TEACHERS' RETIREMENT BOARD

REGULAR MEETING Item Number: 5a

SUBJECT: Adoption of June 30, 2015 Valuation of the Defined Benefit Program

CONSENT: ___ ATTACHMENT(S): 2

ACTION: _X__ MEETING DATE: April 7, 2016 / *30 mins.*

INFORMATION: __ PRESENTER: Rick Reed/David Lamoureux / Nick Collier, Milliman

PURPOSE

The purpose of this item is to present the results of the June 30, 2015 actuarial valuation of the Defined Benefit (DB) Program and to adopt a Normal Cost Rate for CalSTRS 2% at 62 members.

SUMMARY

This is the actuarial valuation of the DB Program required by board policy that is completed every year. The attached actuarial valuation report being presented to the board today was prepared by Milliman, CalSTRS consulting actuary. It is a snapshot of the fund's assets and liabilities and the Normal Cost of the DB Program as of June 30, 2015, based on assumptions adopted by the board at the February 2012 board meeting. The valuation also incorporates the new funding solution enacted in AB 1469—Bonta (Chapter 47, Statutes of 2014).

Funded Status

The funded status of a pension plan is defined as the ratio of assets to a plan's actuarial obligation. Plans with a lower funded ratio are, all other things being equal, more at risk of not being able to meet their future benefit obligations. The table below compares key information about the funding ratio of the DB program for the last two valuations.

Summary of Key Results for DB Program

	June 30 2015 Valuation	**June 30 2014 Valuation**
Actuarial Obligation	$241.8 billion	$231.2 billion
Actuarial Value of Assets	$165.6 billion	$158.5 billion
Unfunded Actuarial Obligation (UAO)	$76.2 billion	$72.7 billion
Funded Ratio	68.5%	68.5%

Although the funded ratio remained the same at 68.5 percent, the UAO increased by $3.5 billion between 2014 and 2015. Page 4 of the attached report provides a history of the funded ratio.

Note that increases in the UAO are expected to continue until the new funding solution is fully implemented. This is mainly due to the fact the Actuarial Obligation is much larger than the Actuarial Value of Assets so that even if the assets make their assumed rate of return, the dollar amount of the investment earnings along with contributions currently is not enough to pay for the interest on the Actuarial Obligation. As a result, the UAO is expected to continue to grow until the state and the employer contribution rates have reached the peak levels set in the funding plan.

Even though the UAO increased by $3.5 billion between 2014 and 2015, this increase was about $1.5 billion less than originally anticipated. Originally, the UAO was expected to increase by $5.0 billion. The better than expected change in the UAO was caused mainly by the asset gain that resulted from the investment return of 18.6 percent on a market value basis during 2013-2014 (net of investment expenses and assuming uniform cash flows) which was deferred over three years. The investment return in 2014-2015 was less than expected at 3.9 percent and resulted in an actuarial loss. This actuarial loss was also deferred over three years as per board policy. The portion of that loss that was recognized this year resulted in a smaller gain that would have occurred had the return been 7.5 percent. Table 8 on page 32 of the attached report provides more details on the reasons for the changes in UAO.

Note that the investment returns shown in the valuation report will be different from the investment returns shown in the CalSTRS financial statements due mainly to the timing of cash flows. The actuarial valuation assumes that all cash flows occur evenly throughout the year, while the returns shown in the financial statements are based on when the cash flows actually occurred. This method is used to simplify asset calculations for the valuation. In any one year the calculated actuarial investment gains and losses are expected to slightly differ under this method. This difference in the calculated investment gains and losses is only reflected in the determination the Actuarial Value of Assets and in any one year this difference is expected to be small. Over the long-term, these small differences are expected to offset one another and do not change the results of the actuarial valuation.

Funding Sufficiency

The primary purpose of the actuarial valuation is to determine whether or not future contributions from members, employers and the state are expected to be sufficient to meet current and future obligations of the DB Program.

Due to the new funding structure, the DB Program is projected to be fully funded by 2046.

Below is a table comparing the level contribution rate needed to fully amortize the current UAO by 2046 to the equivalent contribution rate of the contributions that are expected to be collected assuming no changes in the contribution rates set by AB 1469.

Funding Sufficiency for DB Program

	June 30 2015 Valuation	June 30 2014 Valuation
Contribution Rate Needed to Fully Pay Down UAO by 2046	31.149%	31.106%
Equivalent Contribution Rate for Future Expected Contributions	33.439%	32.228%
Contribution Deficit/(Buffer)	(2.290%)	(1.122%)
Additional Revenue Needed	None	None

State and Employer Contribution Rates

Supplemental contribution rates for the state and the employers will be increasing on July 1, 2016 pursuant to the schedule set in AB 1469. As set forth in the Education Code, the state is responsible for the UAO for the benefits associated with the plan in effect as of July 1, 1990. Employers on the other hand are responsible for the benefits associated with the pre-July 1, 2014 service other than for liabilities for the plan in effect as of July 1, 1990. Below is a table comparing the portion of the UAO that the state and employers are responsible for between the current and previous valuations. The table also displays information about the contribution rates.

Summary of UAO and Contribution Rates

	June 30 2015 Valuation	June 30 2014 Valuation
State's Share of UAO	$13.9 billion	$14.9 billion
Employers' Share of UAO	$62.0 billion	$57.6 billion
State Supplemental Contribution Rate	4.311% (FY 16-17)	2.874% (FY 15-16)
Employer Supplemental Contribution Rate	4.330% (FY 16-17)	2.480% (FY 15-16)

Pursuant to AB 1469, the supplemental contribution rate for the state will increase from 2.874 percent of pay to 4.311 percent of pay on July 1, 2016. Beginning in the 2017-18 fiscal year and each fiscal year thereafter, the percentage will be adjusted by the board to an amount necessary to amortize the existing UAO associated with the plan in effect as of July 1, 1990 by 2046, subject to certain restrictions. The board will set the state supplemental contribution rate a year from now using the June 30, 2016 actuarial valuation of the DB program.

The supplemental contribution rate for the employers will increase from 2.480 percent of pay to 4.330 percent of pay on July 1, 2016. Beginning in the 2021-22 fiscal year and each fiscal year thereafter, the percentage will be adjusted to an amount necessary to amortize the employer's share of the UAO by 2046, subject to certain restrictions. The board will set the employers' supplemental contribution rate for the first time using the June 30, 2020 actuarial valuation of the DB Program in 2021, for the 2021-22 fiscal year.

Even though last year's investment return was below the assumed 7.5 percent, the deferral of the recognition of good investment experience from prior years is expected to result in both the state and employer rates dropping below the ultimate rates specified in AB 1469. These projections are based on the assumption that all future experience is consistent with the board's assumptions. The reduction in the state rate would first occur in fiscal year 2017-18, while the reduction in the employer rate would first occur in fiscal year 2021-22. The initial reduction in the employer rate is expected to be quite small and less certain than the reduction in the state contribution rate. It is important to also note that factors such as possible future changes in actuarial assumptions and the asset loss experienced so far this fiscal year could result in smaller decreases in supplemental rates and even possibly cause increases in the rates. Page 6 of the attached valuation report provides more details on this issue.

Normal Cost Rate for CalSTRS 2% at 62 Members

Under AB 340, the California Public Employees Pension Reform Act of 2013 (PEPRA), members first hired on or after January 1, 2013 (known as CalSTRS 2% at 62 members), must contribute at least one-half the Normal Cost of their pension plan. As of the valuation date, June 30, 2015, there were almost 40,000 members subject to this provision. Based on the June 30, 2015 valuation, Milliman recommends that the board adopt a Normal Cost Rate of 15.614 percent of pay for CalSTRS 2% at 62 members. This will not result in any change to the contribution rate paid by CalSTRS 2% at 62 members, beyond what is required by AB 1469

Impact of Investment Return Assumption

The results of the valuation are based on the annual investment return assumption of 7.50 percent (net of investment and administration expenses) and annual inflation rate assumption of 3.00 percent and the other economic and demographic assumptions adopted by the board as a result of the June 30, 2010 Experience Study in February 2012. Milliman has performed an analysis and included it on page 7 of the attached valuation report to graphically show the impact of alternative investment assumptions, ranging from 5.7 percent to 9.10 percent, on the required total contribution rate to fully fund the program by 2046. Under those alternative assumptions, the total required contributions would range from about 20 percent (based on an 9.1 percent annual investment return) to just about 47 percent (based on a 5.7 percent annual investment return).

CalSTRS Consulting Actuary, Nick Collier of Milliman, will present a thorough discussion of the results of the Actuarial Valuation Report as of June 30, 2015 at the board meeting.

RECOMMENDATION

Staff recommends the board adopt the Normal Cost Rate of 15.614 percent of pay for CalSTRS 2% at 62 members.

1301 Fifth Avenue
Suite 3800
Seattle, WA 98101-2605
USA

Tel +1 206 624 7940
Fax +1 206 623 3485

milliman.com

March 22, 2016

Teachers' Retirement Board
California State Teachers' Retirement System

Re: **Defined Benefit Program Actuarial Valuation as of June 30, 2015**

Dear Members of the Board:

At your request, we have performed an actuarial valuation of the Defined Benefit Program of the State Teachers' Retirement Plan as of June 30, 2015. The major findings of the actuarial valuation are contained in the following report, which reflects the benefit provisions and contribution rates in effect as of the valuation date. This report satisfies all basic disclosure requirements under the Model Disclosure Elements for Actuarial Valuation Reports recommended by the California Actuarial Advisory Panel.

Actuarial Certification

To the best of our knowledge and belief, this report is complete and accurate and contains sufficient information to fully and fairly disclose the funded condition of the Defined Benefit Program as of June 30, 2015.

CalSTRS funding is based on complex legislation. This valuation contains analysis 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 (some oral and some in writing) supplied by CalSTRS staff. This information includes, but is not limited to, statutory provisions, employee data, and financial information. In our examination of these data, we have found them to be reasonably consistent and comparable with data 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 CalSTRS have been determined on the basis of actuarial assumptions and methods which are individually reasonable (taking into account the experience of CalSTRS and reasonable expectations) and which, in combination, offer a reasonable estimate of anticipated experience affecting CalSTRS. Further, in our opinion, each actuarial assumption used is reasonably related to the experience of CalSTRS and to reasonable expectations which, in combination, represent a reasonable estimate of anticipated experience.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes.
Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Offices in Principal Cities Worldwide

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 our assignment, we did not perform an analysis of the potential range of future measurements. The Teachers' Retirement Board has sole authority to determine the actuarial assumptions and methods used for the valuation of the DB Program. The Board adopted the actuarial methods and assumptions used in the 2015 valuation.

Actuarial computations presented in this report are for purposes of assessing the funding of CalSTRS. The calculations in the enclosed report have been made on a basis consistent with our understanding of CalSTRS' funding structure. Determinations for other purposes may be significantly different from the results contained in this report. Accordingly, additional determinations may be needed for other purposes.

Milliman's work is prepared solely for the internal business use 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) CalSTRS may provide a copy of Milliman's work, in its entirety, to CalSTRS' 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 CalSTRS.

(b) CalSTRS 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 own 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 the plan sponsor. 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 accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices, including the relevant Actuarial Standards of Practice. We are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes.
Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

We would like to express our appreciation to the CalSTRS staff who gave substantial assistance in supplying the data on which this report is based.

We respectfully submit the following report and we look forward to discussing it with you.

Sincerely,

Nick J. Collier, ASA, EA, MAAA
Consulting Actuary

Mark C. Olleman, FSA, EA, MAAA
Consulting Actuary

Julie D. Smith, FSA, EA, MAAA
Actuary

NJC/MCO/JDS/nlo

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes.
Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Table of Contents

Page

Letter of Transmittal

Section 1 Summary of the Findings 1
Section 2 Scope of the Report 11
Section 3 Actuarial Obligation 13
Table 1 Normal Cost 16
Table 2 Actuarial Obligation 17
Section 4 Valuation Assets 19
Table 3 Statement of Program Assets 21
Table 4 Statement of Changes in Program Assets 22
Table 5 Actuarial Value of Assets 23
Table 6 History of Actuarial Value of Assets 24
Section 5 Funded Status 25
Table 7 Funded Status 31
Table 8 Actuarial Gains and Losses 32
Section 6 State Supplemental Contribution Rate 33
Table 9 Asset Adjustment for 1990 Benefit Structure 37
Table 10 Funded Status and Supplemental Contribution Rate for 1990 Benefit Structure 38
Section 7 Employer Supplemental Contribution Rate 39
Table 11 Total Assets Allocated for Pre-2014 Service 42
Table 12 1990 Assets Allocated for Pre-2014 Service 43
Table 13 Funded Status and Employer Supplemental Contribution Rate for Pre-2014 Service 44
Section 8 Funding Sufficiency 45
Table 14 Contributions 47
Table 15 Projection of Contributions through June 30, 2046 48
Table 16 Amortization of Unfunded Actuarial Obligation 49
Table 17 Funding Sufficiency 50
Appendix A Provisions of Governing Law 51
Appendix B Actuarial Methods and Assumptions 57
Table B.1 List of Major Valuation Assumptions 59
Table B.2 Mortality 60
Table B.3 Service Retirement 61
Table B.4 Disability Retirement 62
Table B.5 Withdrawal 63
Table B.6 Probability of Refund 64
Table B.7 Merit Salary Increases 65
Table B.8 Supplemental Assumptions 66
Table B.9 Custom Mortality Table Key 67
Appendix C Valuation Data 69
Table C.1 Summary of Statistical Information 70
Table C.2 Age and Service Distribution – Active Male Members 71
Table C.3 Age and Service Distribution – Active Female Members 72
Table C.4 Age and Service Distribution – All Active Members 73
Table C.5 Inactive Members 74
Table C.6 Members Retired for Service 75
Appendix D Glossary 77

Section 1 Summary of the Findings

The primary purpose of the actuarial valuation is to analyze the sufficiency of future contributions from members, employers and the State to meet the current and future obligations of the Defined Benefit (DB) Program. By using the actuarial methods and assumptions adopted by the Teachers' Retirement Board, this actuarial valuation provides a reasonable estimate of the long-term financing of the DB Program.

Effective with the 2016 valuation, adjustments will be recommended to the state contribution rate beginning July 2017. For the employer contribution rate, adjustments will be effective with the 2020 valuation for the fiscal year beginning July 2021. No changes in contribution rates are being recommended in this valuation.

The key findings of this actuarial valuation are:

Funding Sufficiency

As of June 30, 2015, the future revenues from contributions and appropriations for the DB Program **are projected to be sufficient** to finance its obligations. This finding reflects the scheduled contribution increases specified in the Education Code and is based on the valuation assumptions and the valuation policy adopted by the Board.

A level contribution rate of 31.149% beginning on the valuation date is projected to be needed to amortize the Unfunded Actuarial Obligation (UAO) by June 30, 2046. This is compared to the current projected revenue equivalent to 33.439% of payroll. The revenue calculation assumes no changes in the contribution rates specified in the Education Code once contribution rates grade to the ultimate rates. Note that in practice, the state and employer contribution rates will increase or decrease depending primarily on the relevant funded status.

The projected revenue level being greater than the needed contribution rates indicates that the overall contribution level is sufficient to amortize the UAO by 2046 and that future net decreases in the ultimate contribution rate are expected; however, the changes in contribution rates will vary between the state and employers. We have presented additional detail on that breakdown in this report.

(Percent of Earned Salaries)	2015 Valuation	2014 Valuation
Additional Revenue Needed for 100% Funding by 2046		
Normal Cost Rate	18.110%	18.209%
Amortization Rate Needed	13.039%	12.897%
Total Level Rate over the Amortization Period	31.149%	31.106%
Equivalent Contribution Rate(1)	33.439%	32.228%
Contribution Deficit / (Buffer)	(2.290%)	(1.122%)
Additional Revenue Needed	None	None

(1) Assumes no change in contribution rate once ultimate level is reached (See Section 8).

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Funding Sufficiency (continued)

As shown in the previous chart, there was a decrease in the additional revenue needed as a percentage of payroll. This change was primarily due to the recognition of asset gains from prior years under the asset smoothing method and increases in the payroll greater than assumed, which reduced the additional revenue needed relative to the payroll.

The following chart shows a numerical breakdown of each of the factors that caused the change in the additional revenue needed.

Sources of Change	Additional Revenue Needed
June 30, 2014 Actuarial Valuation	**-1.1%**
Expected Year-to-Year Change	0.0%
Recognized Asset (Gain)/Loss	
• From Prior Years	-0.8%
• From Current Year	0.4%
Salary / Payroll Variation	
• Salary Increase > Assumed	0.0%
• Payroll Increase > Assumed	-0.6%
Assumption Changes	0.0%
All Other Sources	-0.2%
Total Change	**-1.2%**
June 30, 2015 Actuarial Valuation	**-2.3%**

Note that the negative value as of June 30, 2015 indicates that no additional revenue is currently needed, apart from the scheduled contribution rate increases, and that there is currently projected to be a reduction in the ultimate contributions needed. This projected decrease is on an aggregate basis; the changes in contribution rates will vary between the state and employers, and may be increases or decreases, as discussed later. This analysis is based on the actuarial value of assets, which is currently deferring a net gain. A projection showing the expected future impact of reflecting the currently deferred asset gain is shown later in this section (see "Looking Ahead").

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

State and Employer Contribution Rates

The 2014 legislation added three subsections to the Education Code dealing with contribution rates. EC §22955.1 specifies graded increases in the state contribution rates. Effective July 1, 2017 the state contribution rate will be adjusted based on the contribution rate necessary to amortize the UAO attributable to the 1990 contribution and benefit structure. EC §22950.5 specifies graded increases in the employer contribution rates. Effective July 1, 2021 the employer contribution rate will be adjusted based on the contribution rate necessary to amortize the UAO attributable to service prior to July 1, 2014 that is not funded by the state as part of the 1990 Benefit Structure. Graded increases were also implemented for member contribution rates under EC §22901.7; however, the member rates are fixed once they reach the ultimate rate and are not dependent on the DB Program's funded status.

For the 2015 valuation, changes in the current schedules for the state and employer contribution rates do not apply. Effective with the 2016 valuation, we will calculate the recommended change in the state contribution rate starting July 1, 2017. Effective with the 2020 valuation, we will calculate the recommended change in the employer contribution rate starting July 1, 2021.

For illustrative purposes, we have shown details of how these calculations will look in Sections 6 and 7 of this report. These hypothetical calculations show that based on the 2015 valuation, an increase would be needed on the ultimate employer rate, and a fairly significant decrease in the state contribution rate is indicated to maintain the 2046 full funding target based on the board's current valuation policy. Note that these adjustments fall within the parameters described in the funding legislation. It is important to be aware that these calculations are based on the smoothed actuarial value of assets. As shown later in this section (see "Looking Ahead"), if the deferred asset gain is reflected in the projected contribution rates, a very small decrease in the employer rate is projected (from the ultimate employer rate of 19.10%) and much larger decreases in the state rate.

As with all projections, future experience will impact the ultimate results. For example, investment returns have been significantly less than assumed for the current fiscal year to date. If this holds for the remainder of the fiscal year, it will result in a smaller decrease (or possibly an increase) in the state contribution rates from those projected in this section.

Normal Cost Rate for CalSTRS 2% at 62 Members

As part of the annual valuation process, we determine the Normal Cost rate for CalSTRS 2% at 62 members, generally those first hired on or after January 1, 2013. The Normal Cost rate is used as the basis for setting the base member contribution rate for this group for the following fiscal year, the fiscal year beginning July 1, 2016, for this valuation. Generally, the base member contribution rate is one-half of the Normal Cost rate within certain parameters.

Education Code Section 22901(b)(1) requires the board to adopt the Normal Cost rate that is used to determine the 2% at 62 member contribution rate. As of June 30, 2015, the Normal Cost rate for the CalSTRS 2% at 62 members is 15.614%. We recommend the Board adopt this rate.

Normal Cost Rate for CalSTRS 2% at 62 Members (continued)

Education Code Section 22901(b)(1) specifies that the CalSTRS 2% at 62 base member contribution rate does not change if the increase or decrease in the Normal Cost rate for members is less than 1% of pay since the last adjustment. This year the cumulative change is a decrease in the Normal Cost rate of 0.286%, from 15.900% (the time of last adjustment) to 15.614% for this group. Therefore, we recommend the Board retain the current base member contribution rate of 8.00% for these members. Note that increases under EC 22901.7(b) are added to the base member rate. Therefore, effective July 1, 2016, the total member contribution rate should be 9.205% (8.00% plus the 1.205% additional contribution rate) for 2% at 62 members.

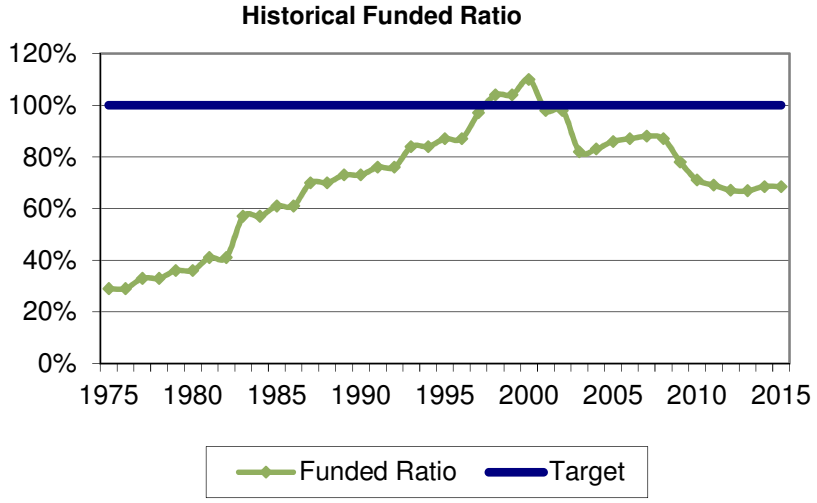
Funding Progress

The UAO of a retirement plan is equal to the difference between its Actuarial Value of Assets and its Actuarial Obligation. The Funded Ratio is equal to the Actuarial Value of Assets divided by the Actuarial Obligation.

($ Millions)	2015 Valuation	2014 Valuation
Actuarial Obligation	$ 241,753	$ 231,213
Actuarial Value of Assets	165,553	158,495
Unfunded Actuarial Obligation	$ 76,200	$ 72,718
Funded Ratio	68.5%	68.5%

The $76.2 billion UAO compares to a projected June 30, 2015 value of $78.9 based on the prior valuation. The difference in these values is discussed in Section 5 under Actuarial Gains and Losses.

The following graph shows a historical perspective of CalSTRS' funding. It shows the significant funding progress CalSTRS achieved from 1975 to 2000, and also the negative impact of the economic environment since then.



Funding Progress (continued)

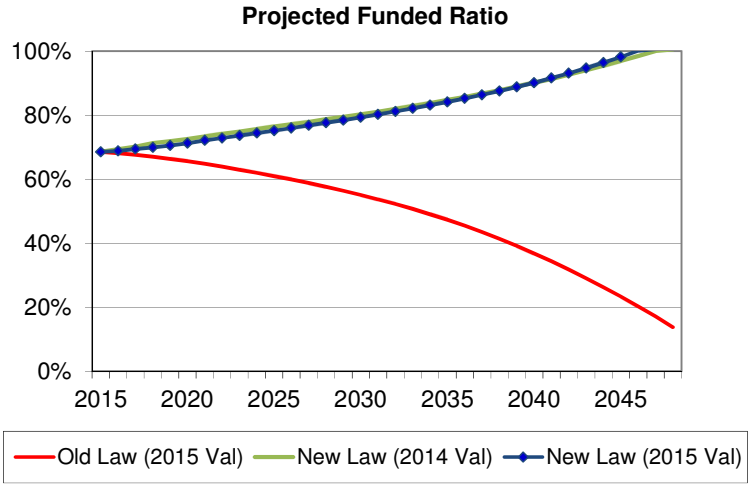
The following chart shows the factors that affected the DB Program's Funded Ratio since the last valuation. The recognition of the deferred asset gain in the actuarial value of assets was the most significant factor increasing the Funded Ratio; however, this was somewhat offset by the less-than-assumed return (Milliman estimate of 3.9% compared to the assumption of 7.5%) in the most recent year.

Sources of Change	Funded Ratio
June 30, 2014 Actuarial Valuation	**68.5%**
Expected Year-to-Year Change (due to underfunding*)	-0.7%
Recognized Asset (Gain)/Loss	
• From Prior Years	1.6%
• From Current Year	-0.9%
Salary Variation	0.0%
Assumption Changes	0.0%
All Other Sources	0.0%
Total Change	**0.0%**
June 30, 2015 Actuarial Valuation	**68.5%**

** Although the utlimate contribution rates are projected to be sufficient to fund the DB Program, contributions paid in the prior year were not enough to improve the funded ratio.*

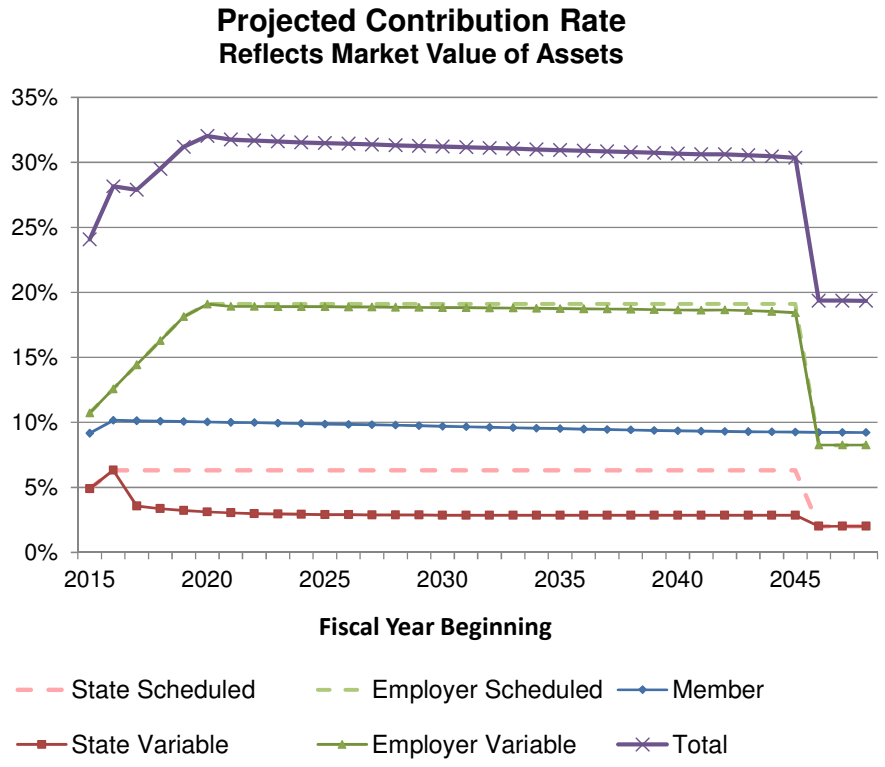
Looking Ahead

As previously noted, the recent legislation provides for contribution increases that are projected to be sufficient to amortize the UAO. The following projection shows the Funded Ratio if the DB Program earns 7.50% in each future year and all other assumptions are met. As shown in the graph, the DB Program is projected to reach 100% funding by 2046 under the recently passed funding legislation (blue line). The pattern is very consistent with the 2014 valuation projection. Note that we have also shown a hypothetical projection of the funded status without the funding legislation. See the end of this subsection for a summary of the assumptions that these projections are based on.



Looking Ahead (continued)

Asset gains and losses will generally have the largest year-to-year impact on the total contribution rate needed. However, under the legislation, as reflected in the valuation policy, the impact of asset gains and losses will tend to have a much more significant impact on the state contribution rate than the employer contribution rate. Therefore, the state contribution rate will tend to be more volatile than the employer rate. The following graph shows the projected contribution rates for each of the stakeholder groups and in total. Note that the actual contribution rates paid in the future will vary based on experience after the valuation date. In particular, assets losses experienced thus far in the fiscal year indicate it is likely that the state contribution rate will decrease less than projected in this graph, or possibly increase, when the variable rate becomes effective. Additionally, potential changes in assumptions before the next valuation date could have a material impact on this projection.



NOTE: Dashed lines indicate contribution rates prior to adjustments for funded status.

The projection calculations are based on the following assumptions:

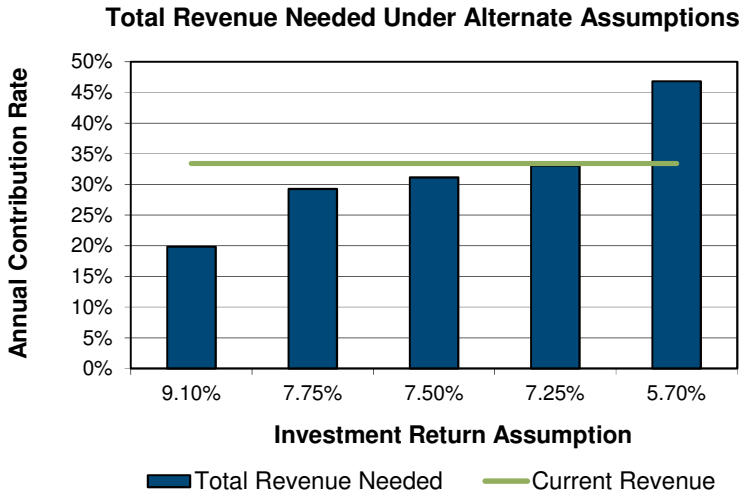
- All experience subsequent to the valuation date is consistent with the valuation assumptions, as described in Appendix B.
- Future changes in the state and employer contribution rates, after the ultimate rates are reached, will be consistent with the board's valuation policy. In particular, the state rate is based on funding the UAO by 2046, which is not defined in statute.
- Current deferred asset gains and losses (currently a net gain) are reflected as they are expected to be recognized in the asset smoothing method.
- The emerging Normal Cost rate will decrease over time due to the lower benefits provided for 2% at 62 members.

Investment Return Assumption

Future investment returns will have a material impact on the contributions ultimately needed to fund the DB Program. To illustrate the sensitivity to future investment returns, we have performed an analysis of the impact of various investment return assumptions. We have shown the revenue needed under the valuation investment return assumption of 7.50%, as well as assumed returns that are 0.25% higher and lower. For comparison, we have shown the projected revenue under the current scheduled contribution rates.

We have also presented the revenue needed at 9.10% and 5.70% investment return assumptions. These expected returns are the 25th and 75th percentiles respectively for a 30-year period net of both administrative and investment expenses and are based on CalSTRS current capital market assumptions.

These percentile returns indicate the likelihood that actual future returns will deviate significantly from the current 7.50% assumption. Specifically, based on these assumptions, there is a 25% chance the net average annual return will be greater than 9.10%, but also a 25% chance the net average annual return will be less than 5.70% over a 30-year period.



This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Changes Since the 2014 Valuation

There were no changes that materially impacted the 2015 valuation outside of the usual year-to-year asset, liability and payroll experience.

Further Information

Details of our findings are included in later sections of this report. The appendices include supporting documentation on the benefit and eligibility provisions used to project future benefits, the actuarial methods and assumptions used to value the projected benefits, and the underlying census data provided by CalSTRS for this valuation.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Summary of Key Valuation Results

	2015 Valuation	2014 Valuation	Percent Change
1. Total Membership			
A. Active Members	429,460	420,887	2.0 %
B. Inactive Members	184,396	182,815	0.9 %
C. Retired Members and Beneficiaries	282,100	275,627	2.3 %
D. Total Membership	895,956	879,329	1.9 %
2. Earned Salaries as of Valuation Date (All Members)			
A. Annual Total *($Millions)*	$ 28,013	$ 26,470	5.8 %
B. Annual Average per Active Member	$ 65,229	$ 62,891	3.7 %
3. Average Annual Allowance Payable			
A. Service Retirement	$ 45,432	$ 44,328	2.5 %
4. Actuarial Obligation *($Millions)*			
A. Active Members	$ 105,535	$ 99,935	5.6 %
B. Inactive Members	4,767	4,702	1.4 %
C. Retired Members and Beneficiaries	131,115	126,235	3.9 %
D. Existing MPPP Unfunded Obligation	336	341	(1.5) %
E. Total	$ 241,753	$ 231,213	4.6 %
5. Value of System Assets *($Millions)*			
A. Fair Market Value	$ 180,633	$ 179,749	0.5 %
B. Deferred Investment (Gains) or Losses	(3,574)	(10,911)	
C. Actuarial Value	$ 177,059	$ 168,838	4.9 %
D. Ratio of Actuarial Value to Fair Value	98%	94%	
E. Less SBMA Reserve	(11,506)	(10,343)	11.2 %
F. Net Actuarial Value	$ 165,553	$ 158,495	4.5 %
6. Funded Status -- Actuarial Value Basis			
A. Unfunded Actuarial Obligation *($Millions)*	$ 76,200	$ 72,718	4.8 %
B. Funded Ratio *(5F ÷ 4E)*	68.5%	68.5%	
7. Normal Cost Rates *(percent of salaries)*			
A. CalSTRS 2% at 60 Members	18.224%	18.258%	(0.2) %
B. CalSTRS 2% at 62 Members	15.614%	15.672%	(0.4) %
C. All Members	18.110%	18.209%	(0.5) %
8. Contribution Rates *(percent of salaries)*			
A. Projected Revenue (through 2046)	33.349%	32.228%	3.5 %
B. Projected Level Funding Rate (through 2046)	31.149%	31.106%	0.1 %
C. Projected Shortfall *(8B – 8A)*	None	None	NA %
9. Funded Status -- Market Value Basis			
A. Unfunded Actuarial Obligation *($Millions) (4E - (5A + 5E)*	$ 72,626	$ 61,807	17.5 %
B. Alternate Funded Ratio (Based on Market Value of Assets)	70.0%	73.3%	

This page intentionally left blank.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Section 2 Scope of the Report

This report presents the actuarial valuation of the Defined Benefit Program of the State Teachers' Retirement Plan as of June 30, 2015. A summary of the key results of this valuation is presented in the previous section. The remainder of this report is arranged as follows:

Section 3 describes the benefit obligations of CalSTRS, including the development of the Normal Cost and the Actuarial Obligation.

Section 4 outlines the Fair Market Value of Assets of the DB Program and the determination of the Actuarial Value of Assets as of June 30, 2015. All of the assets of the Program are available to finance future DB Program benefits and expenses, except those allocated for the Supplemental Benefit Maintenance Account (SBMA).

Section 5 shows the relationship between the Actuarial Value of Assets and the Actuarial Obligation, also called the Funded Ratio.

Section 6 discusses the calculations used to determine the supplemental contribution rate required from the state in accordance with EC §22955.1(b). The key elements of this calculation pertain to an evaluation of the assets and obligations associated with the benefits in effect in 1990. Note that the state supplemental rate is currently based on a fixed schedule of increases. No adjustments to the scheduled rates will be recommended until the 2016 valuation.

Section 7 discusses the calculations used to determine the supplemental contribution rate required from the employers in accordance with EC §22950.5. The key elements of this calculation are parallel to the funding valuation, except the assets and obligations are those associated with the benefits earned prior to July 1, 2014. Note that the employer supplemental rate is currently based on a fixed schedule of increases. No adjustments to the scheduled rates will be recommended until the 2020 valuation.

The funding sufficiency of the current projected revenue stream for the DB Program is tested in Section 8.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Scope of the Report (continued)

This report includes several appendices:

Appendix A — A summary of the current benefit structure, as determined by the provisions of governing law on June 30, 2015.

Appendix B — A summary of the actuarial methods and assumptions used to estimate actuarial obligations and the funding sufficiency.

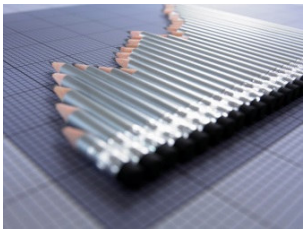
In our opinion, the assumptions used in the valuation are reasonably related to the past experience of the DB Program, are internally consistent, and represent a reasonable estimate of future conditions affecting the DB Program. Nevertheless, the emerging costs of the DB Program will vary from those presented in this report to the extent that actual experience differs from that projected by the actuarial assumptions.

Appendix C — Schedules of valuation data classified by various categories of plan members. We relied upon the membership and beneficiary data supplied by CalSTRS. We compared the data for this and the prior valuation and tested for reasonableness. Based on these tests, we believe the data to be sufficient for the purposes of our calculations.

Appendix D — A glossary of actuarial terms used in this report.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Section 3 Actuarial Obligation



In this section, the discussion will focus on the commitments of CalSTRS for retirement benefits, which are referred to as its actuarial obligation.

The actuarial obligation, or liabilities, are compared with the actuarial value of assets. If there is a deficiency, it has to be provided by future contributions, net actuarial gains due to experience more favorable than assumed or, to some extent, net growth in the number of active members. An actuarial valuation method sets out a schedule of future contributions and determines whether they will amortize any deficiency in an orderly fashion.

Normal Cost

The **Normal Cost** represents the cost assigned to an average member for a given year such that it would meet the continuing costs of a particular benefit if contributed each year starting with the date of membership. The Entry Age Actuarial Cost Method is designed to produce a Normal Cost that remains a level percentage of Earned Salaries, so it is best expressed as a rate. Normal Cost contributions are assumed to be contributed uniformly throughout the year.

The following chart shows that the total DB Program Normal Cost Rate has decreased from 18.209% to 18.110% since the last valuation. This rate represents a blended average of the Normal Cost rates for the 2% at 60 and 2% at 62 members. **Table 1** provides more details on the calculation of the Normal Cost and Normal Cost Rates.

($ Millions)	Projected Earned Salaries	Normal Cost	Normal Cost Rate
FYB July 1, 2014	$27,783	$5,059	18.209%
FYB July 1, 2015	$29,418	$5,328	18.110%

In general, the Normal Cost Rate is expected to remain fairly stable as a percentage of Earned Salaries as long as the benefit provisions are not amended, the assumptions are not changed, membership experience emerges as assumed, and the demographic characteristics of the membership remain reasonably consistent. CalSTRS can expect modest decreases in the Normal Cost rate over time due to the change in benefit levels for most members hired in 2013 or later.

The Normal Cost Rate decreased slightly since last year due mainly to the increasing membership of CalSTRS 2% at 62 members who have a lower overall Normal Cost Rate than the 2% at 60 members. We expect this trend to continue in the future.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Normal Cost Rate for CalSTRS 2% at 62 Members

As part of the annual valuation process, we determine the Normal Cost rate for CalSTRS 2% at 62 members, generally those first hired on or after January 1, 2013. The Normal Cost rate is used as the basis for setting the base member contribution rate for this group for the following fiscal year, the fiscal year beginning July 1, 2016, for this valuation. Generally, the base member contribution rate is one-half of the Normal Cost rate within certain parameters.

Education Code Section 22901(b)(1) requires the board to adopt the Normal Cost rate that is used to determine the 2% at 62 member contribution rate. As of June 30, 2015, the Normal Cost rate for the 2% at 62 members is 15.614%. We recommend the Board adopt this rate.

Education Code Section 22901(b)(2) specifies that CalSTRS 2% at 62 base member contribution rates do not change if the increase or decrease in the Normal Cost rate for members is less than 1% of pay since the last adjustment. This year the cumulative change is a decrease in the Normal Cost rate of 0.286% from 15.900% (the time of last adjustment) to 15.614% for this group. Therefore, we recommend the Board retain the current base member contribution rate of 8.00% for these members. Note that increases under EC 22901.7(b) are added to the base member rate. Therefore, effective July 1, 2016, the total member contribution rate should be 9.205% (8.00% plus the 1.205% increase) for 2% at 62 members.

Actuarial Obligation

The next step in the actuarial valuation process is to project all future DB Program benefit payments for current members and retirees. The level of benefits currently being paid is known, but assumptions are needed to estimate how long they will be paid, and the amount and timing of the payment of future benefits for active and inactive members who are not currently receiving payments. The summation of the discounted values of all of the projected benefit payments for all current members at the assumed rate of return is called the **Actuarial Present Value of Projected Benefits**.

Details are shown in **Table 2** and summarized below.

($ Millions)	2015 Valuation	2014 Valuation
Benefits Being Paid	$ 131,115	$ 126,235
Inactive Deferred Benefits	4,767	4,702
Active Member Benefits	165,101	156,718
Existing MPPP Unfunded Obligation	336	341
Present Value of Projected Benefits	$ 301,319	$ 287,996
Present Value of Future Normal Costs	59,566	56,783
Actuarial Obligation	$ 241,753	$ 231,213

Actuarial Obligation (continued)

The **Actuarial Present Value of Future Normal Costs** is the value of all remaining Normal Costs expected to be received over the future working lifetime of current active members. The **Actuarial Obligation** is the difference between the Actuarial Present Value of Projected Benefits and the Actuarial Present Value of Future Normal Costs. The Actuarial Obligation is equal to the assets that would exist if the current Normal Cost Rate had been paid for all members since entry into the Program, and if all experience had emerged as assumed.

Table 1
Normal Cost

($Millions)	**2015**	**2014**
Estimated Annual Earned Salaries [1]	$28,354	$26,778
Present Value of Future Normal Costs for Current Active Members	$59,566	$56,783
Present Value of Future Earned Salaries for Current Active Members	$330,671	$311,839
Normal Cost		
Retirement	$4,728	$4,489
Disability	203	194
Death	50	48
Refund	154	145
Total Normal Cost	$5,135	$4,876
Normal Cost Rate Percent of Earned Salaries		
Retirement	16.675 %	16.765 %
Disability	0.716	0.724
Death	0.176	0.179
Refund	0.543	0.541
Total Normal Cost	**18.110** %	**18.209** %

(1) Annual rate of Earned Salaries for active members on the valuation date, excluding active members over age 75 on the valuation date who are assumed to retire immediately and therefore do not generate a Normal Cost. Earned salaries for new entrants who have only worked a partial year have been annualized.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Table 2
Actuarial Obligation

($ Millions)	2015	2014
Present Value of Projected Benefits to All Current Members		
Benefits Currently Being Paid		
Service Retirement	$ 121,599	$ 117,222
Disability	3,264	3,120
Survivors	6,252	5,893
Total	$ 131,115	$ 126,235
Benefits to Inactive Members	4,767	4,702
Benefits to Active Members		
Retirement	$ 159,269	$ 151,216
Disability	4,090	3,857
Death	1,166	1,120
Refund	576	525
Total	$ 165,101	$ 156,718
Existing MPPP Unfunded Obligation	336	341
Total Present Value of Projected Benefits	$ 301,319	$ 287,996
Present Value of Future Normal Costs	59,566	56,783
Actuarial Obligation	**$ 241,753**	**$ 231,213**

This page intentionally left blank.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Section 4 Valuation Assets

In many respects, an actuarial valuation can be thought of as an inventory process. The inventory is taken as of the actuarial valuation date, which for this valuation is June 30, 2015. On that date, the assets available for the payment of retirement benefits are appraised.

The next step in the valuation process is to calculate the **Actuarial Value of Assets** that will be used to determine the funding status of the Program. As shown in **Table 3**, the Fair Market Value of assets was reported as $180,633 million as of June 30, 2015, up from $179,749 million as of June 30, 2014. **Table 4** shows the asset changes for the period.

Valuation Assets

Because the underlying calculations in the actuarial valuation are long-term in nature, it may be advantageous to use an asset smoothing method to lessen the impact of short-term fluctuations in the value of assets. This is particularly true given that the supplemental state and employer contribution rates will soon be determined based on the applicable funded status.

The asset smoothing method utilized in the valuation uses a projection of the expected Actuarial Value of Assets from the Actuarial Value of Assets as of the previous year based on the assumed rate of investment return. The projection then recognizes one-third of the difference between the expected value and the Fair Market Value to arrive at the Actuarial Value of Assets. The calculation of the Actuarial Value of Assets is shown in **Table 5** and the result is shown below.

($ Millions)	2015 Valuation	2014 Valuation
Fair Market Value	$ 180,633	$ 179,749
Actuarial Value of Assets	177,059	168,838
Deferred Investment Gains or (Losses)	$ 3,574	$ 10,911
Ratio of AVA to FMV	98%	94%

Due to the asset smoothing method, there are investment gains of $3,574 million that have not yet been recognized (the difference between the Actuarial and Fair Market Value of Assets). Absent investment returns in future years less than the assumed rate to offset the deferred investment gains, the current deferred gains will gradually be reflected in the Actuarial Value of Assets.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Valuation Assets (continued)

If the future returns on the Fair Market Value of Assets are 7.50% each year, then as the current deferred gains flow through the smoothing method and are recognized, future valuations will show an actuarial gain. The result will be a gradual increase in the DB Program's funded status, ultimately decreasing the Unfunded Actuarial Obligation by the $3,574 million of currently deferred investment gains.

Table 6 shows a history of the Actuarial Value of Assets compared to the Fair Market Value of Assets.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Table 3
Statement of Program Assets

($ Millions)	June 30, 2015	June 30, 2014
Invested Assets		
Cash	$ 563	$ 500
Debt Securities	34,119	34,442
Equity Securities	98,340	96,217
Alternative Investments	50,128	50,416
Derivative Instruments	8	14
Total Investments	$ 183,158	$ 181,589
Receivables	4,072	3,226
Liabilities Net of Securities Lending Collateral	(6,587)	(5,066)
Net Deferred (Inflows) and Outflows	(10)	-
Fair Market Value of Net Assets	**$ 180,633**	**$ 179,749**

Table 4
Statement of Changes in Program Assets

($ Millions)	June 30, 2015	June 30, 2014
Contributions		
Members	$ 2,394	$ 2,177
Employers	2,554	2,178
State of California	1,426	1,384
Total Contributions	6,374	5,739
Benefits and Expenses		
Retirement, Death and Survivors	(11,972)	(11,414)
Refunds of Member Contributions	(66)	(82)
Purchasing Power Benefits	(193)	(202)
Administrative & Other Expenses	(146)	(154)
Total Benefits and Expenses	(12,377)	(11,852)
Net Cash Flow	**$ (6,003)**	**$ (6,113)**
Investment Income		
Realized Income	$ 4,675	$ 4,508
Net Appreciation	2,646	24,381
Net Securities Lending Income	94	91
Investment Expenses	(287)	(289)
Other (Expense) Income	4	(5)
Net Investment Return	7,132	28,686
Net Increase (Decrease)	**$ 1,129**	**$ 22,573**
Fair Market Value of Net Assets		
Beginning of Year	179,749	157,176
Acounting Adjustments (GASB 68)	(153)	
Prior Year Fair Value Accrual Adjustment	(92)	-
End of Year	**$ 180,633**	**$ 179,749**
Estimated Net Rate of Return (1)	3.9%	18.6%

(1) Estimated return on a Fair Market Value basis, net of all investment expenses, gross of administrative expenses, and assuming uniform cash flow throughout the year. This number will likely differ from the return reported by CalSTRS as it is a dollar-weighted value, whereas CalSTRS reports time-weighted values.

Table 5
Actuarial Value of Assets

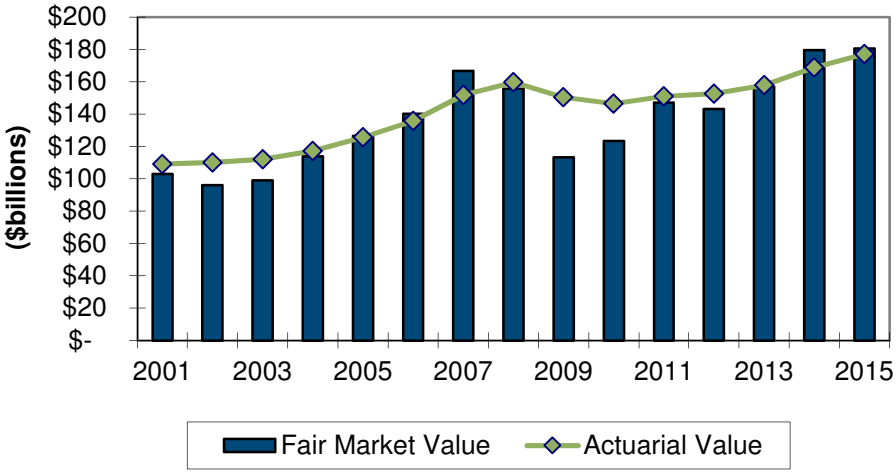
($ Millions)	**June 30, 2015**	**June 30, 2014**
Actuarial Value at Beginning of Year	$ 168,838	$ 157,883
Contributions	6,374	5,739
Benefits and Expenses	(12,377)	(11,852)
Expected Return at 7.50%	12,437	11,612
Expected Actuarial Value End of of Year	$ 175,272	$ 163,382
Fair Market Value	180,633	179,749
Difference between Fair Market Value and Expected Actuarial Value	$ 5,361	$ 16,367
Recognition Factor	One-third	One-third
Recognized Gain or Loss	$ 1,787	$ 5,456
Actuarial Value at End of of Year	**$ 177,059**	**$ 168,838**
Deferred Investment Gains or (Losses)	$ 3,574	$ 10,911
Ratio of Actuarial Value of Assets to Fair Market Value of Assets	98.022%	93.930%
Estimated Net Rate of Return [1]	8.6%	11.0%

(1) Estimated return on an Actuarial Value basis, net of all investment expenses, gross of administrative expenses, and assuming uniform cash flow throughout the year.

Table 6
History of Actuarial Value of Assets

($ Millions) June 30	Fair Market Value	Estimated Return (1)	Actuarial Value	Ratio of Actuarial to Market
2001	$ 102,915	(9.1) %	$ 108,571	105%
2002	96,028	(6.1)	109,755	114
2003	99,031	3.8	111,604	113
2004	113,815	16.6	117,206	103
2005	126,447	12.3	125,665	99
2006	140,192	12.5	135,832	97
2007	166,903	20.9	151,827	91
2008	155,763	(5.5)	159,785	103
2009	113,192	(25.4)	150,445	133
2010	123,242	12.9	146,404	119
2011	147,140	23.6	151,030	103
2012	143,118	0.6	152,515	107
2013	157,176	13.9	157,883	100
2014	179,479	18.6	168,838	94
2015	180,633	3.9	177,059	98

(1) Estimated return on a Fair Market Value basis, net of all investment expenses, gross of administrative expenses, and assuming uniform cash flow throughout the year, reported on a dollar-weighted basis.



Section 5 Funded Status

The **Unfunded Actuarial Obligation** (UAO) is the excess of the Actuarial Obligation over the Actuarial Value of Assets, which represents a liability that must be funded over time. Contributions in excess of the Normal Cost are used to amortize the UAO. An **Actuarial Surplus** exists if the Actuarial Value of Assets exceeds the Actuarial Obligation.

The **Funded Ratio** is equal to the Actuarial Value of Assets divided by the Actuarial Obligation. A Funded Ratio of 100% means the Value of Assets equals the Actuarial Obligation, and the DB Program could be financed by contributions equal to the Normal Cost, if all future experience emerges as assumed. The Funded Ratio is shown below and in **Table 7**.

($ Millions)	2015 Valuation	2014 Valuation
Actuarial Obligation	$ 241,753	$ 231,213
Actuarial Value of Assets (AVA)		
From Table 5	$ 177,059	$ 168,838
Less SBMA Reserve	(11,506)	(10,343)
Net for Funding	165,553	158,495
Unfunded Actuarial Obligation	$ 76,200	$ 72,718
Funded Ratio (on AVA)	**68.5%**	**68.5%**
Alternate Funded Ratio (based on Fair Market Value)	*70.0%*	*73.3%*

Overall, the DB Program is in similar financial condition to what it was one year ago, as measured by the Funded Ratio. The Alternate Funded Ratio using the Fair Market Value of assets has decreased since the last valuation. This decrease was due to the investment loss on an actuarial basis for the 2014-2015 year that resulted from the return being less than 7.5%.

Future benefits provided through the Supplemental Benefits Maintenance Account (SBMA) are not part of the projected benefits included in this valuation. Therefore, the SBMA Reserve is subtracted from the DB Program assets to arrive at the value available to support the benefits included in this valuation.

In addition, the Teachers' Retirement Board has established a policy of allocating funds for future costs associated with the Teachers' Health Benefits Fund (THBF). This policy was revised in April of 2009 to make a one-time credit to the THBF and "true up" the future MPPP obligations (payable from the THBF) in the funding of the DB Program. As of June 30, 2015, only a relatively small amount of less than $0.1 million resides in the THBF, while the remaining unfunded amount of $336 million is added to the DB Program obligation.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

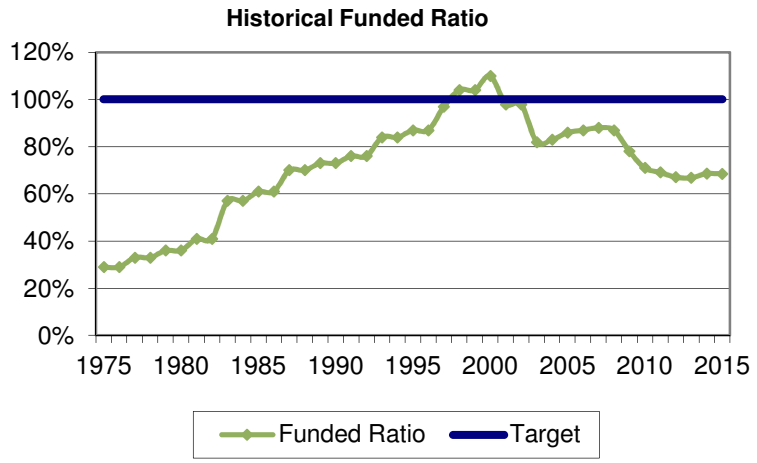
Funded Status (continued)

The following table shows a history of the Funded Status of the DB Program.

($ Millions) Year	Actuarial Obligation	Actuarial Value of Assets	Unfunded Actuarial Obligation	Funded Ratio
1975	**$ 12,834**	**$ 3,775**	**$ 9,059**	**29%**
1977	15,203	5,019	10,184	33%
1979	17,971	6,488	11,483	36%
1981	22,545	9,345	13,200	41%
1983	26,553	15,023	11,530	57%
1985	**28,401**	**17,457**	**10,944**	**61%**
1987	34,637	24,401	10,236	70%
1989	40,266	29,327	10,939	73%
1991	47,100	36,001	11,099	76%
1993	53,581	45,212	8,369	84%
1995	**63,391**	**55,207**	**8,184**	**87%**
1997	69,852	67,980	1,872	97%
1998	74,234	77,290	(3,056)	104%
1999	86,349	90,001	(3,652)	104%
2000	93,124	102,225	(9,101)	110%
2001	109,881	107,654	2,227	98%
2003	131,777	108,667	23,110	82%
2004	138,254	114,094	24,160	83%
2005	**142,193**	**121,882**	**20,311**	**86%**
2006	150,872	131,237	19,635	87%
2007	167,129	146,419	20,710	88%
2008	177,734	155,215	22,519	87%
2009	185,683	145,142	40,541	78%
2010	196,315	140,291	56,024	71%
2011	208,405	143,930	64,475	69%
2012	215,189	144,232	70,957	67%
2013	222,281	148,614	73,667	67%
2014	231,213	158,495	72,718	69%
2015	**241,753**	**165,553**	**76,200**	**69%**

Funded Status (continued)

The historical Funded Ratios are plotted in the following graph. In years in which a valuation was not performed, the Funded Ratio from the previous year is used.



Actuarial Gains and Losses

Comparing the UAO as of two valuation dates does not provide enough information to determine whether there were actuarial gains or losses. The correct comparison is between the UAO on the valuation date and the Expected UAO projected from the prior valuation date using the actuarial assumptions in effect since the previous valuation.

The actuarial gains and losses since the last report are summarized in the following tables and shown in **Table 8**.

($ Millions)	Expected Results	Actual Results	(Gain) or Loss
Actuarial Obligation	$ 241,417	$ 241,753	$ 336
Act. Value of Assets	163,721	165,553	(1,832)
Unfunded Act. Oblig.	$ 77,696	$ 76,200	$ (1,496)
Actuarial (Gains) or Losses by Source			
Change in actuarial assumptions			$ 0
Salaries increased greater than assumed			80
All other non-investment sources			256
Loss on the Actuarial Obligation			$ 336
Investment Return on Actuarial Value of Assets			(1,659)
Contributions (in excess of) or less than assumed			(173)
(Gain) on the Actuarial Value of Assets			$ (1,832)
Total Actuarial (Gain)			$ (1,496)

Actuarial Gains and Losses (continued)

($ Millions) Actuarial (Gains) or Losses on the Actuarial Obligation	(Gain) or Loss	Percent of Act. Oblig.
Change in actuarial assumptions	$ 0	0.0%
Salaries increased greater than assumed	80	0.0
All other non-investment sources	256	0.1
(Gain) or Loss on the Actuarial Obligation	$ 336	0.1%
Actuarial (Gains) or Losses on the Actuarial Value of Assets	**(Gain) or Loss**	**Percent of AVA**
Return on Actuarial Value of Assets	$ (1,659)	(1.0)%
Contributions (greater)/less than assumed	(173)	(0.1)
(Gain) or Loss on the Actuarial Value of Assets	$ (1,832)	(1.1)%

These net gains and losses are within a reasonable range for variances in a single year.

Based on the 2014 Actuarial Valuation, the UAO was expected to increase to $77,696 million. The actual UAO of $76,200 million represents a net actuarial gain of $1,496 million.

- Salaries increased slightly more than predicted by the current actuarial assumptions, causing the Actuarial Obligation to increase by $80 million from the expected amount. This small increase is after several years of smaller-than-expected salary increases which have been common among public agencies in recent years. It is consistent with our observations of a modest rise in salary increases recently. We expect to continue to see salary increase fluctuations from year to year.
- All other non-investment experience represents only a relatively small portion of the expected Actuarial Obligation. These relatively minor net gains and losses indicate that the census is consistent from the prior period, and the actual experience tracked closely overall with the actuarial assumptions (exclusive of the asset return and the salary increase).
- On the asset side, there was an asset gain based on the actuarial value of assets, but an asset loss based on the Market Value of Assets, as the investment return on the Fair Market Value of Assets was less than the 7.50% assumption. The return on market value was estimated at 3.9%, while the return on the Actuarial Value of Assets was greater (estimated at 8.6%) due to the smoothing of the current year loss and the recognition of a portion of prior deferred investment gains.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Comparison with Funding Target at Time of Legislation

A comparison of the current funded ratio with the funded ratio for the current year based on the projections at the time the legislation was passed (after reflecting the new contribution rates) provides a measurement of how well CalSTRS is doing in comparison to their original targeted funding progress. For 2015, the current funded ratio is 68.5% compared to the original projected value for 2015 of 64.8%. In terms of the UAO, the actual 2015 UAO is $76.2 billion compared to the original projected value for 2015 of $85.1 billion. This improved funded status is primarily due to asset returns that have been greater than the assumption since the June 30, 2013 valuation, which was the basis for the legislative calculations.

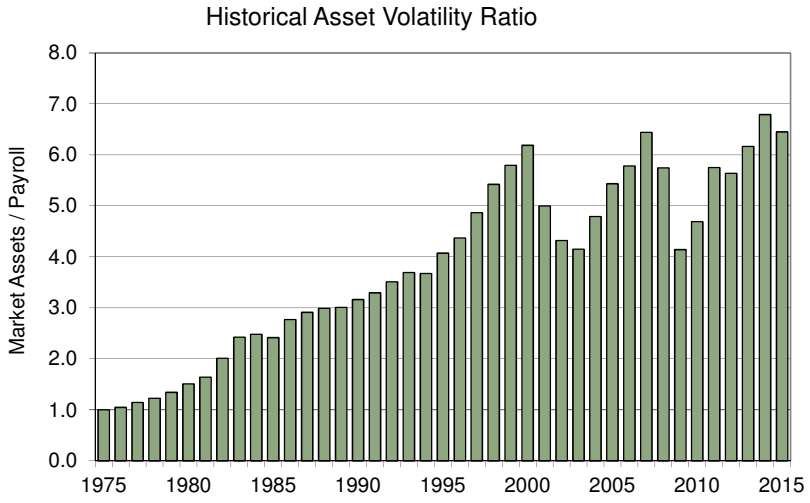
Volatility Ratios

As a retirement system becomes more mature (i.e., a greater percentage of the obligation is attributable to benefits already earned), it tends to be subject to increased volatility in the contributions needed. Specifically, for CalSTRS, there may be significant swings in the Additional Revenue Needed from year to year due to the actual investment return.

One indicator of this potential volatility is the Asset Volatility Ratio (AVR) which is equal to the Fair Market Value of Assets divided by total payroll. Plans with a high Asset Volatility Ratio will be subject to a greater level of contribution volatility. The AVR is a current measure since it is based on the current level of assets and will vary from year to year.

For CalSTRS, the current AVR is equal to 6.4, which is typical for a mature system. This means that for each 1% asset loss (in relation to the assumed investment return), there will need to be an increase in contributions equivalent to 6.4% of one-year's payroll. Since CalSTRS is currently targeting a funding period of 30 years (the years from the next valuation date to June 30, 2046), the increase (or decrease) in the Additional Revenue Needed will be spread out over 30 years, resulting in approximately a 0.35% of payroll increase (decrease) in the Additional Revenue Needed for each 1% asset loss (gain).

The following graph shows how the System matured during the last 25 years of the 20th Century, as represented by the increasing AVR. Over the last decade and a half, increases in the AVR have somewhat leveled off although there continues to be year-to-year variance.



Volatility Ratios (continued)

Another measure of a system's maturity is the Liability Volatility Ratio (LVR), which is equal to the Actuarial Obligation divided by the total payroll. This ratio provides an indication of the longer-term potential for contribution volatility for any given level of investment volatility. In addition, this ratio provides an indication of the potential contribution volatility due to liability experience (gains and losses) and liability re-measurements (assumption changes). For CalSTRS the current LVR is 8.6%. Ultimately, the LVR and AVR should be equal if CalSTRS achieves 100% funding in the future.

The following graph shows the historical LVR. It is a similar pattern to the Asset Volatility Ratio except the increase is more gradual and the year-to-year variance is significantly less.

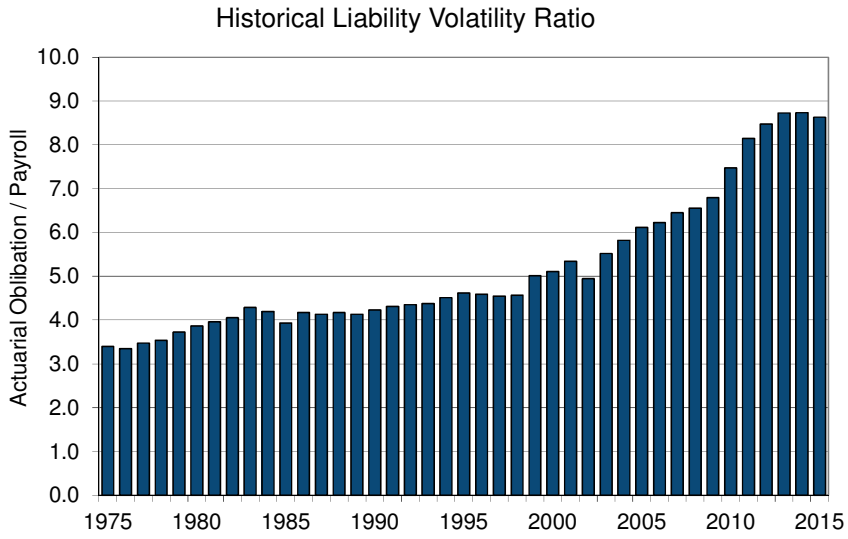


Table 7
Funded Status

($ Millions)	2015	2014
Actuarial Obligation *(Table 2)*	$241,753	$231,213
Actuarial Value of Assets		
Calculated *(Table 5)*	$ 177,059	$ 168,838
Less SBMA Reserve	(11,506)	(10,343)
Program Assets	$ 165,553	$ 158,495
Unfunded Actuarial Obligation	**$ 76,200**	**$ 72,718**
Funded Ratio	**68.5%**	**68.5%**

Table 8
Actuarial Gains and Losses

($ Millions)	Expected	Actual	(Gain) / Loss
Actuarial Obligation			
Actuarial Obligation June 30, 2014	$231,213		
Normal Cost for 2014-2015	5,155		
Benefits Paid (Excludes Purchasing Power)	(12,039)		
Expected Interest at 7.50%	17,088		
Actuarial Obligation June 30, 2015	**$241,417**	**$241,753**	**$ 336**
By Source:			
Change in actuarial assumptions			*0*
Retiree Mortality			*(75)*
Active Member Mortality			*(11)*
Service Retirements			*83*
Disability Retirement			*93*
Other Terminations of Employment			*92*
Salary increases more / (less) than assumed			*80*
All Other Non-investment Sources			*74*
Total (Gain) Loss on the Actuarial Obligation			*$ 336*
Actuarial Value of Assets			
Actuarial Value of Assets June 30, 2014	$158,495		
Expected Contributions for 2014-2015	5,618		
Benefits Paid (Excludes Purchasing Power)	(12,039)		
Expected Interest at 7.50% on AVA	11,647		
Actuarial Value of Assets June 30, 2015	**$163,721**	**$165,553**	**$ (1,832)**
By Source: *Investment Return on Actuarial Value of Assets (including the recognition of prior deferred investment gains and losses)*			*$ (1,659)*
Contributions (in excess of) or less than assumed (including service purchases)			*(173)*
Total (Gain) Loss on the Actuarial Value of Assets			*$ (1,832)*
Unfunded Actuarial Obligation	**$ 77,696**	**$ 76,200**	**$ (1,496)**

Section 6 State Supplemental Contribution Rate

Under EC §22955.1(b), increases in the state contribution rate are required, reaching an ultimate increase of 4.311% of payroll as of July 1, 2016. We will refer to this contribution as the state supplemental contribution. Note that for the state, the payroll is the second prior fiscal year salaries, so contributions made in fiscal year 2017-2018 will be based on the covered member compensation for fiscal year 2015-2016. The state supplemental rate is in addition to the base state contribution under EC §22955.1(a) of 2.017% of payroll.

Effective July 1, 2017, the board shall increase or decrease the state supplemental contribution rate (within certain parameters) to reflect the contribution required to eliminate the remaining UAO associated with the 1990 benefit and contribution rate structure. This will be referred to as the 1990 UAO. State supplemental contributions are included as part of the 1990 UAO. Although not specified in the law, the Board's valuation policy calls for the state supplemental contribution rate to be calculated to amortize the UAO by June 30, 2046.

Changes in the state supplemental contribution are determined annually beginning with the 2016 valuation and subject to the following conditions:

- The state supplemental contribution rate cannot increase by more than 0.5% of payroll over the prior year supplemental rate. There is no limit on decreases.
- In any year when there is no UAO for the 1990 Benefit Structure, the supplemental contribution shall be reduced to zero.

1990 Unfunded Actuarial Obligation

The 1990 Actuarial Obligation for the DB Program is calculated using the benefit provisions in place during 1990. CalSTRS provides us with supplementary information on the census data for this determination. The process has limitations since we do not know, for example, whether members who retired would have done so if the post-1990 benefit enhancements had not been enacted. However, we believe we are using a reasonable process to estimate what the Actuarial Obligation would be if only the 1990 benefits were currently in place.

There were no benefit improvements enacted between 1990 and 1998 that had a material cost. All benefit enhancements enacted with effective dates from July 1, 1990 to December 31, 1998 have been presumed to be cost-neutral. Due to the enhanced retirement benefits enacted since 1990, we are using a separate set of retirement probabilities to evaluate the 1990 Benefit Structure.

1990 Unfunded Actuarial Obligation (continued)

The Actuarial Obligation related to the 1990 Benefit Structure is $196.8 billion. This compares to the Actuarial Obligation for the DB Program of $241.8 billion.

($ Millions)	2015 Valuation	2014 Valuation
Actuarial Obligation -- 1990 Benefit Structure		
Value of Projected Benefits	$ 247,920	$ 236,726
Value of Future Normal Costs	51,114	48,383
Actuarial Obligation	$ 196,806	$ 188,343

The current Actuarial Value of Assets for the DB Program needs to be adjusted to reflect the contributions started on October 1, 1998 (excluding the state supplemental contributions under 22955.1(b)), and an estimate of the additional benefits paid out through the valuation date due to the post-1990 benefit increases. This task also has some limitations since we do not have precise data regarding the portion or the timing of benefit payments that would be attributable to only the 1990 benefits.

The most significant adjustments to the assets are:

- Eliminating contributions in excess of 16.00% (except for the state supplemental contributions),
- Adding back the member contributions that were directed to the DBS Program,
- Adding back the post-1990 benefit enhancements that have been paid, and
- Adjusting for actual investment return.

See **Table 9** for the details of the asset adjustment.

($ Millions)	2015 Valuation	2014 Valuation
Asset Adjustment -- 1990 Benefit Structure		
Actuarial Value for DB Program	$ 165,553	$ 158,495
Adjustments per Table 9	17,314	14,932
Actuarial Value of Assets	$ 182,867	$ 173,427

For purposes of testing the funding sufficiency of the 1990 Benefit Structure, note that we did not reserve the Board's allocation of assets for future THBF costs because it was established subsequent to 1990.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

1990 Unfunded Actuarial Obligation (continued)

The following table summarizes the Funded Status of the 1990 Benefit Structure as detailed in **Table 10**. The 1990 Benefit Structure has an actuarial deficit equal to the UAO of $13.9 billion.

($ Millions)	2015 Valuation	2014 Valuation
Funded Status -- 1990 Benefit Structure		
Actuarial Obligation	$ 196,806	$ 188,343
Actuarial Value of Assets	182,867	173,427
Unfunded Actuarial Obligation	$ 13,939	$ 14,916
Funded Ratio	92.9%	92.1%

Supplemental State Contributions

The statute calls for an adjustment to the supplemental state contribution to amortize the 1990 UAO effective with the 2016 actuarial valuation. Therefore, no adjustment to the scheduled state supplemental contribution rate is needed effective July 1, 2016.

For illustrative purposes, we have shown the adjustment to the state supplemental contribution rate that would have been recommended if this were the 2016 valuation. As shown in **Table 10**, a supplemental contribution rate of 2.047% of pay would be needed to amortize the 1990 UAO by June 30, 2046 based on the board's current valuation policy, a decrease of about 2.3% of pay from the ultimate supplemental rate of 4.311%. Note this is based on the Actuarial Value of Assets, so it does not reflect the future recognition of currently deferred asset gains and losses, and therefore differs from the projection shown in the Looking Ahead subsection of Section 1. Additionally, asset experience during the current fiscal year and potential changes in assumptions prior to the next valuation could have a material impact on this rate.

The funded status of the 1990 Benefit Structure in future years is difficult to predict with certainty because the Actuarial Value of Assets for the 1990 Benefit Structure includes adjustments for contributions and benefits paid in excess of those in place in 1990. The benefits paid may vary considerably depending on demographic experience. In addition, the Actuarial Obligation can only be assessed accurately when current census data is evaluated along with current asset information.

Actuarial Gains and Losses

Similar to the total DB Program, we perform a comparison for the 1990 Benefit Structure between the UAO on the valuation date and the Expected UAO projected from the prior valuation date using the actuarial assumptions in effect since the previous valuation.

The actuarial gains and losses since the last report for the 1990 Benefit Structure are summarized in the following table.

($ Millions)	Expected Results	Actual Results	(Gain) or Loss
Actuarial Obligation	$ 196,494	$ 196,806	$ 312
Act. Value of Assets	181,011	182,867	(1,856)
Unfunded Act. Oblig.	$ 15,483	$ 13,939	$ (1,544)
Actuarial (Gains) or Losses by Source			
Change in actuarial assumptions			$ 0
Salaries increased greater than assumed			63
All other non-investment sources			249
Loss on the Actuarial Obligation			$ 312
Investment Return on Actuarial Value of Assets			(1,707)
Contributions (in excess of) or less than assumed			(149)
(Gain) on the Actuarial Value of Assets			$ (1,856)
Total Actuarial (Gain)			$ (1,544)

Table 9
Asset Adjustment for 1990 Benefit Structure

($ Millions)	**2015**	**2014**
Assets Adjustment due for 1990 Structure Changes		
Allocated Market Value at Beginning of Year	$15,897	$12,512
Contributions During the Year		
EC §22901.7 at 0.150% / 0.000% of Earned Salaries	(44)	0
EC §22950.5 at 0.630% / 0.000% of Earned Salaries	(180)	0
EC §22951 at 0.250% of Earned Salaries	(72)	(66)
EC §22955 at 2.017% of second preceding fiscal year Earned Salaries	(528)	(527)
EC §22955b at 0.000% / 1.024% of second preceding fiscal year Earned Salaries	-	(268)
THBF costs reallocated to DB Program	31	33
Total Adjustment to Contributions[1]	(793)	(828)
Benefits Paid During the Year		
Post-1990 Benefits Paid During the Year	1,932	1,826
Prior 2% DBS redirection contributions refunded	(12)	(16)
Total Adjustment to Benefits Paid [1]	1,920	1,810
Estimated Investment Earnings for the Year [2]	639	2,403
Total Allocated Market Value at End of Year	**$17,663**	**$15,897**
Ratio of Actuarial Value to Market Value [3]	98.022%	93.930%
Actuarial Value of Assets of Asset Adjustment	**$17,314**	**$14,932**

(1) May not add exactly, due to rounding.

(2) Based on Fair Market Value and uniform cash flow for contributions, benefits and expenses. The rates of return used in these calculations were 18.61% for 2013-2014 and 3.90% for 2014-2015.

(3) Developed from Table 5.

Table 10
Funded Status and Supplemental Contribution Rate for 1990 Benefit Structure

($ Millions)	2015	2014
Actuarial Obligation		
Present Value of Projected Benefits		
Benefits Currently Being Paid	$ 108,609	$ 104,718
Benefits to Inactive Members	4,664	4,578
Benefits to Active Members	134,647	127,430
Total	$ 247,920	$ 236,726
Present Value of Future Normal Costs	(51,114)	(48,383)
Actuarial Obligation	$ 196,806	$ 188,343
Actuarial Value of Assets		
Actuarial Value of Assets *(Table 7)*	$ 165,553	$ 158,495
Plus, 1990 Asset Adjustment (Table 9)	17,314	14,932
Theoretical AVA for 1990 Benefits	$182,867	$173,427
Funded Status		
Actuarial Obligation	$ 196,806	$ 188,343
Actuarial Value of Assets	182,867	173,427
Unfunded Actuarial Obligation (Surplus)	$13,939	$14,916
Funded Ratio	92.9%	92.1%
Amortization Sufficiency Under Current Contribution Schedule		
Revenue for 1990 Benefits	16.000%	16.000%
Normal Cost Rate for 1990 Benefits	(15.289)	(15.348)
Normal Cost Surplus / (Deficit) Express as Percent of Employer Payroll	0.711%	0.652%
Normal Cost Surplus / (Deficit) Express as Percent of State Payroll	0.765%	0.702%
Level Equivalent Additional Revenue Under EC 22955.1(b)	4.241	4.097
Revenue Available for Amortization	5.006%	4.799%
Revenue Needed for Amortization	2.742	3.144
Revenue Surplus / (Deficit)	2.264%	1.655%
Amortization Status under current contribution rate schedule and no changes in ultimate rate	Projected to Fund 1990 UAO by 2046	Projected to Fund 1990 UAO by 2046
Contribution Rate for Amortization of 1990 UAO		
[Illustrative Purposes Only. Not Applicable for 2015 Valuation]		
Current EC 22955.1(b) Contribution Rate	4.311%	4.311%
Increase / (Decrease) in State Contribution Rate for Next Fiscal Year	(2.264)	(1.655)
EC 22955.1(b) Contribution Rate for FYB 2017	**2.047%**	**2.656%**

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Section 7 Employer Supplemental Contribution Rate

Under EC §22950.5, increases in the employer contribution rate are required, reaching an ultimate increase of 10.85% of payroll as of July 1, 2020. We will refer to this contribution as the employer supplemental contribution. The employer supplemental rate is in addition to the base employer contribution under EC §22950 and 22951 of 8.25% of payroll.

Effective July 1, 2021, the board shall increase or decrease the employer supplemental contribution rate (within certain parameters) to reflect the contribution required to eliminate the remaining UAO associated with service earned prior to July 1, 2014. This will be referred to as the pre-2014 UAO.

There is an additional complexity in that the pre-2014 UAO that the employer is responsible for funding overlaps with the 1990 UAO that the state is responsible for funding. Under the Board's valuation policy, the pre-2014 UAO is split into two separate pieces: 1) the pre-2014 UAO for the 1990 Benefit Structure; and 2) the pre-2014 UAO for "new" benefits (i.e., those adopted after 1990). The employers are responsible for funding the New Benefit UAO.

Changes in the employer supplemental contribution are determined annually beginning with the 2020 valuation and are subject to the following conditions:

- The employer supplemental contribution rate cannot increase or decrease by more than 1.0% of payroll over the prior year supplemental rate.
- The employer supplemental contribution rate cannot exceed 12.00%.

To determine the pre-2014 UAO for New Benefits, we must determine the total UAO for pre-2014 service and subtract the 1990 UAO for pre-2014 service.

Pre-2014 Unfunded Actuarial Obligation

The pre-2014 Actuarial Obligation for the DB Program is calculated using service through June 30, 2014 and projected salaries. Since there are no future service accruals for this portion of the Actuarial Obligation, the Projected Unit Credit actuarial cost method is used, per the Board's valuation policy.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Pre-2014 Unfunded Actuarial Obligation (continued)

To determine the pre-2014 assets to be used in the 2015 valuation, a theoretical pre-2014 asset value is maintained based on the prior year value adjusted as follows:

- Add total contributions (excluding SBMA),
- Subtract total Normal Costs for prior year,
- Subtract benefit payments attributable to pre-2014 service, and
- Adjust for actual investment return.

See **Table 11** for the details of the asset adjustment.

Pre-2014 Unfunded Actuarial Obligation for 1990 Benefit Structure

A second calculation is done to isolate the portion of the pre-2014 UAO that is allocated to the 1990 Benefit Structure and therefore is subject to state funding. The Actuarial Obligation for this portion is calculated using the 1990 Benefit Structure, service through June 30, 2014 and projected salaries. Since there are no future service accruals, the Projected Unit Credit actuarial cost method is used.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Pre-2014 Unfunded Actuarial Obligation (continued)

To determine the pre-2014 assets allocated to the 1990 Structure that are to be used in the 2015 valuation, a theoretical pre-2014 asset value for the 1990 Structure is maintained based on the prior year value adjusted as follows:

- Add contributions equal to 16.00% of prior year payroll,
- Add state supplemental contributions under EC 22955.1(b),
- Subtract total Normal Costs for prior year attributable to 1990 Benefit Structure,
- Subtract benefit payments attributable to pre-2014 service and the 1990 Benefit Structure, and
- Adjust for actual investment return.

See **Table 12** for the details of the asset adjustment.

Pre-2014 Unfunded Actuarial Obligation for New Benefits

The following table shows the calculation of the UAO for Pre-2014 Service attributable to New Benefits.

($ Millions)	Pre-2014 Service		
	Total	1990 Benefits	New Benefits
Funded Status -- Pre-2014 Service			
Actuarial Obligation	$ 224,371	$ 184,517	$ 39,854
Actuarial Value of Assets	149,826	171,923	(22,097)
Unfunded Actuarial Obligation	$ 74,545	$ 12,594	**$ 61,951**

Supplemental Employer Contributions

The statute calls for an adjustment to the supplemental employer contribution to amortize the pre-2014 UAO effective with the 2020 actuarial valuation. Therefore, no adjustment to the scheduled employer supplemental contribution is needed effective July 1, 2016.

For illustrative purposes, we have shown the adjustment to the employer supplemental contribution rate that would have been recommended if this were the 2020 valuation. As shown in **Table 13**, an increase in the supplemental employer contribution rate of about 0.2% of pay, above the ultimate rate of 10.80%, would be needed to amortize the pre-2014 UAO for New Benefits by June 30, 2046. Note this is based on the Actuarial Value of Assets, so it does not reflect the future recognition of currently deferred asset gains and losses, and therefore differs from the projection shown in the Looking Ahead subsection of Section 1.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Table 11
Total Assets Allocated for Pre-2014 Service(1)

($ Millions)	2015	2014
Asset Value for Pre-2014 Service (excludes SBMA)		
Allocated Market Value at Beginning of Year(2)	$158,825	na
Contributions During the Year		
Total Contributions (excluding SBMA)	5,785	na
Less Normal Costs for Year with Expenses	(5,215)	na
Total Adjusted Contributions	$ 570	na
Benefits and Expenses Paid for Pre-2014 Service	(12,172)	na
Estimated Investment Earnings for the Year (3)	5,626	na
Total Allocated Market Value at End of Year	**$152,849**	**$158,825**
Ratio of Actuarial Value to Market Value (4)	98.022%	93.535%
Actuarial Value of Assets for Pre-2014 Service	**$149,826**	**$148,557**

(1) May not add exactly, due to rounding.

(2) Allocated Market Value at Beginning of Year equals last year's gross market value of $169,168 less last year's SBMA value of $10,343.

(3) Based on Fair Market Value excluding SBMA and uniform cash flow for contributions, benefits and expenses. The rates of return used in these calculations were 18.61% for 2013-2014 and 3.68% for 2014-2015.

(4) Developed from Table 5.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Table 12
1990 Assets Allocated for Pre-2014 Service[1]

($ Millions)	2015	2014
1990 Asset Value for Pre-2014 Service (excludes SBMA)		
Allocated Market Value at Beginning of Year[2]	$178,657	na
Contributions During the Year for 1990 Structure		
Total Contributions (excluding SBMA)	4,992	na
Less 1990 Normal Costs for Year with Expenses	(4,396)	na
Total Adjusted Contributions	$ 596	na
Benefits and Expenses Paid for Pre-2014 Service	(10,252)	na
Estimated Investment Earnings for the Year [3]	6,391	na
Total 1990 Allocated Market Value at End of Year	**$175,392**	**$178,657**
Ratio of Actuarial Value to Market Value [4]	98.022%	93.579%
1990 Actuarial Value of Assets for Pre-2014 Service	**$171,923**	**$167,185**

(1) May not add exactly, due to rounding.

(2) Allocated Market Value at Beginning of Year equals last year's gross market value of $189,000 less last year's SBMA value of $10,343.

(3) Based on Fair Market Value excluding SBMA and uniform cash flow for contributions, benefits and expenses. The rates of return used in these calculations were 18.61% for 2013-2014 and 3.68% for 2014-2015.

(4) Developed from Table 5.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Table 13
Funded Status and Employer Supplemental Contribution Rate for Pre-2014 Service

($ Millions)	**2015**	**2014**
Funded Status		
Total Unfunded Actuarial Obligation (Pre-2014 Service)		
Total Actuarial Obligation for Pre-2014 Service	$224,371	$220,632
Total AVA for Pre-2014 Service	149,826	148,557
Total UAO (pre-2014 Service)	$74,545	$72,075
1990 Unfunded Actuarial Obligation (Pre-2014 Service)		
1990 Actuarial Obligation for Pre-2014 Service	$184,517	$181,697
1990 AVA for Pre-2014 Service	171,923	167,185
1990 UAO (pre-2014 Service)	$12,594	$14,512
Post-1990 UAO (Pre-2014 Service)	$61,951	$57,563
Amortization Sufficiency Under Current Contribution Schedule		
Revenue from Member Contributions(1)	9.743%	9.654%
Revenue from Employer Contributions (22950 & 22951)(1)	8.250	8.250
Revenue from State Contributions EC 22955(a)(1)	1.860	1.868
Equivalent Normal Cost Rate for Total Benefits	(17.091)	(17.141)
Normal Cost Rate Surplus for 1990 Benefits	(0.711)	(0.652)
Additional Revenue Under EC 22950.5(1)	9.676	8.662
Revenue Available for Amortization	11.727%	10.641%
Revenue Needed for Amortization	11.904	11.502
Revenue Surplus / (Deficit)	(0.177%)	(0.861%)
Amortization Status under current contribution rate schedule and no changes in ultimate rate	Contribution Increase Needed	Contribution Increase Needed
Contribution Rate for Amortization of UAO for pre-2014 Service and New Benefits		
[Illustrative Purposes Only. Not Applicable for 2015 Valuation]		
Current EC 22950.5 Contribution Rate	10.850%	10.850%
Adjustment in Employer Contribution Rate for Next Fiscal Year(2)	0.177	0.861
EC 22955.1(b) Contribution Rate for FYB 2021(2)	**11.027%**	**11.711%**

(1) Equivalent level contribution rate payable through June 30, 2046 as detailed in Tables 14 and 15.
(2) Hypothetical value based on the Actuarial Value of Assets. Current projections indicate a decrease in the ultimate employer contribution rate when reflecting the future recognition of currently deferred asset gains and losses. See Looking Ahead subsection of Section 1.

Section 8 Funding Sufficiency

The contributions to fund the DB Program include those listed below and described in **Table 14,** including reference to the appropriate section of the California Education Code. Since each contribution is not paid uniformly over time as a percentage of Earned Salaries, we have calculated an equivalent rate over a period ending June 30, 2046, the target period defined in the Education Code to fully fund the UAO.

Source of Revenue	FYB2015 Rate	Equivalent Rate
Members[1]	9.160 %	9.743 %
Employers – Base Rate	8.000	8.000
Employers – Sick Leave	0.250	0.250
Employers – Supplemental Rate	2.480	9.676
State – Base Rate	2.017	1.860
State – Supplemental Rate	2.874	3.910
Equivalent Level Contribution Rate through 2046 (assuming no changes in scheduled rates)		**33.439 %**

(1) Member rates differ between 2% at 60 and 2% at 62 members. Rate shown is blended average.

The basic state contribution rate will be 2.017% of the second preceding fiscal year Earned Salaries, which is equivalent to a lesser percentage of current Earned Salaries. For example, the state contribution for the 2015-2016 year will be equal to 2.017% of the 2013-2014 Earned Salaries. Based on two years of known future contributions and projections for the other years, the equivalent rate for the full period is 1.860% of current Earned Salaries.

The calculation of the equivalent rates in **Table 15** results in a combined equivalent contribution of 33.439% of Earned Salaries over the period ending June 30, 2046.

Table 16 shows the amortization of the Unfunded Actuarial Obligation for the total DB Program on a year-by-year basis. Based on the current Actuarial Value of Assets, if the graded contribution rate increases with no additional changes and all future experience emerges as assumed, the UAO will be amortized by June 30, 2046.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Funding Sufficiency (continued)

Table 17 summarizes these findings. Note that the scheduled increases under the funding legislation are reflected with no future changes once the rates reach the ultimate amount. In practice, the state and employer supplemental contribution rates are designed to adjust to the funded status of the Plan. Given that there is now projected to be a small revenue surplus, we would expect the overall DB Program contribution rate to decrease from the ultimate rates and effectively use up this projected surplus.

(Percent of Earned Salaries)	2015 Valuation	2014 Valuation
Additional Revenue Needed for 100% Funding by 2046		
Normal Cost Rate	18.110%	18.209%
Amortization Rate Needed	13.039%	12.897%
Total Level Rate over the Amortization Period	31.149%	31.106%
Equivalent Contribution Rate(1)	33.439%	32.228%
Contribution Deficit / (Buffer)	(2.290%)	(1.122%)
Additional Revenue Needed	None	None

(1) Assumes no change in contribution rate once ultimate level is reached.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Table 14
Contributions

		FY2015-2016 Rate	Ultimate Rate	Equivalent Rate(1)
EC 22901 & 22901.7	Members	9.20% / 8.56%	10.25% / 9.205%	9.743%
EC 22950 & 22951	Employers	8.25%	8.25%	8.250%
EC 22950.5(a)	Employers – Supplemental(2)	2.48%	10.85%	9.676%
EC 22950(c)	Employers for THBF(3)	0.00%	*as needed*	0.000%
EC 22955.1(a)	State(4)	2.017%	2.017%	1.860%
EC 22955.1(b)	State – Supplemental	2.874%	4.311%	3.910%
	Equivalent Level Contribution Rate through June 30, 2046			**33.439%**

(1) Equivalent level contribution rate payable through June 30, 2046. See Table 15 for details.

(2) Graded increases per schedule defined in the Education Code. The ultimate contribution will vary depending on the funded status. For purposes of this exhibit, it is assumed the ultimate rate specified in the graded schedule will not change in the future.

(3) The Teachers' Health Benefit Fund is financed by a redirection of employer contributions. The Teachers' Retirement Board has set aside DB Program assets to finance these future costs. This is reflected in the valuation by adding the unfunded obligation for future THBF benefits to the Actuarial Obligation of the DB Program. See Table 2.

(4) The State's contribution of 2.017% is paid quarterly based on second prior fiscal year salaries.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Table 15
Projection of Contributions through June 30, 2046(3)

($Millions) FYE	Projected Salaries	Member *22901 & 22901.7*	Employer *22950 & 22951*	Employer *22950.5*	State *22955(a)*	State *22955.1(b)*	Total Contrib.
2016	$29,466	$2,699	$2,431	$731	$509	$726	$7,096
2017	30,560	3,103	2,521	1,323	528	1,128	8,603
2018	31,699	3,210	2,615	1,959	594	1,270	9,648
2019	32,880	3,320	2,713	2,640	616	1,317	10,606
2020	34,106	3,434	2,814	3,369	639	1,367	11,623
2021	35,377	3,551	2,919	3,838	663	1,417	12,388
2022	36,696	3,672	3,027	3,982	688	1,470	12,839
2023	38,063	3,798	3,140	4,130	714	1,525	13,307
2024	39,482	3,927	3,257	4,284	740	1,582	13,790
2025	40,953	4,060	3,379	4,443	768	1,641	14,291
2026	42,479	4,198	3,505	4,609	796	1,702	14,810
2027	44,061	4,340	3,635	4,781	826	1,765	15,347
2028	45,702	4,486	3,770	4,959	857	1,831	15,903
2029	47,403	4,637	3,911	5,143	889	1,899	16,479
2030	49,168	4,791	4,056	5,335	922	1,970	17,074
2031	50,997	4,951	4,207	5,533	956	2,044	17,691
2032	52,894	5,114	4,364	5,739	992	2,120	18,329
2033	54,862	5,284	4,526	5,953	1,029	2,198	18,990
2034	56,904	5,459	4,695	6,174	1,067	2,280	19,675
2035	59,021	5,640	4,869	6,404	1,107	2,365	20,385
2036	61,218	5,828	5,050	6,642	1,148	2,453	21,121
2037	63,497	6,022	5,239	6,889	1,190	2,544	21,884
2038	65,862	6,224	5,434	7,146	1,235	2,639	22,678
2039	68,315	6,434	5,636	7,412	1,281	2,737	23,500
2040	70,860	6,652	5,846	7,688	1,328	2,839	24,353
2041	73,501	6,879	6,064	7,975	1,378	2,945	25,241
2042	76,242	7,116	6,290	8,272	1,429	3,055	26,162
2043	79,087	7,363	6,525	8,581	1,483	3,169	27,121
2044	82,039	7,620	6,768	8,901	1,538	3,287	28,114
2045	85,102	7,888	7,021	9,234	1,595	3,409	29,147
2046	88,280	8,169	7,283	9,578	1,655	3,537	30,222
PV (1)	$542,056	$52,810	$44,720	$52,452	$10,080	$21,193	$181,255
Level Rate (2)		**9.743%**	**8.250%**	**9.676%**	**1.860%**	**3.910%**	**33.439%**

(1) Present Value, as of the valuation date, of projected contributions through June 30, 2046.

(2) Equivalent level rate payable over the period ending June 30, 2046.

(3) Assumes no changes in the state and employer contribution rates once the ultimate rates have been reached.

Table 16
Amortization of Unfunded Actuarial Obligation(1)
(Reflecting Currently Scheduled Contributions Increases)(2)

($Millions)		Beginning	Amortization Payment			Interest	Ending
Year	FYE	Unfunded Act. Oblig.	Total Contrib.	Normal Cost	Available Amtzn.	Charge at 7.50%	Unfunded Act. Oblig.
1	2016	$76,200	$7,096	$5,322	$1,774	$5,650	$80,076
2	2017	80,076	8,604	5,497	3,107	5,891	82,860
3	2018	82,860	9,648	5,678	3,970	6,068	84,958
4	2019	84,958	10,606	5,866	4,740	6,197	86,415
5	2020	86,415	11,623	6,060	5,563	6,276	87,128
6	2021	87,128	12,389	6,260	6,129	6,309	87,308
7	2022	87,308	12,839	6,465	6,374	6,313	87,247
8	2023	87,247	13,306	6,677	6,629	6,299	86,917
9	2024	86,917	13,790	6,896	6,894	6,265	86,288
10	2025	86,288	14,291	7,120	7,171	6,208	85,325
11	2026	85,325	14,810	7,352	7,458	6,125	83,992
12	2027	83,992	15,347	7,590	7,757	6,014	82,249
13	2028	82,249	15,903	7,834	8,069	5,872	80,052
14	2029	80,052	16,479	8,084	8,395	5,695	77,352
15	2030	77,352	17,075	8,340	8,735	5,480	74,097
16	2031	74,097	17,691	8,603	9,088	5,223	70,232
17	2032	70,232	18,329	8,872	9,457	4,919	65,694
18	2033	65,694	18,989	9,149	9,840	4,565	60,419
19	2034	60,419	19,674	9,436	10,238	4,154	54,335
20	2035	54,335	20,385	9,733	10,652	3,683	47,366
21	2036	47,366	21,121	10,040	11,081	3,144	39,429
22	2037	39,429	21,885	10,358	11,527	2,533	30,435
23	2038	30,435	22,678	10,687	11,991	1,841	20,285
24	2039	20,285	23,500	11,030	12,470	1,062	8,877
25	2040	8,877	24,354	11,387	12,967	188	(3,902)
26	2041	(3,902)	25,241	11,760	13,481	(789)	(18,172)
27	2042	(18,172)	26,162	12,149	14,013	(1,879)	(34,064)
28	2043	(34,064)	27,120	12,556	14,564	(3,091)	(51,719)
29	2044	(51,719)	28,114	12,980	15,134	(4,436)	(71,289)
30	2045	(71,289)	29,147	13,425	15,722	(5,926)	(92,937)
31	2046	(92,937)	30,222	13,891	16,331	(7,572)	(116,840)

(1) Based on the actuarial value of assets with no projected recognition of deferred known asset gains and losses.

(2) Contribution rates based on no change in ultimate supplemental rates. Actual contributions will vary based on funded status.

Table 17
Funding Sufficiency

($ Millions)	June, 2015	June, 2014
Funded Status ***(Table 7)***		
Actuarial Obligation	$ 241,753	$ 231,213
Actuarial Value of Assets	165,553	158,495
Unfunded Actuarial Obligation	$ 76,200	$ 72,718
Funded Ratio	68.5%	68.5%
Level Contributions over 30 Years ***(Table 14)***	33.439%	32.228%
Amortization Period based on Current Revenues		
Total Level Rate over the Amortization Period	33.439%	32.228%
Equivalent Normal Cost Rate(1)	17.091	17.141
Amortization Rate	16.348%	15.087%
Amortization Period (Based on current revenue projections)	*Projected to Amortize by 2046*	*Projected to Amortize by 2046*
Calculated Contribution Rate for Amortization by 2046		
Equivalent Normal Cost Rate(1)	17.091%	17.141%
Amortization Rate	14.058	13.965
Total Level Rate over the Amortization Period	31.149%	31.106%
Estimated Additional Revenue Needed *(Based on current revenue projections and valuation assumptions)*	None	None

(1) Normal Cost Rate shown is expected average Normal Cost Rate through June 30, 2046. It reflects the projected impact of the reduced Normal Cost Rate for future 2% at 62 members. It differs from the table on page 1 which shows the Normal Cost Rate as of the valuation date.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Appendix A Provisions of Governing Law

The actuarial calculations contained in this report are based upon our understanding of the CalSTRS DB Program as contained in Part 13 of the California Education Code and augmented by consultation with CalSTRS staff. The provisions used in this valuation are summarized below for reference purposes.

Member Contributions

Base Contribution Rate:

2% at 60 Members: 8.0% of creditable compensation. 25% of this contribution was redirected to the member's Defined Benefit Supplement account from January 1, 2001 through December 31, 2010.

The redirection of member contributions does not apply to the 1990 Benefit Structure.

2% at 62 Members: Equal to one-half of the Normal Cost rate determined in the valuation rounded to the nearest quarter percent. Member rates only change when the Normal Cost rate changes by 1.0% of pay as compared to the initial Normal Cost rate (or at the time of the last adjustment). Currently, the member contribution rate is equal to 8.0% of creditable compensation.

Supplemental Contribution Rates:

In addition to the base contribution rates, members make additional contributions under the following schedule.

	2% at 60	2% at 62
Effective July 1, 2014	0.150%	0.150%
Effective July 1, 2015	1.200%	0.560%
Effective July 1, 2016	2.250%	1.205%

Interest Rate:

Interest is credited at the end of each fiscal year based on rates adopted by the Teachers' Retirement Board. Currently, rates are approximately equal to two-year Treasury notes.

Normal Retirement

Eligibility Requirement:

2% at 60 Members: Age 60 with five years of credited service.

2% at 62 Members: Age 62 with five years of credited service.

Allowance:

Two percent of final compensation for each year of credited service.

Final Compensation:

2% at 60 Members: Average salary earnable for the highest three consecutive years of credited service for one position. For members with 25 years of service, the calculation is based on the highest average compensation earnable in a consecutive 12-month period.

12-month highest average compensation does not apply to the 1990 Benefit Structure.

2% at 62 Members: Final compensation is based on the highest three consecutive years of salary earnable. Compensation is limited to 120% of the Social Security Wage Base. The limit effective July 1, 2015 is $137,941 (after applying the 120% factor) and is adjusted annually based on changes to the Consumer Price Index for All Urban Consumers. The 2% at 62 members are not eligible for the one-year final compensation benefit enhancement.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Normal Retirement (continued)

Credited Service	For each year of membership, credited service is granted based on the ratio of salary earned to full-time salary earnable for one position.
Sick Leave Service Credit:	Credited service is granted for unused sick leave at the time of retirement. Sick Leave Service Credit up to 0.2 years of Credited Service may be used for eligibility for One-Year Final Compensation or to attain the Career Factor or the Longevity Bonus. Unused sick leave service credit does not apply to the 1990 Benefit Structure.
Career Factor:	If a member has 30 years of credited service, the age factor is increased by 0.2%. However, the maximum age factor is 2.4%. Career factor does not apply to 2% at 62 members or the 1990 Benefit Structure.
Longevity Bonus:	For members attaining 30 years of service by January 1, 2011, a longevity bonus of $200 per month is added to the unmodified allowance. The bonus is increased to $300 per month with 31 years of service, and $400 per month with 32 or more years of service. Longevity Bonus does not apply to 2% at 62 members or the 1990 Benefit Structure.
IRC Section 415:	Benefits are subject to limits imposed under Internal Revenue Code (IRC) Section 415. However, no limits are imposed in the valuation of the DB Program until they actually occur, in order to address the potential pay-as-you-go funding needs of the Teachers' Replacement Benefits Program Fund.
IRC Section 401(a)(17):	Compensation is limited under IRC Section 401(a)(17) and assumed to increase at the rate of inflation for valuation purposes. Current 401(a)(17) limits do not apply to members hired before July 1, 1996.

Early Retirement

Eligibility Requirement:	2% at 60 Members: Age 55 with five years of credited service, or age 50 with 30 years of credited service. 2% at 62 Members: Age 55 with five years of credited service.
Benefit Reduction:	2% at 60 Members: A 1/2% reduction in the normal retirement allowance for each full month or partial month the member is younger than age 60, plus a reduction of 1/4% for each full month or partial month the member is younger than age 55. 2% at 62 Members: A 1/2% reduction in the normal retirement allowance for each full month or partial month the member is younger than age 62

Late Retirement

Allowance:	2% at 60 Members: Members continue to earn additional service credit after age 60. The 2% age factor increases by 0.033% for each quarter year of age that the member is over age 60, up to a maximum of 2.4%. 2% at 62 Members: Members continue to earn additional service credit after age 62. The 2% age factor increases by 0.033% for each quarter year of age that the member is over age 62, up to a maximum of 2.4%. The late retirement adjustment does not apply to the 1990 Benefit Structure.

Deferred Retirement

Allowance:	Any time after satisfying the minimum service requirement, a member may cease active service, leave the accumulated contributions on deposit, and later retire upon attaining the minimum age requirement.

Post-Retirement Benefit Adjustment

Benefit Improvement:	2% simple increase on September 1 following the first anniversary of the effective date of the allowance, applied to all continuing allowances.

Disability Allowance - Coverage A

Eligibility Requirement:	Member has five years of credited California service and has not attained age 60.
Allowance:*	50% of final compensation or 5% of final compensation for each year of service credit if over age 45 with less than 10 years of service credit.
Children's Benefit:	10% for each eligible dependent child, up to a maximum of 40% of final compensation. The increment for each eligible child continues until the child marries or attains age 22.
Offsets:	Allowance, including children's increment, is reduced by disability benefits payable under Social Security, Workers' Compensation and employer-paid income protection plan.

** Note that, for valuation purposes, the greater of the service retirement allowance and the disability allowance is valued if the member is eligible for service retirement.*

Disability Allowance - Coverage B (including 2% at 62 members)

Eligibility Requirement:	Member has five years of credited California service.
Allowance:*	50% of final compensation, regardless of age and service credit.
Children's Benefit:	10% for each eligible child up to four children, for a maximum of 40% of final compensation. The increment for each child continues until the child attains age 21, regardless of student, marital, or employment status.
Offsets:	The member's allowance is reduced by disability benefits payable under Workers' Compensation.

** Note that, for valuation purposes, the greater of the service retirement allowance and the disability allowance is valued if the member is eligible for service retirement.*

Death Before Retirement - Coverage A

Eligibility Requirement:	One or more years of service credit for active members or members receiving a disability allowance.
Lump Sum Payment:	$6,163 lump sum to the designated beneficiary. If there is no surviving spouse, domestic partner or eligible children, the contributions and interest are paid to the designated beneficiary.
Allowance:	The surviving spouse or domestic partner with eligible children will receive a family benefit of 40% of final compensation for as long as there is at least one eligible child. An additional 10% of final compensation is payable for each eligible child up to a maximum benefit of 90%. If there is no surviving spouse or domestic partner, an allowance of 10% of final compensation is payable to eligible children up to a maximum benefit of 50%. When there are no eligible children, the spouse or domestic partner may elect to receive one half of a 50% joint and survivor allowance projected to age 60, or take a lump sum payment of the remaining contributions and interest.

Death Before Retirement - Coverage B (including 2% at 62 members)

Eligibility:	One or more years of service credit for active members.
Lump Sum Payment:	$24,652 lump sum to the designated beneficiary. If there is no surviving spouse or domestic partner, the contributions and interest are paid to the designated beneficiary.
Allowance:	A lump sum payment of the contributions and interest. or One-half of a 50% joint and survivor allowance, beginning on the member's 60th birthday, or immediately with a reduction based on the member's and spouse's (or domestic partner's) ages at the time the benefit begins. If the surviving spouse or domestic partner elects a monthly allowance, each eligible child would receive 10% of the member's final compensation, with a maximum benefit of 50%.

Death After Retirement

Lump Sum Payment:	$6,163 lump sum to the designated beneficiary.
Annuity Form:	If the retiree had elected one of the joint and survivor options, the retirement allowance would be modified in accordance with the option selected. If no option had been elected, payment of the unpaid contributions and interest, if any, remaining in the retiree's account.

Termination from the Program

Refund:	Refund of contributions with interest as credited to the member's account to date of withdrawal. A refund terminates membership and all rights to future benefits from the System.
Re-entry After Refund:	Former members who re-enter the System may redeposit all amounts previously refunded plus regular interest. The member must earn one year of credited service after re-entry before becoming eligible for System benefits.

This page intentionally left blank.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Appendix B Actuarial Methods and Assumptions

This section of the report discloses the actuarial methods and assumptions used in this Actuarial Valuation. These methods and assumptions have been chosen on the basis of recent experience of the DB Program and on current expectations as to future economic conditions. The assumptions were reviewed and changed for the June 30, 2011 actuarial valuation as a result of the 2011 Experience Analysis. Please refer to that Experience Analysis report dated February 7, 2012 for the data and rationale used in the selection and recommendation of each assumption.

The assumptions are intended to estimate the future experience of the members of the DB Program and of the DB Program itself in areas that affect the projected benefit flow and anticipated investment earnings. Any variations in future experience from that expected from these assumptions will result in corresponding changes in estimated costs of the DB Program's benefits.

Actuarial Cost Method

The accruing costs of all benefits with future accruals are measured by the Entry Age Normal Actuarial Cost Method. For measurements where no future service is earned (i.e., those with service fixed as of June 30, 2014), the actuarial obligation uses the Projected Unit Credit Actuarial Cost Method.

The projected revenue in excess of the Normal Cost is tested for sufficiency to amortize the Unfunded Actuarial Obligation created by this method. Amortization is calculated on a level percentage of salary including general wage inflation but no increase or decrease in the number of active members.

Entry Age Normal Cost Method:

The actuarial present value of projected benefits for each individual member included in the valuation is allocated on a level basis over the earnings of the individual between entry age and assumed exit ages. The portion of this actuarial present value allocated to a valuation year is called the Normal Cost. For 2% at 60 members, the Normal Cost is based on Coverage B benefit structure. For 2% at 62 members, the Normal Cost is based on their benefit structure. The portion of this actuarial present value not provided for at a valuation date by the actuarial present value of future Normal Costs is called the Actuarial Obligation. The excess of the Actuarial Obligation over the Actuarial Value of Assets is called the Unfunded Actuarial Obligation. If the Actuarial Value of Assets exceeds the Actuarial Obligation, the difference is called the Actuarial Surplus.

Entry Age:

The ages at entry of future active members are assumed to average the same as the entry ages of the present active members they replace. If the number of active members should increase (or decrease), it is further assumed that the average entry age of the larger (or smaller) group will be the same, from an actuarial standpoint, as that of the present active group. Under these assumptions, the Normal Cost Rate will not vary significantly due to the termination of the present active membership, or with an expansion or contraction of the active membership.

Projected Unit Cost Method:

The actuarial present value of projected benefits for each individual member included in the valuation is determined based on the current service and salary projected to the age the member leaves active employment. The Normal Cost is $0, since no benefits are being earned.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Asset Valuation Method

The assets are valued using a method that delays recognition of investment gains or losses. The expected actuarial value is the prior year's actuarial value increased with net cash flow of funds, and all increased with interest during the past year at the expected investment return assumption. One-third of the difference between the expected actuarial value of assets and the Fair Market Value of assets is added to the expected actuarial value of assets to arrive at the Actuarial Value of Assets. The smoothing is applied on the total DB Program assets and then the SBMA is deducted to determine the net actuarial value for funding purposes.

The asset smoothing method was adopted for the 1999 Actuarial Valuation and is effective for the investment experience beginning in July of 1993.

Actuarial Assumptions

The Actuarial Standards Board has adopted Actuarial Standard of Practice No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*. This Standard provides guidance on selecting economic assumptions under defined benefit retirement programs such as the System. In our opinion, the economic assumptions have been developed in accordance with the Standard.

The Actuarial Standards Board has adopted Actuarial Standard of Practice No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*. This Standard provides guidance on selecting demographic assumptions under defined benefit retirement programs such as the System. In our opinion, the demographic assumptions have been developed in accordance with the Standard.

The assumptions are intended to estimate the future experience of the members of the DB Program and of the System itself in areas that affect the projected benefit flow and anticipated investment earnings. Any variations in future experience from that expected from these assumptions will result in corresponding changes in estimated costs of the Program's benefits.

The demographic assumptions are listed in **Table B.1** and illustrated at selected ages and duration combinations in **Tables B.2** – **B.7**.

Payroll Growth Assumption

The wage growth assumption is equal to 3.75%, and the active population is assumed to be stable. Additionally, the Earned Salaries applicable to the DB Program for members hired after December 31, 2012 are assumed to be 99.23% of a similar CalSTRS 2%-at-60 member. Thus, the DB Program payroll is assumed to increase at a rate slightly less than 3.75% each year depending on the expected number of new members.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Table B.1
List of Major Valuation Assumptions

I.	**Economic Assumptions**			
A.	Investment Return (net of investment and administrative expenses)		7.50%	
B.	Interest on Member Accounts		4.50%	
C.	Wage Growth		3.75%	
D.	Inflation		3.00%	
II.	**Demographic Assumptions**			
A.	Mortality*			
	Active	- Male	2011 CalSTRS Retired – M (-2 years)	Table B.2
		- Female	2011 CalSTRS Retired – F (-2 years)	Table B.2
	Retired & Beneficiary **	- Male	2011 CalSTRS Retired – M	Table B.2
		- Female	2011 CalSTRS Retired – F	Table B.2
	Disabled **	- Male	2011 CalSTRS Disabled – M	Table B.2
		- Female	2011 CalSTRS Disabled– F (select rates in first three years for both Males and Females)	Table B.2
B.	Service Retirement		Experience Tables	Table B.3
C.	Disability Retirement		Experience Tables	Table B.4
D.	Withdrawal		Experience Tables	Table B.5
	Probability of Refund		Experience Tables	Table B.6
E.	Merit Salary Increases		Experience Tables	Table B.7
F.	Supplemental Assumptions			Table B.8

** The mortality assumptions specified contain a margin for expected future mortality improvement. Refer to the 2011 Experience Analysis Report for details. See Table B.9 of this report for a key to the custom mortality tables used for CalSTRS.*

*** Future retirees and beneficiaries are valued with a two-year age setback.*

Table B.2
Mortality

Active Members

Age	Male	Female
25	0.023%	0.013%
30	0.033	0.014
35	0.034	0.018
40	0.057	0.034
45	0.076	0.041
50	0.103	0.063
55	0.143	0.093
60	0.238	0.179
65	0.435	0.368

	Retired Members and Beneficiaries*		Disabled Members (After Year 3)*	
Age	Male	Female	Male	Female
50	0.114%	0.073%	2.400%	1.750%
55	0.164	0.118	2.600	1.875
60	0.300	0.254	2.800	2.000
65	0.596	0.468	3.000	2.125
70	1.095	0.864	3.054	2.331
75	1.886	1.451	4.972	3.334
80	3.772	2.759	7.285	4.477
85	7.619	5.596	9.797	8.367
90	14.212	11.702	17.639	14.007
95	22.860	17.780	27.005	20.992

Select rates for disability:

First year of disablement	6.0%	3.5%
Second year of disablement	4.8	3.0
Third year of disablement	3.5	2.5

* *Future retirees and beneficiaries are valued with a two-year age setback*

Table B.3
Service Retirement

	Only for the 1990 Benefit Structure		For the DB Program			
			Under 30 Years*		30 or More Years	
Age	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
50	0.0%	0.0%	0.0%	0.0%	1.5%	2.5%
51	0.0	0.0	0.0	0.0	1.5	2.5
52	0.0	0.0	0.0	0.0	1.5	2.5
53	0.0	0.0	0.0	0.0	2.0	2.5
54	1.5	1.5	0.0	0.0	2.0	3.0
55	5.8	7.0	2.7	4.5	8.0	9.0
56	3.9	4.5	1.8	3.2	8.0	9.0
57	4.9	4.5	1.8	3.2	10.0	11.0
58	6.8	7.0	2.7	4.1	14.0	16.0
59	17.5	14.0	4.5	5.4	18.0	19.0
60	25.0	22.0	6.3	9.0	27.0	31.0
61	16.5	15.0	6.3	9.0	47.5	47.5
62	16.5	15.0	10.8	10.8	42.5	45.0
63	15.0	15.0	11.7	16.2	35.0	40.0
64	17.5	18.0	10.8	13.5	30.0	35.0
65	20.0	18.0	13.5	14.4	32.5	37.5
66	16.0	18.0	10.8	13.5	30.0	32.0
67	16.0	18.0	10.8	13.5	30.0	32.0
68	16.0	16.0	10.8	13.5	30.0	32.0
69	16.0	16.0	10.8	13.5	30.0	32.0
70	100.0	100.0	10.8	13.5	30.0	35.0
71			10.8	13.5	30.0	35.0
72			10.8	13.5	30.0	35.0
73			10.8	13.5	30.0	35.0
74			10.8	13.5	30.0	35.0
75			100.0	100.0	100.0	100.0

** If service is equal to or greater than 25 but less than 28 years, the assumed retirement rates shown above for members with less than 25 years of service are increased by 100%. For example, a 60-year old female member with 26 years of service would have an 18.0% probability of retirement (twice the rate for service less than 25 years of 9.0%). For members with 28 but less than 30 years of service, the assumed retirement rates shown above for members with less than 25 years of service apply.*

The assumptions shown above are for retirement from active status. We assume that all vested terminated members retire at age 60.

Table B.4
Disability Retirement

Coverage A

Age	Male	Female
25	0.018%	0.018%
30	0.027	0.027
35	0.045	0.054
40	0.072	0.081
45	0.099	0.099
50	0.144	0.198
55	0.189	0.252

Coverage B

Age	Male	Female
25	0.010%	0.020%
30	0.020	0.020
35	0.030	0.040
40	0.060	0.070
45	0.100	0.110
50	0.140	0.185
55	0.245	0.300
60	0.365	0.380
65	0.400	0.400
70	0.400	0.400

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Table B.5
Withdrawal

Year	Male	Female
0	16.0%	15.0%
1	13.0	12.0
2	9.0	8.5
3	6.4	6.4
4	4.6	4.6
5	3.9	3.9
10	1.8	1.8
15	0.9	0.9
20	0.5	0.5
25	0.3	0.3
30	0.2	0.2

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Table B.6
Probability of Refund

	Entry Ages - Male				
Year	**Under 25**	**25 - 29**	**30 - 34**	**35 - 39**	**40 and Up**
Under 5	100%	100%	100%	100%	100%
10	46	46	38	36	36
15	38	38	31	21	
20	28	31	15		
25	15	15			
30	10				

	Entry Ages - Female				
Year	**Under 25**	**25 - 29**	**30 - 34**	**35 - 39**	**40 and Up**
Under 5	100%	100%	100%	100%	100%
10	34	32	32	29	29
15	27	24	24	24	
20	19	14	14		
25	10	10			
30	10				

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Table B.7
Merit Salary Increases

	Entry Age - Annual Increase in Salaries Due to Merit					
Year	**Under 25**	**25 - 29**	**30 - 34**	**35 - 39**	**40 - 44**	**45 & up**
1	5.6%	5.3%	5.1%	4.8%	4.8%	3.5%
2	5.6	5.1	4.9	4.7	4.7	3.3
3	5.6	5.0	4.8	4.6	4.6	3.0
4	5.5	4.8	4.6	4.4	4.4	2.9
5	5.5	4.8	4.5	3.8	3.8	2.6
10	3.2	3.0	2.7	2.3	2.2	1.6
15	1.5	1.5	1.4	1.1	1.1	0.8
20	1.3	1.1	1.1	0.8	0.8	0.6
25	1.1	0.9	0.8	0.5	0.5	
30	0.9	0.7	0.6	0.5		
35	0.8	0.7	0.6			
40	0.8	0.6				
45	0.8					

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Table B.8
Supplemental Assumptions

PEPRA Coverage

All members hired on or after the valuation date are assumed to be subject to the provisions of PEPRA.

Unused Sick Leave

Credited Service is increased by 2.0%.

Optional Forms

Active and Inactive: Based on single life annuity assumed.
Retirees and Beneficiaries: Based on optional form in data.

Probability of Marriage

Male: 90%
Female: 70%

Male spouses are assumed to be three years older than female spouses.

Number of Children

Married members under age 60 are assumed to have the following number of children:

Member's Gender	Assumed Number of Children
Male	0.65
Female	0.50

Assumed Offsets

The following offsets, expressed as a percentage of Final Compensation, are assumed to cease at age 60:

	Coverage A		Coverage B (including 2% @ 62)	
	Male	Female	Male	Female
Death	2.0%	1.0%	0.0%	0.0%
Disability	2.0%	1.0%	1.0%	1.0%

Valuation of Inactive Members

Reliable salary and benefit information is not available for inactive members. Therefore, the Actuarial Obligation for inactive members is valued using individual contribution account balances as follows:

1) Projected account balances at assumed retirement age of 60 are multiplied by 275%. Note this factor is based on a study of the relationship between individual accumulated contribution balances for inactive members and the Actuarial Obligation at actual retirement.
2) An additional load of 10% is applied to account for the potential redeposit of member contributions.
3) A reduction of 17% is applied to non-vested inactives.

Table B.9
Custom Mortality Table Key

Healthy (Service) Retirees and Beneficiaries -- Males*	
Current:	RP2000 Healthy Male White Collar -2 Projected to 2025 to age 70 smoothed to -1 at age 90
Healthy (Service) Retirees and Beneficiaries -- Females*	
Current:	RP2000 Healthy Female White Collar -4 Projected to 2025 to age 75 smoothed to -0 at age 90
Disabled Retirees -- Males*	
Current:	Age < 70: 2% at age 40 & under, graded to 3.2% at age 70 Age ≥ 70: RP2000 Male White Collar +7 Projected to 2025 at age 70 smoothed to +1 age 85 (select rates in first three years, regardless of age)
Disabled Retirees -- Females*	
Current:	Age < 70: 1.5% at age 40 & Less graded to 2.25% at age 70 Age ≥ 70: RP2000 Female White Collar +6 Projected to 2025 at age 70 smoothed to +2 at age 80 (select rates in first three years, regardless of age)

** Tables shown are for current retirees as of the valuation date. Future retirees and beneficiaries are valued with a two-year setback*

This page intentionally left blank.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Appendix C Valuation Data

The membership data for this actuarial valuation was supplied by CalSTRS. Although we did not audit this data, we compared the data for this and the prior valuation and tested for reasonableness, as well as for consistency with prior periodic reports from the CalSTRS staff. Based on these tests, we believe the data to be sufficiently accurate for the purposes of this valuation. Since the valuation results are dependent on the integrity of the data supplied, the results can be expected to differ if the underlying data is incomplete or missing. It should be noted that if any data or other information is inaccurate or incomplete, our calculations may need to be revised.

Tables C.1-C.6 summarize the census data used in this valuation.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Table C.1
Summary of Statistical Information

	June 30, 2015	June 30, 2014
Number of Members		
Active Members (1)	429,460	420,887
Inactive Members (1)	184,396	182,815
Retirees and Beneficiaries		
Service Retirees	247,353	241,920
Disabled Retirees	9,848	9,604
Survivors	24,899	24,103
Total Benefit Recipients	282,100	275,627
Total Membership in Valuation	895,956	879,329
Active Member Statistics		
Earned Salaries (2)	$ 28,013 million	$ 26,470 million
Average Salary	$ 65,229	$ 62,891
Average Age	45.5 years	45.6 years
Average Service	12.2 years	12.3 years

(1) Some active members were reported with no Earnable Salaries, in which case their liabilities, if any, were included with inactive members.

(2) *Total of prior year Earned Salaries for all active members. This differs from the salary amounts shown elsewhere in this report which reflect annualized amounts for members who were hired part way through the prior year.*

Retired Member Statistics(2)	June 30, 2015	June 30, 2014
Average Age		
Service Retiree	73.0	72.8
Disabled Retiree	65.3	65.2
Survivors	77.2	77.1
All Benefit Recipients	73.1	72.9
Average Monthly Benefit		
Service Retirees	$ 3,786	$ 3,694
Disabled Retirees	2,631	2,563
Survivors	2,349	2,259
All Benefit Recipients	$ 3,636	$ 3,547

(2) Average retiree ages shown here are current ages; average retiree ages shown elsewhere in this Appendix are age at retirement.

Inactive Member Statistics	June 30, 2015	June 30, 2014
Average Age	48.7	48.1
Average Account Balance	$ 11,825	$ 11,815

Table C.2
Age and Service Distribution – Active Male Members

Male					
	Years of Service				
Age	Under 5	5-9	10-14	15-19	20-24
Less than 25	1,226				
25 to 30	6,569	471			
30 to 35	6,455	4,879	875		
35 to 40	4,341	4,676	6,094	1,023	5
40 to 45	3,166	3,052	5,676	7,140	515
45 to 50	2,559	2,105	3,574	6,181	3,630
50 to 55	2,081	1,609	2,461	3,716	3,289
55 to 60	1,692	1,325	1,958	2,718	2,170
60 to 65	1,286	1,033	1,445	1,798	1,351
65 to 70	786	618	686	707	505
70 and over	410	308	229	192	132
Age Unknown					
Total	30,571	20,076	22,998	23,475	11,597

	Years of Service					
Age	25-29	30-34	35-39	40-44	45 & Over	Total
Less than 25						1,226
25 to 30						7,040
30 to 35						12,209
35 to 40						16,139
40 to 45	3					19,552
45 to 50	289	4				18,342
50 to 55	2,688	231				16,075
55 to 60	2,810	1,829	266	1		14,769
60 to 65	1,510	885	683	40		10,031
65 to 70	418	201	159	112	8	4,200
70 and over	120	66	45	43	47	1,592
Age Unknown						
Total	7,838	3,216	1,153	196	55	121,175

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Table C.3
Age and Service Distribution – Active Female Members

Female					
	Years of Service				
Age	Under 5	5-9	10-14	15-19	20-24
Less than 25	4,746	1			
25 to 30	21,889	2,112	2		
30 to 35	16,425	17,282	3,316	3	
35 to 40	10,108	13,267	18,820	2,866	7
40 to 45	7,804	8,216	14,009	16,325	1,137
45 to 50	6,449	6,272	8,763	12,215	7,638
50 to 55	5,008	4,801	6,854	8,362	6,678
55 to 60	3,564	3,705	5,598	7,314	5,497
60 to 65	2,158	2,229	3,541	5,136	3,908
65 to 70	944	875	1,185	1,535	1,150
70 and over	399	323	281	311	208
Age Unknown					
Total	79,494	59,083	62,369	54,067	26,223

	Years of Service					
Age	25-29	30-34	35-39	40-44	45 & Over	Total
Less than 25						4,747
25 to 30						24,003
30 to 35						37,026
35 to 40						45,068
40 to 45	3					47,494
45 to 50	857	5				42,199
50 to 55	6,460	628	2			38,793
55 to 60	5,729	4,091	541	3		36,042
60 to 65	3,449	1,772	1,290	63		23,546
65 to 70	907	370	216	135	20	7,337
70 and over	214	104	86	53	51	2,030
Age Unknown						
Total	17,619	6,970	2,135	254	71	308,285

Table C.4
Age and Service Distribution – All Active Members

	Total				
	Years of Service				
Age	Under 5	5-9	10-14	15-19	20-24
Less than 25	5,972	1			
25 to 30	28,458	2,583	2		
30 to 35	22,880	22,161	4,191	3	
35 to 40	14,449	17,943	24,914	3,889	12
40 to 45	10,970	11,268	19,685	23,465	1,652
45 to 50	9,008	8,377	12,337	18,396	11,268
50 to 55	7,089	6,410	9,315	12,078	9,967
55 to 60	5,256	5,030	7,556	10,032	7,667
60 to 65	3,444	3,262	4,986	6,934	5,259
65 to 70	1,730	1,493	1,871	2,242	1,655
70 and over	809	631	510	503	340
Age Unknown					
Total	110,065	79,159	85,367	77,542	37,820

	Years of Service					
Age	25-29	30-34	35-39	40-44	45 & Over	Total
Less than 25						5,973
25 to 30						31,043
30 to 35						49,235
35 to 40						61,207
40 to 45	6					67,046
45 to 50	1,146	9				60,541
50 to 55	9,148	859	2			54,868
55 to 60	8,539	5,920	807	4		50,811
60 to 65	4,959	2,657	1,973	103		33,577
65 to 70	1,325	571	375	247	28	11,537
70 and over	334	170	131	96	98	3,622
Age Unknown						
Total	25,457	10,186	3,288	450	126	429,460

Table C.5
Inactive Members

Fiscal Year Ending June 30	Number Vested	Total Number	Male % of Total	Female % of Total
2002	19,703	96,159	28.0%	72.0%
2003	20,627	104,617	28.3	71.7
2004	22,511	116,128	28.7	71.3
2005	24,113	124,394	28.8	71.2
2006	26,733	133,601	28.8	71.2
2007	28,922	141,450	28.9	71.1
2008	30,370	147,997	29.0	71.0
2009	31,661	156,207	29.0	71.0
2010	33,036	166,976	29.2	70.8
2011	33,976	173,719	29.1	70.9
2012	34,848	178,655	29.1	70.9
2013	35,883	182,576	29.1	70.9
2014	36,344	182,815	29.2	70.8
2015	36,953	184,396	29.3	70.7

Fiscal Year Ending June 30	Average Account on Deposit	Average Age	Average Service Credit	Average Years Inactive
2002	$12,997	46.0	3.1	7.3
2003	12,691	46.0	3.0	7.4
2004	12,418	45.8	2.9	7.3
2005	12,177	45.9	2.9	7.4
2006	12,282	45.9	2.9	7.5
2007	12,440	46.0	3.0	7.7
2008	12,698	46.3	2.9	8.0
2009	12,717	46.5	2.9	8.2
2010	12,334	46.7	2.8	8.3
2011	12,035	46.8	2.8	8.6
2012	11,818	47.2	2.8	8.9
2013	11,771	47.6	2.8	9.4
2014	11,815	48.1	2.8	9.9
2015	11,825	48.7	2.9	10.4

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Table C.6
Members Retired for Service

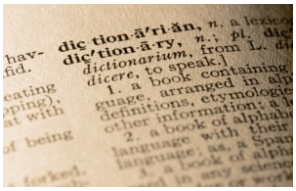
Fiscal Year Ending June 30	Total	Male % of Total	Female % of Total
2002	154,884	37.8%	62.2%
2003	159,172	37.6	62.4
2004	169,022	37.2	62.8
2005	176,008	36.9	63.1
2006	181,833	36.5	63.5
2007	188,659	36.1	63.9
2008	195,960	35.7	64.3
2009	203,649	35.3	64.7
2010	213,952	34.9	65.1
2011	222,222	34.4	65.6
2012	230,278	34.0	66.0
2013	236,487	33.6	66.4
2014	241,920	33.1	66.9
2015	247,353	32.7	67.3

Fiscal Year Ending June 30	Average Age at Retirement	Average Years of Service Credit	Final Average Compensation	Average Current Allowance Payable
2002	60.7	25.7	$3,539	$2,183
2003	60.7	25.9	3,735	2,339
2004	60.7	26.0	3,931	2,488
2005	60.8	26.1	4,103	2,617
2006	60.8	26.2	4,264	2,741
2007	60.8	26.3	4,437	2,878
2008	60.8	26.3	4,620	3,021
2009	60.8	26.4	4,798	3,164
2010	60.9	26.3	4,983	3,302
2011	61.0	26.3	5,138	3,417
2012	61.1	26.2	5,271	3,517
2013	61.1	26.1	5,385	3,609
2014	61.2	26.0	5,487	3,694
2015	61.3	25.9	5,597	3,786

This page intentionally left blank.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Appendix D Glossary



The following definitions are largely excerpts from a list adopted by the major actuarial organizations in the United States. In some cases, the definitions have been modified for specific applicability to the CalSTRS DB Program. Defined terms are capitalized throughout this Appendix.

Actuarial Assumptions — Assumptions as to the occurrence of future events affecting pension costs, such as mortality, withdrawal, disablement and retirement, changes in compensation, rates of investment earnings and asset appreciation or depreciation, and procedures used to determine other relevant items.

Actuarial Cost Method — A procedure for determining the Actuarial Present Value of pension plan benefits and expenses and for developing an actuarially equivalent allocation of such value to time periods, usually in the form of a Normal Cost and an Actuarial Obligation.

Actuarial Equivalent — Of equal Actuarial Present Value, determined as of a given date with each value based on the same set of Actuarial Assumptions.

Actuarial Gain or Loss — A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions during the period between two actuarial valuation dates, as determined in accordance with a particular Actuarial Cost Method.

Actuarial Obligation — That portion, as determined by a particular Actuarial Cost Method, of the Actuarial Present Value of pension plan benefits and expenses which is not provided for by future Normal Costs.

Actuarial Present Value — The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions.

Actuarial Surplus — The excess, if any, of the Actuarial Value of Assets over the Actuarial Obligation.

Actuarial Valuation — The determination, as of a Valuation Date, of the Normal Cost, Actuarial Obligation, Actuarial Value of Assets and related Actuarial Present Values for a pension plan.

Actuarial Value of Assets — The value of cash, investments and other property belonging to a pension plan, as used by the actuary for the purpose of an actuarial valuation.

Entry Age Cost Method	An Actuarial Cost Method under which the Actuarial Present Value of Projected Benefits of each individual included in the actuarial valuation is allocated on a level basis over the earnings of the individual between entry age and assumed exit ages. The portion of this Actuarial Present Value allocated to a valuation year is called the Normal Cost. The portion of this Actuarial Present Value not provided for at a Valuation Date by the Actuarial Present Value of future Normal Costs is called the Actuarial Obligation.
Normal Cost	The portion of the Actuarial Present Value of Projected Benefits which is allocated to a valuation year by the Actuarial Cost Method.
Projected Unit Credit Cost Method	An Actuarial Cost Method under which the Actuarial Obligation is equal to the portion of the Actuarial Present Value of Projected Benefits of each individual included in the actuarial valuation is attributable to service credit that has been earned to date (past service). Since this cost method is only used in this valuation for cases where the service is fixed as of June 30, 2014, the Actuarial Obligation is equal to the portion of the Actuarial Present Value of Projected Benefits for the DB Program, and there is no Normal Cost.
Unfunded Actuarial Obligation	The excess, if any, of the Actuarial Obligation over the Actuarial Value of Assets.
Valuation Date	June 30, 2015.

PROPOSED
RESOLUTION
OF THE
TEACHERS' RETIREMENT BOARD

SUBJECT: Adoption of June 30, 2015, Actuarial Valuation for the Defined Benefit Program

RESOLUTION NO. _____

WHEREAS, section 22311 of the Education Code requires a periodic actuarial valuation of the California State Teachers' Retirement System's assets and liabilities; and

WHEREAS, Milliman has performed the necessary actuarial calculations using the June 30, 2015 data provided by the California State Teachers' Retirement System; and

WHEREAS, the Teachers' Retirement Board has reviewed the June 30, 2015 Actuarial Valuation Report presented by Milliman; therefore, be it

RESOLVED that the Teachers' Retirement Board adopts the Normal Cost Rate of 15.614 percent of pay for CalSTRS 2% at 62 members.

Adopted by:
Teachers' Retirement Board
on April 7, 2016

_____
JACK EHNES
Chief Executive Officer

Reviewed by:

_____
Brian J. Bartow
General Counsel