



California State Teachers' Retirement Plan

GASB 67/68 Reporting

Reporting Date: June 30, 2018

Measurement Date: June 30, 2018

Actuarial Valuation Date: June 30, 2017

Prepared by:

Mark Olleman

FSA, EA, MAAA

Nick Collier

ASA, EA, MAAA

Julie Smith

FSA, EA, MAAA

Milliman, Inc.
1301 Fifth Avenue, Suite 3800
Seattle WA 98101-2605
Tel +1 206 624 7940
milliman.com

Table of Contents

Certification	1
Overview of GASB 67 and GASB 68	3
Summary of Analysis Performed	4
Statement of Fiduciary Net Position.....	6
Statement of Changes in Fiduciary Net Position	7
Net Pension Liability.....	8
Long-Term Expected Rate of Return	9
Discount Rate.....	10
Projection of Fiduciary Net Position (Includes DB & SBMA)	12
Supplemental Information for Projection of Fiduciary Net Position (Includes DB & SBMA)	13
Total Pension Liability and Net Pension Liability	14
Schedule of Changes in Net Pension Liability	15
Schedule of Changes in Net Pension Liability and Related Ratios	16
Schedule of Employer Contributions.....	17
Allocable Pension Expense.....	19
Schedule of Deferred Inflows and Outflows of Resources	20
Actuarial Methods and Assumptions for GASB Valuation	21
Glossary	22

Certification

Actuarial computations presented in this report under Statements No. 67 and 68 of the Governmental Accounting Standards Board are for purposes of assisting CalSTRS and its employers in fulfilling their financial accounting requirements. No attempt is being made to offer any accounting opinion or advice. This report is for fiscal year July 1, 2017 to June 30, 2018. The measurement date for determining plan assets and obligations is June 30, 2018. The calculations enclosed in this report have been made on a basis consistent with our understanding of the plan provisions. Determinations for purposes other than meeting financial reporting requirements may be significantly different than the results contained in this report. Accordingly, additional determinations may be needed for other purposes, such as judging benefit security or meeting employer funding requirements.

This report includes contribution rates that are based on the June 30, 2017 CalSTRS funding valuations. CalSTRS funding is based on complex legislation. The funding valuations contain calculations based on our understanding of the relevant law based on our experience working with CalSTRS and other large public retirement systems and has been augmented by consultation with CalSTRS staff.

In preparing this report, we relied, without audit, on information furnished by the California State Teachers' Retirement System (CalSTRS). This information includes, but is not limited to, statutory provisions, member census data, and financial information. Please see Milliman's June 30, 2017 funding valuation reports for more information on the data used in the valuation, as well as a summary of the plan provisions and actuarial methods and assumptions.

We performed a limited review of the census and financial information used directly in our analysis and have found them to be reasonably consistent and comparable with information used for other purposes. The valuation results depend on the integrity of this information. If any of this information is inaccurate or incomplete our results may be different and our calculations may need to be revised.

All costs, liabilities, rates of interest, and other factors for the Plan have been determined on the basis of actuarial assumptions and methods which are individually reasonable (taking into account the experience of the Plan and reasonable expectations); and which, in combination, offer a reasonable estimate of anticipated experience affecting the Plan. The Teachers' Retirement Board adopted the actuarial methods and assumptions used in the financial reporting valuation. We believe they are reasonable for these purposes.

This report is only an estimate of the Plan's financial condition as of a single date. It can neither predict the Plan's future condition nor guarantee future financial soundness. Actuarial valuations do not affect the ultimate cost of Plan benefits, only the timing of Plan contributions. While the valuation is based on an array of individually reasonable assumptions, other assumption sets may also be reasonable and valuation results based on those assumptions would be different. No one set of assumptions is uniquely correct. Determining results using alternative assumptions (except for the alternate discount rates shown in this report) is outside the scope of our engagement.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to factors such as, but not limited to, the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of the actuarial assignment, we did not perform an analysis of the potential range of such future measurements.

Milliman's work is prepared solely for the use and benefit of CalSTRS. To the extent that Milliman's work is not subject to disclosure under applicable public records laws, Milliman's work may not be provided to third parties without Milliman's prior written consent. Milliman does not intend to benefit or create a legal duty to any third party recipient of its work product. Milliman's consent to release its work product to any third party may be conditioned on the third party signing a Release, subject to the following exceptions:

- a) the plan sponsor may provide a copy of Milliman's work, in its entirety, to the plan sponsor's professional service advisors who are subject to a duty of confidentiality and who agree to not use Milliman's work for any purpose other than to benefit the Fund; and
- b) the plan sponsor may provide a copy of Milliman's work, in its entirety, to other governmental entities, as required by law.

No third party recipient of Milliman's work product should rely upon Milliman's work product. Such recipients should engage qualified professionals for advice appropriate to their specific needs.

The consultants who worked on this assignment are pension actuaries. Milliman's advice is not intended to be a substitute for qualified legal or accounting counsel.

The signing actuaries are independent of CalSTRS and the plan sponsors. We are not aware of any relationship that would impair the objectivity of our work.

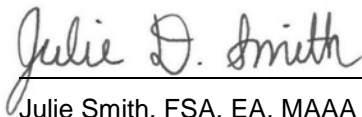
On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this report is complete and has been prepared in accordance with generally recognized accepted actuarial principles and practices. We are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein.



Mark Olleman, FSA, EA, MAAA
Consulting Actuary



Nick Collier, ASA, EA, MAAA
Consulting Actuary



Julie Smith, FSA, EA, MAAA
Consulting Actuary

Overview of GASB 67 and GASB 68

The Governmental Accounting Standards Board (GASB) released new accounting standards for public pension plans and participating employers in 2012. GASB Statements No. 67 and 68 replace and have substantially revised the accounting requirements previously mandated under GASB Statements No. 25 and 27. Under GASB Statements No. 67 and 68, plan sponsors are encouraged to establish a formal funding policy that is separate from financial reporting calculations.

GASB 67 applies to financial reporting for public pension plans and was implemented for plan fiscal years beginning after June 15, 2013.

GASB 68 governs the specifics of accounting for public pension plan obligations for participating employers and was implemented for employer fiscal years beginning after June 15, 2014. Note that a plan's fiscal year might not be the same as the employer's fiscal year, and an employer's GASB 68 reporting date might be different than the plan's GASB 67 reporting date. GASB 68 requires a liability for pension obligations, known as the Net Pension Liability, to be recognized on the balance sheets of participating employers. Changes in the Net Pension Liability will be immediately recognized as Pension Expense on the income statement or reported as deferred inflows/outflows of resources depending on the nature of the change.

The following GASB Statements provide additional information for, amend, or clarify GASB 67 and 68:

1. GASB 73 provides information about accounting and reporting for pensions and related assets that are not within the scope of GASB 68, and amendments to certain provisions of GASB 67 and 68. As it relates to GASB 67 and 68, GASB 73 is effective for fiscal years beginning after June 15, 2015.
2. GASB 82 addresses certain issues with respect to GASB 67, GASB 68 and GASB 73, and is first effective for reporting periods beginning after June 15, 2016 (with early adoption encouraged). CalSTRS implemented GASB 82 for reporting period beginning June 30, 2016.

Summary of Analysis Performed

We have calculated certain requested actuarial figures for the California State Teachers' Retirement Plan (the STRP) per the Governmental Accounting Standards Board (GASB) Statements No. 67 and 68. These statements pertain to accounting and financial reporting for pension plans and employers.

The calculations contained in this analysis have been performed using the results of the June 30, 2017 Defined Benefit (DB) Program, Defined Benefit Supplement (DBS) Program, and Cash Balance Benefit (CBB) Program actuarial valuations, with certain revisions to assumptions and methodology as required by GASB 67 and 68 and described later in this report. The liabilities have been projected to June 30, 2018 and combined with the actual assets of June 30, 2018.

Additionally, GASB 67/68 liabilities for the Supplemental Benefits Maintenance Account (SBMA) Program have been included in the STRP calculations contained in this letter. Per discussions with CalSTRS staff, we have treated future SBMA benefits as substantively automatic at the 85% replacement level under the GASB 67/68 definition.

Our final deliverable product for these GASB 67/68 calculations is a formatted .CSV file with data format specifications provided by CalSTRS accounting staff. We have provided an electronic copy of this file to you, in addition to this report. Please note that all certifications and limitations contained or referenced in this letter also apply to this electronic deliverable file. Staff should verify consistency of numbers in the .CSV file with numbers contained in this letter prior to use.

Per discussions with CalSTRS, we have performed the following analysis for the GASB Reporting Date of June 30, 2018:

1. We have performed an analysis to determine whether the amount of the STRP Fiduciary Net Position is projected to be greater than or equal to the projected STRP benefit payments in every corresponding future year. We have found that the STRP Fiduciary Net Position is projected to be sufficient to pay all projected STRP benefit payments in all future years. This results in a GASB 67/68 discount rate of 7.10% for reporting date June 30, 2018 calculations. The 7.10% discount rate reflects the long-term rate of investment return on total STRP assets, gross of administrative expenses. See the section of this letter entitled "Discount Rate" for details.
2. The Total Pension Liability as of June 30, 2018 for the STRP represents the sum of the Total Pension Liability determined for the DB Program, DBS and CBB Programs, and the SBMA program. These values are determined as of the valuation date of June 30, 2017, and projected to June 30, 2018 using standard actuarial techniques. These calculations are based on the following:
 - a. The DB Program Total Pension Liability (TPL) and Service Cost for GASB 67/68 purposes is based on the indicated discount rate, the Individual Entry Age Normal (EAN) Cost actuarial cost method, and all other assumptions the same as used in the DB Program actuarial valuation as of June 30, 2017.
 - b. The DBS and CBB Program Total Pension Liability and Service Cost for GASB 67/68 purposes is based on the indicated discount rate, the Individual EAN Cost actuarial cost method, assumed crediting rates of 7.00%, assumed lump sum form of payment for all members, and all other assumptions the same as used in the DB Program actuarial valuation as of June 30, 2017.
 - c. The SBMA Program Total Pension Liability and Service Cost for GASB 67/68 purposes is based on the indicated discount rate, the Individual EAN Cost actuarial cost method, an assumption for

- form of payment election consistent with the June 30, 2017 SBMA projection, and all other assumptions the same as used in the DB Program actuarial valuation as of June 30, 2017.
- d. The Total Pension Liability for benefits being paid, or to be paid in the future, from the Replacement Benefit Program (RBP) is included with the TPL for the DB Program, consistent with the funding valuation. Note that it is our understanding that the in-payment data provided to us for DB Program valuation purposes includes benefits payable from the RBP.
3. We have used the projected STRP Total Pension Liability as of June 30, 2018, and the Fiduciary Net Position of the STRP as of June 30, 2018 (as provided to us by CalSTRS staff on August 6, 2018) to calculate the STRP Net Pension Liability as of June 30, 2018.
 4. We have performed a discount-rate sensitivity analysis on the STRP Net Pension Liability for +1% (an 8.10% discount rate) and -1% (a 6.10% discount rate) scenarios on the GASB discount rate. In addition to the +/-1% values required under GASB, we have also provided values under +/-2% and +/-3% discount rates as requested by CalSTRS.
 5. We have calculated a total average remaining service life for all STRP plan members, rounded to the nearest year. This calculation uses an average remaining service life of 0 years for all inactive members and annuitants. The total average remaining service life for all STRP plan members is 7 years.
 6. We have provided the sources of change in the Net Pension Liability between June 30, 2017 and June 30, 2018. These sources of change consist of: changes in benefit terms, differences between actual and expected experience, changes of assumptions, and differences between projected and actual earnings on plan investments. There were no changes in benefit terms as of June 30, 2018, so this line item is \$0.

Statement of Fiduciary Net Position

\$ Millions

	June 30, 2018	June 30, 2017
Assets		
Investments at fair value:		
Debt securities	\$ 43,974	\$ 41,034
Equity securities	115,338	113,333
Alternative investments	65,894	56,383
Derivative instruments	233	138
Securities lending collateral	21,932	18,191
Investment - other	-	-
Total investments at fair value	<u>247,371</u>	<u>229,079</u>
Cash	<u>153</u>	<u>459</u>
Receivables:		
Investments sold	2,518	1,906
Foreign currency forward contracts (net)	-	-
Interest and dividends	559	444
Member and employer	715	660
Loans receivable	2,724	2,819
Other	30	44
Total receivables	<u>6,546</u>	<u>5,873</u>
Other assets:		
Capital assets, net of accumulated depreciation	276	259
Other	-	-
Total other assets	<u>276</u>	<u>259</u>
Total assets	<u>\$ 254,346</u>	<u>\$ 235,670</u>
Deferred outflows of resources	117	71
Total assets and deferred outflow of resources	<u>\$ 254,463</u>	<u>\$ 235,741</u>
Liabilities		
Derivative instruments	140	260
Investment purchase payable	3,347	3,271
Foreign currency forward contracts (net)	-	-
Obligation under reverse repurchase agreement	-	-
Loan payable	2,732	2,824
Benefits in process of payment	263	234
Net pension and OPEB obligation	835	323
Securities lending obligation	21,918	18,184
Other	304	354
Total liabilities	<u>\$ 29,539</u>	<u>\$ 25,450</u>
Deferred inflows of resources	55	1
Total assets and deferred inflow of resources	<u>\$ 29,594</u>	<u>\$ 25,451</u>
Net position restricted for pensions	<u>\$ 224,869</u>	<u>\$ 210,290</u>

Statement of Changes in Fiduciary Net Position

\$ Millions

	<u>2018</u>	<u>2017</u>
Additions		
Contributions:		
Member contributions	\$ 3,496	\$ 3,441
Employer contributions	4,867	4,173
State of California/Federal Government	2,797	2,478
Total Contributions	<u>11,160</u>	<u>10,092</u>
Investment income (Loss):		
Net appreciation (depreciation) in fair value of investments	13,654	20,432
Interest, dividends and other	5,350	4,951
Securities lending income	361	182
Less investment expenses:		
Cost of lending securities	(312)	(84)
Reverse repurchase agreement	-	-
Other investment expenses	(379)	(315)
Net investment income	<u>18,674</u>	<u>25,166</u>
Other income	<u>105</u>	<u>72</u>
Total Additions	<u>\$ 29,939</u>	<u>\$ 35,330</u>
Deductions		
Retirement, disability, and death benefits	14,271	13,626
Premiums paid	-	-
Distributions and withdrawals	-	-
Purchasing power benefits	162	161
Refunds of member contributions	104	116
Administrative expenses	216	182
Borrowing costs	94	58
Other expenses	2	10
Total Deductions	<u>\$ 14,849</u>	<u>\$ 14,153</u>
Transfers in	-	-
Transfers out	-	-
Adjustments		
Adjustment for application of GASB 75	(511)	-
Net increase (decrease)	<u>\$ 14,579</u>	<u>\$ 21,177</u>
Net assets held in trust for pension and other post employment benefits		
Beginning of the year	210,290	189,113
End of the year	<u>\$ 224,869</u>	<u>\$ 210,290</u>

Net Pension Liability

\$ Millions

Net Pension Liability	June 30, 2018	June 30, 2017
Total pension liability	\$ 316,776	\$ 302,769
Fiduciary net position	<u>224,869</u>	<u>210,290</u>
Net pension liability ¹	\$ 91,907	\$ 92,479
Fiduciary net position as a % of total pension liability	70.99%	69.46%
Covered payroll	\$ 34,753	\$ 34,126
Net pension liability as a % of covered payroll	264.46%	270.99%

The total pension liability was determined by an actuarial valuation as of the valuation date, calculated based on the discount rate shown below and actuarial assumptions and methods as outlined in this report for GASB purposes.

Discount Rate

Discount rate	7.10%	7.10%
Long-term expected rate of return		
Gross of administrative expenses	7.10%	7.10%
Net of all expenses	7.00%	7.00%
Municipal bond rate	N/A	N/A

The plan's fiduciary net position was projected to be available to make all projected future benefit payments of current active, inactive, and in-payment members and beneficiaries. Therefore, the discount rate for calculating the total pension liability is equal to the long-term expected rate of return, gross of administrative expenses. See details of discount rate determination in this report.

Other Key Actuarial Assumptions

The actuarial assumptions that determined the total pension liability as of June 30, 2018 were based on the results of an actuarial experience study for the period July 1, 2010 - June 30, 2015.

Valuation date	June 30, 2017	June 30, 2016
Measurement date	June 30, 2018	June 30, 2017
Other assumptions and methods	See the 'Actuarial Methods and Assumptions for GASB Valuation' section of this report.	

1. Numbers may not add due to rounding.

Long-Term Expected Rate of Return

The long-term expected rate of return on CalSTRS assets is determined by combining expected inflation with expected long-term real returns, and reflecting expected volatility and correlation. The capital market assumptions and information shown below are provided by CalSTRS. The numbers shown are based on November 2017 information for a 20-year time horizon.

Note that the valuation assumption for long-term expected return is reviewed annually and re-assessed in detail approximately every four years, and is set based on a 30-year time horizon; the most recent detailed analysis was performed in 2016. See Milliman's Experience Analysis report for the period July 1, 2010 – June 30, 2015 for more details.

Asset Class	Target Allocation	Long-Term Arithmetic Expected Real Rate of Return ¹
Global Equity	47.0%	6.30%
Private Equity	13.0%	9.30%
Real Estate	13.0%	5.20%
Inflation Sensitive	4.0%	3.80%
Fixed Income	12.0%	0.30%
Risk Mitigating Strategies	9.0%	2.90%
Cash / Liquidity	2.0%	-1.00%

1. Real return is net of assumed 2.75% inflation.

Discount Rate

The discount rate is the single rate of return that, when applied to all projected benefit payments, results in an actuarial present value of projected benefit payments equal to the total of the following:

1. The actuarial present value of benefit payments projected to be made in future periods in which (a) the amount of the pension plan's fiduciary net position is projected to be greater than the benefit payments that are projected to be made in that period and (b) pension plan assets up to that point are expected to be invested using a strategy to achieve the long-term rate of return, calculated using the long-term expected rate of return on pension plan investments.
2. The actuarial present value of projected benefit payments not included in (1), calculated using the municipal bond rate.

Therefore, if plan investments in a given future year are greater than projected benefit payments in that year and are invested such that they are expected to earn the long-term rate of return, the discount rate applied to projected benefit payments in that year should be the long-term expected rate of return on plan investments. If future years exist where this is not the case, then an index rate reflecting the yield on a 20-year, tax-exempt municipal bond should be used to discount the projected benefit payments for those years.

The determination of a future date when plan investments are not sufficient to pay projected benefit payments is often referred to as a depletion date projection. A depletion date projection compares projections of the pension plan's fiduciary net position to projected benefit payments and aims to determine a future date, if one exists, when the fiduciary net position is projected to be less than projected benefit payments. If an evaluation of the sufficiency of the projected fiduciary net position compared to projected benefit payments can be made with sufficient reliability without performing a depletion date projection, alternative methods to determine sufficiency may be applied.

In order to determine the GASB 67/68 discount rate for the STRP, we have made two separate assessments of projected sufficiency of the Fiduciary Net Position, as follows:

1. For the DB and SBMA Programs, a depletion date projection was performed. This projection shows that the Fiduciary Net Position of the DB and SBMA Programs is not expected to be depleted in any future year; that is, the projected Fiduciary Net Position is always expected to be sufficient to pay projected benefit payments under the assumptions applied in this projection for accounting purposes.
 - A projection of Fiduciary Net Position (plan net assets) was performed. This projection includes all district contributions, as well as all state contributions to the DB and SBMA Programs, intended to fund the benefits of current plan members. Additionally, all projected contributions from, and expected future benefit payments to, current plan members are included. The projection does not include any contributions expected to be made by (or future benefit payments expected to be made to) future DB Program members, nor does it include any district or state contributions expected to be made to fund the cost of benefits for future DB or SBMA Program members. Mid-year timing of cash flows was assumed.
 - We have reflected the projected statutory contribution rates to the DB Program by members, districts, and the state under the law (to the extent allowed under GASB 67/68; see preceding point). These contribution rates are designed to fully fund the DB Program by 2046 as shown in the June 30, 2017 valuation of the DB Program.
 - For purposes of this depletion date projection, we have treated future SBMA benefits at the 85% purchasing power level as substantively automatic under the GASB 67/68 definition. Note that the DB Program 2% Annual Benefit Adjustment is considered an automatic benefit adjustment and is included in valuation calculations.

- We have reduced future contributions to the DB Program by the projected amounts expected to be diverted to pay benefits of the Medicare Premium Payment Program in future years.
2. For the DBS and CBB Programs, we have used an alternative method as allowed under GASB 67/68 to determine the sufficiency of Fiduciary Net Position in all future years. These Programs are account balance programs, where a crediting rate to member accounts is defined, and additional earnings credits may be granted to member accounts if investment earnings meet certain thresholds.

The investments for these plans are assumed to earn more than the statutory crediting rate for each plan (i.e., investment income is always assumed to exceed crediting to member accounts). Moreover, as of the June 30, 2017 actuarial valuations for these Programs, each Program was more than 100% funded on an actuarial valuation basis.

Due to the nature of the plan design and the strong funding status of these plans, by definition the Fiduciary Net Position of these plans will always be projected to be sufficient to pay projected benefit payments for both the DBS and CBB Programs.

Based on the results of the depletion date projection performed for the DB and SBMA Programs, and the alternative method used to determine ongoing sufficiency of projected Fiduciary Net Position (FNP) for the DBS and CBB Programs, we have concluded that the Fiduciary Net Position of the STRP, when projected in accordance with GASB 67/68 standards and using the assumptions and methods outlined above, is projected to be sufficient to pay projected benefit payments in all future years. The following exhibits show the projection of the FNP and supporting information shows that the DB Program is projected to be fully funded.

Since the projected Fiduciary Net Position of the STRP is projected to be sufficient to pay projected benefit payments in all future years, the GASB 67/68 discount rate for purposes of calculating the STRP liabilities is set equal to the long-term assumed rate of return on STRP investments. This long-term assumed rate of return should be net of investment expenses, but gross of administrative expenses, for GASB 67/68 purposes. Therefore, we have used a discount rate of 7.10% for all calculations for the STRP under GASB 67/68. This rate reflects the long-term assumed rate of return on assets for funding purposes of 7.00% net of all expenses, increased by 0.10% to be gross of administrative expenses. If future years exist in which the Fiduciary Net Position is projected to be insufficient to pay projected benefit payments, an index rate reflecting the yield on a 20-year, tax-exempt municipal bond must be used to discount the payments for years that the FNP is insufficient; however, this does not apply to CalSTRS for this reporting period.

Projection of Fiduciary Net Position (Includes DB & SBMA)

\$ Millions

Fiscal Year Ending	Projected Beginning Fiduciary Net Position (DB + SBMA)	Projected Total Contributions¹	Projected Benefit Payments for Current Members	Projected Admin Expenses Allocated to Current Members²	Projected Investment Earnings	Projected Ending Fiduciary Net Position (DB + SBMA)
2019	\$ 211,383	\$ 11,813	\$ 15,072	\$ 211	\$ 14,887	\$ 222,800
2020	222,800	12,730	15,749	217	15,706	235,270
2021	235,270	13,511	16,440	223	16,594	248,712
2022	248,712	13,631	17,164	229	17,527	262,477
2023	262,477	14,038	17,917	235	18,492	276,855
2024	276,855	14,269	18,699	241	19,494	291,678
2025	291,678	14,507	19,508	247	20,526	306,956
2026	306,956	14,749	20,359	254	21,589	322,681
2027	322,681	14,988	21,257	261	22,683	338,834
2028	338,834	15,219	22,247	268	23,803	355,341
:						
2038	508,085	17,021	35,711	349	35,410	524,456
:						
2048	656,362	5,987	47,905	446	45,124	659,122
:						
2058	653,194	4,421	51,560	454	44,716	650,317
:						
2068	645,783	5,485	44,357	362	44,482	651,031
:						
2078	819,936	7,199	26,880	210	57,521	857,566
:						
2088	1,459,336	9,388	9,808	76	103,596	1,562,436

Note: Only select years have been shown for formatting purposes.

1. Net of projected contributions for service cost attributable to future members.
2. Administrative expenses allocated to current employees based on proportion of benefit payments

Supplemental Information for Projection of Fiduciary Net Position (Includes DB & SBMA)

\$ Millions

Fiscal Year Ending	Projected Payroll Current Employees	Projected Payroll Future Employees	Member Contribs. for Current Employees	ER + State Contribs. for Current Employees	Member Contribs. for Future Employees	ER + State Contribs. for Future Employees	Normal Cost for Current Employees	Normal Cost for Future Employees	Net Contribs. For FNP Projection ¹	Benefit Payments for Current Employees	Projected TPL on Depletion Basis ²	Projected FNP on Depletion Basis ³
2019	\$ 32,308	\$ 1,505	\$ 3,310	\$ 8,385	\$ 154	\$ 245	\$ 6,770	\$ 280	\$ 11,813	\$ 15,072	\$ 330,432	\$ 211,383
2020	32,458	2,539	3,325	9,108	259	510	6,799	473	12,730	15,749	344,385	222,800
2021	32,588	3,634	3,339	9,626	371	854	6,823	677	13,511	16,440	358,641	235,270
2022	32,676	4,813	3,348	9,532	491	1,159	6,838	898	13,631	17,164	373,185	248,712
2023	32,707	6,095	3,351	9,677	622	1,527	6,840	1,139	14,038	17,917	387,997	262,477
2024	32,684	7,475	3,348	9,647	763	1,909	6,831	1,398	14,269	18,699	403,053	276,855
2025	32,595	8,970	3,339	9,609	915	2,323	6,807	1,679	14,507	19,508	418,332	291,678
2026	32,438	10,582	3,323	9,561	1,080	2,769	6,769	1,983	14,749	20,359	433,791	306,956
2027	32,185	12,341	3,297	9,493	1,259	3,254	6,711	2,316	14,988	21,257	449,381	322,681
2028	31,816	14,267	3,259	9,401	1,456	3,784	6,628	2,680	15,219	22,247	464,994	338,834
:												
2038	21,723	43,283	2,224	6,669	4,417	11,932	4,448	8,221	17,021	35,711	597,040	508,085
:												
2048	8,294	83,404	847	1,306	8,511	11,338	1,605	16,016	5,987	47,905	622,898	656,362
:												
2058	1,446	127,902	148	222	13,052	15,831	270	24,832	4,421	51,560	527,324	653,194
:												
2068	31	182,427	3	8	18,617	22,666	6	35,810	5,485	44,357	344,550	645,783
:												
2078	0	257,375	0	0	26,265	32,014	0	51,080	7,199	26,880	162,794	819,936
:												
2088	0	363,054	0	0	37,050	45,189	0	72,851	9,388	9,808	66,554	1,459,336

Note: Only select years have been shown for formatting purposes.

1. Contributions from future employees that are above service cost and, therefore, can be allocated to payment of benefits of current employees under GASB rules.
2. Projected TPL excludes service cost for future employees for consistency with FNP projection.
3. Projected FNP excludes contributions on service cost for future employees for consistency with FNP projection.

Total Pension Liability and Net Pension Liability

After determining the STRP GASB discount rate as of June 30, 2017, the June 30, 2017 actuarial valuations were recalculated using the 7.10% discount rate. These recalculations are sometimes referred to as “financial reporting actuarial valuations” to indicate differences in methodology from regular (funding) actuarial valuation calculations. All Programs were valued using the Individual Entry Age Normal Cost (EAN) actuarial cost method as specified under GASB 67/68. Note that for purposes of GASB 67/68 calculations, future SBMA Program benefits were considered to be substantively automatic and have been included for future years in all liability calculations.

The resulting liabilities were allocated to past and future service using the EAN cost method. The Total Pension Liability is the amount of GASB valuation liability allocated to past service; therefore, it is somewhat analogous to the Actuarial Obligation figures shown in the June 30, 2017 actuarial valuation reports. However, it will differ from those figures due to discount rate, cost method changes for the DBS and CBB Programs, inclusion of the SBMA liabilities, and exclusion of the MPP Program obligation (which is included in DB Program liabilities for funding purposes).

The June 30, 2017 Total Pension Liability (TPL) was then projected forward to the June 30, 2018 reporting date. The June 30, 2018 Net Pension Liability is equal to the Total Pension Liability as of that date, less the Fiduciary Net Position for the STRP as of that date. The following exhibit shows the changes in the Total Pension Liability, Fiduciary Net Position, and Net Pension Liability between June 30, 2017 and June 30, 2018.

In accordance with the requirements of GASB 67/68, we have performed a sensitivity analysis of the STRP Net Pension Liability to changes in the GASB discount rate. The two scenarios specified in the GASB statements are +1% and -1% adjustments to the calculated GASB discount rate. Additionally, per CalSTRS' request, we have shown +/-2% and +/-3% scenarios.

The results of the sensitivity analysis shown in the following exhibit.

Schedule of Changes in Net Pension Liability

\$ Millions

Net Pension Liability	Increase (Decrease)		
	Total Pension	Plan Fiduciary	Net Pension
	Liability	Net Position	Liability
	(a)	(b)	(a) - (b)
Balances as of June 30, 2017	\$ 302,769	\$ 210,290	\$ 92,479
Adjustment to Beginning Balance ¹		(511)	511
Changes for the year:			
Service cost	7,141		7,141
Interest on total pension liability	21,497		21,497
Effect of plan changes	0		0
Effect of economic/demographic gains or losses	(94)		(94)
Effect of assumptions changes	0		0
Benefit payments	(14,433)	(14,433)	0
Refunds of contributions	(104)	(104)	0
Administrative expenses		(216)	216
Borrowing costs		(94)	94
Member contributions		3,496	(3,496)
Employer contributions (District)		4,867	(4,867)
Nonemployer contributions (State)		2,797	(2,797)
Net investment income		18,674	(18,674)
Other income		105	(105)
Other changes		(2)	2
Balances as of June 30, 2018	\$ 316,776	\$ 224,869	\$ 91,907 ²

Sensitivity Analysis

The following presents the Net Pension Liability (NPL) of the STRP, calculated using the discount rate of 7.10%, as well as what the STRP's NPL would be if it were calculated using a discount rate that is 1, 2, or 3 percentage points lower (6.10%, 5.10%, 4.10%) or 1, 2, or 3 percentage points higher (8.10%, 9.10%, 10.10%) than the current rate.

	Total Pension Liability	Plan Fiduciary Net Position	Net Pension Liability
3% Decrease (4.10%)	\$475,160	\$224,869	\$250,291
2% Decrease (5.10%)	411,500	224,869	186,631
1% Decrease (6.10%)	359,502	224,869	134,633
Current Discount Rate	316,776	224,869	91,907
1% Increase (8.10%)	281,352	224,869	56,483
2% Increase (9.10%)	251,733	224,869	26,864
3% Increase (10.10%)	226,852	224,869	1,983

1. An adjustment for the application of GASB 75 to CalSTRS as an employer participating in the State's retiree health plan resulted in a net decrease to the beginning fund balance of approximately \$511 million.

2. Numbers may not add due to rounding.

Schedule of Changes in Net Pension Liability and Related Ratios

\$ Millions

	Fiscal Year Ending June 30									
	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Total Pension Liability										
Service cost	\$ 7,141	\$ 6,064	\$ 5,874	\$ 5,556	\$ 5,338	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Interest on total pension liability	21,497	20,227	19,332	18,556	17,823	0	0	0	0	0
Effect of plan changes	0	0	0	0	0	0	0	0	0	0
Effect of assumption changes	0	19,988	0	0	0	0	0	0	0	0
Effect of economic/demographic (gains) or losses	(94)	399	(1,209)	(1,312)	0	0	0	0	0	0
Benefit payments and refund of contributions	(14,537)	(13,903)	(13,149)	(12,565)	(12,036)	0	0	0	0	0
Net change in total pension liability	14,007	32,775	10,848	10,235	11,125	0	0	0	0	0
Total pension liability, beginning	302,769	269,994	259,146	248,911	237,786	0	0	0	0	0
Total pension liability, ending (a)	\$ 316,776	\$ 302,769	\$ 269,994	\$ 259,146	\$ 248,911	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Fiduciary Net Position										
Employer contributions (District)	\$ 4,867	\$ 4,173	\$ 3,391	\$ 2,678	\$ 2,272	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Nonemployer contributions (State)	2,797	2,478	1,940	1,426	1,383	0	0	0	0	0
Member contributions	3,496	3,441	2,957	2,510	2,264	0	0	0	0	0
Investment income net of investment expenses	18,674	25,166	2,347	7,615	30,405	0	0	0	0	0
Benefit payments and refund of contributions	(14,537)	(13,903)	(13,149)	(12,565)	(12,036)	0	0	0	0	0
Administrative (and other non-investment) expenses	(207)	(178)	(195)	(154)	(163)	0	0	0	0	0
Adjustments	(511)	0	0	(162)	0	0	0	0	0	0
Net change in plan fiduciary net position	14,579	21,177	(2,709)	1,348	24,125	0	0	0	0	0
Fiduciary net position, beginning	210,290	189,113	191,822	190,474	166,349	0	0	0	0	0
Fiduciary net position, ending (b)	224,869	210,290	189,113	191,822	190,474	0	0	0	0	0
Net pension liability, ending = (a) - (b)	\$ 91,907	\$ 92,479	\$ 80,881	\$ 67,324	\$ 58,437	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Fiduciary net position as a % of total pension liability	70.99%	69.46%	70.04%	74.02%	76.52%	N/A	N/A	N/A	N/A	N/A
Covered payroll	\$ 34,753	\$ 34,126	\$ 31,910	\$ 32,026	\$ 27,486	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Net pension liability as a % of covered payroll	264.46%	270.99%	253.47%	210.22%	212.61%	N/A	N/A	N/A	N/A	N/A

This schedule is presented to illustrate the requirement to show information for 10 years. However, recalculations of prior years are not required, and if prior years are not reported in accordance with the current GASB standards, they should not be reported.

This schedule is presented to illustrate the requirement to show information for 10 years. However, recalculations of prior years are not required, and if prior years are not reported in accordance with the current GASB standards, they should not be reported. Note: Numbers may not add due to rounding.

Schedule of Employer Contributions

\$ Millions

Fiscal Year Ending June 30	Actuarially Determined Contribution ¹	Actual Employer Contribution ²	Contribution Deficiency (Excess)	Covered Payroll	As a % of Covered Payroll	
					Actuarially Determined Contribution	Actual Employer Contribution
2014	\$ 7,158	\$ 3,641	\$ 3,517	\$ 27,486	26.04%	13.25%
2015	7,707	4,093	3,614	32,026	24.06%	12.78%
2016	7,748	5,318	2,430	31,910	24.28%	16.67%
2017	7,959	6,638	1,321	34,126	23.32%	19.45%
2018	9,577 ³	7,653	1,924	34,753	27.56%	22.02%

1. For the DB Program, the ADC for the year ending June 30, 2018 is the statutory contribution rate as of the June 30, 2016 actuarial valuation (the rate to fully fund the DB Program over a closed period ending June 30, 2046), applied to actual DB Program payroll for the fiscal year ended June 30, 2018 as provided to us by CalSTRS. For the DBS, CBB, and SBMA Programs, the ADC reflects the actual dollar amounts contributed for these plans in the fiscal year ended June 30, 2018.

2. Actual Employer Contribution includes contributions from non-employer contributing entities (which for CalSTRS is the state) and excludes contributions for separately financed liabilities of individual employers.

3. Unrounded FYE2018 ADC is as follows:
Actuarially Determined Contribution = \$9,576,575,797

Notes to Schedule of Employer Contributions

Valuation Date Actuarially determined contributions are calculated each June 30, two years prior to the end of the fiscal year in which contributions are reported for DB Program.

Methods and assumptions used to determine contribution rates¹:

Actuarial Cost Method	Individual Entry Age Normal
Amortization Method	Level percentage of payroll, closed
Amortization Period	Ending June 30, 2046
Asset Valuation Method	The actuarial value of assets is equal to the expected actuarial value of assets plus one-third of the difference between the expected actuarial value of assets and the Fair Market Value of assets
Limitation of Contribution Rate Changes ²	State: 1) fixed schedule with graded increases until fiscal year beginning in 2017; and 2) maximum increase of 0.5% of pay per year. Districts: 1) fixed schedule with graded increases until fiscal year beginning in 2021; and 2) maximum change of 1.0% of pay per year.
Inflation	2.75%
Payroll Growth	3.50%
Salary Increases	Varies by age and service. Approximately 6% average over career including inflation.
Investment Rate of Return	7.00%, net of investment and administrative expenses, including inflation
Retirement Age	Members who are eligible for service retirement are assumed to commence receiving benefit payments based on age, service, and gender. The average age at service retirement for recent retirees is approximately 63.
Mortality	Custom CalSTRS rates. See June 30, 2017 DB Program funding valuation for details.
Changes in Plan Provisions Reflected in the Schedule	None.
Changes in Assumptions and Methods Reflected in the Schedule	None.

1. Assumptions and methods are for the Actuarially Determined Contribution for the DB Program. For the DBS, CBB and SBMA programs, actual contributions are used. The sum of the values for the individual programs is reported.

2. Contribution limitations apply to the Actual Employer Contribution, but not the Actuarially Determined Contribution.

Allocable Pension Expense

\$ Millions

Pension Expense	July 1, 2017 to June 30, 2018	July 1, 2016 to June 30, 2017
Service cost	\$ 7,141	\$ 6,064
Interest on total pension liability	21,497	20,227
Effect of plan changes	0	0
Administrative (and other non-investment) expenses	207	178
Member contributions	(3,496)	(3,441)
Expected investment return net of investment expenses	(14,769)	(14,224)
Recognition of Deferred Inflows/Outflows of Resources		
Recognition of economic/demographic (gains) or losses	(316)	(303)
Recognition of assumption changes or inputs	2,855	2,855
Recognition of investment (gains) or losses	(2,830)	(2,047)
Pension Expense	\$ 10,289	\$ 9,309

The discount rate and long-term expected rate of return assumptions used in the calculation of pension expense are the same as used to calculate total pension liability as of the end of the prior period.

As of June 30, 2018, the deferred inflows and outflows of resources are as follows:

Deferred Inflows / Outflows of Resources	Deferred Inflows of Resources	Deferred Outflows of Resources
Differences between expected and actual experience	\$ 1,335	\$ 285
Changes of assumptions	0	14,278
Net difference between projected and actual earnings	3,539	0
Contributions made subsequent to measurement date	<u>Employer Determined</u>	<u>Employer Determined</u>
Total	\$ 4,874	\$ 14,563

Other amounts currently reported as deferred outflows of resources and deferred inflows of resources related to pensions will be recognized in pension expense as follows (additional detail on following page):

Year ended June 30: ¹	
2019	\$ 3,308
2020	1,982
2021	(430)
2022	1,945
2023	2,898
Thereafter ²	(13)

1. Note that additional future deferred inflows/outflows may impact these numbers.

2. Reflects remaining balance of total deferred (inflows)/outflows, if any.

Schedule of Deferred Inflows and Outflows of Resources

\$ Millions

	Original Amount	Date Established	Original Recognition Period ¹	Amount Recognized in 06/30/2018 Expense	Balance of Deferred Inflows 06/30/2018	Balance of Deferred Outflows 06/30/2018
Investment (gains) or losses	(\$ 3,904)	06/30/2018	5	(\$ 781)	\$ 3,123	\$ 0
	(10,941)	06/30/2017	5	(2,188)	6,565	0
	12,059	06/30/2016	5	2,412	0	4,823
	6,630	06/30/2015	5	1,326	0	1,326
	(17,987)	06/30/2014	5	(3,599)	0	0
		Total		(\$ 2,830)	\$ 9,688	\$ 6,149
Economic/demographic (gains) or losses	(94)	06/30/2018	7	(\$ 13)	\$ 81	\$ 0
	399	06/30/2017	7	57	0	285
	(1,209)	06/30/2016	7	(173)	690	0
	(1,312)	06/30/2015	7	(187)	564	0
	0	06/30/2014	7	0	0	0
		Total		(\$ 316)	\$ 1,335	\$ 285
Assumption changes	0	06/30/2018	7	\$ 0	\$ 0	\$ 0
	19,988	06/30/2017	7	2,855	0	14,278
	0	06/30/2016	7	0	0	0
	0	06/30/2015	7	0	0	0
		Total		\$ 2,855	\$ 0	\$ 14,278

Future Deferred Inflow/Outflow Recognition

Year ended June 30: ¹	Investment (Gains) or Losses	Economic/ Demographic (Gains) or Losses	Assumption Changes
2019	\$ 769	(\$ 316)	\$ 2,855
2020	(557)	(316)	2,855
2021	(2,969)	(316)	2,855
2022	(781)	(129)	2,855
2023	0	44	2,854
Thereafter ²	0	(13)	0

1. Investment (gains)/losses are recognized in pension expense over a period of five years; economic/demographic (gains)/losses and assumption changes or inputs are recognized over the average remaining service life for all active and inactive members. The total average remaining service life for STRP members based on the June 30, 2017 GASB actuarial valuations is 7 years (as rounded to the nearest whole number of years). This calculation assumes a remaining service life of 0 years for retired, disabled, beneficiary, and inactive members.

2. Reflects remaining balance of total deferred (inflows)/outflows, if any.

Actuarial Methods and Assumptions for GASB Valuation

All actuarial methods and assumptions used for this GASB analysis were the same as those used in the June 30, 2017 funding valuations, except as noted below and throughout this report. Please see the valuation reports for further details.

Following are the key assumptions and methods used in this GASB analysis.

Actuarial Cost Method	Individual Entry Age Normal
Amortization Method	
Recognition of investment gains or losses	Straight-Line amortization over 5 years
Recognition of economic/demographic gains or losses	Straight-Line amortization over Expected Working Life
Recognition of assumptions changes or inputs	Straight-Line amortization over Expected Working Life
Asset Valuation Method	
Fair Value	
Inflation	2.75%
Salary Increases	Same as funding valuation
Investment Rate of Return	7.10% ⁽¹⁾
Cost of Living Adjustments	DB Program: 2% simple annual benefit adjustment SBMA Program: 85% purchasing power level DBS & CBB Programs: 0% post-retirement, but additional credits up to the assumed return are assumed to be granted on non-retired accounts.
Retirement Age	Same as funding valuation
Turnover	Same as funding valuation
Mortality	Custom CalSTRS rates (same as funding valuation). See June 30, 2017 DB Program funding valuation for details.

1. Differs from funding valuation due to addition of administrative expense load of 0.10%.

Glossary

Actuarially Determined Contribution	A target or recommended contribution to a defined benefit pension plan for the reporting period, determined based on the funding policy and most recent measurement available when the contribution for the reporting period was adopted.
Deferred Inflows/Outflows of Resources	Portion of changes in net pension liability that is not immediately recognized in Pension Expense. These changes include differences between expected and actual experience, changes in assumptions, and differences between expected and actual earnings on plan investments.
Discount Rate	Single rate of return that, when applied to all projected benefit payments, results in an actuarial present value of projected benefit payments equal to the sum of: <ol style="list-style-type: none">1) The actuarial present value of benefit payments projected to be made in future periods where the plan assets are projected to be sufficient to meet benefit payments, calculated using the Long-Term Expected Rate of Return.2) The actuarial present value of projected benefit payments not included in (1), calculated using the Municipal Bond Rate.
Fiduciary Net Position	Equal to market value of assets.
Long-Term Expected Rate of Return	Long-term expected rate of return on pension plan investments expected to be used to finance the payment of benefits, net of investment expenses.
Money-Weighted Rate of Return	The internal rate of return on pension plan investments, net of investment expenses.
Municipal Bond Rate	Yield or index rate for 20-year, tax-exempt general obligation municipal bonds with an average rating of AA/Aa or higher.
Net Pension Liability	Total Pension Liability minus the Plan's Fiduciary Net Position.
Projected Benefit Payments	All benefits estimated to be payable through the pension plan to current active and inactive employees as a result of their past service and expected future service.
Service Cost	The portion of the actuarial present value of projected benefit payments that is attributed to a valuation year.
Total Pension Liability	The portion of actuarial present value of projected benefit payments that is attributable to past periods of member service using the Entry Age Normal cost method based on the requirements of GASB 67 and 68.