



# Defined Benefit Supplement Program of the California State Teachers' Retirement System

June 30, 2022 Actuarial Valuation

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April 18, 2023

Teachers' Retirement Board  
California State Teachers' Retirement System

Re: **Defined Benefit Supplement Program Actuarial Valuation as of June 30, 2022**

Dear Members of the Board:

At your request, we have performed an actuarial valuation of the Defined Benefit Supplement (DBS) Program of the State Teachers' Retirement System as of June 30, 2022. Details about the actuarial valuation are contained in the following report. The major findings of the 2022 Actuarial Valuation are contained in this 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 DBS Program as of June 30, 2022.

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.

The valuation results were developed using models employing standard actuarial techniques. We have reviewed the models, including their inputs, calculations, and outputs for consistency, reasonableness, and appropriateness to the intended purpose and in compliance with generally accepted actuarial practice and relevant actuarial standards of practice. We have incorporated other sources of economic data in assessing the reasonableness of the assumptions. Reliance on other experts is reflected in Milliman's capital market assumptions, and in Milliman's expected return model maintained by Milliman investment consultants. We have also considered CalSTRS investment policy, capital market assumptions, and expected return model in our assessment of the investment return assumption.

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

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.



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 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 DBS Program. The board adopted the actuarial methods and assumptions used in the 2022 valuation. There were no changes in plan provisions (except that results are shown with and without Additional Earnings Credits as of June 30, 2022), assumptions, or methods that affected the 2022 DBS Program valuation.

Actuarial computations presented in this report are for purposes of assessing the funding of the DBS Program. The calculations in the enclosed report have been made on a basis consistent with our understanding of the DBS Program 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 retirement 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 which are consistent with the principles prescribed by the Actuarial Standards Board and the *Code of Professional Conduct* and *Qualification Standards for Actuaries Issuing Statements of Actuarial Opinion* in the United States promulgated by the American Academy of Actuaries. We are members of the American Academy of Actuaries and meet its Qualification Standards 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.

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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,

A handwritten signature in blue ink that reads "Nick Collier".

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

A handwritten signature in blue ink that reads "Scott Preppernau".

Scott D. Preppernau, FSA, EA, MAAA  
Consulting Actuary

A handwritten signature in blue ink that reads "Julie D. Smith".

Julie D. Smith, FSA, EA, MAAA  
Consulting Actuary

**Milliman June 30, 2022 Actuarial Valuation  
Defined Benefit Supplement Program of the  
California State Teachers’ Retirement System**

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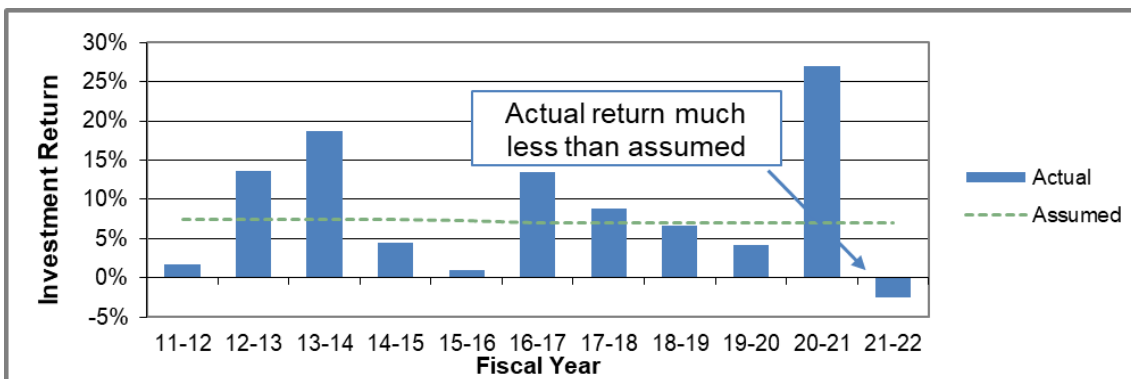
**Milliman June 30, 2022 Actuarial Valuation  
Defined Benefit Supplement Program of the  
California State Teachers' Retirement System**

**1. Summary of the Findings**

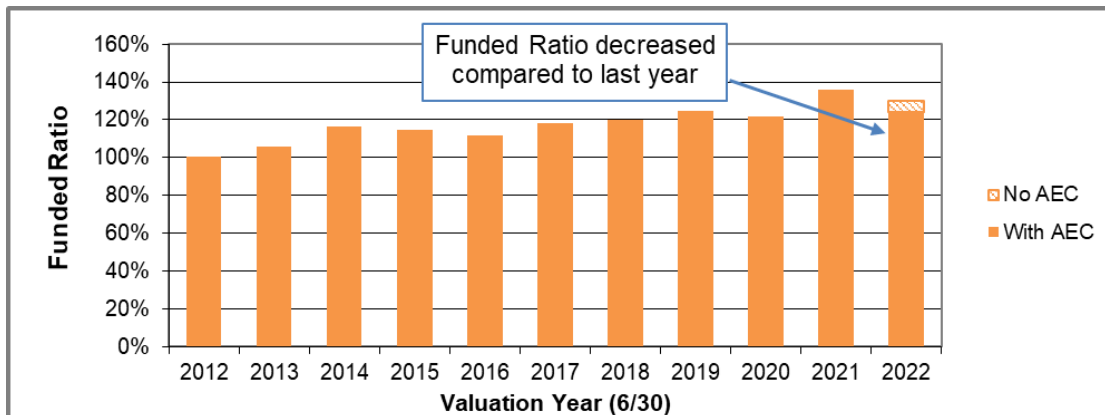
The primary purpose of the actuarial valuation is to determine the financial condition of the DBS Program through the measurement of the Gain and Loss Reserve. By using the actuarial methods and assumptions adopted by the Teachers' Retirement Board, this actuarial valuation provides an estimate of the financial condition of the DBS Program. The assumptions and methods were adopted at the January 2020 Teachers' Retirement Board meeting and there have been no changes to them since the last valuation.

The key findings of this actuarial valuation are:

- The **investment return** for the 2021-22 fiscal year was calculated to be -2.5%, significantly less than the assumed 7.0%. The negative return was the primary factor affecting the results in this valuation.



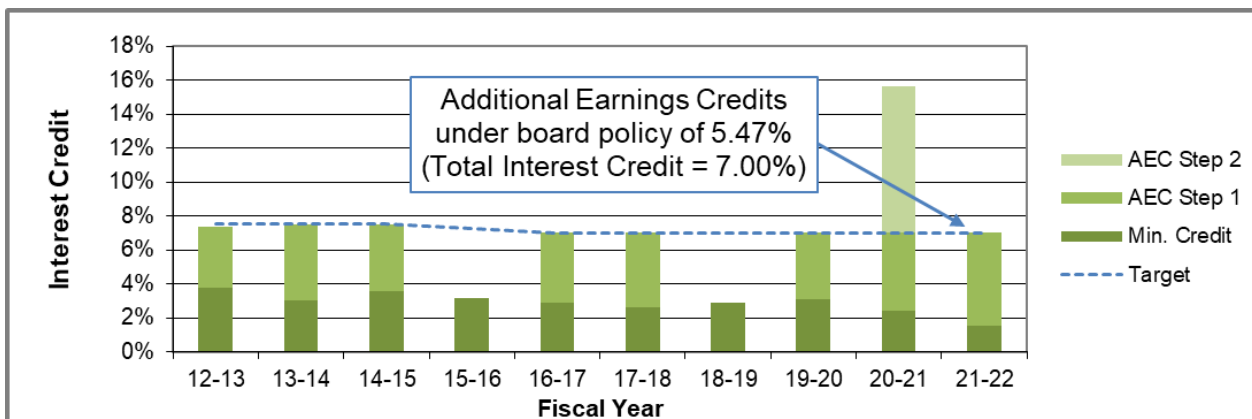
- The **Funded Ratio** decreased from 135.7% to 129.9%, primarily due to an investment return less than the assumed 7.0% return for the prior fiscal year. The Funded Ratio of 129.9% is prior to the potential granting of Additional Earnings Credits (AEC). If the AEC are granted pursuant to the board policy, the Funded Ratio would decrease to 124.1%.



**Milliman June 30, 2022 Actuarial Valuation**  
**Defined Benefit Supplement Program of the**  
**California State Teachers' Retirement System**

**Summary of the Findings**

- Under board policy, an **Additional Earnings Credit** of 5.47% is calculated for June 30, 2022 account balances for non-retired members. The total amount of these credits is \$609,488,000. The following chart shows the minimum interest rate credited each year as well as the additional credits granted under Step 1 and Step 2 of the policy through the 2021-22 fiscal year. The dotted line (target) is the assumed return assumption for each fiscal year. The details of the Step 1 and Step 2 additional credit calculations are described on page 8 of the report.



**Results**

As of June 30, 2022, the Actuarial Value of Assets of the Defined Benefit Supplement (DBS) Program exceeds the Actuarial Obligation by \$3,948,556,000. This number is a negative Unfunded Actuarial Obligation (UAO), sometimes referred to as an Actuarial Surplus. It is consistent with the board's policy to grant Additional Earnings Credits of \$609,488,000 as of June 30, 2022, as discussed in this report.

| (\$ Thousands)                                      | June 30, 2022    | June 30, 2021  |
|---|------------------|----------------|
| <b>Actuarial Balance Sheet</b>                      |                  |                |
| Actuarial Obligation (before Add'l Credits)         |                  |                |
| Active Members                                      | \$ 10,113,063    | \$ 8,955,093   |
| Inactive Members                                    | 1,029,317        | 906,526        |
| Retirees and Beneficiaries                          | 2,081,045        | 1,950,617      |
| Total   | 13,223,425       | 11,812,236     |
| Actuarial Value of Assets                           | 17,171,981       | 17,789,853     |
| Unfunded Actuarial Obligation /                     |                  |                |
| (Actuarial Surplus)                                 | \$ (3,948,556)   | \$ (5,977,617) |
| Additional Earnings Credit                          | 609,488 *        | 1,302,720      |
| Final Unfunded Actuarial Obligation /               |                  |                |
| (Actuarial Surplus)                                 | \$ (3,339,068) * | \$ (4,674,897) |
| <b>Funded Ratio (Assets ÷ Actuarial Obligation)</b> |                  |                |
| <b>Before Additional Credits</b>                    | <b>129.86%</b>   | <b>150.61%</b> |
| <b>After Additional Credits</b>                     | <b>124.14% *</b> | <b>135.65%</b> |

\* Subject to approval by the Teachers' Retirement Board.

**Milliman June 30, 2022 Actuarial Valuation  
Defined Benefit Supplement Program of the  
California State Teachers' Retirement System**

**Summary of the Findings**

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 for the DBS Program, as measured using uniform cash flow throughout the year, was about -2.5% net of investment and administrative expenses.

| (\$ Thousands)                      | Year Ended<br>June 30, 2022 | Year Ended<br>June 30, 2021 |
|-------------------------------------|-----------------------------|-----------------------------|
| <b>Additions</b>                    |                             |                             |
| Contributions                       | \$ 404,478                  | \$ 277,679                  |
| Earnings                            | (398,933)                   | 3,849,526                   |
| Change in GASB Adjustment           | (3,737)                     | 4,033                       |
| <b>Total Additions</b>              | <b>\$ 1,808</b>             | <b>\$ 4,131,238</b>         |
| <b>Deductions</b>                   |                             |                             |
| Benefits                            | \$ 584,097                  | \$ 545,209                  |
| Expenses                            | 35,583                      | 40,003                      |
| <b>Total Deductions</b>             | <b>619,680</b>              | <b>585,212</b>              |
| <b>Net Increase (Decrease)</b>      | <b>\$ (617,872)</b>         | <b>\$ 3,546,026</b>         |
| <b>Net Assets</b>                   |                             |                             |
| Beginning of Year                   | \$ 17,789,853               | \$ 14,243,827               |
| Net Increase (Decrease)             | (617,872)                   | 3,546,026                   |
| End of Year                         | \$ 17,171,981               | \$ 17,789,853               |
| <b>Estimated Net Rate of Return</b> | <b>-2.5%</b>                | <b>27.0%</b>                |

If the experience had emerged as assumed, the Actuarial Surplus would have increased from \$4,674,897,000 to \$5,002,140,000. The difference between the actual and expected UAO is the actuarial gain or loss for the year.

- There was an actuarial loss of \$1,677,256,000 due to the actual investment return being less than last year's assumed long-term return of 7.00%.
- There was an actuarial gain of \$623,672,000 on the Actuarial Obligation. This was primarily due to the current year's interest credits being less than 7.00% during the year. The Minimum Interest Rate for the 2021-22 fiscal year was 1.53%.
- The net actuarial loss was \$1,053,584,000, resulting in a Funded Ratio of 129.86% prior to granting any Additional Earnings Credits.



**Milliman June 30, 2022 Actuarial Valuation  
Defined Benefit Supplement Program of the  
California State Teachers' Retirement System**

**Summary of the Findings**

A summary of the actuarial (gains) and losses for the last two years is shown in the following table.

| (\$ Thousands)  | June 30, 2022  | June 30, 2021  |
|---|----------------|----------------|
| <b>Actuarial (Gain) or Loss</b>   |                |                |
| Investment Return on Assets   | \$ 1,677,256   | \$ (2,825,852) |
| Assumption & Method Changes   | 0              | 0              |
| Interest Credits on Accounts  | (623,672)      | (420,757)      |
| Total Actuarial (Gain) or Loss  | \$ 1,053,584   | \$ (3,246,609) |
| Expected UAO at End of Year   | (5,002,140)    | (2,731,008)    |
| Total Unfunded Actuarial Obligation /<br>(Actuarial Surplus) Before Add'l Credits | \$ (3,948,556) | \$ (5,977,617) |

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 to increase the thresholds needed to be met to grant Additional Earnings Credits and to remove the Additional Annuity Credit.

Based on the board's policy, Additional Earnings Credits of \$609,488,000 may be granted as of June 30, 2022. If Additional Earnings Credits are granted in this amount, the Funded Ratio will be 124.14% as opposed to 129.86% without the credit.

The following table shows a history of prior board actions.

| (\$ Thousands) |              | Available                               |                            |                             |
|----------------|--------------|---|----------------------------|-----------------------------|
| Valuation Date | Funded Ratio | Reserves and Unallocated Gains (Losses) | Additional Credits Adopted | Final Gain and Loss Reserve |
| June 30, 2012  | 100.6%       | \$ 50,527                               | \$ 0                       | \$ 50,527                   |
| June 30, 2013  | 105.8%       | 788,028                                 | 295,872                    | 492,156                     |
| June 30, 2014  | 116.3%       | 1,820,201                               | 347,846                    | 1,472,355                   |
| June 30, 2015  | 114.5%       | 1,711,825                               | 324,216                    | 1,387,609                   |
| June 30, 2016  | 111.6%       | 1,138,769                               | 0                          | 1,138,769                   |
| June 30, 2017  | 118.0%       | 2,224,206                               | 356,926                    | 1,867,280                   |
| June 30, 2018  | 120.1%       | 2,599,246                               | 393,843                    | 2,205,403                   |
| June 30, 2019  | 125.0%       | 2,778,453                               | 0                          | 2,778,453                   |
| June 30, 2020  | 121.8%       | 2,920,879                               | 368,535                    | 2,552,344                   |
| June 30, 2021  | 135.6%       | 5,977,617                               | 1,302,720                  | 4,674,897                   |
| June 30, 2022  | 124.1%       | * 3,948,556                             | 609,488 *                  | 3,339,068 *                 |

\* Subject to approval by the Teachers' Retirement Board.

### **Future Funding**

As of June 30, 2022, the DBS Program has an Actuarial Surplus (negative UAO) 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 (prior to reflecting potential Additional Earnings Credits). If future experience is worse than assumed, a UAO (shortfall between assets and liabilities) may develop. For example, if Additional Earnings Credits are adopted this year and the DBS Program has a 16% investment loss or more for the fiscal year ended June 30, 2023, we project that a UAO would emerge in the next valuation. Alternatively, a longer period with less-than-expected returns not as severe as the 16% loss could cause a UAO to develop.

There is currently no provision in the Education Code to increase contributions to make up for any future shortfalls if they were to occur. However, the assumed return on investments exceeds the current 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 DBS Program according to the California Education Code.

### **Conclusion**

The DBS 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, it is consistent with their policy for the board to grant 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 a UAO could develop in the future.

Granting Additional Earnings Credits of 5.47% to active and inactive member accounts is consistent with the board's policy. The estimated value of the Additional Earnings Credits is \$609,488,000.

## 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 DBS 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 DBS 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 the 2021-22 fiscal year was calculated to be -2.5% 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 CalSTRS investment staff.

### Actuarial Balance Sheet

Under the Traditional Unit Credit Actuarial Cost Method, when the assumed investment return is equal to the assumed interest crediting rate, then the Normal Cost is equal to the contributions made during the year and the Actuarial Obligation is equivalent to the current sum of the Members' Account Balances plus a reserve for the present value of the current annuity payments.

**Table 3** shows the Actuarial Obligation for this valuation and the prior valuation.

For the purpose of this valuation, the account information was provided to us by CalSTRS, including a supplemental file reflecting all Additional Earnings Credits granted prior to 2022. We checked the information for reasonableness by reviewing the individual member records supplied to us. We independently calculated the value of the monthly annuity benefits supplied by CalSTRS.

The excess of the Actuarial Obligation over the Actuarial Value of Assets is called the Unfunded Actuarial Obligation (UAO). 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 DBS Program would have an Actuarial Surplus at the end of each year before any Additional Earnings Credits, assuming 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 and the Additional Earnings Credits.

Although this relationship is projected to hold, there have been situations in the past, such as after the Great Recession of 2008, where investment performance for several prior years was below the Minimum Interest Rate and a UAO emerged.

### Actuarial Gains and Losses

The Minimum Interest Rate for the year ending on the valuation date was 1.53%. Since the assumed total earnings rate last year was 7.00% per year, the increase in the Actuarial Obligation was less than projected. The total actuarial gain on the Actuarial Obligation, primarily due to interest credits being less than assumed, was \$623,672,000.

Last year, the assumed earnings rate on the invested assets was 7.00% per year. The actual return for the year was about -2.5% (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 loss of \$1,677,256,000.

The assumed earnings rate is 7.00% in all future years, as adopted by the board in February 2017 and re-adopted in January 2020.

The total actuarial loss due to all causes was \$1,053,584,000 as shown in **Table 4**.

### Contributions and Normal Costs

**Table 4** shows that the Normal Costs of the DBS 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 \$404,478,000 were made up of \$204,527,000 in member contributions and \$199,951,000 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 Credits, if any.

This report assumes the Teachers' Retirement Board will allocate any unallocated gain or loss to funding after any Additional Earnings Credits are adopted.

### Additional Credits Based on Board Policy

Based on the board's policy, Additional Earnings Credits of \$609,488,000 may be granted as of June 30, 2022.

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 Expected Net Investment Return   | 7.00%         |
| Minimum Interest Rate (year prior to valuation)  | <u>1.53</u>   |
| Maximum Available in First Allocation (1)  | 5.47%         |
| Actuarial Surplus  | 29.86%        |
| First Threshold (1x Portfolio Std. Deviation)  | 13.10         |
| Maximum credit such that resulting Funded Ratio is not less than 100% + Std. Deviation (2) | 17.59%*       |
| <b>First Allocation [lesser of (1) and (2)]</b>  | <b>5.47%</b>  |
| First Allocation Amount  | \$609,488,000 |

\* The result is not a simple subtraction of the Actuarial Surplus and the First Threshold, because the maximum credit is determined based on a division of the Actuarial Value of Assets and the Actuarial Obligation with the First Allocation.

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.

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#### Second Allocation

|  |              |
|--|--------------|
| Remaining Actuarial Surplus (3)  | 24.14%       |
| Second Threshold (2 x Portfolio Std. Deviation) (4)  | 26.20        |
| Target Second Threshold Surplus [Average of (3) and (4), but not less than Second Threshold] | 26.20%       |
| <b>Available for Second Allocation</b>   | <b>0.00%</b> |

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The total available is the sum of the two steps, or 5.47% of the Actuarial Obligation for active and inactive member accounts as of June 30, 2022.

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

#### Historical Information

A history of the DBS 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, 2022 | June 30, 2021 |
|---|---------------|---------------|
| <b>Invested Assets</b>                      |               |               |
| Cash  | \$ 15,229     | \$ 8,113      |
| Debt Securities                             | 3,334,203     | 3,348,717     |
| Equity Securities                           | 6,409,725     | 8,508,085     |
| Alternative Investments                     | 7,645,968     | 6,204,778     |
| Derivative Instruments                      | (18,597)      | (3,270)       |
| Securities Lending Collateral               | 1,440,735     | 1,365,655     |
| Bond Proceeds Investment                    | 6,947         | 11,905        |
| Other Investments                           | <u>40,587</u> | <u>30,042</u> |
| Total Investments                           | \$ 18,874,797 | \$ 19,474,025 |
| <b>Receivables</b>                          | 975,037       | 567,471       |
| <b>Liabilities</b>                          | (2,738,721)   | (2,316,248)   |
| <b>Valuation Adjustment (GASB Expenses)</b> | <u>60,868</u> | <u>64,605</u> |
| <b>Fair Market Value of Net Assets</b>      | \$ 17,171,981 | \$ 17,789,853 |

**Table 2**  
**Statement of Change in Program Assets**

| (\$ Thousands)                                  | Year Ended<br>June 30, 2022 | Year Ended<br>June 30, 2021 |
|---|-----------------------------|-----------------------------|
| <b>Additions</b>                                |                             |                             |
| Contributions                                   |                             |                             |
| Members   | \$ 204,527                  | \$ 140,419                  |
| Employers                                       | <u>199,951</u>              | <u>137,260</u>              |
| Total Contributions                             | 404,478                     | 277,679                     |
| Net Earnings                                    | <u>(398,933)</u>            | <u>3,849,526</u>            |
| Total Additions                                 | \$ 5,545                    | \$ 4,127,205                |
| <b>Deductions</b>                               |                             |                             |
| Benefit Payments                                |                             |                             |
| Retirement, Death and Survivor                  | \$ 565,813                  | \$ 526,748                  |
| Refunds of Member Contributions                 | <u>18,284</u>               | <u>18,461</u>               |
| Total Benefits                                  | 584,097                     | 545,209                     |
| Expenses  | <u>35,583</u>               | <u>40,003</u>               |
| Total Deductions                                | \$ 619,680                  | \$ 585,212                  |
| <b>Net Increase (Decrease)</b>                  | \$ (614,135)                | \$ 3,541,993                |
| <b>Fair Market Value of Net Assets</b>          |                             |                             |
| Beginning of Year                               | \$ 17,789,853               | \$ 14,243,827               |
| Valuation Adjustment (GASB Expenses)            | (3,737)                     | 4,033                       |
| Adjustment for Prior Year Fair Value Accrual    | 0                           | 0                           |
| Transfers In/(Out)                              | 0                           | 0                           |
| Net Increase (Decrease)                         | <u>(614,135)</u>            | <u>3,541,993</u>            |
| <b>End of Year</b>                              | \$ 17,171,981               | \$ 17,789,853               |
| <b>Estimated Net Rate of Return</b>             | -2.5%                       | 27.0%                       |
| - assuming uniform cash flow through the year   |                             |                             |
| - net of investment and administrative expenses |                             |                             |

**Table 3**  
**Actuarial Balance Sheet**

| (\$ Thousands)  | June 30, 2022              |                                 | June 30, 2021      |
|---|----------------------------|---------------------------------|--------------------|
|   | Without Additional Credits | With Additional Credits Adopted |                    |
| <b>Total Requirements</b>                               |                            |                                 |                    |
| Actuarial Obligation                                    |                            |                                 |                    |
| Retirees and Beneficiaries                              | \$ 2,081,045               | \$ 2,081,045                    | \$ 1,950,617       |
| Inactive Members  | 1,029,317                  | 1,085,621*                      | 1,026,278          |
| Active Members  | <u>10,113,063</u>          | <u>10,666,247*</u>              | <u>10,138,061</u>  |
| Total Requirements                                      | \$ 13,223,425              | \$ 13,832,913*                  | \$13,114,956       |
| <b>Total Resources</b>                                  |                            |                                 |                    |
| Actuarial Value of Assets                               | \$ 17,171,981              | \$ 17,171,981                   | \$17,789,853       |
| Unfunded Actuarial Obligation<br>or (Actuarial Surplus) | <u>(3,948,556)</u>         | <u>(3,339,068)*</u>             | <u>(4,674,897)</u> |
| Total Resources   | \$ 13,223,425              | \$ 13,832,913*                  | \$13,114,956       |
| <b>Funded Ratio</b>                                     | 129.86%                    | 124.14%*                        | 135.65%            |

\* Subject to approval by the Teachers' Retirement Board.



**Table 4**  
**Actuarial Gains and Losses\***

| (\$ Thousands)                           |                             |                                 |  |
|--|-----------------------------|---------------------------------|--|
|  | Actuarial<br>Obligation     | Actuarial<br>Value of<br>Assets | Unfunded<br>Actuarial<br>Obligation /<br>(Surplus) |
| <b>Balance at June 30, 2021</b>          | \$ 13,114,956               | \$ 17,789,853                   | \$ (4,674,897)                                     |
| <b>Expected Changes</b>                  |                             |                                 |  |
| Actual Contributions/Normal Cost         | 404,478                     | 404,478                         | 0  |
| Actual Benefits Paid                     | (584,097)                   | (584,097)                       | 0  |
| Expected Earnings/Credits                | <u>911,760</u>              | <u>1,239,003</u>                | <u>(327,243)</u>                                   |
| <b>Expected Balance at June 30, 2022</b> | \$ 13,847,097               | \$ 18,849,237                   | \$ (5,002,140)                                     |
| <b>Actuarial Gains or Losses</b>         |                             |                                 |  |
| (Gain)/Loss on Actuarial Obligation      | (623,672)                   |                                 |  |
| Gain/(Loss) on Assets                    |                             | (1,677,256)                     |  |
| Assumption Change                        |                             | 0                               |  |
| Net (Gain) or Loss on UAO                | <u>                    </u> | <u>                    </u>     | <u>1,053,584</u>                                   |
| <b>Actual Balance at June 30, 2022</b>   | \$ 13,223,425               | \$ 17,171,981                   | \$ (3,948,556)                                     |

\* Prior to Additional Earnings Credits.

**Table 5**  
**Gain and Loss Reserve**

| (\$ Thousands)   |                            |                                 |                  |
|--|----------------------------|---------------------------------|------------------|
|  | June 30, 2022              |                                 | June 30, 2021    |
|  | Without Additional Credits | With Additional Credits Adopted |                  |
| <b>Unfunded Actuarial Obligation or (Actuarial Surplus) (prior to any Additional Earnings Credits)</b> | \$ (3,948,556)             | \$ (3,948,556)                  | \$ (5,977,617)   |
| Additional Earnings Credits  | <u>0</u>                   | <u>609,488*</u>                 | <u>1,302,720</u> |
| <b>Unfunded Actuarial Obligation or (Actuarial Surplus)</b>  | (3,948,556)                | (3,339,068)*                    | (4,674,897)      |
| <b>Gain and Loss Reserve</b>   |                            |                                 |                  |
| Beginning of Year  | \$ 4,674,897               | \$ 4,674,897                    | \$ 2,552,344     |
| Allocated to Funding   | <u>(726,341)</u>           | <u>(1,335,829)*</u>             | <u>2,122,553</u> |
| End of Year Gain and Loss Reserve  | 3,948,556                  | 3,339,068*                      | 4,674,897        |
| <b>Unallocated Gains and (Losses)</b>  | \$ 0                       | \$ 0*                           | \$ 0             |

| (\$ Thousands) |   |                            |                             |
|----------------|---|----------------------------|-----------------------------|
| Valuation Date | Available Reserves and Unallocated Gains (Losses) | Additional Credits Adopted | Final Gain and Loss Reserve |
| June 30, 2009  | \$ (1,453,334)                                    | \$ 0                       | \$ (1,453,334)              |
| June 30, 2010  | (1,044,262)                                       | 0                          | (1,044,262)                 |
| June 30, 2011  | 281,195   | 0                          | 281,195                     |
| June 30, 2012  | 50,527  | 0                          | 50,527                      |
| June 30, 2013  | 788,028   | 295,872                    | 492,156                     |
| June 30, 2014  | 1,820,201   | 347,846                    | 1,472,355                   |
| June 30, 2015  | 1,711,825   | 324,216                    | 1,387,609                   |
| June 30, 2016  | 1,138,769   | 0                          | 1,138,769                   |
| June 30, 2017  | 2,224,206   | 356,926                    | 1,867,280                   |
| June 30, 2018  | 2,599,246   | 393,843                    | 2,205,403                   |
| June 30, 2019  | 2,778,453   | 0                          | 2,778,453                   |
| June 30, 2020  | 2,920,879   | 368,535                    | 2,552,344                   |
| June 30, 2021  | 5,977,617   | 1,302,720                  | 4,674,897                   |
| June 30, 2022  | 3,948,556   | 609,488*                   | 3,339,068*                  |

\* Subject to approval by the Teachers' Retirement Board.

**Table 6**  
**Additional Credits Based on Board Policy**

|   | June 30, 2022    | June 30, 2021      |
|---|------------------|--------------------|
| Funded Ratio before Additional Credits  | 129.86%          | 150.61%            |
| Actuarial Surplus   | 29.86%           | 50.61%             |
| First Threshold   | 13.10%           | 13.10%             |
| Second Threshold  | 26.20%           | 26.20%             |
| <b>First Allocation</b>   |                  |                    |
| Long-term Net Investment Return   | 7.00%            | 7.00%              |
| Minimum Interest Rate (year prior to valuation)   | <u>1.53</u>      | <u>2.44</u>        |
| Maximum Available in First Allocation (1)   | 5.47%            | 4.56%              |
| First Threshold (1 x Std. Deviation of Portfolio Return)  | 13.10            | 13.10              |
| Maximum credit such that resulting Funded Ratio is not less than 100% + Std. Deviation (2)  | 17.59%*          | 39.72%*            |
| <b>First Allocation [lesser of (1) and (2)]</b>   | <b>5.47%</b>     | <b>4.56%</b>       |
| <i>* The result is not a simple subtraction of the Actuarial Surplus and the First Threshold, because the maximum credit is determined based on a division of the Actuarial Value of Assets and the Actuarial Obligation with the First Allocation.</i> |                  |                    |
| <b>Second Allocation</b>  |                  |                    |
| Remaining Actuarial Surplus after First Allocation  | \$3,339,068      | \$5,527,927        |
| Total Actuarial Obligation after First Allocation   | \$13,832,913     | \$12,261,926       |
| Remaining Actuarial Surplus % (3)   | 24.14%           | 45.08%             |
| Second Threshold (2 x Std. Deviation of Portfolio Return) (4)   | 26.20%           | 26.20%             |
| Target Second Threshold Surplus [Average of (3) and (4), but not less than Second Threshold]  | 26.20%           | 35.64%             |
| Maximum Credit to meet Target Surplus   | \$0              | \$853,467          |
| Non-Retired Actuarial Obligation [Prior to First Allocation]  | \$11,142,380     | \$9,861,619        |
| <b>Available for Second Allocation</b>  | <b>0.00%</b>     | <b>8.65%</b>       |
| <b>Additional Earnings Credits based on Board Policy</b>  |                  |                    |
| As a percentage of Actuarial Obligation (actives and inactives only) as of the valuation date   | 5.47%            | 13.21%             |
| <b>As a dollar amount (\$ Thousands)</b>  | <b>\$609,488</b> | <b>\$1,302,720</b> |

**Milliman June 30, 2022 Actuarial Valuation**  
**Defined Benefit Supplement Program of the**  
**California State Teachers' Retirement System**

**Findings of the Actuarial Valuation**

**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    |                    |                             |
| 2002           | \$ 487,185                 | \$ 0                         | \$ 4,982             | \$ 255   | \$ 5,237 | \$ 481,948         | \$ 660,148                  |
| 2003           | 604,853                    | 0                            | 17,102               | 580      | 17,682   | 587,171            | 1,311,269                   |
| 2004           | 691,081                    | 41,991                       | 3,078                | 1,206    | 46,275   | 644,806            | 2,203,682                   |
| 2005           | 669,706                    | 75,426                       | 8,599                | 1,740    | 85,765   | 583,941            | 3,023,177                   |
| 2006           | 703,104                    | 97,997                       | 14,032               | 1,952    | 113,981  | 589,123            | 3,951,327                   |
| 2007           | 749,844                    | 97,221                       | 18,026               | 2,464    | 117,711  | 632,133            | 5,381,585                   |
| 2008           | 802,380                    | 139,435                      | 17,716               | 2,903    | 160,054  | 642,326            | 5,636,113                   |
| 2009           | 822,010                    | 156,458                      | 29,823               | 3,385    | 189,666  | 632,344            | 5,145,981                   |
| 2010           | 796,743                    | 223,733                      | 13,673               | 6,113    | 243,519  | 553,224            | 6,412,180                   |
| 2011           | 410,820                    | 249,949                      | 25,956               | 6,140    | 282,045  | 128,775            | 8,054,962                   |
| 2012           | 102,570                    | 223,411                      | 24,436               | 6,886    | 254,733  | (152,163)          | 8,042,090                   |
| 2013           | 160,771                    | 279,284                      | 25,131               | 7,568    | 311,983  | (151,212)          | 8,983,919                   |
| 2014           | 159,663                    | 300,031                      | 23,960               | 8,385    | 332,376  | (172,713)          | 10,493,062                  |
| 2015           | 216,128                    | 300,058                      | 19,473               | 8,145    | 327,676  | (111,548)          | 10,940,917                  |
| 2016           | 251,393                    | 332,845                      | 19,761               | 11,243   | 363,849  | (112,456)          | 10,943,296                  |
| 2017           | 263,200                    | 383,828                      | 20,909               | 11,680   | 416,417  | (153,217)          | 12,269,382                  |
| 2018           | 282,377                    | 397,635                      | 21,453               | 12,007   | 431,095  | (148,718)          | 13,173,522                  |
| 2019           | 284,587                    | 454,261                      | 20,924               | 37,453   | 512,638  | (228,051)          | 13,904,497                  |
| 2020           | 276,767                    | 487,832                      | 20,131               | 32,704   | 540,667  | (263,900)          | 14,243,827                  |
| 2021           | 277,679                    | 526,748                      | 18,461               | 40,003   | 585,212  | (307,533)          | 17,789,853                  |
| 2022           | 404,478                    | 565,813                      | 18,284               | 35,583   | 619,680  | (215,202)          | 17,171,981                  |

**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 |
| 2002           | \$ 660,148                | \$ 711,440                  | \$ 51,292                            | 93%                     | \$ 21,732,000             | 0%                      |
| 2003           | 1,311,269                 | 1,358,635                   | 47,366                               | 97%                     | 22,654,000                | 0%                      |
| 2004           | 2,203,682                 | 2,035,052                   | (168,630)                            | 108%                    | 22,589,000                | (1)%                    |
| 2005           | 3,023,177                 | 2,756,199                   | (266,978)                            | 110%                    | 23,257,000                | (1)%                    |
| 2006           | 3,951,327                 | 3,616,259                   | (335,068)                            | 109%                    | 24,240,000                | (1)%                    |
| 2007           | 5,381,585                 | 4,622,046                   | (759,539)                            | 116%                    | 25,906,000                | (3)%                    |
| 2008           | 5,636,113                 | 5,627,344                   | (8,769)                              | 100%                    | 27,118,000                | 0%                      |
| 2009           | 5,145,981                 | 6,599,315                   | 1,453,334                            | 78%                     | 27,327,000                | 5%                      |
| 2010           | 6,412,180                 | 7,456,442                   | 1,044,262                            | 86%                     | 26,274,000                | 4%                      |
| 2011           | 8,054,962                 | 7,773,767                   | (281,195)                            | 104%                    | 25,536,000                | (1)%                    |
| 2012           | 8,042,090                 | 7,991,563                   | (50,527)                             | 100%                    | 25,091,000                | (0)%                    |
| 2013           | 8,983,919                 | 8,491,763                   | (492,156)                            | 106%                    | 24,994,000                | (2)%                    |
| 2014           | 10,493,062                | 9,020,707                   | (1,472,355)                          | 116%                    | 25,805,000                | (6)%                    |
| 2015           | 10,940,917                | 9,553,308                   | (1,387,609)                          | 115%                    | 27,143,000                | (5)%                    |
| 2016           | 10,943,296                | 9,804,527                   | (1,138,769)                          | 112%                    | 28,788,000*               | (4)%                    |
| 2017           | 12,269,382                | 10,402,102                  | (1,867,280)                          | 118%                    | 29,971,000*               | (6)%                    |
| 2018           | 13,173,522                | 10,968,119                  | (2,205,403)                          | 120%                    | 30,650,000*               | (7)%                    |
| 2019           | 13,904,497                | 11,126,044                  | (2,778,453)                          | 125%                    | 31,501,000*               | (9)%                    |
| 2020           | 14,243,827                | 11,691,483                  | (2,552,344)                          | 122%                    | 32,450,000*               | (8)%                    |
| 2021           | 17,789,853                | 13,114,956                  | (4,674,897)                          | 136%                    | 32,740,000*               | (14)%                   |
| 2022           | 17,171,981                | 13,832,913**                | (3,339,068)**                        | 124%**                  | 34,496,000*               | (10)%**                 |

\* Covered payroll estimated for active members with a non-zero DBS account.

\*\* Subject to approval by the Teachers' Retirement Board.

**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           | \$ 1,044,262          | \$ 75,709                  | \$ (363,073)*                 | \$ (1,038,093)  | \$ 0               | (281,195)       |
| 2012           | (281,195)             | (21,089)                   | (214,512)                     | 466,269         | 0                  | (50,527)        |
| 2013           | (50,527)              | (3,789)                    | (246,009)                     | (487,703)       | 295,872            | (492,156)       |
| 2014           | (492,156)             | (36,912)                   | (285,294)                     | (1,005,839)     | 347,846            | (1,472,355)     |
| 2015           | (1,472,355)           | (110,427)                  | (360,887)                     | 231,844         | 324,216            | (1,387,609)     |
| 2016           | (1,387,609)           | (104,070)                  | (360,271)*                    | 713,181         | 0                  | (1,138,769)     |
| 2017           | (1,138,769)           | (82,561)                   | (323,511)*                    | (679,365)       | 356,926            | (1,867,280)     |
| 2018           | (1,867,280)           | (130,710)                  | (414,477)                     | (186,779)       | 393,843            | (2,205,403)     |
| 2019           | (2,205,403)           | (154,379)                  | (412,574)                     | 6,097*          | 0                  | (2,778,453)     |
| 2020           | (2,778,453)           | (194,492)                  | (342,631)                     | 394,697         | 368,535            | (2,552,344)     |
| 2021           | (2,552,344)           | (178,664)                  | (420,757)                     | (2,825,852)     | 1,302,720          | (4,674,897)     |
| 2022           | (4,674,897)           | (327,243)                  | (623,672)                     | 1,677,256       | 609,488**          | (3,339,068)**   |

\* Includes impact of changes in assumptions and methods.

\*\* Subject to approval by the Teachers' Retirement Board.

**Table 10**  
**Changes in Economic Assumptions**

| Year | Price Inflation | Wage Inflation | Investment Return |
|------|-----------------|----------------|-------------------|
| 2011 | 3.00%           | 3.75%          | 7.50%             |
| 2012 | 3.00%           | 3.75%          | 7.50%             |
| 2013 | 3.00%           | 3.75%          | 7.50%             |
| 2014 | 3.00%           | 3.75%          | 7.50%             |
| 2015 | 3.00%           | 3.75%          | 7.50%             |
| 2016 | 2.75%           | 3.50%          | 7.25%             |
| 2017 | 2.75%           | 3.50%          | 7.00%             |
| 2018 | 2.75%           | 3.50%          | 7.00%             |
| 2019 | 2.75%           | 3.50%          | 7.00%             |
| 2020 | 2.75%           | 3.50%          | 7.00%             |
| 2021 | 2.75%           | 3.50%          | 7.00%             |
| 2022 | 2.75%           | 3.50%          | 7.00%             |

**Table 11**  
**Smoothing and Volatility Ratios**

| Year | Asset<br>Smoothing<br>Ratio<br>AVA/MVA | Asset<br>Volatility<br>Ratio<br>MVA/Payroll | Liability<br>Volatility<br>Ratio<br>AAL/Payroll |
|------|--|---|---|
| 2002 | 100%                                   | 3.0%  | 3.3%  |
| 2003 | 100%                                   | 5.8%  | 6.0%  |
| 2004 | 100%                                   | 9.8%  | 9.0%  |
| 2005 | 100%                                   | 13.0%                                       | 11.9%   |
| 2006 | 100%                                   | 16.3%                                       | 14.9%   |
| 2007 | 100%                                   | 20.8%                                       | 17.8%   |
| 2008 | 100%                                   | 20.8%                                       | 20.8%   |
| 2009 | 100%                                   | 18.8%                                       | 24.1%   |
| 2010 | 100%                                   | 24.4%                                       | 28.4%   |
| 2011 | 100%                                   | 31.5%                                       | 30.4%   |
| 2012 | 100%                                   | 32.1%                                       | 31.9%   |
| 2013 | 100%                                   | 35.9%                                       | 34.0%   |
| 2014 | 100%                                   | 40.7%                                       | 35.0%   |
| 2015 | 100%                                   | 40.3%                                       | 35.2%   |
| 2016 | 100%                                   | 38.0%                                       | 34.1%   |
| 2017 | 100%                                   | 40.9%                                       | 34.7%   |
| 2018 | 100%                                   | 43.0%                                       | 35.8%   |
| 2019 | 100%                                   | 44.1%                                       | 35.3%   |
| 2020 | 100%                                   | 43.9%                                       | 36.0%   |
| 2021 | 100%                                   | 54.3%                                       | 40.1%   |
| 2022 | 100%                                   | 49.8%                                       | 40.1%*  |

\* Actuarial Accrued Liability used in calculation is subject to approval of Additional Earnings Credits by the Teachers' Retirement Board.



### 3. Risk Disclosures

The results of any actuarial valuation are based on a set of assumptions. Although we believe the current assumptions provide a reasonable estimate of future expectations, it is almost certain that future experience will differ from the assumptions to some extent. The following is a general discussion of the potential risks to the DBS Program funding and is not intended to be a comprehensive analysis of all potential risks.

#### Factors Affecting Future Results

There are a number of factors that affect future valuation results. To the extent actual experience for these factors varies from the assumptions, this will likely cause either increases or decreases in the plan's future funding level. Examples of factors that can have a significant impact on valuation results are:

- Investment return
- Payroll variation
- Salary variation
- Mortality (how long retirees live)
- Service retirement
- Termination (members leaving active employment for reasons other than death, disability, or service retirement)
- Contribution limitations. There is no dedicated funding if a deficit develops between the Program's assets and the value of future benefits.

Of these factors, we believe the factor with the greatest potential risk is future investment returns. As an example of these risks, if actual investment returns fall materially short of the current assumption of 7.00% per year, this will cause a decrease in the Funded Ratio for the DBS Program, all other things being equal. Although, the DBS Program currently has a Funded Ratio of approximately 130%, if Additional Earnings Credits are adopted for this year and the fiscal year 2022-23 return is -16% or less, the Funded Ratio would be projected to be less than 100% next year and a deficit would emerge.

#### Maturity Risk

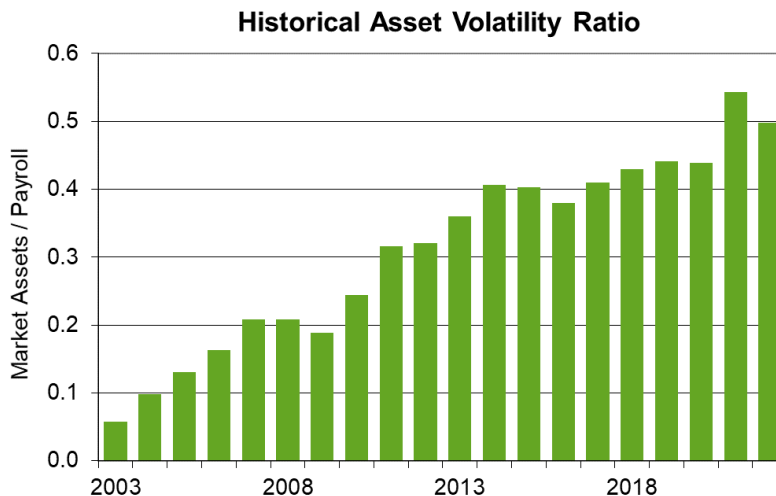
The magnitude of any contribution rate increase needed to make up any funding deficit (if one were to occur) is affected by the Program's maturity level. As the DBS Program becomes more mature (i.e., the number of retirees grows compared to the number of actives, and the accumulated assets grow compared to payroll), it becomes more difficult to emerge from a deficit position (if one were to occur in the future). One indicator of this maturity is the Asset Volatility Ratio (AVR), which is equal to the Fair Market Value of Assets divided by total payroll. The AVR is a current measure since it is based on the current level of assets and will vary from year to year.

For the DBS Program, the current AVR is equal to 0.50. This means that for each 1% asset loss (in relation to the assumed investment return), there would need to be an increase in contributions equivalent to 0.50% of one-year's payroll to make up for this loss. However, this type of contribution increase would only be needed if the DBS Program were to move to a deficit position. It should be noted that there is no current mechanism to provide deficit reduction contributions to the DBS Program. Additionally, the DBS Program interest credit rates have historically been less than the assumed investment return, so it is possible the DBS Program could emerge from a deficit position without additional contributions.

**Milliman June 30, 2022 Actuarial Valuation  
Defined Benefit Supplement Program of the  
California State Teachers' Retirement System**

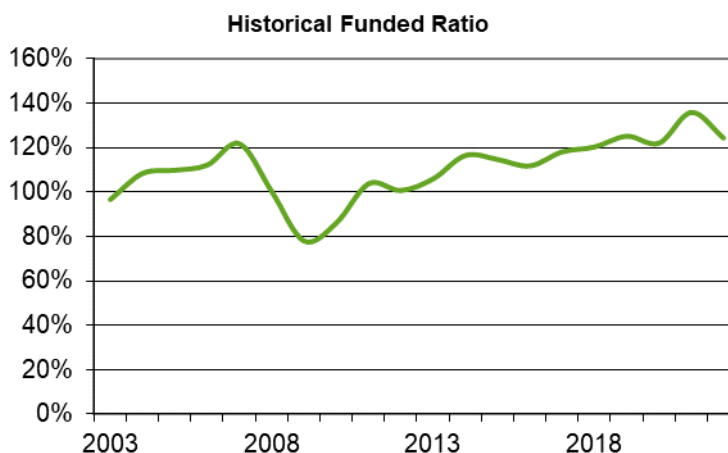
**Risk Disclosures**

The following graph shows how the DBS Program has matured over the last 20 years. Over the last several years, increases in the AVR had somewhat leveled off although there was a large increase in the 2021 valuation due to the significant increase in the market value of assets.



**Historical Measures**

One way to assess future risks is to look at historical measurements. The following graph shows how the DBS Program Funded Ratio has varied over the last 20 years. In particular, it reflects the significant impact that investment returns can have. The DBS Program had a Funded Ratio over 120% in 2007, but decreased to less than 80% in two years. The Funded Ratio has since recovered primarily due to strong returns. Note that the 2022 Funded Ratio includes potential Additional Earnings Credits, subject to approval by the Teachers' Retirement Board.



## Appendix A Provisions of Governing Law

All of the actuarial calculations contained in this report are based upon our understanding of the Defined Benefit Supplement (DBS) Program of the State Teachers' Retirement System as contained in Part 13 of the California Education Code. The provisions used in this valuation are summarized below for reference purposes.

### Membership

Eligibility Requirement: All members of the Defined Benefit Program who perform creditable service and earn creditable compensation after December 31, 2000.

Member: An eligible employee with creditable service subject to coverage in the DBS Program.

### Account Balance

Account Balance: Nominal accounts established for the purpose of determining benefits payable to the Member. Accounts are credited with Contributions, a Minimum Interest Rate and Additional Earnings Credits.

Contributions: One-quarter (2% of compensation) of the DB Program Member contributions on creditable compensation was allocated to the Member's DBS Account through December 31, 2010.

Member and employer contributions will be credited to the Member's DBS Account for creditable compensation that is not credited to the DB Program.

Minimum Interest Rate: Annual rate determined for the plan year by the board in accordance with federal laws and regulations. The Minimum Interest Rate 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 0.01%.

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

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

### Normal Retirement

Eligibility Requirement: Receipt of a corresponding benefit under the DB Program.

Benefit: The DBS Account Balance at the benefit effective date subject to limits imposed under Internal Revenue Code Section 415.

Form of Payment: The normal form of payment is a lump sum distribution. Annuity options are available if the DBS Account equals or exceeds \$3,500.

### Early Retirement

Eligibility Requirement: Same as Normal Retirement.

Benefit and Form: Same as Normal Retirement.

### Late Retirement

Benefit and Form: Same as Normal Retirement.

Contributions and earnings continue to be credited to the Account Balances until distributed.

### **Deferred Retirement**

Benefit: A Member must receive a DBS benefit when the corresponding benefit is received under the DB Program.

### **Disability Benefit**

Eligibility Requirement: Receipt of a corresponding benefit under the DB Program.

Benefit: The DBS Account Balance at the date the disability benefit becomes payable. An annuity benefit is discontinued upon the termination of the corresponding DB Program benefit. 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 Member has a DBS Account Balance.

Benefit: The DBS Account Balance at the date of death, plus minimum interest credited through the date of payment, 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 Member was receiving an annuity.

Benefit: According to the terms of the annuity elected by the Member.

### **Termination from the Program**

Eligibility Requirement: Termination of all CalSTRS-covered employment.

Benefit: Lump-sum distribution of the DBS Account Balance as of the date of distribution. The benefit is payable six months from the termination of creditable service.

## 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 DBS Program and on current expectations as to future economic conditions. The assumptions were reviewed and changed for the June 30, 2019 Actuarial Valuation as a result of the 2020 Experience Analysis. Please refer to that Experience Analysis report dated January 14, 2020 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 DBS Program and of the DBS 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 DBS 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. The Fair Market Value excludes the liability for "Net Pension and OPEB Obligation," which are pre-recognized administrative expenses, from the Fiduciary Net Position reported for accounting purposes.

### 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 DBS 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 economic and 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**

### Economic Assumptions

|   |        |
|---|--------|
| Investment Return (net of investment and administrative expenses) | 7.00%  |
| Interest on Member Accounts                                       | 7.00%  |
| Wage Growth   | 3.50%  |
| Inflation   | 2.75%  |
| Standard Deviation of Portfolio                                   | 13.10% |

### Demographic Assumptions

#### Mortality<sup>(1)</sup>

|                                |  |             |
|--------------------------------|--|-------------|
| Retired & Beneficiary - Male   | 2019 CalSTRS Service Retired Male  | Table A-3.2 |
| Retired & Beneficiary - Female | 2019 CalSTRS Service Retired Female  | Table A-3.2 |
| Disabled - Male                | 2019 CalSTRS Disabled Retiree Male   | Table A-3.2 |
| Disabled - Female              | 2019 CalSTRS Disabled Retiree Female<br>(select rates in first three years for both Males and Females) | Table A-3.2 |

1. The mortality assumption uses a generational mortality approach with a base year of 2019. Projected improvement is based on 110% of the MP-2019 Ultimate Projection Scale. The combined base tables and projection scale specified contain a margin for expected future mortality improvement.

Note: Assumptions for active and inactive members do not apply to the DBS Program valuation, as each active and inactive member's liabilities are equal to the member's account balance.

**Table B.2**  
**Mortality as of June 30, 2022**

| Age | Retired Members and Beneficiaries <sup>(1)</sup> |        | Disabled Members (After Year 3) <sup>(1)</sup> |        |
|-----|--|--------|--|--------|
|     | Male   | Female | Male   | Female |
| 50  | 0.227%   | 0.126% | 1.748%   | 0.987% |
| 55  | 0.335  | 0.199  | 2.033  | 1.235  |
| 60  | 0.449  | 0.265  | 2.306  | 1.458  |
| 65  | 0.638  | 0.400  | 2.683  | 1.742  |
| 70  | 1.021  | 0.659  | 3.327  | 2.261  |
| 75  | 1.832  | 1.211  | 4.388  | 3.217  |
| 80  | 3.362  | 2.322  | 6.074  | 4.765  |
| 85  | 6.464  | 4.632  | 8.824  | 7.081  |
| 90  | 12.501   | 9.450  | 13.419   | 10.491 |
| 95  | 21.425   | 17.761 | 20.122   | 15.574 |

**Select minimum rates for disability:**

|                           |      |      |
|---------------------------|------|------|
| First year of disability  | 4.0% | 3.0% |
| Second year of disability | 3.5  | 2.5  |
| Third year of disability  | 3.0  | 2.0  |

1. The mortality assumption uses a generational mortality approach with a base year of 2019. Projected improvement is based on 110% of the MP-2019 Ultimate Projection Scale. The rates shown reflect mortality improvement through June 30, 2022. The projection scale does not apply to the select minimum rates.

## **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 materially 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, 2022 | June 30, 2021 |
|--|---------------|---------------|
| <b>Number of Members<sup>(1)</sup></b>         |               |               |
| Active Members                                 | 449,418       | 429,681       |
| Inactive Members                               | 145,020       | 146,396       |
| Retirees and Beneficiaries                     | <u>79,468</u> | <u>77,369</u> |
| Total Membership in Valuation                  | 673,906       | 653,446       |
| <b>Active Members Statistics<sup>(1)</sup></b> |               |               |
| Earned Salaries (\$ millions)                  | \$ 36,017     | \$ 33,914     |
| Average Salary                                 | \$ 80,143     | \$ 78,928     |
| Average Age                                    | 45.1 years    | 45.4 years    |
| Average Service                                | 12.5 years    | 12.9 years    |

1. Active member statistics include all active members in the DB Program, as they are eligible to participate in the DBS Program. Inactive and annuitant counts only include those with non-zero DBS Program account balances and monthly benefits, respectively.

**Table C.2**  
**Age and Service Distribution – All Active Members**

| Total        |                  |                |               |               |               |               |       |
|--------------|------------------|----------------|---------------|---------------|---------------|---------------|-------|
| Age          | Years of Service |                |               |               |               |               |       |
|              | 1 & Under        | Greater than 1 |               | 5-9           | 10-14         | 15-19         | 20-24 |
|              |                  | & Under 5      |               |               |               |               |       |
| Less than 25 | 6,290            | 1,805          | 2             | -             | -             | -             |       |
| 25 to 30     | 12,266           | 22,198         | 4,332         | -             | -             | -             |       |
| 30 to 35     | 7,271            | 18,906         | 23,702        | 1,797         | 1             | -             |       |
| 35 to 40     | 4,666            | 11,636         | 19,960        | 14,906        | 3,299         | 4             |       |
| 40 to 45     | 3,965            | 9,029          | 13,199        | 14,499        | 22,187        | 3,691         |       |
| 45 to 50     | 2,911            | 6,679          | 9,415         | 8,991         | 17,067        | 22,771        |       |
| 50 to 55     | 2,258            | 5,347          | 7,295         | 6,885         | 11,247        | 18,963        |       |
| 55 to 60     | 1,350            | 3,394          | 4,640         | 4,446         | 6,999         | 10,260        |       |
| 60 to 65     | 760              | 2,228          | 2,823         | 2,771         | 4,413         | 5,510         |       |
| 65 to 70     | 375              | 1,196          | 1,354         | 1,153         | 1,629         | 1,876         |       |
| 70 and over  | 285              | 775            | 716           | 546           | 631           | 743           |       |
| <b>Total</b> | <b>42,397</b>    | <b>83,193</b>  | <b>87,438</b> | <b>55,994</b> | <b>67,473</b> | <b>63,818</b> |       |

| Age          | Years of Service |               |              |            |            | Total          |
|--------------|------------------|---------------|--------------|------------|------------|----------------|
|              | 25-29            | 30-34         | 35-39        | 40-44      | 45 & Over  |                |
| Less than 25 | -                | -             | -            | -          | -          | 8,097          |
| 25 to 30     | -                | -             | -            | -          | -          | 38,796         |
| 30 to 35     | -                | -             | -            | -          | -          | 51,677         |
| 35 to 40     | -                | -             | -            | -          | -          | 54,471         |
| 40 to 45     | 2                | -             | -            | -          | -          | 66,572         |
| 45 to 50     | 2,561            | 10            | -            | -          | -          | 70,405         |
| 50 to 55     | 15,431           | 1,127         | 3            | -          | -          | 68,556         |
| 55 to 60     | 10,131           | 7,251         | 685          | -          | -          | 49,156         |
| 60 to 65     | 4,326            | 2,945         | 1,390        | 50         | 1          | 27,217         |
| 65 to 70     | 1,104            | 600           | 291          | 130        | 15         | 9,723          |
| 70 and over  | 429              | 260           | 148          | 87         | 128        | 4,748          |
| <b>Total</b> | <b>33,984</b>    | <b>12,193</b> | <b>2,517</b> | <b>267</b> | <b>144</b> | <b>449,418</b> |

**Table C.3**  
**Inactive Members**

| Fiscal Year<br>Ending June 30 | Number  | Account<br>Balances <sup>(1)</sup> |
|-------------------------------|---------|------------------------------------|
| 2012                          | 127,763 | \$403,271,000                      |
| 2013                          | 130,776 | 444,279,000                        |
| 2014                          | 129,961 | 468,268,000                        |
| 2015                          | 129,698 | 496,059,000                        |
| 2016                          | 130,456 | 525,465,000                        |
| 2017                          | 131,823 | 551,790,000                        |
| 2018                          | 133,413 | 576,987,000                        |
| 2019                          | 135,579 | 608,705,000                        |
| 2020                          | 138,689 | 645,817,000                        |
| 2021                          | 146,396 | 694,450,000                        |
| 2022                          | 145,020 | 698,930,000                        |

1. Member counts and balances as shown in CalSTRS Overview.  
 Does not include Additional Earnings Credits for given year.

**Table C.4**  
**Annuitants**

| Fiscal Year<br>Ending June 30 | Number | Accounts at<br>Retirement |
|-------------------------------|--------|---------------------------|
| 2012                          | 41,991 | \$783,543,000             |
| 2013                          | 46,927 | 926,192,000               |
| 2014                          | 50,852 | 1,042,152,000             |
| 2015                          | 54,742 | 1,163,868,000             |
| 2016                          | 58,880 | 1,305,902,000             |
| 2017                          | 63,416 | 1,472,730,000             |
| 2018                          | 67,918 | 1,641,958,000             |
| 2019                          | 71,408 | 1,783,925,000             |
| 2020                          | 74,312 | 1,910,776,000             |
| 2021                          | 77,369 | 2,041,459,000             |
| 2022                          | 79,468 | 2,145,397,000             |

## 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 DBS 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, 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.

### **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 Member 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, 2022.