California State Teachers' Retirement System (CalSTRS)

Replication and Review of June 30, 2023 Actuarial Valuations

Segal

Segal

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January 22, 2025

Rick Reed
System Actuary
California State Teachers' Retirement System

Re: Replication and review of June 30, 2023 actuarial valuations

Dear Rick:

We are pleased to present the results of this replication and review of the June 30, 2023 Actuarial Valuations for the California State Teachers' Retirement System (CalSTRS). The purpose of this replication and review is to verify the calculations completed by Milliman for the June 30, 2023 actuarial valuations, and to offer comments on the methodology, results, and reports. We have also replicated and reviewed the actuarial assumptions developed by Milliman in their 2024 Experience Analysis. Our results and recommendations pertaining to the actuarial assumptions are provided in our report dated May 17, 2024.

This review was conducted by Todd Tauzer, a Fellow of the Society of Actuaries and Member of the American Academy of Actuaries, Andy Yeung, an Associate of the Society of Actuaries, Member of the American Academy of Actuaries and an Enrolled Actuary under ERISA, and Brad Ramirez, a Fellow of the Society of Actuaries, Member of the American Academy of Actuaries and an Enrolled Actuary under ERISA. This review was conducted in accordance with the standards of practice prescribed by the Actuarial Standards Board.

We are members of the American Academy of Actuaries, and we meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein.

The assistance of CalSTRS and Milliman is gratefully acknowledged. We appreciate the opportunity to be of service to CalSTRS, and we are available to answer any questions you may have on this report.

Sincerely,

Todd Tauzer, FSA, MAAA, FCA, CERA
Senior Vice President and Actuary

Andy Yeung, ASA, MAAA, FCA, EA
Vice President and Actuary

Brad Ramirez, FSA, MAAA, EA
Vice President and Consulting Actuary

MAM/jl

Table of Contents

Executive Summary 4

Purpose and Scope of the Actuarial Replication and Review 7
- Purpose of the replication and review 7
- Scope of the replication and review 7

Defined Benefit Program Valuation 8
- Assets 8
- Data 10
- Liabilities 11
- Contribution rates 22
- Cost impact of assumption changes 25
- Recommendations 26
- Content of valuation report 27
- Methods and procedures 29

Defined Benefit Supplement Program Valuation 30
- Data 30
- Valuation results 31

Cash Balance Benefit Program Valuation 35
- Data 35
- Valuation results 36

Supplemental Benefit Maintenance Account Projection 40
- Projections 40
- Content of projection report 42

Medicare Premium Payment Program Valuation 43
- Data 43
- Valuation results 43

Definition of Pension Terms 45

Executive Summary

This report has been prepared by Segal to present a replication and review of the June 30, 2023 actuarial valuations performed by Milliman for CalSTRS.

This replication and review report includes an independent reproduction of the Defined Benefit (DB), Defined Benefit Supplement (DBS), and Cash Balance Benefit (CBB) valuations, the Supplemental Benefit Maintenance Account (SBMA) projection, and the Medicare Premium Payment (MPP) valuation. The original reports were prepared by Milliman. The DB, MPP, and SBMA reports were dated April 11, 2024, and the DBS and CBB reports were dated May 14, 2024. This replication and review was based on actuarial reports, employee data and supplemental information provided by both CalSTRS and Milliman.

We have performed this replication and review to provide assurance to CalSTRS that the actuarial calculations are reasonable and that the actuarial process was conducted according to generally accepted actuarial principles and practices. **Our replication and review confirms that the actuarial calculations as of June 30, 2023 are reasonable and based on generally accepted actuarial principles and practices.** We were able to follow Milliman's methodologies to closely match and validate their results. There are only a few minor areas where we believe adjustments to the methodology would result in a more appropriate valuation of plan liabilities and determination of plan contributions.

Defined Benefit Program

We closely matched Milliman's results, which are reasonable and based on generally accepted actuarial principles and practices. The key results are shown in the following table:

Defined Benefit Program Summary

Result *($ millions)*	Milliman	Segal	Ratio
Actuarial Value of Assets[1]	$273,155	$273,155	100.0%
Normal Cost	7,917	7,962	100.6%
Present Value of Benefits	455,027	455,445	100.1%
Actuarial Obligation	359,741	359,934	100.1%
Unfunded Actuarial Obligation	86,586	86,780	100.2%
Funded Ratio	75.9%	75.9%	100.0%
State Supplemental Contribution Rate	5.811%	5.811%	100.0%
Employer Supplemental Contribution Rate	9.850%	9.850%	100.0%

We also generally have a close match when the liabilities are broken down by benefit structure, tier, status group, and decrement, as seen throughout the report below.

[1] The Actuarial Value of Assets shown in the table above is net of the SBMA reserve.

Executive Summary

Segal has two minor technical recommendations for the forthcoming June 30, 2024 valuation pertaining to Milliman's calculation of the liabilities, neither of which would have a material impact on the total liability results.

- The select minimum disabled mortality rates are not being applied to disabled retirees currently in pay status. We recommend that Milliman apply the select minimum mortality rates to these members.
- For the 1990 Benefit Structure, Milliman assumes that all inactive members will retire at age 60. For current inactive members in the 2% at 62 tier, the valuation assumes a retirement age of 62. We recommend that Milliman apply the assumed retirement age of 60.

Milliman's valuation report complies with generally accepted actuarial principles and practices, though we have some recommendations of areas where Milliman could add additional detail to the report for increased clarity and transparency.

Defined Benefit Supplement Program

We closely matched Milliman's results, which are reasonable and based on generally accepted actuarial principles and practices. The key results are shown in the following table:

Defined Benefit Supplement Program Summary

Result *($ thousands)*	Milliman	Segal	Ratio
Market Value of Assets[1]	$18,162,899	$18,162,899	100.0%
Actuarial Obligation	$14,706,756	$14,717,565	100.1%
Gain and Loss Reserve	$3,456,143	$3,445,334	99.7%
Funded Ratio	123.5%	123.4%	99.9%
Additional Earnings Credit	5.81%	5.77%	99.3%

Cash Balance Benefit Program

We closely matched Milliman's results, which are reasonable and based on generally accepted actuarial principles and practices. The key results are shown in the following table:

Cash Balance Benefit Program Summary

Result *($ thousands)*	Milliman	Segal	Ratio
Market Value of Assets[1]	$477,960	$477,960	100.0%
Actuarial Obligation	$423,624	$423,719	100.0%
Gain and Loss Reserve	$54,336	$54,241	99.8%
Funded Ratio	112.8%	112.8%	100.0%
Additional Earnings Credit	4.91%	4.91%	100.0%

[1] For the Defined Benefit Supplement Program and Cash Balance Benefit Program, the Actuarial Value of Assets equals the Market Value of Assets.

Supplemental Benefit Maintenance Account Projection

We closely matched Milliman's results, which are reasonable and based on generally accepted actuarial principles and practices.

We agree with Milliman's projection that the SBMA assets plus expected future contributions will be sufficient at the 85% level through June 30, 2089. Although the law only permits a purchasing power level up to 85%, we project that the maximum purchasing power at which the SBMA would be sufficient through June 30, 2089 is 90%, which is the same level that Milliman has projected.

Milliman's valuation report complies with generally accepted actuarial principles and practices, though we have some recommendations of areas where Milliman could add additional detail to the report for increased clarity and transparency.

Medicare Premium Payment Program

We closely matched Milliman's results, which are reasonable and based on generally accepted actuarial principles and practices.

Medicare Premium Payment Program Summary

Result *($ millions)*	Milliman	Segal	Ratio
Actuarial Obligation			
• Retirees with Part A premium	$221.2	$221.3	100.0%
• Retirees with Part B penalty	0.7	0.7	100.0%
Total	**$221.9**	**$222.0**	**100.0%**

Milliman's valuation report complies with generally accepted actuarial principles and practices, though we have some recommendations of areas where Milliman could add additional detail to the report for increased clarity and transparency.

Purpose and Scope of the Actuarial Replication and Review

Purpose of the replication and review

Segal has performed an actuarial replication and review of the CalSTRS June 30, 2023 Actuarial Valuations to provide assurance to CalSTRS that the actuarial calculations are reasonable and that the actuarial process was conducted according to generally accepted actuarial principles and practices.

Scope of the replication and review

The scope of the replication and review, as described in the CalSTRS Actuarial Replication and Review Services Agreement with Segal, includes the following:

- Replication of the June 30, 2023 Actuarial Valuations for the DB, DBS, CBB, SBMA and MPP programs, and evaluation of the reasonableness of the key results, including the following:
  - Normal cost, present value of benefits, actuarial obligation, present value of future normal cost, actuarial value of assets, amortization of the unfunded obligation, actuarial gain and loss analysis, contribution rates, actuarial gain and loss reserve, additional earnings credits, projected MPP costs, projected SBMA sufficiency, and cost impact of assumption changes.
- Review of individual sample life calculations.
- Documentation of results, methods, and recommendations for change or improvement, including the following:
  - Summary of key findings and analysis of key results.
  - Review of whether the valuation reports comply with actuarial standards.
  - Review of methods, checking and reviewing procedures.
  - Standards used in determining reasonableness of key results and an explanation of any significant differences.
  - Review of the clarity and completeness of the valuation reports.

Defined Benefit Program Valuation

Segal performed a full replication and review of the CalSTRS Defined Benefit (DB) program. **Our review confirms that the actuarial calculations as of June 30, 2023 are reasonable and based on generally accepted actuarial principles and practices.** We were able to closely match Milliman's results, and we have only minor recommendations for changes that would result in a more appropriate valuation of plan liabilities and determination of plan contributions.

Assets

For the valuation, Milliman receives information from CalSTRS about the Fair Market Value of Assets (MVA). Segal has relied upon this financial information as provided in Milliman's valuation report.

Based on the Fair Market Value of Assets, Milliman calculates an Actuarial Value of Assets (AVA) that is intended to gradually adjust assets to market value, resulting in more stable plan costs by not recognizing the full value of market fluctuations in a single year. The asset smoothing method uses three-year smoothing, which is a relatively short smoothing period when compared to five or seven years used by other public pension plans in California. According to CalSTRS, the shorter smoothing period was determined to be appropriate for the plan considering CalSTRS' annual limitation on contribution rate changes. We find this reasonable.

Defined Benefit Program Valuation

The table below shows the calculation of the AVA under CalSTRS' asset smoothing method. **We have confirmed the application of the asset smoothing method as of June 30, 2023.**

Actuarial Value of Assets

Result *($ millions)*	Milliman	Segal	Ratio
Expected Actuarial Value of Assets			
AVA at beginning of year[1]	$280,591	$280,591	100.0%
• Contributions[1]	15,230	15,230	100.0%
• Benefits[1]	(17,727)	(17,727)	100.0%
• Change in GASB adjustments[1]	(22)	(22)	100.0%
• Expected return	19,554	19,553	100.0%
Expected AVA at end of year	**$297,626**	**$297,625**	**100.0%**
Actual Actuarial Value of Assets			
MVA at end of year[1]	$299,148	$299,148	100.0%
Difference between MVA and expected AVA	1,522	1,523	100.1%
One-third recognition of difference	507	508	100.2%
AVA at end of year (including SBMA)	**$298,133**	**$298,133**	**100.0%**
Value of SBMA assets at end of year[1]	$24,978	$24,978	100.0%
AVA at end of year (excluding SBMA)	**$273,155**	**$273,155**	**100.0%**

Based on the beginning of year AVA and the cash flows for the year provided in Milliman's report, Segal closely matches the expected and actual AVA at the end of the year.

[1] The value in the Segal column relies upon the financial information shown in Milliman's valuation report.

Data

Milliman provided Segal with the scrubbed membership data used in the June 30, 2023 DB valuation. As directed by CalSTRS, Segal used this data as provided by Milliman, and did not replicate Milliman's data preparation process. **Based on this data, we closely match Milliman's valuation statistics.**

We understand from CalSTRS that the member counts in Milliman's report are based on counts in the CalSTRS' financial statements, and therefore may differ slightly from the counts in the membership data. Segal's counts below reflect the number in the membership data, and they are very close to the counts in the valuation report.

Summary of Membership Data

Statistic	Milliman	Segal	Ratio
Number of Members			
• Active members	458,645	457,656	99.8%
• Inactive members	234,479	234,528	100.0%
• Service retirees	288,494	288,470	100.0%
• Disabled retirees	9,809	9,809	100.0%
• Survivors	30,629	31,713	103.5%
Total	**1,022,056**	**1,022,176**	**100.0%**
Active Member Statistics			
Prior year earned salary *($ millions)*	$38,916	$39,186	100.7%
Average earned salary	84,850	85,623	100.9%
Average age	45.1	45.1	100.0%
Average service	12.5	12.5	100.0%
Inactive Member Statistics			
Average age	51.0	50.9	99.8%
Average account balance	$15,475	$15,597	100.8%
Pay Status Member Statistics			
Service retiree average age	74.7	74.7	100.0%
Disabled retiree average age	68.0	68.0	100.0%
Survivor average age[1]	78.0	78.0	100.0%
Total pay status average age	**74.8**	**74.8**	**100.0%**
Service retiree average benefit	$4,575	$4,575	100.0%
Disabled retiree average benefit	3,188	3,188	100.0%
Survivor average benefit[1]	3,087	3,087	100.0%
Total pay status average benefit	**$4,410**	**$4,410**	**100.0%**

[1] The average excludes survivors in the family benefit data file.

Liabilities

Based on the member data, plan provisions, and actuarial assumptions provided by Milliman and described in their report, Segal programmed our valuation system to replicate the liability results for the DB program. **We closely match Milliman's valuation liabilities.**

All of our liability totals are within 1% of Milliman's. While the percentage difference may be greater when the liabilities are broken down by benefit structure, tier, status group, or decrement, these results remain reasonable. Some differences in the results are expected due to differences between Segal and Milliman's valuation systems. Differences could include such things as the rounding used in the calculations of ages or the assumed timing for salary increases and benefit payments. Various methodologies are acceptable, with each actuarial firm establishing its own standards. Given the differences in the valuation systems, we would not expect to match Milliman's results exactly.

Normal Cost

The following tables summarize Segal's replication of Milliman's normal cost. The normal cost is calculated using the Entry Age cost method. **We closely match Milliman's calculation of the total normal cost.**

Normal Cost - Total

Result *($ millions)*	Milliman	Segal	Ratio
Estimated Annual Earned Salaries	$39,108	$39,112	100.0%
Present Value of Future Normal Costs	95,286	95,511	100.2%
Present Value of Future Earned Salaries	487,611	487,334	99.9%
Normal Cost			
• Service retirement	$7,188	$7,204	100.2%
• Deferred retirement and refund	412	434	105.3%
• Death	57	61	107.0%
• Disability	260	263	101.2%
Total Normal Cost	**$7,917**	**$7,962**	**100.6%**
Total Normal Cost Rate	**20.244%**	**20.356%**	**100.6%**

Defined Benefit Program Valuation

Normal Cost – 2% at 60 Tier

Result *($ millions)*	Milliman	Segal	Ratio
Estimated Annual Earned Salaries	$27,571	$27,570	100.0%
Present Value of Future Normal Costs	55,308	55,767	100.8%
Present Value of Future Earned Salaries	264,465	264,191	99.9%
Normal Cost			
• Service retirement	$5,286	$5,307	100.4%
• Deferred retirement and refund	291	320	110.0%
• Death	42	45	107.1%
• Disability	176	179	101.7%
Total Normal Cost	**$5,795**	**$5,850**	**100.9%**
Total Normal Cost Rate	**21.022%**	**21.219%**	**100.9%**

Normal Cost – 2% at 62 Tier

Result *($ millions)*	Milliman	Segal	Ratio
Estimated Annual Earned Salaries	$11,537	$11,542	100.0%
Present Value of Future Normal Costs	39,978	39,744	99.4%
Present Value of Future Earned Salaries	223,146	223,143	100.0%
Normal Cost			
• Service retirement	$1,902	$1,897	99.7%
• Deferred retirement and refund	121	114	94.2%
• Death	15	16	106.7%
• Disability	84	84	100.0%
Total Normal Cost	**$2,122**	**$2,112**	**99.5%**
Total Normal Cost Rate	**18.393%**	**18.296%**	**99.5%**

Segal closely matches Milliman's calculation of total normal cost and present value of future normal costs, and Milliman's results are reasonable.

Actuarial Obligation

The following tables summarize Segal's replication of Milliman's Actuarial Obligation. The Actuarial Obligation is calculated using the Entry Age cost method. **We closely match Milliman's calculation of the total Actuarial Obligation.**

Note that the small difference in liabilities between Milliman and Segal for members in pay status is primarily due to the timing of benefit payments in our respective valuation systems. This is a common result across different valuation systems.

Actuarial Obligation – Total

Result *($ millions)*	Milliman	Segal	Ratio
Present Value of Benefits			
• Service retirees	$171,992	$173,200	100.7%
• Disabled retirees	3,994	4,013	100.5%
• Survivors	9,847	9,920	100.7%
• Inactive members	9,553	9,658	101.1%
• Active members			
– Service retirement	$247,347	$246,130	99.5%
– Deferred retirement and refund	5,008	5,000	99.8%
– Death	1,267	1,362	107.5%
– Disability	5,797	5,938	102.4%
– Total active	$259,419	$258,430	99.6%
• MPP program unfunded obligation	$222	$222	100.0%
Total Present Value of Benefits	**$455,027**	**$455,445**	**100.1%**
Present Value of Future Normal Costs	$95,286	$95,511	100.2%
Actuarial Obligation			
• Retirees and beneficiaries	$185,833	$187,133	100.7%
• Inactive members	9,553	9,658	101.1%
• Active members	164,355	163,143	99.3%
Total Actuarial Obligation	**$359,741**	**$359,934**	**100.1%**

Defined Benefit Program Valuation

Actuarial Obligation – 2% at 60 Tier

Result *($ millions)*	Milliman	Segal	Ratio
Present Value of Benefits			
• Service retirees	$171,932	$173,140	100.7%
• Disabled retirees	3,980	3,999	100.5%
• Survivors	9,847	9,915	100.7%
• Inactive members	9,016	9,116	101.1%
• Active members			
– Service retirement	$201,224	$200,292	99.5%
– Deferred retirement and refund	2,660	2,683	100.9%
– Death	927	1,008	108.7%
– Disability	3,799	3,938	103.7%
– Total active	$208,610	$207,922	99.7%
• MPP program unfunded obligation	$222	$222	100.0%
Total Present Value of Benefits	**$403,607**	**$404,313**	**100.2%**
Present Value of Future Normal Costs	$55,308	$55,767	100.8%
Actuarial Obligation			
• Retirees and beneficiaries	$185,759	$187,054	100.7%
• Inactive members	9,016	9,116	101.1%
• Active members	153,524	152,376	99.3%
Total Actuarial Obligation	**$348,299**	**$348,546**	**100.1%**

Defined Benefit Program Valuation

Actuarial Obligation – 2% at 62 Tier

Result *($ millions)*	Milliman	Segal	Ratio
Present Value of Benefits			
• Service retirees	$60	$60	100.0%
• Disabled retirees	14	14	100.0%
• Survivors[1]	0	6	N/A
• Inactive members	537	543	101.1%
• Active members			
– Service retirement	$46,123	$45,838	99.4%
– Deferred retirement and refund	2,348	2,317	98.7%
– Death	340	354	104.1%
– Disability	1,998	1,999	100.1%
– Total active	$50,809	$50,509	99.4%
• MPP program unfunded obligation	$0	$0	N/A
Total Present Value of Benefits	**$51,420**	**$51,132**	**99.4%**
Present value of future normal costs	$39,978	$39,744	99.4%
Actuarial Obligation			
• Retirees and beneficiaries[1]	$74	$80	108.1%
• Inactive members	537	543	101.1%
• Active members	10,831	10,765	99.4%
Total Actuarial Obligation	**$11,442**	**$11,388**	**99.5%**

Segal closely matches Milliman's calculation of total present value of benefits and total Actuarial Obligation, and Milliman's results are reasonable.

[1] As noted in the *Content of valuation report* subsection on page 27, the difference in liability for retirees and beneficiaries in the 2% at 62 tier is primarily due to a difference in how Milliman and Segal are categorizing the survivor results by tier.

Unfunded Actuarial Obligation

The Unfunded Actuarial Obligation (UAO) is the difference between the Actuarial Obligation and Actuarial Value of Assets described above.

Unfunded Actuarial Obligation

Result *($ millions)*	Milliman	Segal	Ratio
Actuarial Obligation	$359,741	$359,934	100.1%
Actuarial Value of Assets	273,155	273,155	100.0%
Unfunded Actuarial Obligation	**$86,586**	**$86,780**	**100.2%**
Funded Ratio	**75.9%**	**75.9%**	**100.0%**

In the valuation, Milliman calculates the Actuarial Obligation under several structures in order to comply with the policies in the Funding Plan. The assets for each structure are projected forward each year based on the contributions and benefit payments attributable to that structure, and are then used to calculate the structure's UAO.

The 1990 Benefit Structure is a re-calculation of the liabilities under the plan provisions in effect in 1990. The UAO attributable to these plan provisions is allocated to the State.

The New Benefits liability is the value of plan provisions effective after 1990. For service through June 30, 2014, the New Benefits UAO is allocated to the Employers. The liability for service through June 30, 2014 has no normal cost as there are no ongoing accruals, so for this liability breakdown the Actuarial Obligation is equal to the present value of benefits.

The New Benefits structure for service after June 30, 2014 is currently in a surplus. The allocation of assets to this structure is credited with each year's normal cost for the New Benefits. Any UAO that may emerge due to future experience is unallocated, with no entity being responsible for its funding.

The following tables show the Actuarial Obligation under each of the above benefit structures. Some of the information on the Actuarial Obligation by status for these benefit structures was not provided in Milliman's valuation report, but was provided separately to Segal upon request for purposes of this review. The following tables also show the UAO based on the financial information in Milliman's valuation report pertaining to each of these benefit structures. **We closely match Milliman's breakdown of the Actuarial Obligation and the UAO.**

Defined Benefit Program Valuation

Unfunded Actuarial Obligation – 1990 Benefit Structure

Result *($ millions)*	Milliman	Segal	Ratio
Actuarial Obligation			
• Retirees and beneficiaries	$154,120	155,198	100.7%
• Inactive members	9,174	9,370	102.1%
• Active members	133,922	133,792	99.9%
Total Actuarial Obligation	**$297,216**	**$298,360**	**100.4%**
Actuarial Value of Assets[1]	$288,825	$288,825	100.0%
Unfunded Actuarial Obligation	**$8,391**	**$9,535**	**113.6%**

Unfunded Actuarial Obligation – New Benefits Pre-2014

Result *($ millions)*	Milliman	Segal	Ratio
Actuarial Obligation			
• Retirees and beneficiaries	$29,273	$29,478	100.7%
• Inactive members	293	295	100.7%
• Active members	15,874	15,767	99.3%
• MPP program unfunded obligation	222	222	100.0%
Total Actuarial Obligation	**$45,662**	**$45,762**	**100.2%**
Actuarial Value of Assets[1]	$(32,889)	$(32,889)	100.0%
Unfunded Actuarial Obligation	**$78,551**	**$78,651**	**100.1%**

Unfunded Actuarial Obligation – New Benefits Post-2014

Result *($ millions)*	Milliman	Segal	Ratio
Actuarial Obligation			
• Retirees and beneficiaries	$2,440	$2,458	100.7%
• Inactive members	86	(7)	(8.1%)
• Active members	14,337	13,362	93.2%
Total Actuarial Obligation	**$16,863**	**$15,813**	**93.8%**
Actuarial Value of Assets[1]	$17,219	$17,219	100.0%
Unfunded Actuarial Obligation	**$(356)**	**$(1,406)**	**394.9%**

[1] The value in the Segal column relies upon the financial information shown in Milliman's valuation report.

Defined Benefit Program Valuation

Compared to the other benefit structures, we do not match Milliman as closely on a percentage basis for the Actuarial Obligation of the New Benefits Post-2014 Service. However, this is to be expected as it is a relatively small number calculated as the difference between larger numbers where we do have a reasonably close match. We believe Milliman's result to be reasonable. This leverage effect on the UAO difference can also be seen to a lesser extent with the 1990 Benefit Structure.

Gain/loss

The gain/loss is a reconciliation between the expected June 30, 2023 UAO based on the June 30, 2022 valuation results and the actual June 30, 2023 UAO. If overall experience is more favorable than anticipated from the actuarial assumptions, there will be an actuarial gain, and if overall experience is less favorable than anticipated, there will be an actuarial loss. Segal did not fully replicate the gain/loss analysis as we did not perform a June 30, 2022 valuation. However, we reviewed the gain/loss by referencing Milliman's June 30, 2022 valuation results. **Milliman's calculation of the gain/loss as of June 30, 2023 is reasonable.**

(Gain)/Loss as of June 30, 2023

Result *($ millions)*	Milliman	Segal	Ratio
Expected Unfunded Actuarial Obligation			
• June 30, 2022 Unfunded Actuarial Obligation[1]	$88,552	$88,552	100.0%
• June 30, 2022 Normal Cost[1]	7,612	7,612	100.0%
• Expected Contributions[2]	14,036	13,923	99.2%
• Interest	5,980	5,981	100.0%
Expected June 30, 2023 Unfunded Actuarial Obligation	**$88,108**	**$88,223**	**100.1%**
Gain/Loss on Unfunded Actuarial Obligation			
• Expected June 30, 2023 Unfunded Actuarial Obligation	$88,108	$88,223	100.1%
• Actual June 30, 2023 Unfunded Actuarial Obligation	86,586	86,780	100.2%
(Gain)/Loss	**$(1,522)**	**$(1,443)**	**94.9%**

To the extent that information was available, we reviewed the breakdown of the gain/loss and found it to be reasonable. The gain/loss above includes the impact of assumption changes, which Segal closely matched; for more details, see the *Cost impact of assumption changes* subsection below on page 25. The investment gain is reasonable based on the difference between the actual and expected AVA. The contribution gain is reasonable based on the actual contributions for the prior year, the adopted contribution rates for the prior year, and the projected payroll amounts from the June 30, 2022 valuation report.

[1] The value in the Segal column relies upon the June 30, 2022 results shown in Milliman's valuation report.
[2] Segal has estimated the expected contributions based on adopted contribution rates for the year ended June 30, 2023 and the projected payroll amounts for state and employer from the June 30, 2022 valuation report.

Sample lives

As part of our replication and review, Segal reviewed 16 sample lives covering a range of demographic characteristics. **We closely match Milliman's liabilities for the individual members.** These sample lives are summarized below, with additional detail provided for the five actives that we reviewed.

Retiree and Beneficiary Sample Lives – Actuarial Obligation

Sample Life	Milliman	Segal	Ratio
1. Healthy Retiree, Male, Pop-Up Annuity	$305,499	$307,573	100.7%
2. Healthy Retiree, Female, Joint and Survivor Annuity	216,274	217,734	100.7%
3. Disabled Retiree, Female, Life Annuity	363,769	360,440	99.1%
4. Beneficiary, Male	422,729	425,675	100.7%
5. Family Benefit, Spouse Only	48,273	49,197	101.9%
6. Family Benefit, Children Only	37,880	37,210	98.2%
7. Family Benefit, Spouse and Children	335,852	342,314	101.9%

Inactive Sample Lives – Actuarial Obligation

Sample Life	Milliman	Segal	Ratio
1. Non-Vested, Lump Sum Only	$23,795	$23,930	100.6%
2. Vested, Male, 2% at 60	221,633	223,171	100.7%
3. Vested, Female, 2% at 60	207,316	210,443	101.5%
4. Vested, Female, 2% at 62	21,743	22,097	101.6%

Active Sample Life #1: Male, Age 75+

Result	Milliman	Segal	Ratio
Projected Compensation	$0	$0	100.0%
Present Value of Future Salary	0	0	100.0%
Present Value of Benefits	1,066,340	1,075,467	100.9%
Normal Cost	0	0	100.0%
Actuarial Obligation (Total)	1,066,340	1,075,467	100.9%
Actuarial Obligation (1990 Benefit Structure)	831,602	841,480	101.2%
Actuarial Obligation (New Benefits Pre-2014)	191,463	192,686	100.6%
Actuarial Obligation (New Benefits Post-2014)	43,275	41,301	95.4%

Defined Benefit Program Valuation

Active Sample Life #2: Female, 2% at 60 Tier, Coverage A

Result	Milliman	Segal	Ratio
Projected Compensation	$128,350	$128,346	100.0%
Present Value of Future Salary	895,362	894,559	99.9%
Present Value of Benefits	1,265,840	1,262,638	99.7%
Normal Cost	25,105	25,083	99.9%
Actuarial Obligation (Total)	1,090,709	1,087,815	99.7%
Actuarial Obligation (1990 Benefit Structure)	868,884	867,621	99.9%
Actuarial Obligation (New Benefits Pre-2014)	146,675	146,477	99.9%
Actuarial Obligation (New Benefits Post-2014)	75,151	73,717	98.1%

Active Sample Life #3: Male, 2% at 60 Tier, Coverage B

Result	Milliman	Segal	Ratio
Projected Compensation	$70,893	$70,892	100.0%
Present Value of Future Salary	637,708	636,528	99.8%
Present Value of Benefits	517,753	515,278	99.5%
Normal Cost	14,631	14,357	98.1%
Actuarial Obligation (Total)	386,145	386,371	100.1%
Actuarial Obligation (1990 Benefit Structure)	330,910	330,045	99.7%
Actuarial Obligation (New Benefits Pre-2014)	23,062	22,813	98.9%
Actuarial Obligation (New Benefits Post-2014)	32,173	33,513	104.2%

Active Sample Life #4: Female, 2% at 62 Tier

Result	Milliman	Segal	Ratio
Projected Compensation	$28,376	$28,377	100.0%
Present Value of Future Salary	670,552	670,286	100.0%
Present Value of Benefits	127,956	126,905	99.2%
Normal Cost	5,345	5,303	99.2%
Actuarial Obligation (Total)	1,640	1,639	99.9%
Actuarial Obligation (1990 Benefit Structure)	1,626	1,625	99.9%
Actuarial Obligation (New Benefits Pre-2014)	0	0	100.0%
Actuarial Obligation (New Benefits Post-2014)	14	14	100.0%

Defined Benefit Program Valuation

Active Sample Life #5: Male, 2% at 62 Tier, Salary Above Limitation

Result	Milliman	Segal	Ratio
Projected Compensation	$168,371	$168,369	100.0%
Present Value of Future Salary	1,973,651	1,971,791	99.9%
Present Value of Benefits	418,315	415,430	99.3%
Normal Cost	26,645	26,329	98.8%
Actuarial Obligation (Total)	105,983	107,089	101.0%
Actuarial Obligation (1990 Benefit Structure)	121,321	123,332	101.7%
Actuarial Obligation (New Benefits Pre-2014)	0	0	100.0%
Actuarial Obligation (New Benefits Post-2014)	(15,337)	(16,243)	105.9%

Contribution rates

Based on the above liability results, Milliman has applied the provisions of the Funding Plan to develop contribution rates as of June 30, 2023. We have replicated the state supplemental contribution rate, the employer supplemental contribution rate, and the base contribution rate for members in the 2% at 62 tier. **We closely match Milliman's calculation of the contribution rates.**

State Supplemental Contribution Rate

Result	Milliman	Segal	Ratio
Funded Status *($ millions)*			
1990 Benefit Structure Actuarial Obligation	$297,216	$298,360	100.4%
1990 Benefit Structure Actuarial Value of Assets[1]	288,825	288,825	100.0%
Unfunded Actuarial Obligation	**$8,391**	**$9,535**	**113.6%**
Amortization Sufficiency			
Revenue for 1990 Benefit Structure	16.000%	16.000%	100.0%
Normal Cost Rate for 1990 Benefit Structure[2]	17.980%	17.925%	99.7%
Normal Cost Surplus/(Deficit)	**(1.980%)**	**(1.925%)**	**97.2%**
Normal Cost Surplus/(Deficit) Using State Payroll[3]	(2.110%)	(2.057%)	97.5%
Additional Revenue Under EC 22955.1(b)	6.311%	6.311%	100.0%
Revenue Available for Amortization	**4.201%**	**4.254%**	**101.3%**
Revenue Needed for Amortization[4]	1.230%	1.439%	117.0%
Revenue Surplus/(Deficit)	**2.971%**	**2.815%**	**94.7%**
Unconstrained Contribution Rate			
Current EC 22955.1(b) Contribution Rate	6.311%	6.311%	100.0%
Increase/(Decrease) in State Contribution Rate	(2.971%)	(2.815%)	94.7%
Unconstrained Contribution Rate	**3.340%**	**3.496%**	**104.7%**
EC 22955.1(b) Calculated Contribution Rate			
Current EC 22955.1(b) Contribution Rate	6.311%	6.311%	100.0%
Increase/(Decrease) Capped at 0.5%	(0.500%)	(0.500%)	100.0%
EC 22955.1(b) Calculated Contribution Rate	**5.811%**	**5.811%**	**100.0%**

Segal's calculation of the unconstrained state supplemental contribution rate is slightly higher than Milliman's due to our higher UAO for the 1990 Benefit Structure. However, we exactly

[1] The value in the Segal column relies upon the financial information shown in Milliman's valuation report.
[2] The normal cost rate is calculated as an average on a present value basis through June 30, 2046.
[3] State payroll is based on the member compensation from two fiscal years prior. The conversion from employer payroll to state payroll is the ratio between the present value of state payroll through June 30, 2046 and the present value of employer payroll through June 30, 2046.
[4] The revenue needed for amortization is calculated as the UAO as of June 30, 2023, projected forward to June 30, 2024, divided by the present value of state payroll from that date through June 30, 2046.

match Milliman's calculated state supplemental contribution rate after applying the maximum change of 0.5%.

Employer Supplemental Contribution Rate

Result	Milliman	Segal	Ratio
Funded Status *($ millions)*			
New Benefits Pre-2014 Actuarial Obligation	$45,662	$45,762	100.2%
New Benefits Pre-2014 Actuarial Value of Assets[1]	(32,889)	(32,889)	100.0%
Unfunded Actuarial Obligation	**$78,551**	**$78,651**	**100.1%**
Amortization Sufficiency			
New Benefits Normal Cost Rate Surplus/(Deficit)[2]	2.692%	2.712%	100.7%
Current EC 22950.5 Contribution Rate	10.850%	10.850%	100.0%
Revenue Available for Amortization	**13.542%**	**13.562%**	**100.1%**
Revenue Needed for Amortization[3]	12.419%	12.445%	100.2%
Revenue Surplus/(Deficit)	**1.123%**	**1.117%**	**99.5%**
Unconstrained Contribution Rate			
Current EC 22950.5 Contribution Rate	10.850%	10.850%	100.0%
Increase/(Decrease) in State Contribution Rate	(1.123%)	(1.117%)	99.5%
Unconstrained Contribution Rate	**9.727%**	**9.733%**	**100.1%**
EC 22950.5 Calculated Contribution Rate			
Current EC 22950.5 Contribution Rate	10.850%	10.850%	100.0%
Increase/(Decrease) Capped at 1.0%	(1.000%)	(1.000%)	100.0%
EC 22950.5 Calculated Contribution Rate	**9.850%**	**9.850%**	**100.0%**

Segal very closely matches Milliman's calculation of the unconstrained employer supplemental contribution rate, and we exactly match Milliman's calculated contribution rate after applying the maximum change of 1.0%.

In the calculation of the contribution rates, the normal cost and Unfunded Actuarial Obligation amortization rates are calculated on a present value basis through June 30, 2046. This is consistent with the policy in the Funding Plan to set contribution rates that fully fund the DB program by June 30, 2046. In general, the normal cost rate for the 2% at 60 tier is higher than the normal cost rate for the 2% at 62 tier. Instead of having the contribution rate decline as the proportion of active members shifts between tiers, Milliman's approach results in a slightly lower normal cost rate in the current valuation, though it is expected to remain approximately level

[1] The value in the Segal column relies upon the financial information shown in Milliman's valuation report.
[2] The New Benefits normal cost surplus is calculated as the employer sick leave rate plus the state base rate plus the average member supplemental contribution rate on a present value basis through June 30, 2046, minus the average New Benefits normal cost rate on a present value basis through June 30, 2046.
[3] The revenue needed for amortization is calculated as the Unfunded Actuarial Obligation as of June 30, 2023, projected forward to June 30, 2024, divided by the present value of state payroll from that date through June 30, 2046.

instead of declining. We understand that this approach has been agreed upon between CalSTRS and Milliman.

Although the calculated state and employer supplemental contribution rates have decreased from the rates adopted as of June 30, 2022, we understand that the board's practice has been to maintain the supplemental contribution rates at the current levels.

As described below in the *Content of valuation report* subsection on page 27, we recommend adding some additional detail to the report about the calculation of the state and employer supplemental contribution rates for increased transparency.

For members in the 2% at 62 tier, Milliman calculated a normal cost rate of 18.393%. **This result is reasonable; for comparison, we have calculated a normal cost rate of 18.296% for members in the 2% at 62 tier.** As Milliman has noted, the base member contribution rate for members in the 2% at 62 tier does not change unless the increase or decrease in the normal cost rate is greater than 1% of payroll since the last adjustment, and this threshold has not been reached. Therefore, there is no change to the member contribution rate for the 2% at 62 tier as of June 30, 2023.

Cost impact of assumption changes

The June 30, 2023 valuation reflects the updated actuarial assumptions recommended by Milliman in their experience analysis report dated December 22, 2023. The updates included changes to the assumptions for mortality, retirement, disability, termination, refund, merit salary increases, payroll growth, and other miscellaneous assumptions. **We have confirmed the implementation of the assumption changes in the June 30, 2023 valuation, and Milliman's calculation of the cost impact is reasonable.**

Assumption Change Cost Impact – Actuarial Obligation

Result *($ millions)*	Milliman	Segal	Ratio
Prior Actuarial Assumptions	$364,901	$365,312	100.1%
New Actuarial Assumptions	359,741	359,934	100.1%
Cost Impact	**$(5,160)**	**$(5,378)**	**104.2%**

Assumption Change Cost Impact – Contribution Rates

Cost Impact on Contribution Rate	Milliman	Segal	Ratio
Unconstrained State Supplemental Rate	(0.54%)	(0.82%)	151.9%
Unconstrained Employer Supplemental Rate	0.14%	0.20%	142.9%

Segal closely matches the impact of the assumption changes on the Actuarial Obligation, and we calculate a similar impact as Milliman on the unconstrained employer supplemental contribution rate as a percentage of payroll.

For the unconstrained state supplemental contribution rate, Segal's calculation of the cost impact is a larger reduction as a percentage of payroll than Milliman. This is due in part to Segal calculating a higher 1990 Benefit Structure Unfunded Actuarial Obligation, and the relative sizes of this Unfunded Actuarial Obligation before and after the assumption changes. There also may be methodology differences between Milliman and Segal in reconciling the contribution rates from the prior year to the current year. Milliman's cost impact result is reasonable.

Recommendations

Based on our review of the above liability results, Segal has the following recommendations for the forthcoming June 30, 2024 valuation. These are minor technical changes, and the adoption of these recommendations would not have a material impact on the total liability results.

- According to Milliman's valuation report, there is an assumption that the mortality rate for disabled members will be at least a minimum rate in the first, second, and third years of disability. These select minimum rates are being applied in the projected disablements for active members, but not for disabled retirees currently in pay status. **We recommend that Milliman apply this assumption to disabled retirees currently in pay status.**
- The 1990 Benefit Structure is valued using assumed retirement timing that is intended to be consistent with the benefits in effect in 1990. According to Milliman's valuation report, all inactive members are assumed to retire at age 60 under the 1990 Benefit Structure. However, the valuation for the 1990 Benefit Structure currently assumes that inactive members in the 2% at 62 tier will retire at age 62. **We recommend that Milliman apply the assumed retirement age of 60 for all inactive members in the 1990 Benefit Structure valuation.** We understand that Milliman's 1990 Benefit Structure valuation is correctly using the retirement age of 60 for active members assumed to become inactive in the future.

Content of valuation report

Milliman's report complies with generally accepted actuarial principles and practices which are consistent with the core requirements of the Actuarial Standards of Practice and the Code of Professional Conduct and Qualifications Standards for Public Statements of Actuarial Opinion of the American Academy of Actuaries.

As part of our review, we evaluated Milliman's report for clarity and organization. Their report is organized in a reasonable manner, developing the Actuarial Obligation, Actuarial Value of Assets, funded status, and contribution rates in a logical order. We believe the Summary of the Findings section from pages 1 to 12 adds particular value for CalSTRS and other stakeholders as an accessible summary of the valuation results and the Funding Plan.

Actuarial Standard of Practice No. 41 (Actuarial Communications), Section 3.2 states: *In the actuarial report, the actuary should state the actuarial findings, and identify the methods, procedures, assumptions, and data used by the actuary with sufficient clarity that another actuary qualified in the same practice area could make an objective appraisal of the reasonableness of the actuary's work as presented in the actuarial report.*

While Milliman's report includes a significant amount of information that another actuary can use toward making an objective appraisal of the reasonableness of their work, there are some areas where we recommend that Milliman consider adding additional detail that would be helpful for such an appraisal:

- In Table 2 (Actuarial Obligation) on page 18, the survivor liability for both tiers is combined into the column for the 2% at 60 tier. **We recommend separating the survivor liability by tier, consistent with the other status groups.**
- In Table 2 (Actuarial Obligation) on page 18, the post-retirement lump sum death benefit for current retirees is included in the row for survivors. **We recommend adding a note about this liability allocation.**
- In Table 5 (Market Value of Assets by Funding Group) on page 22, it is not clear how contributions toward the New Benefits are allocated between pre- and post-2014 service. In conversations with Milliman, they provided us with an updated version of Table 5 which clarifies the allocation. **We recommend using this updated version of Table 5.**
- In Table 11 (1990 Benefit Structure) on page 37, additional detail on how the Normal Cost Surplus/Deficit is converted from employer payroll to state payroll would be helpful. **We recommend adding a note that it is based on the ratio of the present value of state payroll through June 30, 2046 to employer payroll through June 30, 2046.**
- In Table 11 (1990 Benefit Structure) on page 37 and Table 14 (Pre-2014 Service) on page 44, additional detail on how the Revenue Needed for Amortization is calculated would be helpful. **We recommend adding a note that it is based on Unfunded Actuarial Obligation projected forward one year, then divided by present value of payroll through June 30, 2046.**
- In Table 14 (Pre-2014 Service) on page 44, additional detail on how the Post-1990 Normal Cost Rate Surplus/Deficit is calculated would be helpful. In conversations with Milliman, they provided us an expanded version of the Allocation of Contribution Rates table on page 41

which provides these details. This expanded version also splits the New Benefits column into two columns for service pre- and post-2014. **We recommend using this expanded version of the Allocation of Contribution Rates table.**

- Active members are not assumed to earn one year of service per year; instead, assumed future benefit accruals are based on a service rate in the census data. **We recommend describing this assumption.**
- For the disability assumption, Milliman only applies the disability rates beginning at five years of credited service (consistent with the service requirement for a disability benefit). For the termination assumption, the termination rates cease when a member is eligible for service retirement. **In the descriptions of the demographic assumptions, we recommend noting these details of when the decrement rates apply.**
- In valuing the 1990 Benefit Structure, Milliman has observed that complete data is not available for beneficiaries of members with dates of retirement on or after January 1, 2000. For this reason, the benefit for beneficiaries under the 1990 plan provisions is assumed to be a certain percentage of their total benefit, with the percentage varying based on date of retirement. The percentages have been calculated based on an analysis of service retirements for the relevant time periods. **We recommend describing this assumption.**
- Milliman's payroll growth assumption is 3.25%. However, in projecting payroll used to calculate the contribution rates, Milliman also assumes an additional payroll increase of 1.00% in the first year only. This is based on the observation that teachers tend to exit employment in May or June, and their replacements may not be hired by the valuation date of June 30, so the active member data may understate the payroll. **We recommend describing the additional first year 1.00% payroll growth assumption.**
- In the description of the pre-retirement death provisions for Coverage A on page 62, it is not clear whether the joint and survivor allowance is payable at the member's age 60 or the beneficiary's age 60. We understand from a conversation with Milliman that it is based on the member's age. **We recommend clarifying the description of this Coverage A provision.** Note that this wording is already clear in the report for Coverage B on page 63.

Methods and procedures

As part of our replication and review, we asked Milliman to provide information on their methods and procedures used in performing their work. **The information we received indicates that appropriate methods, checking, and reviewing procedures were followed in the preparation of the actuarial valuations.** The following is a summary of the information provided by Milliman:

- Consistent with the requirements of Actuarial Standard of Practice No. 23 (Data Quality) Milliman does not audit the census data, but they do review it for reasonableness. This review includes comparisons with prior year data, comparisons with information published by CalSTRS, review of age/service distributions, reconciliation of counts by status, and gain/loss analysis.
- Milliman electronically prints their work so that other team members can review that it was performed correctly and check any changes to the process.
- Milliman has a team of four to five members who perform the actuarial work, and they routinely obtain an independent peer review from a Milliman consultant who is not assigned to CalSTRS.
- CalSTRS reviews the plan provisions as described in Milliman's valuation reports to ensure they are consistent with the Teachers' Retirement Law, and CalSTRS communicates any changes in plan provisions to Milliman so they can be appropriately valued.
- CalSTRS reviews the draft valuation reports before Milliman produces final versions, and Milliman responds to any questions raised by CalSTRS, updating the reports where necessary.

Defined Benefit Supplement Program Valuation

Segal performed a full replication and review of the CalSTRS Defined Benefit Supplement (DBS) program. **Our review confirms that the actuarial calculations as of June 30, 2023 are reasonable and based on generally accepted actuarial principles and practices.** We were able to closely match Milliman's results.

Additionally, Milliman's report complies with generally accepted actuarial principles and practices which are consistent with the core requirements of the Actuarial Standards of Practice and the Code of Professional Conduct and Qualifications Standards for Public Statements of Actuarial Opinion of the American Academy of Actuaries.

Data

Milliman provided Segal with the scrubbed data used in the June 30, 2023 DBS valuation. As directed by CalSTRS, Segal used this data as provided by Milliman, and did not replicate Milliman's data preparation process. **Based on this data, we closely match Milliman's valuation statistics.**

We understand from CalSTRS that the member counts in Milliman's report are based on counts in CalSTRS' financial statements, and therefore may differ slightly from the counts in the valuation data. Segal's counts below reflect the number in the valuation data, and they are very close to the counts in the valuation report.

Summary of Membership Data

Statistic	Milliman	Segal	Ratio
Number of Members			
• Active members	458,645	457,656	99.8%
• Inactive members	149,298	150,153	100.6%
• Retirees and beneficiaries	80,975	81,441	100.6%
Total	**688,918**	**689,250**	**100.0%**
Active Member Statistics[1]			
Prior year earned salary *($ millions)*	$38,916	$39,186	100.7%
Average earned salary	84,850	85,623	100.9%
Average age	45.1	45.1	100.0%
Average service	12.5	12.5	100.0%

[1] The active member statistics for the DBS valuation are the same as for the DB valuation.

Valuation results

Based on the member data, plan provisions, and actuarial assumptions provided by Milliman and described in their report, Segal programmed our valuation system to replicate the liability results for the DBS program. **We closely match Milliman's valuation liabilities.**

For the valuation, Milliman receives information from CalSTRS about the Fair Market Value of Assets of $18.2 billion. The Actuarial Value of Assets for the DBS program is equal to the Fair Market Value of Assets. Segal has relied upon this financial information as provided in Milliman's valuation report.

Actuarial Obligation

The following table summarizes Segal's replication of the Actuarial Obligation in Milliman's valuation report. We have calculated the Actuarial Obligation both before and after the application of the 5.81% Additional Earnings Credit is applied to active and inactive member accounts. This Additional Earnings Credit is discussed in more detail below. **We closely match Milliman's calculation of the Actuarial Obligation.**

Actuarial Obligation

Result *($ thousands)*	Milliman	Segal	Ratio
Before Additional Earnings Credit			
• Active members	$10,701,911	$10,701,910	100.0%
• Inactive members	1,140,944	1,140,944	100.0%
• Retirees and beneficiaries	2,175,831	2,186,641	100.5%
Total	**$14,018,686**	**$14,029,495**	**100.1%**
Additional Earnings Credit			
• Active and inactive members	$688,070	$688,070	100.0%
Total with Additional Earnings Credit	**$14,706,756**	**$14,717,565**	**100.1%**
Actuarial Value of Assets	$18,162,899	$18,162,899	100.0%
Funded Ratio	**123.5%**	**123.4%**	**99.9%**

The Actuarial Obligation for active and inactive members is the value of the member account balances as of June 30, 2023. The Actuarial Obligation for retirees and beneficiaries is the present value of their benefits in pay status.

Sample lives

As part of our replication and review, Segal reviewed five sample lives. **We closely match Milliman's results for the individual members.** These sample lives are summarized below. The Actuarial Obligation values are before the application of the Additional Earnings Credit.

Sample Lives – Actuarial Obligation

Sample Life	Milliman	Segal	Ratio
1. Active	$37,424	$37,424	100.0%
2. Inactive	37,891	37,891	100.0%
3. Healthy Retiree, Pop-Up Annuity	39,170	39,302	100.3%
4. Disabled Retiree, Single Life Annuity	5,985	5,964	99.6%
5. Beneficiary, Certain Only Annuity	18,611	18,716	100.6%

Additional Earnings Credit

The board's policy is to grant an Additional Earnings Credit on June 30 if permitted by the formula below. The application of the policy as of June 30, 2023 resulted in a 5.81% Additional Earnings Credit as of that date. **We closely match the calculation of the Additional Earnings Credit.**

Additional Earnings Credit

Result	Milliman	Segal	Ratio
First Allocation			
1. Long-Term Expected Net Investment Return	7.00%	7.00%	100.0%
2. Minimum Interest Rate (Prior Year)[1]	2.09%	2.09%	100.0%
3. Maximum Credit in First Allocation	**4.91%**	**4.91%**	**100.0%**
4. Actuarial Surplus[2]	29.56%	29.46%	99.7%
5. First Threshold (1x Portfolio Standard Deviation)	11.30%	11.30%	100.0%
6. Maximum Credit for First Allocation[3]	**19.42%**	**19.42%**	**100.0%**
7. First Allocation (Lesser of 3 and 6)	**4.91%**	**4.91%**	**100.0%**
Second Allocation			
8. Remaining Actuarial Surplus[4]	24.40%	24.31%	99.6%
9. Second Threshold (2x Portfolio Standard Deviation)	22.60%	22.60%	100.0%
10. Target Second Threshold Surplus **(Average of 8 and 9, no less than Second Threshold)**	23.50%	23.46%	99.8%
11. Second Allocation (10 – 9)	**0.90%**	**0.86%**	**95.6%**
12. Total Additional Earnings Credit (7 + 11)	**5.81%**	**5.77%**	**99.3%**

The minor differences in Segal's calculation of the Additional Earnings Credit are due to a slightly different total Actuarial Obligation.

[1] The minimum interest rate was determined by the board as the average of the yields on 30-year Treasuries for the 12 months ending in February 2022. Segal has confirmed that the 2.09% average is reasonable based on the historical yields on 30-year Treasuries.

[2] The actuarial surplus is the extent to which the funded ratio is above 100% before application of the Additional Earnings Credit.

[3] The maximum credit for the first allocation is calculated such that the funded ratio is at least 100% plus the standard deviation. Based on Segal's liability results, the Actuarial Obligation that would result in this funded ratio is $16,319 million. This implies a maximum credit of $2,300 million, which is 19.42% of the active and inactive DBS account balances.

[4] The remaining actuarial surplus is the extent to which the funded ratio is above 100% after application of the first allocation of 4.91%.

Gain and Loss Reserve

The Gain and Loss reserve is the surplus of assets over the Actuarial Obligation. **We closely match the calculation of the Gain and Loss Reserve.**

Gain and Loss Reserve

Result *($ thousands)*	Milliman	Segal	Ratio
Available Reserves	$4,144,213	$4,133,404	99.7%
Additional Credit Adopted	688,070	688,070	100.0%
Final Gain and Loss Reserve	**$3,456,143**	**$3,445,334**	**99.7%**

Cost impact of assumption changes

The June 30, 2023 valuation reflects the updated actuarial assumptions recommended by Milliman in their experience analysis report dated December 22, 2023. The update to the mortality assumption is the only change affecting the Actuarial Obligation. **We have confirmed the implementation of the assumption changes in the June 30, 2023 valuation, and Milliman's calculation of the cost impact is reasonable.**

Assumption Change Cost Impact – Actuarial Obligation

Result *($ thousands)*	Milliman	Segal	Ratio
Prior Actuarial Assumptions	$14,036,870	$14,055,560	100.1%
New Actuarial Assumptions	14,018,686	14,029,495	100.1%
Cost Impact	**$(18,184)**	**$(26,065)**	**143.3%**

Although Segal's calculation of the cost impact is a larger reduction than Milliman's on a percentage basis, this is to be expected as it is a relatively small number calculated as the difference between larger numbers where we do have a close match. Milliman's result is reasonable.

Cash Balance Benefit Program Valuation

Segal performed a full replication and review of the CalSTRS Cash Balance Benefit (CBB) program. **Our review confirms that the actuarial calculations as of June 30, 2023 are reasonable and based on generally accepted actuarial principles and practices.** We were able to closely match Milliman's results.

Additionally, Milliman's report complies with generally accepted actuarial principles and practices which are consistent with the core requirements of the Actuarial Standards of Practice and the Code of Professional Conduct and Qualifications Standards for Public Statements of Actuarial Opinion of the American Academy of Actuaries.

Data

Milliman provided Segal with the scrubbed data used in the June 30, 2023 CBB valuation. As directed by CalSTRS, Segal used this data as provided by Milliman, and did not replicate Milliman's data preparation process. **Based on this data, we closely match Milliman's valuation statistics.**

We understand from CalSTRS that the member counts in Milliman's report are based on counts in CalSTRS' financial statements, and therefore may differ slightly from the counts in the valuation data. Segal's counts below reflect the number in the valuation data.

Summary of Membership Data

Statistic	Milliman	Segal	Ratio
Number of Members			
• Active members	8,175	8,174	100.0%
• Inactive members[1]	30,065	27,621	91.9%
• Retirees and beneficiaries	550	583	106.0%
Total	**38,790**	**36,378**	**93.8%**
Active Member Statistics			
Prior year earned salary *($ millions)*	$231.5	$228.3	98.6%
Average earned salary	28,313	27,933	98.7%
Average age	49.9	49.9	100.0%
Average service	8.2	8.2	100.0%

[1] For inactive members, Milliman's count includes members who are over age 72 who are assumed to have already taken their minimum required distribution. These members are valued with zero liability and were not included in the data file provided to Segal.

Valuation results

Based on the member data, plan provisions, and actuarial assumptions provided by Milliman and described in their report, Segal programmed our valuation system to replicate the liability results for the CBB program. **We closely match Milliman's valuation liabilities.**

For the valuation, Milliman receives information from CalSTRS about the Fair Market Value of Assets of $478 million. The Actuarial Value of Assets for the CBB program is equal to the Fair Market Value of Assets. Segal has relied upon this financial information as provided in Milliman's valuation report.

Actuarial Obligation

The following table summarizes Segal's replication of the Actuarial Obligation in Milliman's valuation report. We have calculated the Actuarial Obligation both before and after the application of the 4.91% Additional Earnings Credit is applied to active and inactive member accounts. This Additional Earnings Credit is discussed in more detail below. **We closely match Milliman's calculation of the Actuarial Obligation.**

Actuarial Obligation

Result *($ thousands)*	Milliman	Segal	Ratio
Before Additional Earnings Credit			
• Active members	$198,968	$198,968	100.0%
• Inactive members	190,719	190,718	100.0%
• Retirees and beneficiaries	14,803	14,899	100.6%
Total	**$404,490**	**$404,585**	**100.0%**
Additional Earnings Credit			
• Active and inactive members	$19,134	$19,134	100.0%
Total with Additional Earnings Credit	**$423,624**	**$423,719**	**100.0%**
Actuarial Value of Assets	$477,960	$477,960	100.0%
Funded Ratio	**112.8%**	**112.8%**	**100.0%**

The Actuarial Obligation for active and inactive members is the value of the member account balances as of June 30, 2023. The Actuarial Obligation for retirees and beneficiaries is the present value of their benefits in pay status.

Sample lives

As part of our replication and review, Segal reviewed six sample lives. **We closely match Milliman's results for the individual members.** These sample lives are summarized below. The Actuarial Obligation values are before the application of the Additional Earnings Credit.

Sample Lives – Actuarial Obligation

	Sample Life	Milliman	Segal	Ratio
1.	Active	$4,878	$4,878	100.0%
2.	Inactive	7,018	7,018	100.0%
3.	Healthy Retiree, Joint & Survivor Annuity	13,570	13,558	99.9%
4.	Healthy Retiree, Joint & Survivor Annuity	12,020	12,053	100.3%
5.	Beneficiary, Life Annuity	8,929	8,941	100.1%
6.	Beneficiary, Certain Only Annuity	5,493	5,681	103.4%

Additional Earnings Credit

The board's policy is to grant an Additional Earnings Credit on June 30 if permitted by the formula below. The application of the policy as of June 30, 2023 resulted in a 4.91% Additional Earnings Credit as of that date. **We closely match the calculation of the Additional Earnings Credit.**

Additional Earnings Credit

Result	Milliman	Segal	Ratio
First Allocation			
1. Long-Term Expected Net Investment Return	7.00%	7.00%	100.0%
2. Minimum Interest Rate (Prior Year)[1]	2.09%	2.09%	100.0%
3. Maximum Credit in First Allocation	**4.91%**	**4.91%**	**100.0%**
4. Actuarial Surplus[2]	18.16%	18.14%	99.9%
5. First Threshold (1x Portfolio Standard Deviation)	11.30%	11.30%	100.0%
6. Maximum Credit for First Allocation[3]	**6.40%**	**6.40%**	**100.0%**
7. First Allocation (Lesser of 3 and 6)	**4.91%**	**4.91%**	**100.0%**
Second Allocation			
8. Remaining Actuarial Surplus[4]	12.83%	12.80%	99.8%
9. Second Threshold (2x Portfolio Standard Deviation)	22.60%	22.60%	100.0%
10. Target Second Threshold Surplus **(Average of 8 and 9, no less than Second Threshold)**	22.60%	22.60%	100.0%
11. Second Allocation (10 – 9)	**0.00%**	**0.00%**	**100.0%**
12. Total Additional Earnings Credit (7 + 11)	**4.91%**	**4.91%**	**100.0%**

[1] The minimum interest rate was determined by the board as the average of the yields on 30-year Treasuries for the 12 months ending in February 2022. Segal has confirmed that the 2.09% average is reasonable based on the historical yields on 30-year Treasuries.

[2] The actuarial surplus is the extent to which the funded ratio is above 100% before application of the Additional Earnings Credit.

[3] The maximum credit for the first allocation is calculated such that the funded ratio is at least 100% plus the standard deviation. Based on Segal's liability results, the Actuarial Obligation that would result in this funded ratio is $429 million. This implies a maximum credit of $25 million, which is 6.40% of the active and inactive CBB account balances.

[4] The remaining actuarial surplus is the extent to which the funded ratio is above 100% after application of the first allocation of 4.91%.

Gain and Loss Reserve

The Gain and Loss reserve is the surplus of assets over the Actuarial Obligation. **We closely match the calculation of the Gain and Loss Reserve.**

Gain and Loss Reserve

Result *($ thousands)*	Milliman	Segal	Ratio
Available Reserves	$73,470	$73,375	99.9%
Additional Credit Adopted	19,134	19,134	100.0%
Final Gain and Loss Reserve	**$54,336**	**$54,241**	**99.8%**

Cost impact of assumption changes

The June 30, 2023 valuation reflects the updated actuarial assumptions recommended by Milliman in their experience analysis report dated December 22, 2023. The updates to the investment return assumption and mortality assumption are the only changes affecting the Actuarial Obligation. **We have confirmed the implementation of the assumption changes in the June 30, 2023 valuation, and Milliman's calculation of the cost impact is reasonable.**

Assumption Change Cost Impact – Actuarial Obligation

Result *($ thousands)*	Milliman	Segal	Ratio
Prior Actuarial Assumptions	$405,105	$405,306	100.0%
New Actuarial Assumptions	404,490	404,585	100.0%
Cost Impact	**$(615)**	**$(721)**	**117.2%**

Although Segal's calculation of the cost impact is a larger reduction than Milliman's on a percentage basis, this is to be expected as it is a relatively small number calculated as the difference between larger numbers where we do have a close match. Milliman's result is reasonable.

Supplemental Benefit Maintenance Account Projection

Segal performed a full replication and review of the sufficiency projection for the CalSTRS Supplemental Benefit Maintenance Account (SBMA) program. **Our review confirms that the actuarial calculations as of June 30, 2023 are reasonable and based on generally accepted actuarial principles and practices.** We were able to closely match Milliman's results.

Projections

The DB program pays annual benefit adjustments equal to 2% of a member's original benefit at retirement. Over time, purchasing power will likely decline due to inflation. The SBMA makes additional payments to retirees and beneficiaries to maintain their purchasing power at a level between 80% and 85%. The current purchasing power level is 85%. **We agree with Milliman's projection that the SBMA assets plus expected future contributions will be sufficient to pay benefits at the 85% level through June 30, 2089.**

Further, Milliman has projected that the SBMA has a margin over the expected 85% purchasing power benefits. Although the law only permits purchasing power benefits up to 85%, Milliman has calculated a maximum purchasing power level at which the SBMA is expected to be sufficient through June 30, 2089. **We agree with Milliman's projection that the maximum purchasing power under which the SBMA would be sufficient through June 30, 2089 is 90%.**

Milliman also calculated the funding surplus as of June 30, 2023. The surplus is calculated as the difference between current resources (current assets plus the present value of future contributions) and the present value of projected SBMA benefit payments. Additionally, the funding surplus is calculated for current members only, without recognizing the potential impact of new entrants. Based on these cash flows, Milliman has calculated a surplus of $10.7 billion. **Milliman's funding surplus is reasonable; for comparison, we have calculated a funding surplus of $10.0 billion.**

Supplemental Benefit Maintenance Account Projection

Milliman has analyzed the sensitivity of the SBMA results to future inflation scenarios. They reviewed three scenarios with short-term inflation higher than the assumption and three scenarios with long-term inflation higher than the assumption. This is an important component of the report because of the SBMA's sensitivity to changes in inflation. The following table shows the results under these scenarios.[1] **Milliman's sensitivity test results are reasonable.**

SBMA Inflation Sensitivity Tests

Scenario	Milliman	Segal
Baseline		
• 2.75% inflation for all years	Sufficient through June 30, 2089	Sufficient through June 30, 2089
Higher Short-Term Inflation		
• 5.00% inflation for 3 years	Sufficient through June 30, 2089	Sufficient through June 30, 2089
• 5.00% inflation for 5 years	Sufficient through June 30, 2089	Sufficient through June 30, 2089
• 5.00% inflation for 10 years	Depletes by June 30, 2043	Depletes by June 30, 2040
Higher Long-Term Inflation		
• 3.25% inflation for all years	Sufficient through June 30, 2089	Sufficient through June 30, 2089
• 3.75% inflation for all years	Depletes by June 30, 2053	Depletes by June 30, 2051
• 4.25% inflation for all years	Depletes by June 30, 2045	Depletes by June 30, 2044

In addition to the sensitivity tests, Milliman used a stochastic model to evaluate the probability that the SBMA will be sufficient at the 85% purchasing power level through June 30, 2089. As mentioned by Milliman, neither the deterministic sensitivity tests nor the stochastic model take into account the fact that the board has the authority to lower the purchasing power level should the SBMA face adverse experience in the future.

Some of Segal's SBMA projection results differ slightly from Milliman's. We believe this is likely due to minor differences in methodology. The SBMA is a leveraged program, so any small differences in methodology could have a large impact on the SBMA benefit payments. Additionally, while the impact should be very minor, Milliman's future new entrants are based on characteristics of new entrants over the last 10 years, whereas Segal's future new entrants are based on characteristics of new entrants over the last one year, based on the data available to us for this replication and review.

[1] Milliman's report shows the inflation sensitivity tests graphically, and they separately provided us the information on the specific dates of depletion for the sensitivity tests.

Content of projection report

Milliman's report complies with generally accepted actuarial principles and practices which are consistent with the core requirements of the Actuarial Standards of Practice and the Code of Professional Conduct and Qualifications Standards for Public Statements of Actuarial Opinion of the American Academy of Actuaries.

While Milliman's report includes a significant amount of information that another actuary can use to make an objective appraisal of the reasonableness of their work per ASOP 41, there are some areas where we recommend that Milliman consider adding additional detail:

- In the description of the plan provisions, it would be helpful to clarify that the 85% purchasing power benefit for beneficiaries is based on the purchasing power at the member's original retirement date. **We recommend adding this detail for the 85% purchasing power benefits.** Note that this detail is specified in Milliman's report for the description of the S.B. 868 benefit.
- In the description of the S.B. 868 benefit, it would be helpful to note that this entails a new benefit that is subject to separate 2% benefit adjustments from its commencement date of June 30, 2023, and that the 85% purchasing power provision applies separately to this new benefit using its more recent commencement date. In conversations with Milliman, they provided us with an analysis dated February 17, 2022 that included these details. **We recommend including some of these details in the main SBMA report.**
- Members in the DB program are assumed to receive a life annuity upon retirement. For future retirements, Milliman has increased the SBMA purchasing power payments by 17.4% to account for the fact that some retirees will elect an optional form with survivor continuance, which increases the purchasing power payments required from the SBMA. **We recommend providing additional rationale for how the 17.4% assumption was chosen.**

Medicare Premium Payment Program Valuation

Segal performed a full replication and review of the CalSTRS Medicare Premium Payment (MPP) program. **Our review confirms that the actuarial calculations as of June 30, 2023 are reasonable and based on generally accepted actuarial principles and practices.** We were able to closely match Milliman's results.

Data

Milliman provided Segal with the scrubbed data used in the June 30, 2023 MPP valuation. As directed by CalSTRS, Segal used this data as provided by Milliman, and did not replicate Milliman's data preparation process. Based on this data, we exactly matched Milliman's valuation statistics.

Valuation results

Actuarial Obligation

Result *($ millions)*	Milliman	Segal	Ratio
Actuarial Obligation			
• Retirees with Part A premium	$221.2	$221.3	100.0%
• Retirees with Part B penalty	0.7	0.7	100.0%
Total	**$221.9**	**$222.0**	**100.0%**
Actuarial Obligation by Status			
• Current enrollees (Part A and B)	$213.5	$213.5	100.0%
• Future enrollees (Part A only)	8.4	8.5	101.2%
Total	**$221.9**	**$222.0**	**100.0%**

As shown in the table above, we closely match Milliman's calculation of the Actuarial Obligation. We reviewed in detail the calculations for 7 sample lives to determine whether liabilities were calculated in accordance with the actuary's stated methods and assumptions. Actuarial firms each have their own software programs for calculating liabilities, and while actuaries have a common understanding of actuarial assumptions and cost methods, it is unlikely that any two firms will perform calculations in the same way. However, in this case, the valuation only includes inactive members, and we were able to match very closely once Milliman provided the sample lives.

Cost impact of assumption changes

In Milliman's 2023 MPP valuation, updates to the trend and mortality assumptions increased the actuarial obligation by $2.5 million. Our replication produced a very similar impact of $2.6 million.

Content of valuation report

Milliman's report complies with generally accepted actuarial principles and practices which are consistent with the core requirements of the Actuarial Standards of Practice and the Code of Professional Conduct and Qualifications Standards for Public Statements of Actuarial Opinion of the American Academy of Actuaries.

While Milliman's report includes a significant amount of information that another actuary can use to make an objective appraisal of the reasonableness of their work per ASOP 41, there is one area where we recommend that Milliman consider adding additional detail.

Our only recommendation pertains to the presentation of liabilities and census data for participants who may enroll in the future. We believe the report would benefit from providing liabilities for current enrollees and potential future enrollees separately. To help our replication efforts, Milliman provided the liability split between current and future enrollees. As can be seen on the prior page, future enrollees accounted for $8.4 million or 3.8% of the June 30, 2023 actuarial obligation. In addition to providing the liability for future enrollees, including the headcounts for potential future retirees and a description of how the headcounts are developed would provide a clearer understanding of Milliman's methodology and better fulfill the requirements of ASOP No. 41. In this case, the June 30, 2023 valuation included 132,333 potential future retirees. Because certain data fields, such as elections made by the Districts, are not in the census data; the number of potential retirees included in the valuation is a relatively large number compared to the 4,404 current enrollees. We understand why so many potential enrollee records are included and found the assumed participation rates for future enrollees were developed in a manner consistent with the records included in the valuation. We are only suggesting that the headcounts, a description of how the headcounts were determined (including the restriction to those who commenced benefits prior to June 1, 2012), and the liabilities for future enrollees be included in the report.

Definition of Pension Terms

The following list defines certain technical terms for the convenience of the reader:

Term	Definition
Actuarial obligation for actives	The equivalent of the accumulated normal costs allocated to the years before the valuation date.
Actuarial obligation for retirees and beneficiaries	Actuarial present value of lifetime benefits to existing retirees and beneficiaries. This sum takes account of life expectancies appropriate to the ages of the annuitants and the interest that the sum is expected to earn before it is entirely paid out in benefits.
Actuarial cost method	A procedure allocating the actuarial present value of future benefits to various time periods; a method used to determine the normal cost and the actuarial accrued liability that are used to determine the actuarially determined contribution.
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. To the extent that actual experience differs from that assumed, actuarial accrued liabilities emerge which may be the same as forecasted or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., assets earn more than projected, salary increases are less than assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results yield actuarial liabilities that are larger than projected.
Actuarially equivalent	Of equal actuarial present value, determined as of a given date and based on a given set of actuarial assumptions.
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. Each such amount or series of amounts is: Adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.) Multiplied by the probability of the occurrence of an event (such as survival, death, disability, withdrawal, etc.) on which the payment is conditioned, and Discounted according to an assumed rate (or rates) of return to reflect the time value of money.
Actuarial present value of future benefits	The actuarial present value of benefit amounts expected to be paid at various future times under a particular set of actuarial assumptions, taking into account such items as the effect of advancement in age, anticipated future compensation, and future service credits. The actuarial present value of future benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive members entitled to either a refund of member contributions or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.
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 plan, as well as actuarially determined contributions.

Definition of Pension Terms

Term	Definition
Actuarial value of assets	The value of the Plan's assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly plans use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the actuarially determined contribution.
Actuarially determined	Values that have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the Plan.
Actuarially determined contribution	The contributions, expressed as a dollar amount or a percentage of covered plan compensation, determined under the Plan's funding policy. The actuarially determined contribution consists of the normal cost and the amortization payment.
Amortization method	A method for determining the amortization payment. The most common methods used are level dollar and level percentage of payroll. Under the level dollar method, the amortization payment is one of a stream of payments, all equal, whose actuarial present value is equal to the unfunded actuarial accrued liability. Under the level percentage of pay method, the amortization payment is one of a stream of increasing payments, whose actuarial present value is equal to the unfunded actuarial accrued liability. Under the level percentage of pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.
Amortization payment	The portion of the pension plan contribution, or actuarially determined contribution, that is intended to pay off the unfunded actuarial accrued liability.
Assumptions or actuarial assumptions	The estimates upon which the cost of the Plan is calculated, including: **Investment return** — the rate of investment yield that the Plan will earn over the long-term future; **Mortality rates** — the rate or probability of death at a given age for employees and retirees; **Retirement rates** — the rate or probability of retirement at a given age or service; **Disability rates** — the rate or probability of disability retirement at a given age; **Withdrawal rates** — the rate or probability at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement; **Salary increase rates** — the rates of salary increase due to inflation, real wage growth and merit and promotion increases.
Closed amortization period	A specific number of years that is counted down by one each year, and therefore declines to zero with the passage of time. For example, if the amortization period is initially set at 20 years, it is 19 years at the end of one year, 18 years at the end of two years, etc. See "open amortization period."
Decrements	Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or withdrawal.
Defined benefit plan	A retirement plan in which benefits are defined by a formula based on the member's compensation, age and/or years of service.
Defined contribution plan	A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.

Definition of Pension Terms

Term	Definition
Experience study	A periodic review and analysis of the actual experience of the Plan that may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified based on recommendations from the Actuary.
Funded ratio	The ratio of the valuation value of assets to the actuarial accrued liability. Plans sometimes also calculate a market funded ratio, using the market value of assets, rather than the valuation value of assets.
Investment return	The rate of earnings of the Plan from its investments, including interest, dividends and capital gain and loss adjustments, computed as a percentage of the average value of the fund. For actuarial purposes, the investment return often reflects a smoothing of the capital gains and losses to avoid significant swings in the value of assets from one year to the next.
Negative amortization	Negative amortization is a result of an increase in the unfunded actuarial accrued liability when the amortization payment is less than the interest accrued on the unfunded actuarial accrued liability.
Normal cost	The portion of the actuarial present value of future benefits and expenses, if applicable, allocated to a valuation year by the actuarial cost method. Any payment with respect to an unfunded actuarial accrued liability is not part of the normal cost (see “amortization payment”). For pension plan benefits that are provided in part by employee contributions, normal cost refers to the total of member contributions and employer normal cost unless otherwise specifically stated.
Open amortization period	An open amortization period is one which is used to determine the amortization payment but which does not change over time. If the initial period is set as 30 years, the same 30-year period is used in each future year in determining the amortization period.
Service costs	The portions of the actuarial present value of projected benefit payments that are attributed to valuation years.
Unfunded actuarial obligation	The excess of the actuarial obligation over the actuarial value of assets. This value may be negative, in which case it may be expressed as a negative unfunded actuarial obligation, also called the funding surplus or an overfunded actuarial obligation.
Valuation date or actuarial valuation date	The date as of which the value of assets is determined and as of which the actuarial present value of future benefits is determined. The expected benefits to be paid in the future are discounted to this date.

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