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June 1, 2015

Teachers' Retirement Board
California State Teachers' Retirement System

**Re: Cash Balance Benefit Program
Actuarial Valuation as of June 30, 2014**

Dear Members of the Board:

At your request, we have performed an actuarial valuation of the Cash Balance Benefit (CBB) Program of the State Teachers' Retirement Plan as of June 30, 2014. Details about the actuarial valuation are contained in the following report. This report reflects the benefit provisions and contribution rates in effect as of the valuation date.

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 Cash Balance Benefit Program as of June 30, 2014.

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. 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.

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. The Teachers' Retirement Board has sole authority to determine the actuarial assumptions and methods used for the valuation of the CBB Program. The Board adopted the actuarial methods and assumptions used in the 2014 valuation.

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

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.

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(such as the end of an amortization period or additional cost or contribution requirements based on the Plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of future measurements.

Actuarial computations presented in this report are for purposes of assessing the funding of the CBB Program. The calculations in the enclosed report have been made on a basis consistent with our understanding of the CBB Program funding. 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:

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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. 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.



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.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Nick Collier".

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

A handwritten signature in black ink, appearing to read "Mark C. Olleman".

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

A handwritten signature in black ink, appearing to read "J. Senta".

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Section 1 Summary of the Findings



The Cash Balance Benefit (CBB) Program was established on July 1, 1996 (as the CB Plan). The number of participants has increased over the years, as shown below.

| Date of Valuation | Number of Non-Retired Participants | Accumulated Account Balances |
|-------------------|------------------------------------|------------------------------|
| June 30, 2008 | 26,664 | \$ 97,802,319 |
| June 30, 2009 | 28,461 | 114,338,203 |
| June 30, 2010 | 29,149 | 129,075,283 |
| June 30, 2011 | 29,798 | 143,705,744 |
| June 30, 2012 | 30,337 | 156,609,547 |
| June 30, 2013 | 31,004 | 168,698,672 |
| June 30, 2014 | 32,233 | 187,310,217 * |

*Includes adjustment to reflect 2013 Additional Credits. 2014 Additional Earnings Credits will be reported in the 2015 valuation.

The Actuarial Value of Assets for this valuation is the Fair Market Value as provided to us by CalSTRS. The actual return for the year, as measured using uniform cash flow throughout the year, was about 18.4% net of investment and administrative expenses.

| (\$ Thousands) | Year Ended June 30, 2014 | Year Ended June 30, 2013 |
|-------------------------------------|-----------------------------|-----------------------------|
| Additions | | |
| Contributions | \$ 13,831 | \$ 13,425 |
| Earnings | 35,661 | 22,288 |
| Total Additions | \$ 49,492 | \$ 35,713 |
| Deductions | | |
| Benefits | \$ 6,187 | \$ 5,021 |
| Expenses | 185 | 161 |
| Total Deductions | 6,372 | 5,182 |
| Net Increase (Decrease) | \$ 43,120 | \$ 30,531 |
| Net Assets | | |
| Beginning of Year | \$ 188,551 | \$ 158,020 |
| Net Increase (Decrease) | 43,120 | 30,531 |
| End of Year | \$ 231,671 | \$ 188,551 |
| Estimated Net Rate of Return | 18.4% | 13.6% |

**Summary of the Findings
 (continued)**

As of June 30, 2014 the Actuarial Value of Assets of the CBB Program exceeds the Actuarial Obligation by \$33,818,000. This number is the negative Unfunded Actuarial Obligation (sometimes referred to as an Actuarial Surplus). If the experience had emerged as assumed, the Actuarial Surplus would have increased from \$12,428,000 to \$13,298,000. The difference between the actual and expected Unfunded Actuarial Obligation is the actuarial gain or loss for the year.

- There was an actuarial gain of \$22,010,000 due to the actual investment return being greater than last year's assumed long-term return of 7.00%.
- There was an actuarial gain of \$6,002,000 due primarily to the current year's interest credits being less than 7.00% during the year. The Minimum Interest Rate for 2013-2014 was 3.00%.
- The net actuarial gain was \$28,012,000, which increased the Funded Ratio to 121.70%, prior to granting Additional Credits.
- The Actuarial Obligation increased by \$7,492,000 due to Additional Credits adopted effective June 30, 2014. Note that the valuation results assume the Board will adopt Additional Credits based on the new policy adopted at the April Board meeting.

The valuation results are based on the June 30, 2014 fair market value of assets.

| (\$ Thousands) | June 30, 2014 | June 30, 2013 |
|---|-----------------|----------------|
| Actuarial Balance Sheet | | |
| Actuarial Obligation (before Add'l Credits) | \$ 190,361 | \$ 170,579 |
| Actuarial Value of Assets | <u>231,671</u> | <u>188,551</u> |
| Unfunded Actuarial Obligation / (Actuarial Surplus) | \$ (41,310) | \$ (17,972) |
| Additional Earnings Credit | 7,492 | 5,483 |
| Additional Annuity Credit | <u>-</u> | <u>61</u> |
| Final Unfunded Actuarial Obligation / (Actuarial Surplus) | \$ (33,818) | \$ (12,428) |
| Funded Ratio (Assets ÷ Actuarial Obligation) | | |
| Before Add'l Credits | 121.70% | 110.54% |
| After Add'l Credits | 117.09% | 107.06% |
| Actuarial (Gain) or Loss | | |
| Investment Return on Assets | \$ (22,010) | \$ (10,771) |
| Interest Credits on Accounts | <u>(6,002)</u> | <u>(7,164)</u> |
| Actuarial (Gain) or Loss | \$ (28,012) | \$ (17,935) |
| Expected UAO at End of Year | <u>(13,298)</u> | <u>(37)</u> |
| Total Unfunded Actuarial Obligation / (Actuarial Surplus) Before Add'l Credits | \$ (41,310) | \$ (17,972) |



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**Summary of the Findings
 (continued)**

The Board established a policy ("Additional Credit Policy") on June 9, 2006 that was effective for the Additional Earnings Credit and Additional Annuity Credit decisions beginning in 2006.

The Board's Additional Credit Policy calls for a two-step determination of the allocation as shown in detail in this report. This policy was updated at the Board's April 2015 meeting. At the June 2015 meeting, the Board is expected to grant an Additional Earnings Credit of \$7,492,000, pursuant to the updated Board policy.

The following chart shows a history of prior Board actions.

| Valuation Date | (\$ Thousands) | | |
|----------------|---|----------------------------|-----------------------------|
| | Available Reserves and Unallocated Gains (Losses) | Additional Credits Adopted | Final Gain and Loss Reserve |
| June 30, 2003 | \$ (3,874) | \$ 0 | \$ (3,874) |
| June 30, 2004 | 250 | 0 | 250 |
| June 30, 2005 | 2,137 | 0 | 2,137 |
| June 30, 2006 | 6,641 | 733 | 5,908 |
| June 30, 2007 | 16,879 | 3,579 | 13,300 |
| June 30, 2008 | 861 | 0 | 861 |
| June 30, 2009 | (22,887) | 0 | (22,887) |
| June 30, 2010 | (15,156) | 0 | (15,156) |
| June 30, 2011 | 6,786 | 0 | 6,786 |
| June 30, 2012 | 34 | 0 | 34 |
| June 30, 2013 | 17,972 | 5,544 | 12,428 |
| June 30, 2014 | 41,310 | 7,492 | 33,818 |

Future Funding

The CBB Program has an Actuarial Surplus (negative Unfunded Actuarial Obligation), since the value of assets is greater than the current value of the Actuarial Obligation. If all assumptions are met, the funding surplus will slowly grow in the future. If future experience is worse than assumed, an Unfunded Actuarial Obligation may develop. There is currently no provision in the Education Code to increase contributions to make up this shortfall, if it were to occur. However, the assumed return on investments exceeds the Minimum Interest Rate. To the extent that the assets earn more than the accounts are credited in the future, this may be sufficient to make up any potential shortfall.

The actuarially determined contribution in accordance with the funding policy is equal to the actual contributions that will be required to be made to the CBB Program according to the California Education Code.

Conclusion

The CBB Program is currently in a surplus funded position; that is, the assets exceed the value of the actuarial obligation based on the actuarial assumptions. Given the current funded position, we believe that it is appropriate for the Board to consider granting Additional Credits. However, it should be noted that future experience will not exactly conform to the assumptions. To the extent future experience is worse than assumed, it is possible that an Unfunded Actuarial Obligation could develop in the future.

Granting an Additional Earnings Credit of 4.00% to active and inactive member accounts is consistent with the Board's policy, as updated by the Board at the April 2015 meeting. No Additional Annuity Credit will be granted to current retirees under this revised policy. The estimated value of the Additional Earnings Credits is \$7,492,000.

Section 2 Findings of the Actuarial Valuation



An actuarial valuation is performed as of June 30 of each year, the last day of the Program's plan year. The primary purpose of the valuation is to determine the financial condition of the CBB Program through the measurement of the Gain and Loss Reserve. We also describe recent changes in the Program's financial condition and provide additional disclosure information.

The findings have been determined according to actuarial assumptions that were adopted on the basis of recent experience and current expectations of future experience. In our opinion, the assumptions used in the valuation are reasonably related to the past experience of the CBB Program and represent a reasonable estimate of future conditions affecting the Program. Nevertheless, the emerging costs of the Program will vary from those presented in this report to the extent that actual experience differs from that projected by the actuarial assumptions.

Actuarial Value of Assets

The Actuarial Value of Assets for this valuation is the Fair Market Value as reported by CalSTRS. A Statement of Program Assets for the last two plan years is shown in **Table 1**, and the Statement of Change in Program Assets is shown in **Table 2**.

The investment return for 2013-2014 was calculated to be 18.4% net of all investment and administrative expenses and assuming uniform cash flow throughout the year. This is an estimate only for the purpose of comparing investment experience from one year to the next and will likely differ from information provided by your investment advisors.

Actuarial Balance Sheet

Under the Traditional Unit Credit Actuarial Cost Method, when the assumed investment return is equal to the assumed interest crediting rate, the Normal Cost is equal to the contributions made during the year and the Actuarial Obligation is equivalent to the current sum of the Participants' Account Balances plus a reserve for current annuity payments. **Table 3** shows the Actuarial Obligation for this and the prior valuation.

For the purpose of this valuation, the account information was provided to us by CalSTRS. Milliman has adjusted these account balances to reflect the Additional Earnings Credits granted for 2013. We checked the information for reasonableness by reviewing the individual participant records supplied to us. We independently calculated the value of the annuitized benefits.

Actuarial Balance Sheet (continued)

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.

If all experience emerged as assumed every year, the CBB Program would have an Actuarial Surplus at the end of each year before any Additional Earnings Credit or Additional Annuity Credits. This is because the Minimum Interest Rate is less than the assumed earnings rate. In order to retain an Actuarial Surplus, the investment returns over a long period of time must exceed the combination of the Minimum Interest Rates, the Additional Earnings Credits and the Additional Annuity Credits.

Although we expect this to be the case, investment performance for several prior years was below the long-term assumption.

Actuarial Gains and Losses

The Minimum Interest Rate for the year ending on the valuation date was 3.00%. Since the assumed total earnings rate last year was 7.00% per year, the increase in the Actuarial Obligation was less than expected. The total actuarial gain on the Actuarial Obligation due to interest credits being less than expected was \$6,002,000.

Last year, the assumed earnings rate on the invested assets was 7.00% per year. The actual return for the year was about 18.4% (net of investment and administrative expenses and assuming uniform cash flow through the year, which is slightly different than how interest is actually posted), which produced an investment gain of \$22,010,000.

The assumed earnings rate for future years will be 7.00%, as adopted by the Board in February 2012.

The total actuarial gain due to all causes was \$28,012,000 as shown in **Table 4**.

Contributions and Normal Costs

As shown in Table 4, the Normal Costs of the Cash Balance Benefit Program are equal to the actual contributions. They are shown as the actual dollar amount of contributions. The timing in Table 4 is therefore consistent with the fact that contributions are spread over the entire year and correspond to payroll timing. The total contributions of \$13,831,000 were made up of \$6,899,000 in employee contributions and \$6,932,000 in employer contributions.

Gain and Loss Reserve

Table 5 shows the derivation of the Gain and Loss Reserve. After each actuarial valuation, the Teachers' Retirement Board decides on the adjustment to the prior year's Gain and Loss Reserve and the Additional Earnings Credit, if any.

The Teachers' Retirement Board allocated any gain or loss to funding after Additional Earnings Credits were adopted.

**Additional Credits
 Based on Board Policy**

Based on the Board's Policy, an Additional Earnings Credit of \$7,492,000 was granted as of June 30, 2014.

The Board's Policy calls for a two-step determination of the allocation.

The first step in the process allocates the excess of the Actuarial Surplus over 1 times the Standard Deviation of the Expected Long-Term Rate of Return on the investment portfolio, but limited by the long-term assumed rate of earnings.

First Allocation

| | |
|--|--------------|
| Long-term Net Investment Return | 7.00% |
| Minimum Interest Rate (year prior to valuation) | <u>3.00</u> |
| Maximum Available in First Allocation (1) | 4.00% |
| Actuarial Surplus | 21.70% |
| First Threshold (1x Portfolio Std. Deviation) | <u>13.20</u> |
| Actuarial Surplus in excess of First Threshold (2) | 8.50% |
| First Allocation (lesser of (1) and (2)) | 4.00% |

The second step in the process allocates 50% of the remaining Actuarial Surplus over 2 times the Standard Deviation of the Expected Long-Term Rate of Return on the investment portfolio.

Second Allocation

| | |
|---|---------------|
| Remaining Actuarial Surplus | 17.09% |
| Second Threshold (2x Portfolio Std. Deviation) | <u>26.40</u> |
| Actuarial Surplus in excess of Second Threshold | 0.00% |
| Less 50% | <u>(0.00)</u> |
| Available for Second Allocation | 0.00% |

The total available is the sum of the two steps, or 4.00% of the Actuarial Obligation for active and inactive member accounts as of June 30, 2014.

Details of the calculation are shown in **Table 6**.

**Historical
Information**

A history of the CBB Program's cash flow and funded status are shown in **Tables 7 and 8**.

**Supplemental
Information**

Supplemental information that is recommended to be disclosed by the California Actuarial Advisory Panel is shown in **Tables 9, 10 and 11**.

Table 1
Statement of Program Assets

| (\$ Thousands) | June 30, 2014 | June 30, 2013 |
|--|---------------|---------------|
| Invested Assets | | |
| Cash | \$ 309 | \$ * |
| Debt Securities | 58,651 | * |
| Equity Securities | 166,564 | * |
| Alternative Investments | 11,244 | * |
| Derivative Instruments | <u>24</u> | <u>*</u> |
| Total Investments | \$ 236,792 | \$ 188,472 |
| Receivables | (4,668) | 347 |
| Liabilities | <u>(453)</u> | <u>(268)</u> |
| Fair Market Value of Net Assets | \$ 231,671 | \$ 188,551 |

**Asset classes redefined by CalSTRS for tracking purposes in 2014. Detailed investment information for new asset classes not available as of 2013.*

Table 2
Statement of Change in Program Assets

| <i>(\$ Thousands)</i> | Year Ended June 30, 2014 | Year Ended June 30, 2013 |
|---|-----------------------------|-----------------------------|
| Additions | | |
| Contributions | | |
| Participants | \$ 6,899 | \$ 6,963 |
| Employers | <u>6,932</u> | <u>6,462</u> |
| Total Contributions | 13,831 | 13,425 |
| Net Earnings | <u>35,661</u> | <u>22,288</u> |
| Total Additions | \$ 49,492 | \$ 35,713 |
| Deductions | | |
| Benefit Payments | | |
| Retirement, Death and Survivor | \$ 4,200 | \$ 3,329 |
| Refunds of Participant Contributions | <u>1,987</u> | <u>1,692</u> |
| Total Benefits | 6,187 | 5,021 |
| Expenses | <u>185</u> | <u>161</u> |
| Total Deductions | \$ 6,372 | \$ 5,182 |
| Net Increase (Decrease) | \$ 43,120 | \$ 30,531 |
| Fair Market Value of Net Assets | | |
| Beginning of Year | \$ 188,551 | \$ 158,020 |
| Accounting Adjustments | 0 | 0 |
| Net Increase (Decrease) | <u>43,120</u> | <u>30,531</u> |
| End of Year | \$ 231,671 | \$ 188,551 |
| Estimated Net Rate of Return | 18.4% | 13.6% |
| - Assuming uniform cash flow through the year | | |
| - Net of investment and administrative expenses | | |

Table 3
Actuarial Balance Sheet

(\$ Thousands)

| | <u>June 30, 2014</u> | | <u>June 30, 2013</u> |
|---|----------------------------------|---------------------------------------|----------------------|
| | Without Additional Credits | With Additional Credits Adopted | |
| Total Requirements | | | |
| Actuarial Obligation | | | |
| Retirees and Beneficiaries | \$ 3,061 | \$ 3,061 | \$ 1,952 |
| Inactive Participants | 75,748 | 78,778 | 70,666 |
| Active Participants | <u>111,552</u> | <u>116,014</u> | <u>103,505</u> |
| Total Requirements | \$ 190,361 | \$ 197,853 | \$ 176,123 |
| Total Resources | | | |
| Actuarial Value of Assets | \$ 231,671 | \$ 231,671 | \$ 188,551 |
| Unfunded Actuarial Obligation or (Actuarial Surplus) | <u>(41,310)</u> | <u>(33,818)</u> | <u>(12,428)</u> |
| Total Resources | \$ 190,361 | \$ 197,853 | \$ 176,123 |
| Funded Ratio | 121.70% | 117.09% | 107.06% |

Table 4
Actuarial Gains and Losses*

| <i>(\$ Thousands)</i> | Actuarial Obligation | Actuarial Value of Assets | Unfunded Actuarial Obligation (Surplus) |
|--|---------------------------------|--|--|
| Balance at June 30, 2013 | \$ 176,123 | \$ 188,551 | \$ (12,428) |
| Expected Changes | | | |
| Actual Contributions | 13,831 | 13,831 | 0 |
| Actual Benefits Paid | (6,187) | (6,187) | 0 |
| Expected Earnings / Credits | <u>12,596</u> | <u>13,466</u> | <u>(870)</u> |
| Expected Balance at June 30, 2014 | \$ 196,363 | \$ 209,661 | \$ (13,298) |
| Actuarial Gains or Losses | | | |
| (Gain)/Loss on Actuarial Obligation | (6,002) | | |
| Gain/(Loss) on Assets | | 22,010 | |
| Net (Gain) or Loss | <u> </u> | <u> </u> | <u>(28,012)</u> |
| Actual Balance at June 30, 2014 | \$ 190,361 | \$ 231,671 | \$ (41,310) |

* Prior to Additional Credits.

Table 5
Gain and Loss Reserve

| <i>(\$ Thousands)</i> | <u>June 30, 2014</u> | | <u>June 30, 2013</u> |
|--|----------------------------------|---------------------------------------|----------------------|
| | Without Additional Credits | With Additional Credits Adopted | |
| Unfunded Actuarial Obligation or (Actuarial Surplus) (prior to any additional earnings) | \$ (41,310) | \$ (41,310) | \$ (17,972) |
| Additional Earnings Credit | 0 | 7,492 | 5,483 |
| Additional Annuity Credit | <u>0</u> | <u>0</u> | <u>61</u> |
| Unfunded Actuarial Obligation or (Actuarial Surplus) (after any additional earnings) | \$ (41,310) | \$ (33,818) | \$ (12,428) |
| Gain and Loss Reserve | | | |
| Beginning of Year | \$ 12,428 | \$ 12,428 | \$ 34 |
| Allocated to Funding | <u>28,882</u> | <u>21,390</u> | <u>12,394</u> |
| End of Year Gain and Loss Reserve | \$ 41,310 | 33,818 | \$ 12,428 |
| Unallocated Gains and (Losses) | \$ 0 | \$ 0 | \$ 0 |

| <i>(\$ Thousands)</i> | Available Reserves and Unallocated Gains (Losses) | Additional Credits Adopted | Final Gain and Loss Reserve |
|-----------------------|--|----------------------------------|-----------------------------------|
| Valuation Date | | | |
| June 30, 2004 | \$ 250 | \$ 0 | \$ 250 |
| June 30, 2005 | 2,137 | 0 | 2,137 |
| June 30, 2006 | 6,641 | 733 | 5,908 |
| June 30, 2007 | 16,879 | 3,579 | 13,300 |
| June 30, 2008 | 861 | 0 | 861 |
| June 30, 2009 | (22,887) | 0 | (22,887) |
| June 30, 2010 | (15,156) | 0 | (15,156) |
| June 30, 2011 | 6,786 | 0 | 6,786 |
| June 30, 2012 | 34 | 0 | 34 |
| June 30, 2013 | 17,972 | 5,544 | 12,428 |
| June 30, 2014 | 41,310 | 7,492 | 33,818 |

Table 6
Additional Credits Based on Board Policy

| | June 30, 2014 | June 30, 2013* |
|--|----------------------|-----------------------|
| Funded Ratio before Additional Credits | 121.70% | 110.54% |
| Actuarial Surplus | 21.70 | 10.54 |
| Minimum Interest Rate (year following valuation date) | 3.55% | 3.00% |
| First Threshold | 13.20% | 6.00% |
| Second Threshold | 26.40% | 9.00% |
| First Allocation | | |
| Long-term Net Investment Return | 7.00% | 7.00% |
| Minimum Interest Rate (MIR) (year prior to valuation) | <u>3.00</u> | <u>3.75</u> |
| Maximum Available in First Allocation (1) | 4.00% | 3.25% |
| Actuarial Surplus | 21.70% | 10.54% |
| First Threshold (1 x Std. Deviation of Portfolio Return) | <u>13.20</u> | <u>6.00*</u> |
| Actuarial Surplus in excess of First Threshold (2) | 8.50% | 4.54% |
| First Allocation [lesser of (1) and (2)] | 4.00% | 3.25% |
| Second Allocation | | |
| Remaining Actuarial Surplus | 17.09% | 7.29% |
| Second Threshold (2 x Std. Deviation of Portfolio Return) | <u>26.40</u> | <u>9.00*</u> |
| Actuarial Surplus in excess of Second Threshold | 0.00% | 0.00% |
| Less 50% | <u>0.00%</u> | <u>(0.00)</u> |
| Available for Second Allocation | 0.00% | 0.00% |
| Additional Earnings Credit and Additional Annuity Credit based on Board Policy | | |
| As a percentage of Actuarial Obligation (actives and inactive only) as of the valuation date | 4.00% | 3.25% |
| As a dollar amount (\$ Thousands) | \$ 7,492 | \$ 5,544 |

*June 30, 2013 column based on prior Board crediting policy.

Table 7
History of Cash Flow

(\$ Thousands)

| Year End | Contributions for the Year | Expenditures During the Year | | | | External Cash Flow | Fair Market Value of Assets |
|----------|----------------------------|------------------------------|----------------------|----------|--------|--------------------|-----------------------------|
| | | Benefit Payments | Contribution Refunds | Expenses | Total | | |
| 1997 | \$ 148 | \$ 0 | \$ 0 | \$ 428 | \$ 428 | \$ (280) | \$ (393) |
| 1998 | 1,544 | 0 | 0 | 466 | 466 | 1,078 | 790 |
| 1999 | 3,082 | 0 | 15 | 430 | 445 | 2,637* | 5,224 |
| 2000 | 4,955 | 0 | 59 | 4 | 63 | 4,892 | 10,868 |
| 2001 | 5,972 | 0 | 119 | 8 | 127 | 5,845 | 15,768 |
| 2002 | 7,121 | 0 | 195 | 11 | 206 | 6,915 | 21,748 |
| 2003 | 7,171 | 0 | 320 | 17 | 337 | 6,834 | 29,963 |
| 2004 | 7,712 | 580 | 197 | 28 | 805 | 6,907 | 42,253 |
| 2005 | 8,639 | 1,235 | 245 | 34 | 1,514 | 7,125 | 53,918 |
| 2006 | 10,605 | 1,330 | 472 | 34 | 1,836 | 8,769 | 68,797 |
| 2007 | 11,884 | 884 | 664 | 44 | 1,592 | 10,292 | 93,182 |
| 2008 | 14,418 | 1,053 | 608 | 52 | 1,713 | 12,705 | 98,892 |
| 2009 | 14,970 | 1,222 | 1,054 | 65 | 2,341 | 12,629 | 91,793 |
| 2010 | 13,199 | 2,019 | 1,091 | 112 | 3,222 | 9,977 | 114,418 |
| 2011 | 12,889 | 2,463 | 1,305 | 114 | 3,882 | 9,007 | 151,248 |
| 2012 | 11,846 | 3,582 | 1,160 | 133 | 4,875 | 6,971 | 158,020 |
| 2013 | 13,425 | 3,329 | 1,692 | 161 | 5,182 | 8,243 | 188,551 |
| 2014 | 13,831 | 4,200 | 1,987 | 185 | 6,372 | 7,459 | 231,671 |

*Excludes write-off of loan from the DB Plan of \$1,417,000 as of January 1, 1999.

Table 8
Schedule of Funding Progress

(\$ Thousands)

| Year End | Actuarial Value of Assets | Actuarial Accrued Liability | Unfunded Actuarial Accrued Liability | Funded Ratio Assets/AAL | Estimated Covered Payroll | Coverage Ratio UAAL/Pay |
|----------|---------------------------|-----------------------------|--------------------------------------|-------------------------|---------------------------|-------------------------|
| 1997 | \$ (393) | \$ 164 | \$ 557 | (240)% | \$ 4,504 | 12% |
| 1998 | 790 | 1,728 | 938 | 46% | 18,838 | 5% |
| 1999 | 5,224 | 5,001 | (223) | 104% | 50,426 | 0% |
| 2000 | 10,868 | 10,351 | (517) | 105% | 70,605 | (1)% |
| 2001 | 15,768 | 16,938 | 1,170 | 93% | 97,921 | 1% |
| 2002 | 21,748 | 25,080 | 3,332 | 87% | 89,871 | 4% |
| 2003 | 29,963 | 33,837 | 3,874 | 89% | 81,080 | 5% |
| 2004 | 42,253 | 42,003 | (250) | 101% | 96,199 | (0)% |
| 2005 | 53,918 | 51,781 | (2,137) | 104% | 106,951 | (2)% |
| 2006 | 68,797 | 62,889 | (5,908) | 109% | 122,316 | (5)% |
| 2007 | 93,182 | 79,882 | (13,300) | 117% | 144,516 | (9)% |
| 2008 | 98,892 | 98,031 | (861) | 101% | 181,104 | (0)% |
| 2009 | 91,793 | 114,680 | 22,887 | 80% | 182,030 | 13% |
| 2010 | 114,418 | 129,574 | 15,156 | 88% | 162,546 | 9% |
| 2011 | 151,248 | 144,462 | (6,786) | 105% | 157,871 | (4)% |
| 2012 | 158,020 | 157,986 | (34) | 100% | 150,686 | (0)% |
| 2013 | 188,551 | 176,123 | (12,428) | 107% | 150,678 | (8)% |
| 2014* | 231,671 | 197,853 | (33,818) | 117% | 174,342 | (19)% |

*Results include Additional Credits Adopted at the June 2015 Teachers' Retirement Board meeting.

Table 9
Reconciliation of Changes in Unfunded Actuarial Obligation

(\$ Thousands)

| Year End | Beginning of Year UAO | Expected Earnings/Credits | (G)/L on Actuarial Obligation | (G)/L on Assets | Additional Credits | End of Year UAO |
|----------|-----------------------|---------------------------|-------------------------------|-----------------|--------------------|-----------------|
| 2011 | \$ 15,156 | \$ 1,099 | \$ (3,958) | \$ (19,083) | \$ 0 | (6,786) |
| 2012 | (6,786) | (475) | (3,941) | 11,168 | 0 | (34) |
| 2013 | (34) | (3) | (7,164) | (10,771) | 5,544 | (12,428) |
| 2014* | (12,428) | (870) | (6,002) | (22,010) | 7,492 | (33,818) |

*Results include Additional Credits adopted at the June 2015 Teachers' Retirement Board meeting.

Table 10
Changes in Economic Assumptions

| Year | Price Inflation | Wage Inflation | Investment Return |
|-------------|------------------------|-----------------------|------------------------------|
| 2011 | 3.00% | 3.75% | 7.00% |
| 2012 | 3.00% | 3.75% | 7.00% |
| 2013 | 3.00% | 3.75% | 7.00% |
| 2014 | 3.00% | 3.75% | 7.00% |

Table 11
Smoothing and Volatility Ratios

| Year | Asset Smoothing Ratio AVA/MVA | Asset Volatility Ratio MVA/Payroll | Liability Volatility Ratio AAL/Payroll |
|-------------|--|---|---|
| 2001 | 100% | 16.1% | 17.3% |
| 2002 | 100% | 24.2% | 27.9% |
| 2003 | 100% | 37.0% | 41.7% |
| 2004 | 100% | 43.9% | 43.7% |
| 2005 | 100% | 50.4% | 48.4% |
| 2006 | 100% | 56.2% | 51.4% |
| 2007 | 100% | 64.5% | 55.3% |
| 2008 | 100% | 54.6% | 54.1% |
| 2009 | 100% | 50.4% | 63.0% |
| 2010 | 100% | 70.4% | 79.7% |
| 2011 | 100% | 98.8% | 91.5% |
| 2012 | 100% | 104.9% | 104.8% |
| 2013 | 100% | 125.1% | 116.9% |
| 2014* | 100% | 132.9% | 113.5% |

**Results include Additional Credits adopted at the June 2015 Teachers' Retirement Board meeting.*

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Appendix A Provisions of Governing Law



All of the actuarial calculations contained in this report are based upon our understanding of the Cash Balance Benefit (CBB) Program of the State Teachers' Retirement Plan as contained in Part 14 of the California Education Code. The provisions used in this valuation are summarized below for reference purposes.

Participation

Eligibility Requirement: Participation if employed at less than 50% of a full-time position for a California school district, or county office of education, or a temporary employee of a community college district, and the employer has elected to offer the CBB Program and the employee has elected to participate. In addition, a trustee of an employer that offers the CBB Program is eligible to participate.

Participant: An eligible employee or trustee with creditable service subject to coverage, who has contributions credited in the Program or is receiving an annuity from the Program.

Account Balance

Account Balance: Nominal employer and employee accounts established for the purpose of determining benefits payable to the Participant. Accounts are credited with Contributions, Minimum Interest Rate (MIR) and Additional Earnings Credits.

Contributions: Generally, Participant Contributions are 4% of salary and Employer Contributions are 4% of salary.

Rules for Contribution rates may differ for Participants covered by a collective bargaining agreement, but the sum of the Participant and Employer contributions must equal or exceed 8% of salary, and in no event can the Employee contribution rate be less than 4% of salary.

The Retirement Board may adjust Employer Contributions for a fixed number of years, but the adjustment shall not exceed 0.25% of salaries in any plan year, up to a maximum mandatory Employer Contribution of 4.25%.

Minimum Interest Rate: Annual rate determined for the plan year by the Retirement Board in accordance with federal laws and regulations. The MIR is equal to the average of the yields on 30-year Treasuries for the 12 months ending in February preceding the beginning of the plan year, rounded to the next highest 0.25%.

Additional Earnings Credit: Annual rate determined for the plan year by the Retirement Board pursuant to earnings credit policy adopted at the April 2015 meeting.

Additional Annuity Credit: No longer applies, per the Board annuity credit policy as adopted at the April 2015 meeting.

Normal Retirement

- Eligibility Requirement: Age 60, or age 62 for a Participant subject to the Public Employees' Pension Reform Act.
- Benefit: The Account Balance at the retirement date subject to limits imposed under Internal Revenue Code (IRC) Section 415.
- Form of Payment: The normal form of payment is a lump sum distribution. Annuity options are available if the sum of the employer and Participant accounts equal or exceed \$3,500.

Early Retirement

- Eligibility Requirement: Age 55.
- Benefit and Form: Same as Normal Retirement.

Late Retirement

- Benefit and Form: Same as Normal Retirement.
- Contributions and interest continue to be credited to the Account Balances until distributed.

Deferred Retirement

- Benefit: A Participant may cease active service, leave the accumulated Account Balance on deposit, and later retire upon attaining the minimum age requirement.

Disability Benefit

- Eligibility Requirement: Determination by the Retirement Board that the Participant has a total and permanent disability.
- Benefit: The Account Balance at the date of disability. An annuity benefit is discontinued if the Participant is re-employed before age 60, and performs service creditable under the Program. The actuarial equivalent of the Participant's annuity as of the date creditable service is resumed is credited to the Participant's Account Balance.
- Form of Payment: Same as Normal Retirement.

Death Before Retirement

- Eligibility Requirement: Deceased Participant has an Account Balance.
- Benefit: The Account Balance at the date of death payable to the designated beneficiary.
- Form of Payment: Same as Normal Retirement, except annuity options are limited to a Period Certain Annuity.

Death After Retirement

Eligibility Requirement: The deceased Participant was receiving an annuity.
Benefit: According to the terms of the annuity elected by the Participant.

Termination from the Program

Eligibility Requirement: Termination of all CalSTRS-covered service. A Participant may not apply for a Termination Payment if less than five years has elapsed since the most recent termination benefit, if any, has been paid.
Benefit: Lump-sum distribution of the Account Balance as of the date of distribution. The benefit is payable six months from the termination of credited service.

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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 CBB Program and on current expectations as to future economic conditions.

The assumptions are intended to estimate the future experience of the members of the CBB Program and of the CBB 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 CBB Program's benefits.

Actuarial Cost Method

The accruing costs of all benefits are measured by the Traditional Unit Credit Actuarial Cost Method. Under this method, the projected benefits of each individual member are allocated by a consistent formula to valuation years. The actuarial present value of future projected benefits allocated to the current year is called the Normal Cost. The actuarial present value of future projected benefits allocated to periods prior to the valuation year is called the Actuarial Obligation.

The Actuarial Obligation is equal to the accumulated account balances and the Normal Cost is equal to the total annual contribution.

Asset Valuation Method

The assets are valued at Fair Market Value.

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.

**Actuarial Assumptions
(continued)**

The assumptions are intended to estimate the future experience of the members of the CBB 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 **Table B.2**.

Table B.1
List of Major Valuation Assumptions

I. Economic Assumptions

| | | |
|----|--|--------|
| A. | Investment Return (net of investment and administrative expenses) | 7.00% |
| B. | Interest on Member Accounts | 7.00% |
| C. | Wage Growth | 3.75% |
| D. | Inflation | 3.00% |
| E. | Standard Deviation of Portfolio | 13.20% |

II. Demographic Assumptions

A. Mortality*

| | | | |
|-------------|----------|---------------------------|-----------|
| Retired & | - Male | 2011 CalSTRS Retired – M | Table B.2 |
| Beneficiary | - Female | 2011 CalSTRS Retired – F | Table B.2 |
| Disabled | - Male | 2011 CalSTRS Disabled – M | Table B.2 |
| | - Female | 2011 CalSTRS Disabled – F | Table B.2 |

(select rates in first three years for both
 Males and Females)

**Assumptions for active members do not apply to the CBB Program valuation, as each active and inactive member's liabilities are equal to their account balance. Mortality rates shown include a margin for anticipated future mortality improvement.*

**Table B.2
 Mortality**

| Age | Retired Members and Beneficiaries | | Disabled Members (After Year 3) | |
|-------------------------------------|-----------------------------------|--------|---------------------------------|--------|
| | 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 disability | | 6.0% | 3.5% |
| | Second year of disability | | 4.8 | 3.0 |
| | Third year of disability | | 3.5 | 2.5 |

Appendix C Valuation Data



The participant data for this actuarial valuation was supplied by CalSTRS and accepted without audit. We have examined the data for reasonableness and consistency with prior valuations and periodic reports from the CalSTRS staff to the Teachers' Retirement Board.

In preparing this report, we relied upon the participant data furnished by CalSTRS. Although we did not audit this data, we compared the data for this and the prior valuation and tested for reasonableness. 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 through **C.4** summarize the census data used in this valuation.

Table C.1
Summary of Statistical Information

| | June 30, 2014 | June 30, 2013 |
|--------------------------------------|---------------|---------------|
| Number of Participants | | |
| Active Participants* | 9,955 | 9,129 |
| Inactive Participants* | 22,278 | 21,875 |
| Retirees and Beneficiaries | <u>158</u> | <u>123</u> |
| Total Number of Participants | 32,391 | 31,127 |
| Active Participant Statistics | | |
| Annualized Salaries (\$ millions) | \$ 174.3 | \$ 150.7 |
| Average Salary | \$ 17,513 | \$ 16,505 |
| Average Age | 48.8 years | 49.3 years |
| Average Service in CBB Program | 6.1 years | 6.3 years |

**Participant counts as shown in CalSTRS Overview.*

Table C.2
Age and Service Distribution
All Active Participants

| Age Group | | Years | |
|------------------|--------------|--------------|--------------|
| Under 25 | 56 | Under 1 | 2,116 |
| 25 – 29 | 575 | 1 – 2 | 949 |
| 30 – 34 | 1,145 | 2 – 3 | 644 |
| 35 – 39 | 1,248 | 3 – 4 | 525 |
| 40 – 44 | 1,171 | 4 – 5 | 454 |
| 45 – 49 | 1,163 | 5 – 9 | 2,870 |
| 50 – 54 | 1,189 | 10 and Over | <u>2,397</u> |
| 55 – 59 | 1,146 | Total | 9,955 |
| 60 – 64 | 1,041 | | |
| 65 and Over | <u>1,221</u> | | |
| Total | 9,955 | | |

**Table C.3
 Inactive Members**

| Fiscal Year Ending June 30 | Number | Account Balances |
|---------------------------------------|---------------|-----------------------------|
| 2006 | 12,101 | \$ 19,307,000 |
| 2007 | 13,536 | 23,848,000 |
| 2008 | 15,037 | 28,543,000 |
| 2009 | 17,129 | 37,547,000 |
| 2010 | 18,771 | 44,154,000 |
| 2011 | 19,875 | 51,952,000 |
| 2012 | 21,064 | 60,558,000 |
| 2013 | 21,875 | 68,442,000 |
| 2014 | 22,278 | 75,363,000* |

**From CalSTRS Overview. Does not include 2013 Additional Credits.*

**Table C.4
 Annuitants**

| Fiscal Year Ending June 30 | Number | Accounts at Retirement |
|---------------------------------------|---------------|-----------------------------------|
| 2006 | 13 | \$ 141,000 |
| 2007 | 17 | 185,000 |
| 2008 | 24 | 311,000 |
| 2009 | 35 | 467,000 |
| 2010 | 50 | 599,000 |
| 2011 | 66 | 883,000 |
| 2012 | 102 | 1,626,000 |
| 2013 | 123 | 2,287,000 |
| 2014 | 158 | 3,799,000 |

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 CBB Program. Defined terms are capitalized throughout this Appendix.

| | |
|--------------------------------|---|
| Account Balance | The nominal account amount of an individual's benefit as of a specific date, determined in accordance with the terms of the Plan. The Account Balance is accumulated with contributions and interest. |
| Actuarial Assumptions | Assumptions as to the occurrence of future events affecting pension costs, such as mortality, withdrawal, disability and retirement, changes in compensation, rates of investment earnings and asset appreciation or depreciation, procedures used to determine the Actuarial Value of Assets and 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. |
| Normal Cost | The Actuarial Present Value of benefits expected to accrue in the plan year subsequent to the valuation date. The Normal Cost is equivalent to the expected Participant and Employer contributions for the next year. |
| Traditional Unit Credit Actuarial Cost Method | A method under which the Actuarial Obligation is equal to the actuarial present value of benefits for service accrued to the valuation date. |
| Unfunded Actuarial Obligation | The excess, if any, of the Actuarial Obligation over the Actuarial Value of Assets. |
| Valuation Date | June 30, 2014. |