1959 Survivor Benefit Program
Actuarial Valuation

As of June 30, 2016

CalPERS

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Actuarial Certification

April 2017

To the best of our knowledge, this report is complete and accurate and contains sufficient information to fully and fairly disclose the funded condition of the 1959 Survivor Program for Public Agency 1st, 2nd, 3rd, 4th, and Indexed Level, and the State and Schools 5th Level Pools. This valuation is based on the beneficiary and membership data provided to the Actuarial Office, the statement of assets provided by the CalPERS Financial Office, and the benefits provided under this program. It is our opinion that this valuation has been performed by qualified actuaries in accordance with generally accepted actuarial principles, in accordance with standards of practice prescribed by the Actuarial Standards Board, and that the assumptions and methods are internally consistent and reasonable for this program.

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.

[redacted]

Kerry J. Worgan, FSA, FCIA, MAAA
Senior Pension Actuary, CalPERS

[redacted]

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

Highlights and Executive Summary

Highlights and Executive Summary

INTRODUCTION

The 1959 Survivor program was designed to provide pre-retirement death benefits comparable to those provided by Social Security, formally the Federal Old Age and Survivor Insurance (OASI) program, to CalPERS' members not covered by Social Security.

PURPOSE OF REPORT

This actuarial valuation of the 1959 Survivor Program for Public Agency 1st, 2nd, 3rd, 4th and Indexed level and the State and Schools 5th level pools within the California Public Employees' Retirement System (CalPERS) was performed by CalPERS staff actuaries as of June 30, 2016 in order to:

- Set forth the funded status of the program, reflecting the assets and funding liabilities of this program as of June 30, 2016.
- Establish the actuarially required premiums for all levels and employee premiums in the Indexed, and State and Schools 5th Level for the Fiscal Year July 1, 2017 through June 30, 2018; and
- Provide actuarial information as of June 30, 2016 to the CalPERS Board of Administration and other interested parties.

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

FUNDED STATUS OF THE PLAN

Shown below are the Accrued Liability, Market Value of Assets (MVA), and Funded Ratio of all pools within the 1959 Survivor Benefit Program as of June 30, 2016.

Plan	Accrued Liability[1]	Market Value of Assets	Funded Ratio
State 5th Level Pool	$146,264,802	$104,309,600	71.3%
Schools 5th Level Pool	12,856,706	70,543,063	548.7%
PA 1st Level Pool	2,727,022	43,713,899	1,603.0%
PA 2nd Level Pool	2,487,505	10,495,726	421.9%
PA 3rd Level Pool	28,559,335	104,701,900	366.6%
PA 4th Level Pool	130,143,117	138,750,170	106.6%
PA Indexed Level Pool	19,296,481	22,719,925	117.7%
TOTAL	**$342,334,968**	**$495,234,282**	**144.7%**

(1) By definition, under the Term Insurance Method, the present value of future benefits and the accrued liability are equal. Under the Entry Age Normal Method, which is being used to fund the benefit in the Indexed Pool, the accrued liability is defined as the difference between the present value of future benefits and the present value of future normal costs.

REQUIRED EMPLOYER AND EMPLOYEE MONTHLY PREMIUMS

The actuarially required employer and employee monthly premiums per covered member per month for the 1959 Survivor Program for the Fiscal Year July 1, 2017 through June 30, 2018 are shown below. The results for Fiscal Year July 1, 2016 through June 30, 2017 are shown for comparison. Except for the Public Agency Indexed Level pool, these monthly premiums are determined using a Modified Term Insurance funding method. Monthly premiums for the Public Agency Indexed Level pool are determined using the Entry Age Normal funding method.

Required Monthly Premiums

	2016-17 Premium			2017-18 Premium		
	Employer	Employee	Total	Employer	Employee	Total
State 5th Level Pool[1]	$5.15	$5.15	$10.30	$5.20	$5.20	$10.40
Schools 5th Level Pool[1]	$0.00	$2.00	$2.00	$0.00	$2.00	$2.00
PA 1st Level Pool[2]	$0.00	$2.00	$2.00	$0.00	$2.00	$2.00
PA 2nd Level Pool[2]	$0.00	$2.00	$2.00	$0.00	$2.00	$2.00
PA 3rd Level Pool[2]	$0.00	$2.00	$2.00	$0.00	$2.00	$2.00
PA 4th Level Pool[2]	$4.30	$2.00	$6.30	$5.20	$2.00	$7.20
PA Indexed Level Pool[1]	$2.75	$2.75	$5.50	$3.50	$3.50	$7.00

(1) Section 21581 of the California Public Employees' Retirement Law requires mandatory cost sharing when the total premium exceeds $4.00. Mandatory $2.00 member monthly premium required.
(2) Mandatory $2.00 member monthly premium required.

REQUIRED EMPLOYER AND EMPLOYEE MONTHLY PREMIUMS (CONTINUED)

The required employee premium for the State 5th level pool will change from $5.15 to $5.20 per member, per month (or from $2.38 to $2.40 for biweekly paid members) for Fiscal Year 2017-18. This is in accordance with Statute 21581(c), which specifies that when the total required premium (after amortization of surplus/unfunded liability) exceeds $4.00, the employer and the member shall evenly share the required monthly premium.

The required employee premium for the Indexed level pool will change from $2.75 to $3.50 per member, per month (or from $1.27 to $1.62 for biweekly paid members) for Fiscal Year 2017-18. This is in accordance with Statute 21581(b), which specifies that when the total required premium (after amortization of surplus/unfunded liability) exceeds $4.00, the employer and the member shall evenly share the required monthly premium.

Employee required premiums for all of the other pools shall remain the same, $2.00 per member, per month, as in the prior year.

CHANGES SINCE THE PRIOR YEAR'S VALUATION

Actuarial Methods and Assumptions

On December 21, 2016, the CalPERS Board of Administration lowered the discount rate from 7.50 percent to 7.00 percent using a three year phase-in beginning with the June 30, 2016 actuarial valuations. The discount rate for this valuation is 7.375 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. A complete description of the actuarial methods and assumptions used in the June 30, 2016 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, 2016 valuation may be found in Appendix B of this report.

Other Changes

CalPERS recently adopted a Funding Risk Mitigation Policy that will reduce the funding risk over time. Under this policy, good investment performance that significantly outperforms the discount rate triggers adjustments to the discount rate, expected investment return and strategic asset allocation targets. In conjunction with the discount rate change described above, the Board also temporarily suspended the Funding Risk Mitigation Policy for a three year period. This has no impact on the current valuation results.

Assets

RECONCILIATION OF THE MARKET VALUE OF ASSETS FOR:

Assets

RECONCILIATION OF THE MARKET VALUE OF ASSETS

Shown below are the changes in the market value of assets for the various pools.

State 5th Level	June 30, 2015	June 30, 2016
Beginning Balance	$113,878,478	$109,619,378
Contributions (Employer and Employee) Received During Fiscal Year	9,328,084	9,400,741
Benefit Payments During Fiscal Year	(15,755,900)	(15,034,139)
Net Transfer of Assets Into and Out of this Pool	—	—
Investment Earnings Credited	2,168,716	323,620
Ending Balance	**$109,619,378**	**$104,309,600**
Fund Return for Year	2.00%	0.30%

Schools 5th Level	June 30, 2015	June 30, 2016
Beginning Balance	$71,331,499	$71,525,517
Contributions (Employer and Employee) Received During Fiscal Year	210,282	212,941
Benefit Payments During Fiscal Year	(1,458,812)	(1,430,067)
Net Transfer of Assets Into and Out of this Pool	—	—
Investment Earnings Credited	1,442,549	234,672
Ending Balance	**$71,525,517**	**$70,543,063**
Fund Return for Year	2.00%	0.33%

Public Agency 1st Level	June 30, 2015	June 30, 2016
Beginning Balance	$43,028,607	$43,637,106
Contributions (Employer and Employee) Received During Fiscal Year	177,824	176,722
Benefit Payments During Fiscal Year	(231,026)	(243,756)
Net Transfer of Assets Into and Out of this Pool	(212,216)	—
Investment Earnings Credited	873,917	143,826
Ending Balance	**$43,637,106**	**$43,713,899**
Fund Return for Year	2.00%	0.33%

Public Agency 2nd Level	June 30, 2015	June 30, 2016
Beginning Balance	$10,527,005	$10,589,764
Contributions (Employer and Employee) Received During Fiscal Year	92,682	92,757
Benefit Payments During Fiscal Year	(236,761)	(221,127)
Net Transfer of Assets Into and Out of this Pool	(4,443)	—
Investment Earnings Credited	211,281	34,332
Ending Balance	**$10,589,764**	**$10,495,726**
Fund Return for Year	2.00%	0.33%

RECONCILIATION OF THE MARKET VALUE OF ASSETS OVER THE PRIOR FISCAL YEAR (CONTINUED)

Public Agency 3rd Level	June 30, 2015	June 30, 2016
Beginning Balance	$106,304,466	$106,293,464
Contributions (Employer and Employee) Received During Fiscal Year	984,836	1,024,049
Benefit Payments During Fiscal Year	(2,623,553)	(2,728,291)
Net Transfer of Assets Into and Out of this Pool	(497,448)	(230,616)
Investment Earnings Credited	2,125,163	343,294
Ending Balance	**$106,293,464**	**$104,701,900**
Fund Return for Year	2.00%	0.33%

Public Agency 4th Level	June 30, 2015	June 30, 2016
Beginning Balance	$149,327,096	$145,999,937
Contributions (Employer and Employee) Received During Fiscal Year	5,701,601	4,571,409
Benefit Payments During Fiscal Year	(12,677,733)	(12,511,293)
Net Transfer of Assets Into and Out of this Pool	704,436	230,616
Investment Earnings Credited	2,944,537	459,501
Ending Balance	**$145,999,937**	**$138,750,170**
Fund Return for Year	2.00%	0.32%

Public Agency Indexed Level	June 30, 2015	June 30, 2016
Beginning Balance	$23,230,521	$23,270,090
Contributions (Employer and Employee) Received During Fiscal Year	792,091	602,118
Benefit Payments During Fiscal Year	(1,223,796)	(1,226,026)
Net Transfer of Assets Into and Out of this Pool	9,671	—
Investment Earnings Credited	461,602	73,742
Ending Balance	**$23,270,090**	**$22,719,925**
Fund Return for Year	2.00%	0.32%

Liabilities and Funding Requirements

Liabilities and Funding Requirements

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.

State 5th Level	June 30, 2015	June 30, 2016
Covered Active Members	74,372	75,782
Beneficiaries Included in the Valuation		
Deferred (eligible, but not yet receiving benefits)	290	300
Receiving Benefits	1,437	1,439
Total	1,727	1,739
Present Value of Benefits	$142,864,757	$146,264,802
Market Value of Assets (MVA)	109,619,378	104,309,600
Unfunded Liability/(Excess Assets)	33,245,379	41,955,202
Required Employer Monthly Premium Per Member		
Before Amortization of Unfunded Liability/(Excess Assets)	$7.00	$7.10
After Amortization of Unfunded Liability/(Excess Assets)	$10.30	$10.40
After Employer/Employee Premium Sharing	$5.15	$5.20
Funded Ratio Based on MVA	76.7%	71.3%

Schools 5th Level	June 30, 2015	June 30, 2016
Covered Active Members	10,490	10,259
Beneficiaries Included in the Valuation		
Deferred (eligible, but not yet receiving benefits)	18	21
Receiving Benefits	154	143
Total	172	164
Present Value of Benefits	$13,498,624	$12,856,706
Market Value of Assets (MVA)	71,525,517	70,543,063
Unfunded Liability/(Excess Assets)	(58,026,893)	(57,686,357)
Required Employer Monthly Premium Per Member		
Before Amortization of Unfunded Liability/(Excess Assets)	$4.70	$4.60
After Amortization of Unfunded Liability/(Excess Assets)	$0.00	$0.00
After Employer/Employee Premium Sharing	$0.00	$0.00
Funded Ratio Based on MVA	529.9%	548.7%

Public Agency 1st Level	June 30, 2015	June 30, 2016
Covered Active Members	7,413	7,555
Beneficiaries Included in the Valuation		
Deferred (eligible, but not yet receiving benefits)	33	32
Receiving Benefits	94	100
Total	127	132
Present Value of Benefits	$2,585,287	$2,727,022
Market Value of Assets (MVA)	43,637,106	43,713,899
Unfunded Liability/(Excess Assets)	(41,051,819)	(40,986,876)
Required Employer Monthly Premium Per Member		
Total Premium Required	$1.40	$1.50
Premium Required After Employee Contributions	$0.00	$0.00
Employer Premium After Amortization of Unfunded Liability/(Excess Assets)	$0.00	$0.00
Funded Ratio Based on MVA	1,687.9%	1,603.0%

COMPARISON OF CURRENT AND PRIOR YEAR RESULTS (CONTINUED)

Public Agency 2nd Level	June 30, 2015	June 30, 2016
Covered Active Members	3,945	3,996
Beneficiaries Included in the Valuation		
Deferred (eligible, but not yet receiving benefits)	25	22
Receiving Benefits	73	76
Total	98	98
Present Value of Benefits	$2,474,187	$2,487,505
Market Value of Assets (MVA)	10,589,764	10,495,726
Unfunded Liability/(Excess Assets)	(8,115,577)	(8,008,222)
Required Employer Monthly Premium Per Member		
Total Premium Required	$1.80	$1.80
Premium Required After Employee Contributions	$0.00	$0.00
Employer Premium After Amortization of Unfunded Liability/(Excess Assets)	$0.00	$0.00
Funded Ratio Based on MVA	428.0%	421.9%

Public Agency 3rd Level	June 30, 2015	June 30, 2016
Covered Active Members	42,933	45,110
Beneficiaries Included in the Valuation		
Deferred (eligible, but not yet receiving benefits)	186	190
Receiving Benefits	547	544
Total	733	734
Present Value of Benefits	$27,969,382	$28,559,335
Market Value of Assets (MVA)	106,293,464	104,701,900
Unfunded Liability/(Excess Assets)	(78,324,082)	(76,142,565)
Required Employer Monthly Premium Per Member		
Total Premium Required	$2.80	$2.80
Premium Required After Employee Contributions	$0.80	$0.80
Employer Premium After Amortization of Unfunded Liability/(Excess Assets)	$0.00	$0.00
Funded Ratio Based on MVA	380.0%	366.6%

Public Agency 4th Level	June 30, 2015	June 30, 2016
Covered Active Members	70,072	71,981
Beneficiaries Included in the Valuation		
Deferred (eligible, but not yet receiving benefits)	234	235
Receiving Benefits	936	936
Total	1,170	1,171
Present Value of Benefits	$128,491,218	$130,143,117
Market Value of Assets (MVA)	145,999,937	138,750,170
Unfunded Liability/(Excess Assets)	(17,508,719)	(8,607,052)
Required Employer Monthly Premium Per Member		
Total Premium Required	$7.60	$7.60
Premium Required After Employee Contributions	$5.60	$5.60
Employer Premium After Amortization of Unfunded Liability/(Excess Assets)	$4.30	$5.20
Funded Ratio Based on MVA	113.6%	106.6%

COMPARISON OF CURRENT AND PRIOR YEAR RESULTS (CONTINUED)

Public Agency Indexed Level	June 30, 2015	June 30, 2016
Covered Active Members	10,516	10,939
Beneficiaries Included in the Valuation		
Deferred (eligible, but not yet receiving benefits)	21	18
Receiving Benefits	110	116
Total	131	134
Entry Age Normal Accrued Liability	$18,279,091	$19,296,481
Market Value of Assets (MVA)	23,270,090	22,719,925
Unfunded Liability/(Excess Assets)	(4,990,999)	(3,423,444)
Required Employer Monthly Premium Per Member		
Before Amortization of Unfunded Liability/(Excess Assets)	$8.20	$8.60
After Amortization of Unfunded Liability/(Excess Assets)	$5.50	$7.00
After Employer/Employee Premium Sharing	$2.75	$3.50
Funded Ratio Based on MVA	127.3%	117.7%

DEVELOPMENT OF FUNDING REQUIREMENTS

The following table develops the annual premiums required for 2017-18 for the State 5th and Schools 5th Level Pools.

June 30, 2016	State 5th Level	Schools 5th Level
1) Development of Unfunded Liability		
a) Present Value of Future Survivor Benefits	$146,264,802	$12,856,706
b) Market Value of Assets	104,309,600	70,543,063
c) Unfunded Accrued Liability/(Excess Assets) [(1a) - (1b)]	**$41,955,202**	**($57,686,357)**
2) Development of Normal Cost		
a) Present Value of Benefits for 2012 - 2015 Deaths	$25,991,852	$2,077,496
b) Number of 2012 - 2015 Member Months	3,481,908	490,128
c) Total Per Member, Per Month 2016/2017 Term Insurance Normal Cost	$7.00	$4.70
d) Total Per Member, Per Month 2017/2018 Term Insurance Normal Cost [.25 * (2a) / (2b) + .75 * (2c)], rounded to nearest $0.10	$7.10	$4.60
3) 2017 Projected Unfunded Liability		
a) 2016 Unfunded Accrued Liability/(Excess Assets) as of June 30, 2017 [(1c) * 1.07375]	$45,049,399	($61,940,726)
b) Projected Normal Cost Accrual 2016-2017 with Interest	7,030,712	603,514
c) Projected Employer Contributions 2016-2017 with Interest	4,923,972	—
d) Projected Employee Contributions 2016-2017 with Interest	4,923,972	253,157
e) Total Projected UAL/(Excess Assets) as of June 30, 2017 [(3a) + (3b) - (3c) - (3d)]	**$42,232,166**	**($61,590,369)**
4) 2017/2018 Required Contribution		
a) Required Normal Cost Per Member, Per Month [(2d)]	$7.10	$4.60
b) Projected Active Members as of 6/30/2017	78,000	10,100
c) Required Normal Cost Contribution [12 * (4a) * (4b) * $(1.07375)^{1/2}$]	$6,886,298	$577,713
d) Amortization of the UAL/(Excess Assets)[1]	2,851,331	(577,713)
e) Total Required Contribution Per Member, Per Month [((4c) + (4d)) / ((4b)*12)], Rounded to Nearest $0.10	$10.40	$0.00
f) Amortization Period	see table on pg 14	30-year
5) 2017/2018 Required Employer and Employee Premiums With Cost Sharing Provision		
a) Required Employee Premium Per Member, Per Month [maximum ($2, (4e) / 2)]	$5.20	$2.00
b) Required Employer Premium Per Member, Per Month [maximum ($0, (4e) - (5a))]	$5.20	$0.00

(1) See amortization schedule on Page 14

DEVELOPMENT OF FUNDING REQUIREMENTS (CONTINUED)

The following table develops the annual premiums required for 2017-18 for the Public Agency 1st, 2nd, 3rd and 4th Level Pools.

June 30, 2016	Public Agency 1st Level	Public Agency 2nd Level	Public Agency 3rd Level	Public Agency 4th Level
1) Development of Unfunded Liability				
a) Present Value of Future Survivor Benefits	$2,727,022	$2,487,505	$28,559,335	$130,143,117
b) Market Value of Assets	43,713,899	10,495,726	104,701,900	138,750,170
c) Unfunded Accrued Liability/(Excess Assets) [(1a) - (1b)]	**($40,986,876)**	**($8,008,222)**	**($76,142,565)**	**($8,607,052)**
2) Development of Normal Cost				
a) Present Value of Benefits for 2012 - 2015 Deaths[1]	$8,666,101	$10,832,626	$16,850,752	$45,737,755
b) Number of 2012 - 2015 Member Months[1]	6,353,436	6,353,436	6,353,436	6,353,436
c) Total Per Member, Per Month 2016/2017 Term Insurance Normal Cost	$1.40	$1.80	$2.80	$7.60
d) Total Per Member, Per Month 2017/2018 Term Insurance Normal Cost [.25 * (2a) / (2b) + .75 * (2c)], rounded to nearest $0.10	$1.50	$1.80	$2.80	$7.60
3) 2017 Projected Unfunded Liability				
a) 2016 Unfunded Accrued Liability as of June 30, 2017 [(1c) * 1.07375]	($44,009,659)	($8,598,828)	($81,758,079)	($9,241,823)
b) Projected Normal Cost Accrual 2016-2017 with Interest	147,372	92,724	1,651,676	7,125,312
c) Projected Employer Contributions 2016-2017 with Interest	—	—	—	3,892,028
d) Projected Employee Contributions 2016-2017 with Interest	189,690	99,427	1,139,136	1,810,246
e) Total Projected UAL as of June 30, 2017 [(3a) + (3b) - (3c) - (3d)]	**($44,051,977)**	**($8,605,531)**	**($81,245,539)**	**($7,818,785)**
4) 2017/2018 Required Contribution				
a) Required Normal Cost Per Member, Per Month [(2d)]	$1.50	$1.80	$2.80	$7.60
b) Projected Active Members as of 6/30/2017	7,700	4,000	46,500	73,600
c) Required Normal Cost Contribution [12 * (4a) * (4b) * $(1.07375)^{1/2}$]	$143,620	$89,529	$1,618,989	$6,955,434
d) Amortization of the UAL/(Excess Assets)	(143,620)	(89,529)	(1,618,989)	(631,129)
e) Total Required Contribution Per Member, Per Month [((4c) + (4d)) / ((4b) * 12)], Rounded to Nearest $0.10	$0.00	$0.00	$0.00	$7.20
f) Amortization Period	N/A	N/A	N/A	30-year
5) 2017/2018 Required Employer and Employee Premiums				
a) Required Employee Premium Per Member, Per Month	$2.00	$2.00	$2.00	$2.00
b) Required Employer Premium Per Member, Per Month [maximum ($0, (4e) - (5a))]	$0.00	$0.00	$0.00	$5.20

(1) Mortality experience and survivor distribution are assumed to be homogeneous across all Public Agency pools and are added together to develop normal costs in order to improve credibility of the data. This is further explained in the Actuarial Funding Methods section.

DEVELOPMENT OF FUNDING REQUIREMENTS (CONTINUED)

The following table develops the annual premiums required for 2017-18 for the Public Agency Indexed Level Pools.

June 30, 2016	Public Agency Indexed Level
1) Development of Unfunded Liability	
a) Present Value of Future Benefits for Active Members	$12,535,100
b) Present Value of Future Benefits for Current Survivors	14,588,831
c) Total Present Value of Future Benefits [(1a) + (1b)]	$27,123,931
d) Present Value of Future Normal Costs	$7,827,450
e) Entry Age Normal Total Accrued Liability [(1c)-(1d)]	$19,296,481
f) Market Value of Assets	$22,719,925
g) Unfunded Accrued Liability/(Excess Assets) [(1e) - (1f)]	**($3,423,444)**
2) Development of Normal Cost	
a) Required Entry Age Normal Cost	$1,124,881
b) Active Members as of June 30, 2016	10,939
c) Total Per Member, Per Month Entry Age Normal Cost [(2a) / (2b) * 12], Rounded to Nearest $0.10	$8.60
3) 2017 Projected Unfunded Liability	
a) 2016 Unfunded Accrued Liability/(Excess Assets) as of June 30, 2017 [(1g) * 1.07375]	($3,675,923)
b) Projected Normal Cost Accrual 2016-2017 with Interest	1,226,117
c) Projected Employer Contributions 2016-2017 with Interest	378,524
d) Projected Employee Contributions 2016-2017 with Interest	378,524
e) Total Projected UAL as of June 30, 2017 [(3a) + (3b) - (3c) - (3d)]	**($3,206,854)**
4) 2017/2018 Required Contribution	
a) Required Normal Cost Per Member, Per Month [(2c)]	$8.60
b) Projected Active Members as of 6/30/2017	11,200
c) Required Normal Cost Contribution [12 * (4a) * (4b) * $(1.07375)^{1/2}$]	$1,197,703
d) Amortization of the UAL/(Excess Assets)	(258,856)
e) Total Required Contribution Per Member, Per Month [((4c) + (4d)) / ((4b) * 12)], Rounded to Nearest $0.10	$7.00
f) Amortization Period	30-year
5) 2017/2018 Required Employer and Employee Premiums With Cost Sharing Provision	
a) Required Employee Premium Per Member, Per Month [maximum ($2, (4e) / 2]	$3.50
b) Required Employer Premium Per Member, Per Month [maximum($0, (4e) - (5a))]	$3.50

SCHEDULE OF AMORTIZATION BASES

The schedule below shows the development of the required payments on the Amortization Bases in accordance with the Amortization Policy. In accordance with Board policy, a plan with a funding excess will have their funding excess amortized over a minimum of 30 years.

State 5th Level Pool

	Date Established	Remaining Period	Projected Balance 6/30/2016	Payment 2016-17	Projected Balance 6/30/2017	Payment 2017-18	Projected Balance 6/30/2018	Projected Payment 2018-19
Unfunded Liability	6/30/2013	27	$37,116,838	$3,093,190	$36,648,982	$3,055,839	$36,185,325	$3,055,839
Experience (Gain)/Loss	6/30/2014	28	(14,342,641)	(533,783)	(14,847,294)	(790,843)	(15,122,795)	(1,054,458)
Experience (Gain)/Loss	6/30/2015	29	10,022,549	196,695	10,557,892	388,275	10,934,199	582,412
Assumption Change	6/30/2016	20			1,458,901	35,047	1,530,178	70,095
Experience (Gain)/Loss	6/30/2016	30			8,413,685	163,014	8,865,277	326,027
TOTAL			**$32,796,746**	**$2,756,102**	**$42,232,166**	**$2,851,331**	**$42,392,185**	**$2,979,915**

(GAIN)/LOSS ANALYSIS 6/30/2015 - 6/30/2016

The following table develops the asset and demographic gain and losses between June 30, 2015 and June 30, 2016 for the State and Schools 5th Level Pools.

	State 5th Level	Schools 5th Level
Amounts as of 6/30/2015		
1) Present Value of Benefits	$142,864,757	$13,498,624
2) Market Value of Assets	109,619,378	71,525,517
3) Unfunded Liability/(Excess Assets) [(1) - (2)]	**$33,245,379**	**($58,026,893)**
Amounts During the Period 6/30/15 - 6/30/2016		
4) Expected Claims for the Fiscal Year	$6,280,995	$588,492
5) Employer and Employee Premiums Collected	9,400,741	212,941
6) Benefit Payments	(15,034,139)	(1,430,067)
7) Net Liabilities Transferred into the Level Pool	—	—
8) Net Assets Transferred into the Level Pool	—	—
Expected Amounts as of 6/30/2016		
9) Change in Accrued Liability due to Discount Rate Change	$1,458,901	$121,359
10) Expected Present Value of Benefits [(1) * 1.075 + ((4) + (6) + (7)) * $(1.075)^{1/2}$ + (9)]	145,963,062	13,759,816
11) Expected Market Value of Assets [(2) * 1.075 + ((5) + (6) + (8)) * $(1.075)^{1/2}$]	112,000,000	75,627,988
12) Expected Unfunded Liability/(Excess Assets) [(10) - (11)]	**$33,963,062**	**($61,868,172)**
Amounts as of 6/30/2016		
13) Present Value of Benefits	$146,264,802	$12,856,706
14) Market Value of Assets	104,309,600	70,543,063
15) Unfunded Liability/(Excess Assets) [(13) - (14)]	**$41,955,202**	**($57,686,357)**
(Gain)/Loss for the Period 6/30/2015 - 6/30/2016		
16) Liability (Gain)/Loss [(13) - (10)]	$301,740	($903,110)
17) Asset (Gain)/Loss [(11) - (14)]	7,690,400	5,084,925
18) Total (Gain)/Loss [(16) + (17)]	**$7,992,141**	**$4,181,814**

(GAIN)/LOSS ANALYSIS 6/30/2015 - 6/30/2016 (CONTINUED)

The following table develops the asset and demographic gain and losses between June 30, 2015 and June 30, 2016 for the Public Agency 1st, 2nd, 3rd, and 4th Level Pools.

	Public Agency 1st Level	Public Agency 2nd Level	Public Agency 3rd Level	Public Agency 4th Level
Amounts as of 6/30/2015				
1) Present Value of Benefits	$2,585,287	$2,474,187	$27,969,382	$128,491,218
2) Market Value of Assets	43,637,106	10,589,764	106,293,464	145,999,937
3) Unfunded Liability/(Excess Assets) [(1) - (2)]	**($41,051,819)**	**($8,115,577)**	**($78,324,082)**	**($17,508,719)**
Amounts During the Period 6/30/15 - 6/30/2016				
4) Expected Claims for the Fiscal Year	$130,586	$86,239	$1,489,688	$6,537,279
5) Employer and Employee Premiums Collected	176,722	92,757	1,024,049	4,571,409
6) Benefit Payments	(243,756)	(221,127)	(2,728,291)	(12,511,293)
7) Net Liabilities Transferred into the Level Pool	—	—	(49,633)	134,719
8) Net Assets Transferred into the Level Pool	—	—	(230,616)	230,616
Expected Amounts as of 6/30/2016				
9) Change in Accrued Liability due to Discount Rate Change	$28,143	$25,391	$299,361	$1,344,105
10) Expected Present Value of Benefits [(1)*1.075+((4)+(6)+(7))*$(1.075)^{1/2}$ +(9)]	2,689,990	2,545,288	29,030,774	133,417,856
11) Expected Market Value of Assets [(2) * 1.075 + ((5) + (6) + (8)) * $(1.075)^{1/2}$]	46,840,387	11,250,900	112,259,370	148,956,792
12) Expected Unfunded Liability/(Excess Assets) [(10) - (11)]	**($44,150,397)**	**($8,705,612)**	**($83,228,596)**	**($15,538,937)**
Amounts as of 6/30/2016				
13) Present Value of Benefits	$2,727,022	$2,487,505	$28,559,335	$130,143,117
14) Market Value of Assets	43,713,899	10,495,726	104,701,900	138,750,170
15) Unfunded Liability/(Excess Assets) [(13) - (14)]	**($40,986,876)**	**($8,008,222)**	**($76,142,565)**	**($8,607,052)**
(Gain)/Loss for the Period 6/30/2015 - 6/30/2016				
16) Liability (Gain)/Loss [(13) - (10)]	$37,032	($57,783)	($471,439)	($3,274,739)
17) Asset (Gain)/Loss [(11)- (14)]	3,126,488	755,174	7,557,470	10,206,623
18) Total (Gain)/Loss [(16) + (17)]	**$3,163,521**	**$697,391**	**$7,086,031**	**$6,931,884**

(GAIN)/LOSS ANALYSIS 6/30/2015 - 6/30/2016 (CONTINUED)

The following table develops the asset and demographic gain and losses between June 30, 2015 and June 30, 2016 for the Public Agency Indexed Level Pool.

	Public Agency Indexed Level
Amounts as of 6/30/2015	
1) Accrued Liability	$18,279,091
2) Market Value of Assets	23,270,090
3) Unfunded Liability/(Excess Assets) [(1) - (2)]	**($4,990,999)**
Amounts During the Period 6/30/15 - 6/30/2016	
4) Expected Claims for the Fiscal Year	$1,069,746
5) Employer and Employee Premiums Collected	602,118
6) Benefit Payments	(1,226,026)
7) Net Liabilities Transferred into the Level Pool	—
8) Net Assets Transferred into the Level Pool	—
Expected Amounts as of 6/30/2016	
9) Change in Accrued Liability due to Discount Rate Change	$321,475
10) Expected Present Value of Benefits [(1) * 1.075 + ((4) + (6) + (7)) * $(1.075)^{1/2}$ + (9)]	19,809,464
11) Expected Market Value of Assets [(2) * 1.075 + ((5) + (6) + (8)) * $(1.075)^{1/2}$]	24,368,465
12) Expected Unfunded Liability/(Excess Assets) [(10) - (11)]	**($4,559,002)**
Amounts as of 6/30/2016	
13) Accrued Liability	$19,296,481
14) Market Value of Assets	22,719,925
15) Unfunded Liability/(Excess Assets) [(13) - (14)]	**($3,423,444)**
(Gain)/Loss for the Period 6/30/2015 - 6/30/2016	
16) Liability (Gain)/Loss [(13) - (10)]	($512,983)
17) Asset (Gain)/Loss [(11) - (14)]	1,648,541
18) Total (Gain)/Loss [(16) + (17)]	**$1,135,558**

Risk Analysis

ANALYSIS OF FUTURE INVESTMENT RETURN SCENARIOS

The following analysis looks at what the 2018-19 contributions would be under four different investment return scenarios. This type of analysis can give the reader a sense of the short-term risk to the contributions.

The first scenario is what one would expect if the markets were to give us a 5th percentile return without considering we are already at an approximate return of 8 percent so far for the 2016-17 Fiscal Year (thru January 31, 2017). The 5th percentile return corresponds to a negative 12 percent return for the 2016-17 Fiscal Year. The second scenario assumed the return would be our assumed 7.375 percent. The third scenario assumes an approximate return of 8 percent, the rate of return attained so far this fiscal year. The last scenario is what one would expect if the markets were to give us a 95th percentile return notwithstanding the 8 percent year-to-date return for the current fiscal year. This 95th percentile return is equivalent to around 27 percent. A 27 percent return would trigger a reduction in the discount rate by 0.25 percent in accordance with the Risk Mitigation Policy but with the temporary suspension of the Risk Mitigation Policy, this reduction has not been reflected under that scenario.

The tables below shows 2018-19 projected employee and employer contributions under the return scenarios mentioned above.

(12%) Return

	2018-19 Employer Monthly Premium	2018-19 Employee Monthly Premium
State 5th Level	$5.40	$5.40
Schools 5th Level	$0.00	$2.00
PA 1st Level	$0.00	$2.00
PA 2nd Level	$0.00	$2.00
PA 3rd Level	$0.00	$2.00
PA 4th Level	$7.80	$2.00
PA Indexed Level	$4.80	$4.80

7.375% Return

	2018-19 Employer Monthly Premium	2018-19 Employee Monthly Premium
State 5th Level	$5.20	$5.20
Schools 5th Level	$0.00	$2.00
PA 1st Level	$0.00	$2.00
PA 2nd Level	$0.00	$2.00
PA 3rd Level	$0.00	$2.00
PA 4th Level	$5.20	$2.00
PA Indexed Level	$3.50	$3.50

8% Return

	2018-19 Employer Monthly Premium	2018-19 Employee Monthly Premium
State 5th Level	$5.20	$5.20
Schools 5th Level	$0.00	$2.00
PA 1st Level	$0.00	$2.00
PA 2nd Level	$0.00	$2.00
PA 3rd Level	$0.00	$2.00
PA 4th Level	$5.10	$2.00
PA Indexed Level	$3.50	$3.50

27% Return

	2018-19 Employer Monthly Premium	2018-19 Employee Monthly Premium
State 5th Level	$5.00	$5.00
Schools 5th Level	$0.00	$2.00
PA 1st Level	$0.00	$2.00
PA 2nd Level	$0.00	$2.00
PA 3rd Level	$0.00	$2.00
PA 4th Level	$2.80	$2.00
PA Indexed Level	$2.20	$2.20

ANALYSIS OF DISCOUNT RATE SENSITIVITY

The following analysis looks at what the 2017-18 contributions would be under two different discount rate scenarios. We determined the required contributions using discount rates that are 1 percent lower and 1 percent higher than the valuation discount rate of 7.375 percent. This analysis will give an indication of the potential required contributions if the PERF had investment returns of 6.375 percent or 8.375 percent over the long-term.

This type of analysis can give employers a sense of the long-term risk to the contributions.

6.375% Discount Rate (-1%)

	2017-18 Employer Monthly Premium	2017-18 Employee Monthly Premium
State 5th Level	$5.65	$5.65
Schools 5th Level	$0.00	$2.00
PA 1st Level	$0.00	$2.00
PA 2nd Level	$0.00	$2.00
PA 3rd Level	$0.00	$2.00
PA 4th Level	$6.70	$2.00
PA Indexed Level	$4.85	$4.85

Increase in Contribution

	2017-18 Employer Monthly Premium	2017-18 Employee Monthly Premium
State 5th Level	$0.45	$0.45
Schools 5th Level	$0.00	$0.00
PA 1st Level	$0.00	$0.00
PA 2nd Level	$0.00	$0.00
PA 3rd Level	$0.00	$0.00
PA 4th Level	$1.50	$0.00
PA Indexed Level	$1.35	$1.35

8.375% Discount Rate (+1%)

	2017-18 Employer Monthly Premium	2017-18 Employee Monthly Premium
State 5th Level	$4.85	$4.85
Schools 5th Level	$0.00	$2.00
PA 1st Level	$0.00	$2.00
PA 2nd Level	$0.00	$2.00
PA 3rd Level	$0.00	$2.00
PA 4th Level	$3.60	$2.00
PA Indexed Level	$2.25	$2.25

Decrease in Contribution

	2017-18 Employer Monthly Premium	2017-18 Employee Monthly Premium
State 5th Level	($0.35)	($0.35)
Schools 5th Level	$0.00	$0.00
PA 1st Level	$0.00	$0.00
PA 2nd Level	$0.00	$0.00
PA 3rd Level	$0.00	$0.00
PA 4th Level	($1.60)	$0.00
PA Indexed Level	($1.25)	($1.25)

Appendix A
Statement of Actuarial Methods and Assumptions

ACTUARIAL FUNDING METHOD FOR PUBLIC AGENCY 1ST, 2ND, 3RD AND 4TH LEVEL, AND STATE AND SCHOOLS 5TH LEVEL POOLS

The actuarial funding method used, as provided in State statute for Public Agency 1st, 2nd, 3rd and 4th level, and State and Schools 5th level pools, is called the Term Insurance method. This is a terminal funding arrangement with no pre-funding of the survivor benefits payable on account of deaths expected to occur beyond those in the coming year.

The Normal Cost for the year is equal to the Expected Claims (present value of benefits arising from deaths) that will occur in the coming fiscal year. The expected claims for the coming fiscal year is determined as the expected claim per member, per month multiplied by the expected member months for the coming fiscal year. The Normal Cost (or Expected Claims) per member, per month for the coming fiscal year is equal to a weighted average of the prior year and current year Normal Cost. Specifically, the current year's Normal Cost is calculated as the present value of member deaths for the past 4 years divided by the total number of members exposed to the death benefit over the same period. Then the Normal Cost (Expected Claims) for the coming year is simply 25 percent of the current year's Normal Cost and 75 percent of the prior year's Normal Cost. The reason for this methodology is that when new deaths occur each year, it is often unknown which benefit will ultimately apply (i.e. 1957 Survivor, Industrial Death, Pre-Retirement Option 2 or 1959 Survivor). Many times, new deaths are initially placed under the 1959 Survivor roll, but ultimately are reclassified to another roll some time later. This can create extreme volatility in the Normal Cost calculation between valuation years, especially for smaller pools.

The consequence of this approach is that less weight is given to the most recent year's data and more weight is given to previous years. In fact, as this methodology matures or reaches a steady state, all data from the past would have some impact on the calculated Normal Cost. The following matrix shows ultimate weights for the past ten year's data as the methodology approaches its steady state:

Data 't' Years Ago	Weights
1	6.3%
2	10.9%
3	14.5%
4	17.1%
5	12.8%
6	9.6%
7	7.2%
8	5.4%
9	4.1%
10	3.0%

For Public Agency 1st, 2nd, 3rd and 4th Levels, the Present Value of Benefits for 2012-2015 Deaths for each level are calculated as if all members of all four levels who died from 2012-2015 were members of that particular level.

The Accrued Liability is equal to the Present Value of Benefits payable to current survivors. If the Accrued Liability exceeds the Market Value of Assets, the difference is called the Unfunded Liability. On the other hand, if the Market Value of Assets exceeds the Accrued Liability, the difference is called Excess Assets.

ACTUARIAL FUNDING METHOD FOR PUBLIC AGENCY 1ST, 2ND, 3RD AND 4TH LEVEL, AND STATE AND SCHOOLS 5TH LEVEL POOLS (CONTINUED)

The required employer monthly premium is the total required monthly premium less the $2.00 per month member contributions as required by State Statute Section 21581. For all levels, existing excess assets in the pool will be amortized and directly used to offset required employer contributions. However, for the State and Schools 5th Level pool, if the total required monthly premium after amortization of excess assets exceeds $4.00, the member and the employer shall evenly share the required monthly premium. For the current valuation date, the unfunded liability for the State 5th Level pool was amortized using CalPERS amortization policy. Excess assets for the Schools 5th Level pool, and Public Agency 1st, 2nd, and 3rd Level pools were sufficient to offset required employer contributions indefinitely, based on June 30, 2016 data and assumptions. Excess assets for the Public Agency 4th Level were amortized over a 30-year period, and are not sufficient to fully offset the required employer contribution. The resulting employer contribution for the 4th Level is $5.20 per covered member per month.

ACTUARIAL FUNDING METHOD FOR PUBLIC AGENCY INDEXED LEVEL POOL

The funding method used for the Public Agency Indexed Level pool is the Entry Age Normal method. Under this method, projected benefits are determined for all members and the associated liabilities are spread in a manner that produces an annual cost that increases by approximately 2 percent in each year.

The Normal Cost for the Public Agency Indexed Level pool is the portion of the total Entry Age Normal Cost, as described in the preceding paragraph that is allocated to the current fiscal year. Since there is no cost allocated to the current fiscal year for those already receiving benefits or are in a deferred status, only active members have a Normal Cost. The population demographics, excluding population growth, are assumed to remain stable for purposes of projecting the Normal Cost to the year for which the contribution requirement is being determined.

The Accrued Liability is equal to the Present Value of Future Benefits for both current survivors and active members, less the Present Value of Future Normal Costs.

The total required monthly premium is the sum of the individual Normal Costs divided by the number of member months. The required employer monthly premium is the total required monthly premium less the $2.00 per month member contributions as required by State Statute Section 21581. Existing excess assets in the pool will be amortized and directly used to offset required employer contributions. However, if the total required monthly premium after amortization of excess assets exceeds $4.00, the member and the employer shall evenly share the required monthly premium. Excess assets for the Public Agency Indexed Level are amortized over a 30-year period. The resulting employer contribution for the Indexed Level is $3.50 per covered member per month.

ASSET VALUATION METHOD

Commencing with the June 30, 2013 valuation, assets were and continue to be valued on a Market Value basis.

METHOD FOR PROJECTING ACTIVE COUNTS

In the past, actuarial staff has found that two particular methods have worked well in predicting future active member counts for the pools. Projected counts are necessary to determine employer premiums. The two methods that are normally used are linear trend or autoregressive models. For this valuation year, we will continue to use these models for the Public Agency Pools. They continue to model slow growth in the 1st, 2nd, 3rd, 4th and Indexed Level pools.

These methods when applied to the State and Schools Pools are also predicting modest growth for State and small decline for Schools. This is consistent with the current state of the economy, current hiring practices of the State and the fact that new migration into and out of these pools do not take place.

ACTUARIAL ASSUMPTIONS

The actuarial assumptions used in this valuation include the investment return rate and the mortality rates for current beneficiaries. These assumptions are shown below. Actual mortality rates for active members of all pools combined are shown in Appendix D and are used in the calculation of the annual normal costs, except for the Public Agency Indexed Level.

Economic Assumptions

Investment Return 7.375% compounded annually (net of administrative expenses)

Demographic Assumptions:

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 20 years of projected on-going mortality improvement using Scale BB published by the Society of Actuaries. For more details, please refer to the experience study report that can be found at the following link:

https://www.calpers.ca.gov/docs/forms-publications/calpers-experience-study-2014.pdf

Attained Age	Male Mortality Rate	Female Mortality Rate
25	0.0003	0.0002
30	0.0004	0.0003
35	0.0006	0.0005
40	0.0011	0.0009
45	0.0023	0.0020
50	0.0050	0.0047
55	0.0060	0.0042
60	0.0071	0.0044

Attained Age	Male Mortality Rate	Female Mortality Rate
65	0.0083	0.0059
70	0.0131	0.0099
75	0.0221	0.0172
80	0.0390	0.0290
85	0.0697	0.0524
90	0.1297	0.0989
95	0.2244	0.1849
100	0.3254	0.3002

ADDITIONAL ACTUARIAL ASSUMPTIONS APPLICABLE TO THE PUBLIC AGENCY INDEXED LEVEL

The Public Agency Indexed Level's Accrued Liability and Entry Age Normal cost for active members are calculated based on the actuarial assumptions for our Public Agency miscellaneous 2% @ 55 and police 2% @ 50 pension plans. The final valuation results equals the sum of the results valued on the basis of a miscellaneous 2% @ 55 plan plus the results valued on the basis of a police 2% @ 50 plan, where all miscellaneous employees of plans contracting for the Public Agency Indexed Level of 1959 Survivor benefits are valued using miscellaneous 2% @ 55 assumptions, and all safety employees of plans contracting for the Public Agency Indexed Level of 1959 Survivor benefits are valued using police 2% @ 50 assumptions.

The actuarial assumptions for each of these plans are as follows:

Eligible Survivor Status

For active members of both the Miscellaneous and Safety Police plans, the probability of having eligible survivor(s) at the date of death is assumed according to the following table:

Age at Death	Percent Having Eligible Survivor(s)
Age 20 and Under	30%
Between Ages 21 and 24	50%
Between Ages 25 and 29	70%
Between Ages 30 and 29	90%
Between Ages 40 and 49	95%
Between Ages 50 and 54	90%
Age 55 and Above	85%

ADDITIONAL ACTUARIAL ASSUMPTIONS APPLICABLE TO THE PUBLIC AGENCY INDEXED LEVEL (CONTINUED)

Average claims are developed at every age using actual experience from the program. These average claims are then multiplied by the percentages in the above table. The results are used to estimate expected claims in the active population.

Benefit amounts and Present Value of benefits were based on average claim experience. A sample of the average claim experience is shown in the table below:

Age at Death	Present Value of Average Claim[1] at the Time of Death[2]
Age 20 and Under	$31,965
25	93,837
30	126,498
35	120,449
40	114,250
45	99,570
50	81,925

Age at Death	Present Value of Average Claim[1] at the Time of Death[2]
55	$68,900
60	64,294
65	62,982
70	63,192
75	61,956
Age 80 and Above	55,104

(1) Average claims were calculated using actual experience from the 1959 Survivor program and smoothed using a polynomial regression model.
(2) Values are based on an initial benefit of $500/$1,000/$1,500 for one, two, or three survivors, respectively. This was the benefit level on June 30, 2000, when the Indexed Level first became effective. The valuation program increases these amounts by 2 percent per year up to the current valuation year.

Public Agency Miscellaneous 2% @ 55

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

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

	Non-Industrial (Not Job-Related)			
	Male		Female	
Attained Age	Death	Disability	Death	Disability
20	0.00031	0.00017	0.00020	0.00010
25	0.00040	0.00017	0.00023	0.00010
30	0.00049	0.00019	0.00025	0.00024
35	0.00057	0.00049	0.00035	0.00081
40	0.00075	0.00122	0.00050	0.00155
45	0.00106	0.00191	0.00071	0.00218
50	0.00155	0.00213	0.00100	0.00229
55	0.00228	0.00221	0.00138	0.00179
60	0.00308	0.00222	0.00182	0.00135

ADDITIONAL ACTUARIAL ASSUMPTIONS APPLICABLE TO THE PUBLIC AGENCY INDEXED LEVEL (CONTINUED)

Public Agency Miscellaneous 2% @ 55 (continued)

Service Retirement

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

Age	Service Retirement					
	Duration of Service					
	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.0140	0.0180	0.0210	0.0250	0.0270	0.0310
51	0.0120	0.0140	0.0170	0.0200	0.0210	0.0250
52	0.0130	0.0170	0.0190	0.0230	0.0250	0.0280
53	0.0150	0.0200	0.0230	0.0270	0.0300	0.0340
54	0.0260	0.0330	0.0380	0.0450	0.0510	0.0590
55	0.0480	0.0610	0.0740	0.0880	0.1000	0.1170
56	0.0420	0.0530	0.0630	0.0750	0.0850	0.1000
57	0.0440	0.0560	0.0670	0.0810	0.0910	0.1070
58	0.0490	0.0620	0.0740	0.0890	0.1000	0.1180
59	0.0570	0.0720	0.0860	0.1030	0.1180	0.1380
60	0.0670	0.0860	0.1030	0.1230	0.1390	0.1640
61	0.0810	0.1030	0.1240	0.1480	0.1680	0.1990
62	0.1160	0.1470	0.1780	0.2140	0.2430	0.2880
63	0.1140	0.1440	0.1740	0.2080	0.2370	0.2810
64	0.1080	0.1380	0.1660	0.1990	0.2270	0.2680
65	0.1550	0.1970	0.2380	0.2850	0.3250	0.3860
66	0.1320	0.1680	0.2030	0.2430	0.2760	0.3280
67	0.1220	0.1550	0.1890	0.2250	0.2560	0.3040
68	0.1110	0.1410	0.1700	0.2040	0.2320	0.2740
69	0.1140	0.1440	0.1740	0.2090	0.2380	0.2820
70	0.1300	0.1650	0.2000	0.2400	0.2720	0.3230

Termination with Refund

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

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

ADDITIONAL ACTUARIAL ASSUMPTIONS APPLICABLE TO THE PUBLIC AGENCY INDEXED LEVEL (CONTINUED)

Public Agency Miscellaneous 2% @ 55 (continued)

Termination with Vested Deferred Benefits

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

Duration of Service	Termination with Vested Deferred Benefits				
	Entry Age				
	20	25	30	35	40
5	0.0656	0.0597	0.0537	0.0477	0.0418
10	0.0530	0.0466	0.0403	0.0339	0.0000
15	0.0443	0.0373	0.0305	0.0000	0.0000
20	0.0333	0.0261	0.0000	0.0000	0.0000
25	0.0212	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000	0.0000

Public Agency Police 2% @ 50

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

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

Attained Age	Non-Industrial (Not Job-Related)			
	Male		Female	
	Death	Disability	Death	Disability
20	0.00031	0.00010	0.00020	0.00010
25	0.00040	0.00010	0.00023	0.00010
30	0.00049	0.00020	0.00025	0.00020
35	0.00057	0.00030	0.00035	0.00030
40	0.00075	0.00040	0.00050	0.00040
45	0.00106	0.00050	0.00071	0.00050
50	0.00155	0.00080	0.00100	0.00080
55	0.00228	0.00130	0.00138	0.00130
60	0.00308	0.00200	0.00182	0.00200

Industrial (Job-Related) Death and Industrial (Job-Related) Disability

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

Attained Age	Industrial (Job-Related)			
	Male		Female	
	Death	Disability	Death	Disability
20	0.00003	0.00000	0.00003	0.00000
25	0.00007	0.00165	0.00007	0.00165
30	0.00010	0.00476	0.00010	0.00476
35	0.00012	0.00788	0.00012	0.00788
40	0.00013	0.01100	0.00013	0.01100
45	0.00014	0.01412	0.00014	0.01412
50	0.00015	0.01846	0.00015	0.01846
55	0.00016	0.04785	0.00016	0.04785
60	0.00017	0.06024	0.00017	0.06024

ADDITIONAL ACTUARIAL ASSUMPTIONS APPLICABLE TO THE PUBLIC AGENCY INDEXED LEVEL (CONTINUED)

Public Agency Police 2% @ 50 (continued)

Service Retirement

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

	Service Retirement					
	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.0050	0.0050	0.0050	0.0050	0.0170	0.0890
51	0.0050	0.0050	0.0050	0.0050	0.0170	0.0870
52	0.0180	0.0180	0.0180	0.0180	0.0420	0.1320
53	0.0440	0.0440	0.0440	0.0440	0.0900	0.2170
54	0.0650	0.0650	0.0650	0.0650	0.1260	0.2830
55	0.0860	0.0860	0.0860	0.0860	0.1660	0.3540
56	0.0670	0.0670	0.0670	0.0670	0.1300	0.2890
57	0.0660	0.0660	0.0660	0.0660	0.1290	0.2880
58	0.0660	0.0660	0.0660	0.0660	0.1290	0.2880
59	0.1390	0.1390	0.1390	0.1390	0.1760	0.3120
60	0.1230	0.1230	0.1230	0.1230	0.1530	0.2780
61	0.1100	0.1100	0.1100	0.1100	0.1380	0.2560
62	0.1300	0.1300	0.1300	0.1300	0.1620	0.2910
63	0.1300	0.1300	0.1300	0.1300	0.1620	0.2910
64	0.1300	0.1300	0.1300	0.1300	0.1620	0.2910
65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Termination with Refund

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

	Termination with Refund					
	Entry Age					
Duration of Service	20	25	30	35	40	45
0	0.1013	0.1013	0.1013	0.1013	0.1013	0.1013
1	0.0636	0.0636	0.0636	0.0636	0.0636	0.0636
2	0.0271	0.0271	0.0271	0.0271	0.0271	0.0271
3	0.0258	0.0258	0.0258	0.0258	0.0258	0.0258
4	0.0245	0.0245	0.0245	0.0245	0.0245	0.0245
5	0.0086	0.0086	0.0086	0.0086	0.0086	0.0086
10	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
15	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027
20	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017
25	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012
30	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009

ADDITIONAL ACTUARIAL ASSUMPTIONS APPLICABLE TO THE PUBLIC AGENCY INDEXED LEVEL (CONTINUED)

Public Agency Police 2% @ 50 (continued)

Termination with Vested Deferred Benefits

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

Duration of Service	Termination with Vested Deferred Benefits				
	Entry Age				
	20	25	30	35	40
5	0.0163	0.0163	0.0163	0.0163	0.0163
10	0.0126	0.0126	0.0126	0.0126	0.0000
15	0.0082	0.0082	0.0082	0.0000	0.0000
20	0.0065	0.0065	0.0000	0.0000	0.0000
25	0.0058	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000	0.0000

Appendix B
Summary of Principal Plan Provisions

The 1959 Survivor program was designed to provide pre-retirement death benefits comparable to those provided by Social Security, formally the Federal Old Age and Survivor Insurance (OASI) program, to CalPERS' members not covered by Social Security.

ELIGIBILITY

The benefit is available only to those members not covered by Social Security OASI benefits. For public agencies, this benefit is provided by contract with CalPERS. Only those public agencies that contract for the 1st, 2nd, 3rd, 4th, or Indexed level of the program are eligible for the benefits valued in this report. Public Agency 1st and 2nd levels have been closed since January 1, 1994 and 3rd level has been closed since July 1, 2001. For State and Schools members, the 5th level benefit is provided by State statute to certain groups of employees. Members who are eligible for the benefit are given a one-time option to join at the time of contract. Members hired subsequent to the time of contract are automatically enrolled in the program.

SPOUSAL OR DOMESTIC PARTNER BENEFIT

The benefit is a monthly payment to eligible surviving spouses or domestic partners age 62 or older for Public Agency 1st, 2nd and 3rd Levels and age 60 or older for all other levels. The benefit is also payable under these deferred ages for spouses or partners that have care of children under the age of 22. As an example, assume an agency contracts for the 3rd Level benefit and an active member dies and leaves behind a 35 year old spouse and 2 children, ages 5 and 15. The following table describes how the benefit would be paid over the course of time.

Event	Monthly Benefit Paid
Member Death	$840
1st Child Turns 22	$700
2nd Child Turns 22[1]	$0
Spouse Turns 62[2]	$350

(1) At this time, the spouse would be 52 years old and would not receive any benefit until age 62.
(2) Spouse would continue to receive this benefit until his/her death.

CHILD BENEFIT

Children are eligible if they are not married or in a registered domestic partnership and are under the age of 22 whether or not a spouse or domestic partner exists. For 3 or more children, the 3 survivor benefit is paid; for 2 children, the 2 survivor benefit is paid and so forth (see tables below). In all cases, unless a child is disabled, the benefit stops at age 22. If a child is disabled, the benefit is paid until the disability ceases.

PARENTAL BENEFITS

If there is no eligible spouse or domestic partner or children, parent(s) dependent for at least half of their support from the deceased member may be eligible for benefits. The parent(s) must be over age 62 for Public Agency 1st, 2nd and 3rd Levels and over age 60 for all other levels.

MONTHLY BENEFIT AMOUNTS

The monthly benefit amount depends upon the coverage level within the program.

1st, 2nd and 3rd Level (For Members of Public Agencies who Contract)

	1st Level	2nd Level	3rd Level
Spouse or Domestic Partner With Two or More Eligible Children; or Three or More Eligible Children	$430	$538	$840
Spouse with One Eligible Child; or Two Eligible Children Only	$360	$450	$700
One Eligible Child Only; or Spouse Age 62 or Older; or Eligible Dependent parents	$180	$225	$350

4th Level and Indexed Level (For Members of Public Agencies who Contract) and 5th Level (State and School Members)

	4th Level	Indexed Level	State and Schools 5th Level
Spouse or Domestic Partner with Two or More Eligible Children; or Three or More Eligible Children	$2,280	$2,100 [1]	$1,800
Spouse with One Eligible Child; or Two Eligible Children Only	$1,900	$1,400 [1]	$1,500
One Eligible Child Only; or Spouse Age 60 or Older; or Eligible Dependent parents	$950	$700 [1]	$750

(1) These figures indicate calendar year benefit amounts for the Indexed Level in effect for calendar year 2017. Benefit amounts will increase by 2 percent each January 1.

COMPARISON OF SOCIAL SECURITY AND CALPERS 1959 SURVIVOR BENEFITS

The following tables compare current Social Security survivor benefits with current benefit levels paid under the 1959 Survivor Program.

Social Security

Survivor Group	Low	Average	High
Three Survivors	$1,544	$2,823	$4,009
Two Survivors	1,542	2,316	3,436
One Survivor	771	1,158	1,718

Unlike the 1959 Survivor Benefit (with the exception of the Indexed level), federal Social Security benefits normally receive an automatic cost-of-living adjustment every year. Also, unlike the 1959 Survivor Benefit, Social Security benefits are based on a worker's actual earnings up to the maximum covered. The values shown assume death at age 45 (benefits slightly higher at lower ages, lower at higher ages), and steady earnings. "Low" is 2016 salary of $25,000, "Average" is $50,000, and "High" is $90,000.

CalPERS 1959 Survivor Benefit

Survivor Group	1st Level	2nd Level	3rd Level	4th Level	Indexed Level[1]	State and Schools 5th Level
Three Survivors	$430	$538	$840	$2,280	$2,100	$1,800
Two Survivors	360	450	700	1,900	1,400	1,500
One Survivors	180	225	350	950	700	750

(1) Amounts effective January 1, 2017

SUMMARY OF PLAN CHANGES

Existing public agency employers joining the Public Agency 4th or Indexed Level Pool during the 2017-18 Fiscal Year are required to pay only the Unfunded Liability based on their own membership (amortized over a period of five years) which exists at the time they join plus the agency's normal cost for all members at the new benefit level for the first five years. If they have excess assets, the excess assets will be amortized over five years and used to offset the agency's normal cost for each year.

Appendix C
Demographic and Experience Information

CURRENT AND DEFERRED BENFICIARIES - ALL LEVELS OF THE 1959 SURVIVOR PROGRAM FOR PUBLIC AGENCIES, STATE AND SCHOOLS

Currently, there are 4,172 cases where liability exists. These cases include widows or widowers in deferred status even though presently there are no benefits being paid. There are 9 possible beneficiary combinations that can be associated with each case. The combinations presented below are given as of the date of the valuation, for all levels of the 1959 Survivor program.

Status	Number	Percent
Widow Deferred	818	19.6%
Widow Only Receiving	2,522	60.5%
Widow With One Child	315	7.6%
Widow With Two or More Children	273	6.5%
One Child	158	3.8%
Two Children	50	1.2%
Three or More Children	20	0.5%
One Parent	13	0.3%
Two Parents	3	0.1%
Totals	**4,172**	**100.0%[1]**

(1) Percentages may not sum to 100% due to rounding.

BENEFICIARY COMBINATIONS AT DATE OF DEATH - ALL LEVELS OF THE 1959 SURVIVOR PROGRAM FOR PUBLIC AGENCIES, STATE AND SCHOOLS

There exist 7,603 cases of death associated with the 1959 Survivor program since its inception where 1959 Survivor benefits became payable. With this data, a historical account of each combination can be made. Further, probabilities can be approximated with respect to these combinations when a member dies. Below is a list of all combinations on record, numbers and associated percentages as of the time of death, for all levels of the 1959 Survivor program.

Status	Number	Percent
Widow Deferred	2,180	28.7%
Widow Only Receiving	1,072	14.1%
Widow With One Child	1,261	16.6%
Widow With Two or More Children	2,060	27.1%
One Child	448	5.9%
Two Children	334	4.4%
Three or More Children	215	2.8%
One Parent	27	0.4%
Two Parents	6	0.1%
Totals	**7,603**	**100.0%[1]**

(1) Percentages may not sum to 100% due to rounding.

Appendix D
1959 Survivor Deaths Per Year

1959 SURVIVOR DEATHS PER YEAR

Displayed below is a year-by-year account of the number of deaths under the program and the death rate each year for the last 35 years for public agencies, State, and Schools. Deaths given in the exhibit are on a calendar year basis and may change from previous valuations due mainly to reclassification of the benefit that ultimately gets paid to the beneficiary. Counts represent mid-year active exposure. The historic covered active counts may not match those reported in the prior year's valuation. This is due to the fact that in some cases there is a time gap between a member's death and the determination of which type of death benefit that member will receive.

Calendar Year	Public Agency			State			School		
	Deaths	Mid-year Active Counts	Death Rate	Deaths	Mid-year Active Counts	Death Rate	Deaths	Mid-year Active Counts	Death Rate
2015	75	134,879	0.06%	60	74,372	0.08%	5	10,490	0.05%
2014	66	132,024	0.05%	52	72,848	0.07%	3	10,287	0.03%
2013	77	129,796	0.06%	57	71,180	0.08%	4	9,944	0.04%
2012	91	132,754	0.07%	51	71,759	0.07%	6	10,123	0.06%
2011	108	134,255	0.08%	56	77,714	0.07%	7	9,811	0.07%
2010	84	138,470	0.06%	54	79,587	0.07%	7	10,203	0.07%
2009	98	143,207	0.07%	60	82,434	0.07%	6	10,562	0.06%
2008	103	144,828	0.07%	50	81,369	0.06%	8	10,550	0.08%
2007	105	140,012	0.07%	70	76,902	0.09%	5	10,131	0.05%
2006	84	137,095	0.06%	68	71,742	0.09%	13	9,469	0.14%
2005	101	133,510	0.08%	65	70,193	0.09%	7	9,402	0.07%
2004	93	131,633	0.07%	59	64,252	0.09%	3	9,325	0.03%
2003	91	129,620	0.07%	70	68,791	0.10%	6	9,390	0.06%
2002	84	129,355	0.06%	47	65,558	0.07%	5	9,195	0.05%
2001	83	116,161	0.07%	58	64,309	0.09%	5	7,884	0.06%
2000	78	121,538	0.06%	57	60,349	0.09%	7	8,338	0.08%
1999	90	118,850	0.08%	58	59,406	0.10%	3	7,444	0.04%
1998	85	112,389	0.08%	57	55,435	0.10%	6	6,956	0.09%
1997	69	102,475	0.07%	59	55,084	0.11%	4	6,794	0.06%
1996	82	100,494	0.08%	53	51,746	0.10%	6	6,726	0.09%
1995	72	99,235	0.07%	51	47,689	0.11%	10	6,751	0.15%
1994	68	98,088	0.07%	56	47,323	0.12%	11	6,653	0.17%
1993	74	97,752	0.08%	52	46,872	0.11%	3	6,776	0.04%
1992	83	95,840	0.09%	45	48,872	0.09%	8	6,823	0.12%
1991	95	91,574	0.10%	41	47,708	0.09%	7	7,752	0.09%
1990	86	86,196	0.10%	59	45,502	0.13%	7	7,942	0.09%
1989	66	82,046	0.08%	60	44,069	0.14%	6	6,899	0.09%
1988	72	84,808	0.08%	50	41,980	0.12%	9	7,100	0.13%
1987	60	69,340	0.09%	51	40,315	0.13%	11	6,200	0.18%
1986	64	68,500	0.09%	40	39,391	0.10%	8	6,500	0.12%
1985	68	66,927	0.10%	80	39,175	0.20%	5	6,842	0.07%
1984	74	65,480	0.11%	63	38,488	0.16%	4	7,104	0.06%
1983	77	59,917	0.13%	68	37,186	0.18%	8	7,685	0.10%
1982	75	56,401	0.13%	79	37,030	0.21%	10	7,987	0.13%
1981	72	54,354	0.13%	73	38,192	0.19%	10	7,843	0.13%

Appendix E
Glossary of Actuarial Terms

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

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

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

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

Amortization Base: 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 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 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.

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.)

Normal Cost: The portion of the actuarial present value of projected benefits that is allocated to a period, typically twelve months, under the actuarial cost method. The normal cost may include a provision for expenses.

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.

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.

Term Insurance Method: An actuarial cost method designed such that contributions are made to the plan to meet benefit payments expected to fall due within the year for which the contribution is made.

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

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

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