is equal to the normal cost shown for each discount rate in the table above where the Unfunded Accrued Liability Payment is negative.

Risk Analysis (continued)

ANALYSIS OF DISCOUNT RATE SENSITIVITY (CONTINUED)

The following presents the funded status of the Judges Retirement System II calculated using the discount rate of 6.50 percent, as well as what the Judges Retirement System II's funded status would be if it were calculated using a discount rate that is 1-percentage-point lower, 5.50 percent, or 1-percentage-point higher, 7.50 percent, than the current rate:

Funded Status			
As of June 30, 2017	5.50% Discount Rate (-1%)	6.50% Return (Assumed Rate)	7.50% Discount Rate (+1%)
AL	\$1,540,198,765	\$1,365,862,092	\$1,225,711,051
MVA	1,356,099,297	1,356,099,297	1,356,099,297
UAL	184,099,467	9,762,795	(130,388,246)
Funded Status	88.0%	99.3%	110.6%

Appendix A

Statement of Actuarial Methods and Assumptions

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.

ACTUARIAL FUNDING METHOD

The actuarial funding method used for the Retirement Program is the Entry Age Normal Cost Method. Under this method, projected benefits are determined for all members and the associated liabilities are spread in a manner that produces level annual cost as a percent of pay in each year from the age of hire (entry age) to the assumed retirement age. 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.

The excess of the total 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 an amortization of the unfunded liability as a level percentage of assumed future payrolls. Commencing with the June 30, 2013 valuation all new gains or losses are tracked and amortized over a fixed 30-year period with a five year ramp up at the beginning and a five year ramp down at the end of the amortization period. All changes in liability due to plan amendments, changes in actuarial assumptions, or changes in actuarial methodology are amortized separately over a 20-year period with a five year ramp up at the beginning and a five year ramp down at the end of the amortization period.

The five 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 an “ultimate” payment which begins in year five. The five year ramp down means that the reverse is true in the final four years of the amortization period. The “ultimate” payment increases each year based on the annual payroll growth assumption.

Exceptions for Inconsistencies

An exception to the funding rules above is used whenever the application of such rules results in inconsistencies. In these cases a “fresh start” approach is used. This simply means that the current unfunded actuarial liability is projected and amortized over a set number of years. A fresh start is needed in the following situations:

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

It should be noted that the actuary may choose to use a fresh start under other circumstances. In all cases, the fresh start period is set by the actuary at what they deem appropriate and will not be less than five years nor greater than 30 years.

Valuation Year June 30	Funding Method
1997-Current	Entry Age Normal

Appendix A - Statement of Actuarial Methods and Assumptions (continued)

ASSET VALUATION METHOD

The value of assets equals the market value of the fund.

ACTUARIAL ASSUMPTIONS

The actuarial assumptions used in the valuation are shown below.

The demographic assumptions used in the valuation, with the exception of the mortality assumption, have been in place for many years and have not produced significant experience gains or losses for the plan. The actuary has concluded that the continued use of these assumptions is reasonable for valuation purposes. More information on the mortality assumption is available in the mortality assumption section of this appendix.

The assumptions for inflation, individual salary increase and overall payroll growth are based on the 2017 experience study performed by CalPERS staff based on the Public Employees' Retirement Fund (PERF) and adopted by the CalPERS Board of Administration in December 2017. The discount rate (investment return assumption) for this valuation is 6.5 percent. The decision was primarily based on reduced capital market assumptions provided by external investment consultants and CalPERS investment staff in December, 2016.

ECONOMIC ASSUMPTIONS

The following table identifies the economic assumptions used in the valuation.

June 30, 2017	
Gross Investment Return	6.65%
Less Administrative Expense	0.15%
Net Investment Return, compounded annually	6.50%
Individual Salary Increases, compounded annually	2.75%
Overall Payroll Growth, compounded annually ¹	2.75%
Inflation	2.50%

(1) The Overall Payroll Growth assumption is used in projecting the payroll over which the unfunded liability is amortized.

Interest Rate

The following table provides a brief history of the Investment Return Assumption.

Valuation Year	Investment Return
2016-Current	6.50%
2011-2015	7.00%
2003-2010	7.25%
1998-2002	7.75%
1997	8.50%

Inflation, Individual Salary Increase, and Payroll Growth

The following table provides a brief history of the Inflation, Individual Salary Increase, and Payroll Growth Assumptions.

Valuation Year	Inflation	Individual Salary Increase	Payroll Growth
2017	2.50%	2.75%	2.75%
2011-2016	2.75%	3.00%	3.00%
2003-2010	3.00%	3.25%	3.25%
1998-2002	3.50%	3.75%	3.75%
1997	4.50%	5.75%	4.50%

Appendix A - Statement of Actuarial Methods and Assumptions (continued)

DEMOGRAPHIC ASSUMPTIONS

Service Retirement

The table below illustrates the assumptions used in the valuation to determine the probability of a judge retiring out of the system.

Service Greater than 20 Years	
Age	Rate
Below 65	0.000
65	0.750
66	0.400
67	0.300
68	0.350
69	0.500
70 ¹	1.000

(1) For Judges age 70 and older with 5 or more years of service the probability of retirement is 100 percent.

Withdrawal

Rates vary by age and years of service as shown in the table below.

Entry Age	Years of Service					
	0 - 1	1 - 2	2 - 3	3 - 4	4 - 5	5 or more
35	0.00525	0.00525	0.00525	0.00525	0.00525	0.00225
40	0.00450	0.00450	0.00450	0.00450	0.00450	0.00375
45	0.00375	0.00375	0.00375	0.00375	0.00375	0.00750
50	0.00375	0.00375	0.00375	0.00375	0.00375	0.00900
55	0.00000	0.00000	0.00000	0.00000	0.00000	0.00825
60	0.00000	0.00000	0.00000	0.00000	0.00000	0.00750

Pre-Retirement Non-Industrial Disability

Rates vary by age as shown in the table below.

Attained Age	Non-Industrial Disability	
	Male	Female
35	0.00000	0.00000
40	0.00100	0.00100
45	0.00190	0.00190
50	0.00320	0.00320
55	0.00540	0.00540
60	0.00850	0.00850
65	0.01220	0.01220
70	0.00000	0.00000

The mortality assumptions are based on mortality rates resulting from the most recent CalPERS Experience Study adopted by the CalPERS Board. For purposes of the mortality rates, the revised rates include 15 years of projected on-going mortality improvement using 90 percent of Scale MP 2016 published by the Society of Actuaries. For more details, please refer to the experience study report that can be found on the CalPERS website.

Appendix A - Statement of Actuarial Methods and Assumptions (continued)

DEMOGRAPHIC ASSUMPTIONS (CONTINUED)

Pre-Retirement Mortality

Attained Age	Male	Female
35	0.00049	0.00027
40	0.00064	0.00037
45	0.00080	0.00054
50	0.00116	0.00079
55	0.00172	0.00120
60	0.00255	0.00166
65	0.00363	0.00233
70	0.00623	0.00388

Post-Retirement Mortality

Attained Age	Standard		Non-Industrial Disability	
	Male	Female	Male	Female
35	0.00049	0.00027	0.00049	0.00027
40	0.00064	0.00037	0.00064	0.00037
45	0.00080	0.00054	0.00080	0.00054
50	0.00372	0.00346	0.01183	0.01083
55	0.00437	0.00410	0.01613	0.01178
60	0.00671	0.00476	0.02166	0.01404
65	0.00928	0.00637	0.02733	0.01757
70	0.01339	0.00926	0.03358	0.02183
75	0.02316	0.01635	0.04277	0.02969
80	0.03977	0.03007	0.06272	0.04641
85	0.07122	0.05418	0.09793	0.07847
90	0.13044	0.10089	0.14616	0.13220
95	0.21658	0.17698	0.21658	0.21015
100	0.32222	0.28151	0.32222	0.32226
105	0.46691	0.43491	0.46691	0.43491
110	1.00000	1.00000	1.00000	1.00000

Industrial Mortality

Rates are zero.

Industrial Disability

Rates are zero.

Marital Status

Probability of being married at service retirement or disability retirement is 90 percent.

Age of Spouse

Assumes that female spouses are three years younger than male spouses are.

Internal Revenue Code Section 415

The limitations on benefits imposed by Internal Revenue Code Section 415 were taken into account in this valuation. The effect of these limitations has been deemed immaterial on the overall results of this valuation.

Internal Revenue Code Section 401(a)(17)

The limitations on compensation imposed by Internal Revenue Code Section 401(a) (17) were taken into account in this valuation. It was determined that this change generally had minimal impact on the employer rates and no special amortization base has been created.

Appendix B

Summary of Principal Plan Provisions

BACKGROUND

Judges' Retirement System II (JRS II) was established in 1994 to create a fully funded, actuarially sound retirement system for judges appointed or elected on or after November 9, 1994. This system provides a unique combination of two basic types of retirement allowances: a defined benefit plan and a monetary credit plan. The defined benefit plan provides a lifetime monthly retirement allowance of up to 75 percent of final compensation. The monetary credit plan allows for a refund of member contributions, employer contributions (see below) and interest at retirement.

MEMBERSHIP

The JRS II provides retirement, death, withdrawal and disability benefits for Supreme and Appellate Court Justices, Superior Court Judges, and Municipal Court Judges who are appointed or elected on or after November 9, 1994, and their beneficiaries.

MEMBERSHIP CONTRIBUTIONS

Classic members - Members contribute 8 percent of their annual compensation to the plan.

PEPRA members - The Base Total Normal Cost rate for PEPRA members is re-determined in each annual valuation. The employee contribution for the PEPRA group will only change in any given year once the change to the total normal cost is greater than 1 percent from the Base Total Normal Cost. The PEPRA member rate should be 50 percent of the new normal cost rounded to the nearest quarter percentage.

MONETARY CREDIT ACCOUNT

Members accrue monthly monetary credits equal to 18 percent of monthly salary. These monetary credits are accumulated in a Monetary Credit Account for each member and also credited with earnings monthly at a rate, not less than zero, equal to the annual net earnings rate achieved by the Fund. The Monetary Credit Account provides an optional benefit at eligible retirement ages (described below) if the member chooses this option. If a member withdraws from the system before he or she has vested (accumulated at least five years of service), the member is paid the amount of his or her contributions to the system, but not the full Monetary Credit Account. After five years of service however, the Monetary Credit Account becomes the property of the member upon withdrawal.

Appendix B - Summary of Principal Plan Provisions (continued)

SERVICE RETIREMENT

Eligibility

Judges must be at least age 65 with 20 years or more of service or age 70 with a minimum of five years of service. Two types of service retirement are available: Defined Benefit Plan or Monetary Credit Plan. Election of a plan must be made within 30 days after retirement.

Defined Benefit Plan

Classic Members -This option provides a "defined benefit" of 3.75 percent of the highest 12-month average salary per year of service, up to 75 percent of final average pay for judges reaching age 65 with at least 20 years of service. The normal form of payment is a joint and 50 percent contingent annuity with the spouse as contingent annuitant. This provides a surviving spouse with a monthly allowance equal to 50 percent of the judge's allowance. Optional settlements are available which reduce a judge's normal retirement benefit.

PEPRA Members -This option provides a "defined benefit" of 3.75 percent of the highest 36-month average salary per year of service, up to 75 percent of final average pay for judges reaching age 65 with at least 20 years of service. The normal form of payment is a joint and 50 percent contingent annuity with the spouse as contingent annuitant. This provides a surviving spouse with a monthly allowance equal to 50 percent of the judge's allowance. Optional settlements are available which reduce a judge's normal retirement benefit.

Monetary Credit Plan

This option provides a cash payment in a single lump sum or the member may elect to receive an annuity at retirement based on the value of his or her Monetary Credit Account.

NON-INDUSTRIAL DISABILITY RETIREMENT (NON-WORK RELATED)

Eligibility

Judges who have five years of service who become permanently disabled because of a mental or physical disability may apply to the Commission on Judicial Performance for disability retirement.

Benefit

An allowance, based upon the judge's age, equal to the lesser of the following:

- 3.75 percent of final compensation multiplied by the number of years of service the judge would have been credited had he or she continued to work until the age he or she would have first been eligible to retire, or
- 65 percent of the judge's average monthly salary during the 12 or 36 months preceding the retirement date.

The normal form of payment is a joint and 50 percent contingent annuity with the spouse as the contingent annuitant.

INDUSTRIAL DISABILITY RETIREMENT (WORK-RELATED)

Benefit

Judges receive 65 percent of their average monthly salary during the 12 or 36 months preceding the retirement date regardless of age or length of service.

The normal form of payment is a joint and 50 percent contingent annuity with the spouse as the contingent annuitant.

PRE-RETIREMENT DEATH BENEFIT

If Eligible for Service Retirement - Spouses receive either the monthly retirement allowance equal to one-half of the judge's "defined benefit" plan allowance or the judge's monetary credits.

If Not Eligible for Service Retirement - Spouses receive the judge's monetary credits or three times the annual salary at the time of death, whichever is greater. This is paid in 36 monthly installments. If there is no spouse, this benefit is paid to member children; or if none, to the designated beneficiary.

Appendix B - Summary of Principal Plan Provisions (continued)

PRE-RETIREMENT DEATH BENEFIT OPTIONAL SETTLEMENT TWO

If a judge dies in office, is age 65 or older with a minimum of 20 years of service and elects to have this provision apply (one time irrevocable election while judge is in office) then a payment to the surviving spouse is payable upon death. The spouse would receive a monthly allowance equal to the Optional Settlement 2 allowance paid to the judge had he or she retired immediately preceding death. A spouse who receives this benefit is not entitled to any other Pre-Retirement Death Benefit.

POST RETIREMENT DEATH BENEFIT

If the Judge elected the Defined Benefit Plan - The surviving spouse of a retired judge who elected an Optional Settlement in the defined benefit plan receives one of four options:

- Option 1 - return of unused accumulated contributions;
- Option 2 - 4 - the Optional Settlement Benefit amount varies based on the option chosen by the member.

If the Judge elected the Monetary Credit Plan - If the full amount of monetary credits was received in a lump sum, there are no survivor benefits. If the judge elected the Monetary Credit Plan with benefits paid as an annuity, the spouse receives the amount based on the option chosen at retirement.

COST-OF-LIVING ADJUSTMENTS (COLA)

If the Judge elected the Defined Benefit Plan - The retirement allowance of retired judges who have elected the defined benefit plan will be adjusted every January after the judge has been retired six months. The adjustment is based on the United States city average of the "Consumer Price Index For All Urban Consumers," as published by the United States Bureau of Labor Statistics. No adjustment shall be made unless the cost-of-living increase equals or exceeds 1 percent. Further, the allowance shall not be increased more than 3 percent in a single year. Increases shall be compounded.

Appendix C Participant Data

SUMMARY OF VALUATION DATA

The table below illustrates counts of records processed by the valuation.

	June 30, 2016	June 30, 2017
1) Active Members		
a) Counts	1488	1511
b) Average Attained Age	58.87	59.16
c) Average Entry Age to Rate Plan	49.29	49.30
d) Average Years of Service	9.57	9.86
e) Average Annual Covered Pay	\$189,932	\$192,841
f) Annual Covered Payroll	282,618,851	291,383,167
g) Projected Annual Payroll for Contribution Year	299,830,339	307,629,600
h) Present Value of Future Payroll	2,101,396,856	2,084,304,713
2) Transferred and Vested Termination Members		
a) Counts	2	1
3) Retired Members and Beneficiaries		
a) Counts	120	161
b) Average Attained Age	72.53	72.25
c) Average Monthly Benefits	\$7,724	\$8,290
4) Active to Retired Ratio [(1a) / (3)]	12.61	9.50

RECONCILIATION OF PARTICIPANTS

The table below illustrates a reconciliation of the participant data over the course of the valuation year. It identifies numerically who entered the plan, who left the plan and who remained in the plan in the same status as on the previous valuation date or who moved to a new status over the course of the year.

Reconciliation of Participants For the Fiscal Year Ending June 30, 2017

	Actives	Inactive	Retirees and Beneficiaries	Total
As of June 30, 2016	1,488	2	120	1,610
New Entrants	77			77
Non-Vested Terminations				
Refund Paid	—	(1)	—	(1)
Refund Pending	—	—	—	—
Vested Terminations				
Monetary Credit Paid	(12)	(1)	—	(13)
Monetary Credit Pending	(1)	1	—	—
Disabilities	—	—	—	—
Retirements	(41)	—	41	—
Death with Beneficiary	—	—	(1)	(1)
Active Death Beneficiary	—	—	1	1
Benefits Ceasing (Beneficiaries)	—	—	—	—
As of June 30, 2017	1,511	1	161	1,673

Appendix C - Participant Data (continued)

DISTRIBUTION OF ACTIVE MEMBERS

The following table displays the number of active participants by age and service as of June 30, 2017.

Attained Age	Years of Service at Valuation					Total
	0 - 4	5 - 9	10 - 14	15 - 19	20+	
15 - 34	0	0	0	0	0	0
35 - 39	1	—	—	—	—	1
40 - 44	36	2	—	—	—	38
45 - 49	90	59	8	—	—	157
50 - 54	81	96	54	4	—	235
55 - 59	83	87	92	44	13	319
60 - 64	68	84	104	72	40	368
65+	40	94	94	120	45	393
All Ages	399	422	352	240	98	1,511

DISTRIBUTION OF AVERAGE ANNUAL SALARIES

The following table displays the average salaries of active participants by age and service as of June 30, 2017.

Attained Age	Years of Service at Valuation Date					Average
	0 - 4	5 - 9	10 - 14	15 - 19	20+	
<35	\$0	\$0	\$0	\$0	\$0	\$0
35 - 39	191,914	—	—	—	—	191,914
40 - 44	193,857	191,914	—	—	—	193,755
45 - 49	192,691	193,100	191,914	—	—	192,805
50 - 54	191,914	191,914	192,427	191,914	—	192,032
55 - 59	192,248	193,188	192,516	193,803	194,045	192,869
60 - 64	193,136	191,914	193,512	193,838	193,299	193,119
65+	192,607	192,209	192,209	192,837	196,839	192,971
Average	\$192,612	\$192,408	\$192,701	\$193,299	\$195,024	\$192,841

DISTRIBUTION OF RETIRED MEMBERS AND BENEFICIARIES

The following table displays the number of recipients by age and retirement type as of June 30, 2017.

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Total
40-44	0	0	0	0
45-49	1	—	—	1
50-54	—	—	—	—
55-59	3	2	1	6
60-64	3	4	1	8
65-69	22	5	1	28
70-74	51	6	—	57
75-79	39	1	3	43
80-84	13	—	—	13
85 and Over	3	—	—	3
All Ages	135	18	6	159

(1) Does not include 2 beneficiaries receiving 36 month pre-retirement death benefit.

Appendix D

Glossary of Actuarial Terms

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

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

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

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

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

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

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

Classic Member (under PEPRA): A classic member is a member who joined The Judges Retirement System prior to January, 1, 2013 and who is not defined as a new member under PEPRA. (See definition of new member below)

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 same as the date of hire.

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

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

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

Appendix D -Glossary of Actuarial Terms (continued)

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

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

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

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

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

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

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

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