



**Cavanaugh Macdonald**  
CONSULTING, LLC

*The experience and dedication you deserve*

**Teachers' Retirement System  
State of Montana**

**Actuarial Valuation  
As of July 1, 2023**





# Cavanaugh Macdonald

CONSULTING, LLC

*The experience and dedication you deserve*

September 25, 2023

Teachers' Retirement Board  
State of Montana  
P.O. Box 200139  
Helena, MT 59620-0139

Members of the Board:

In this report are submitted the results of the annual valuation of the assets and liabilities of the Teachers' Retirement System of Montana (TRS), prepared as of July 1, 2023.

The purpose of this report is to provide a summary of the funded status of the System as of July 1, 2023. While not verifying the data at source, the actuary performed tests for consistency and reasonability. The valuation indicates that the statutory contribution rate reflecting all anticipated contribution increases is sufficient to amortize the unfunded accrued liability within a 24-year period.

The promised benefits of the System are included in the actuarially calculated contribution rates which are developed using the Entry Age Normal cost method. Four-year market related value of assets is used for actuarial valuation purposes. Gains and losses are reflected in the unfunded accrued liability that is being amortized by regular annual contributions as a level percentage of payroll, on the assumption that payroll will increase by 3.25% annually. The assumptions recommended by the actuary and adopted by the Board are in the aggregate reasonably related to the experience under the Fund and reasonable expectations of anticipated experience under the Fund.

In order to prepare the results in this report, we have utilized actuarial models that were developed to measure liabilities and develop actuarial costs. These models include tools that we have produced and tested, along with commercially available valuation software that we have reviewed to confirm the appropriateness and accuracy of the output. In utilizing these models, we develop and use input parameters and assumptions about future contingent events along with recognized actuarial approaches to develop the needed results.



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This is to certify that the undersigned are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein. This also certifies that the undersigned have experience in performing valuations for public retirement systems, that the valuation was prepared in accordance with principles of practice prescribed by the Actuarial Standards Board, and that the actuarial calculations were performed by qualified actuaries in accordance with accepted actuarial procedures, based on the current provisions of the retirement system and on actuarial assumptions that are internally consistent and reasonably based on the actual experience of the System.

Future actuarial results may differ significantly from the current results 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. Since the potential impact of such factors is outside the scope of a normal annual actuarial valuation, an analysis of the range of results is not presented herein.

The Table of Contents, which immediately follows, outlines the material contained in the report.

Respectfully submitted,

A handwritten signature in blue ink that reads "Todd B. Green" followed by a horizontal line.

Todd B. Green, ASA, EA, FCA, MAAA  
President

A handwritten signature in blue ink that reads "Bryan Hoge" in a stylized cursive script.

Bryan Hoge, FSA, EA, FCA, MAAA  
Consulting Actuary

A handwritten signature in blue ink that reads "Micki R. Taylor" in a cursive script.

Micki R. Taylor, ASA, EA, FCA, MAAA  
Consulting Actuary



**Teachers' Retirement System  
State of Montana**

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**Section I**  
**Summary of Findings**

For convenience of reference, the principal results of the valuation and a comparison with the preceding year's results are summarized below:

(Dollar amounts in thousands)

<b>VALUATION DATE</b>	<b>July 1, 2023</b>	<b>July 1, 2022</b>
Active members		
Number		
Full-Time Members	13,814	13,765
Part-Time Members	6,164	6,210
Annual valuation compensation	\$ 983,749	\$ 960,836
Retired members and beneficiaries		
Number	17,707	17,369
Annual allowances	\$ 446,280	\$ 430,947
Inactive Members		
Vested Terminated Members	2,214	2,015
Non-Vested Terminated Members	5,854	5,656
Assets		
Actuarial value	\$ 4,971,905	\$ 4,799,597
Market value	4,920,843	4,724,449
Actuarial Accrued Liability (AAL)	\$ 6,858,306	\$ 6,691,275
Unfunded Actuarial Accrued Liability	\$ 1,886,401	\$ 1,891,678
Funded Ratio	72.49%	71.73%
Actuarial Value Rate of Return	7.66%	8.14%
Market Value Rate of Return	8.30%	(4.13)%
<b>Annual Cost</b>		
Total Normal Rate	10.75%	10.87%
Employee Contribution Rate	<u>8.15%</u>	<u>8.15%</u>
Employer Normal Rate	2.60%	2.72%
Employer Statutory Contribution Rate		
Normal Rate	2.60%	2.72%
UAAL Rate	<u>9.36%</u>	<u>9.14%</u>
Total Rate	11.96%	11.86%
Amortization Period*	24 Years	25 Years

\* Reflects anticipated increases in employer contribution rates.



As a result of this actuarial valuation of the benefits in effect under the Montana Teachers' Retirement System as of July 1, 2023, the statutory employer contributions are sufficient to amortize the Unfunded Actuarial Accrued Liability (UAAL) of the Retirement System within 24 years. The Funded Ratio is 72.49%.

The table below shows a history of the legislated contribution rates as a percent of pay. In addition to these contributions the State will contribute \$25 million annually to the System payable July 1<sup>st</sup> of each year.

Finally, MCA 19-20-605 requires each employer to contribute 9.85% of total compensation paid to all re-employed TRS retirees employed in a TRS reportable position. Pursuant to MCA 19-20-609, this amount shall increase by 1.00% for fiscal year 2014 and increase by 0.10% each fiscal year through 2024 until the total employer contribution is equal to 11.85% of re-employed retiree compensation.

History of Legislated Contributions  
(as a Percent of Pay)

**School District and Other Employers**

	<u>Members</u>	<u>Employers</u>	<u>General fund</u>	<u>Total employee &amp; employer</u>
Prior to July 1, 2007	7.15%	7.47%	0.11%	14.73%
July 1, 2007 to June 30, 2009	7.15%	7.47%	2.11%	16.73%
July 1, 2009 to June 30, 2013	7.15%	7.47%	2.49%	17.11%
July 1, 2013 to June 30, 2014	8.15%	8.47%	2.49%	19.11%
July 1, 2014 to June 30, 2015	8.15%	8.57%	2.49%	19.21%
July 1, 2015 to June 30, 2016	8.15%	8.67%	2.49%	19.31%
July 1, 2016 to June 30, 2017	8.15%	8.77%	2.49%	19.41%
July 1, 2017 to June 30, 2018	8.15%	8.87%	2.49%	19.51%
July 1, 2018 to June 30, 2019	8.15%	8.97%	2.49%	19.61%
July 1, 2019 to June 30, 2020	8.15%	9.07%	2.49%	19.71%
July 1, 2020 to June 30, 2021	8.15%	9.17%	2.49%	19.81%
July 1, 2021 to June 30, 2022	8.15%	9.27%	2.49%	19.91%
July 1, 2022 to June 30, 2023	8.15%	9.37%	2.49%	20.01%
July 1, 2023 to June 30, 2024	8.15%	9.47%	2.49%	20.11%

**State and University Employers**

	<u>Members</u>	<u>Employers</u>	<u>General fund</u>	<u>Total employee &amp; employer</u>
Prior to July 1, 2007	7.15%	7.47%	0.11%	14.73%
July 1, 2007 to June 30, 2009	7.15%	9.47%	0.11%	16.73%
July 1, 2009 to June 30, 2013	7.15%	9.85%	0.11%	17.11%
July 1, 2013 to June 30, 2014	8.15%	10.85%	0.11%	19.11%
July 1, 2014 to June 30, 2015	8.15%	10.95%	0.11%	19.21%
July 1, 2015 to June 30, 2016	8.15%	11.05%	0.11%	19.31%
July 1, 2016 to June 30, 2017	8.15%	11.15%	0.11%	19.41%
July 1, 2017 to June 30, 2018	8.15%	11.25%	0.11%	19.51%
July 1, 2018 to June 30, 2019	8.15%	11.35%	0.11%	19.61%
July 1, 2019 to June 30, 2020	8.15%	11.45%	0.11%	19.71%
July 1, 2020 to June 30, 2021	8.15%	11.55%	0.11%	19.81%
July 1, 2021 to June 30, 2022	8.15%	11.65%	0.11%	19.91%
July 1, 2022 to June 30, 2023	8.15%	11.75%	0.11%	20.01%
July 1, 2023 to June 30, 2024	8.15%	11.85%	0.11%	20.11%



### **Calculations based on the Market Value of Assets**

MCA 19-20-201 requires this report to show how market performance is affecting the actuarial funding of the Retirement System. The July 1, 2023 market value of assets is \$51.1 million less than the actuarial value of assets. This is due to the smoothing of investment gains and losses over a four-year period. If the market value of assets was used, the amortization period would be 25 years, and the Funded Ratio would be 71.75%.

### **Additional Details**

MCA 19-20-604 states that the contribution from the State General Fund will be reduced by 0.11% when the amortization period of the System's UAAL is 10 years or less according to the System's latest actuarial valuation.

Based on the current statutory funding rate, the amortization period as of the valuation date is 24 years. The 24-year period is likely longer than what will actually occur if all assumptions are met due to the snapshot valuation not reflecting the declining normal cost rate from new lower cost members. Contributions are developed with the intent of being level as a percentage of covered payroll, assuming the number of active members remains stable. Furthermore, the funding policy is expected to accumulate sufficient assets to make all future benefit payments as they become due if all assumptions are met. Actuarial Standard of Practice Number 4 (ASOP 4) requires the disclosure of a reasonable actuarial determined contribution rate. The current statutory funding rate is expected to fully fund the plan and likely complies with the guidelines of ASOP 4. While there are potentially other reasonable actuarially determined contribution rates, in our professional judgement, one other reasonable actuarially determined contribution rate would be 13.09%, which is based on a closed 20-year funding period.

The actuarial costs are calculated using the entry age actuarial cost method. This is the method used by most public plans. It is designed to provide a stable contribution rate as a percent of member pay. This actuarial valuation measures the adequacy of the contribution rates set in Montana State Law.



## Investment Experience

The market assets earned 8.30% net of investment and operating expenses. As a result of cumulative unrecognized gains, the actuarial assets earned 7.66% which is 0.36% more than the actuarial assumption of 7.30%. The return on the actuarial assets differs from the return on market assets because the actuarial value of assets spreads gains and losses over four years. The chart below shows the annual returns for the past ten years.

Year	Market Return	Actuarial Return	Market Return over Assumption	Actuarial Return over Assumption
7/1/2013 to 6/30/2014	17.09%	13.21%	9.34%	5.46%
7/1/2014 to 6/30/2015	4.57%	9.59%	(3.18)%	1.84%
7/1/2015 to 6/30/2016	2.08%	8.79%	(5.67)%	1.04%
7/1/2016 to 6/30/2017	11.92%	8.24%	4.17%	0.49%
7/1/2017 to 6/30/2018	8.82%	6.85%	1.07%	(0.90)%
7/1/2018 to 6/30/2019	5.69%	7.00%	(1.81)%	(0.50)%
7/1/2019 to 6/30/2020	2.72%	7.00%	(4.78)%	(0.50)%
7/1/2020 to 6/30/2021	27.73%	10.68%	20.23%	3.18%
7/1/2021 to 6/30/2022	(4.13)%	8.14%	(11.63)%	0.64%
7/1/2022 to 6/30/2023	8.30%	7.66%	1.00%	0.36%

Asset gains or losses result when the return on the actuarial value of assets differs from the actuarial investment return assumption of 7.30% effective July 1, 2022.

The net result as of July 1, 2023 is that the market value of assets is \$51.1 million less than the actuarial value of assets. This \$51.1 million in unrecognized asset losses will either offset any future investment gains or if there are none, increase the amortization period of the UAAL in future valuations.

## Recent Contribution Increases

The Montana University System Retirement Program (MUS-RP) supplemental contribution ensures university member benefits are funded by university employers. The supplemental contribution was increased from 4.04% to 4.72% of MUS-RP member pay at July 1, 2007. The valuation that determined the 4.72% contribution rate of MUS-RP member pay was based on the valuation completed as of July 1, 2006. The most recent MUS-RP valuation completed as of July 1, 2022 indicated an increase is needed in the supplemental contribution rate from 4.72% to 13.53% of MUS-RP member compensation rate.

MCA 19-20-608 and MCA 19-20-609 dictate that employers and members are required to make supplemental contributions if the funded ratio of the System is less than 90%. Since the funded ratio is currently 72.49%, Tier One Members are required to contribute an additional 1% of compensation. The individual employers are required to contribute an additional 1% of compensation. The employer contribution shall increase by an additional 0.1% each year following July 1, 2013 until the total employer supplemental contribution is equal to 2% of compensation.

MCA 19-20-605 requires each employer to contribute 9.85% of total compensation paid to all re-employed TRS retirees employed in a TRS reportable position. Pursuant to MCA 19-20-609, this





amount shall increase by 1.00% for fiscal year 2014 and increase by 0.10% each fiscal year through 2024 until the total employer contribution is equal to 11.85% of re-employed retiree compensation.

**Amortization of the UAAL**

The July 1, 2022 actuarial valuation calculated a 25-year amortization period for the UAAL. The resulting amortization period at July 1, 2023 is 24 years. The amortization period anticipates future increases in employer supplemental contributions. In addition, it anticipates future State General Fund contributions will decrease by 0.11% when the amortization period of the System's UAAL is 10 years or less. Future decreases in the Employer and Member Supplemental Contributions are not anticipated.



## Funding and Benefits Policy

The Teachers' Retirement System has adopted a Funding and Benefits Policy to provide general guidelines to help ensure decisions are made based on sound, consistent, and thoroughly examined criteria. The Funding and Benefits Policy includes guidance on the following topics:

### 1) Additional Funding

#### a) The Funding and Benefits Policy states:

- “1. If the amortization period is greater than 30 years, the actuary will recommend the single contribution rate increase that can reasonably expect to fully amortize the UAAL over a closed 30-year period effective July 1, following the next regular legislative session.
2. If the amortization period is less than 30 years, but greater than 0, and it is projected to continue to decline over the remainder of the closed period, the actuary will not recommend a change in the statutory contribution rates.
3. If the amortization period is less than 30 years, but has increased over prior valuations and is projected to continue to grow, the actuary will recommend a contribution rate increase that is reasonably expected to reverse the recent trend and reestablish a closed amortization period equal to that of the last valuation.”

2) Analysis: The amortization period as of July 1, 2023 is 24 years based on actuarial assets and 25 years based on market assets. Assuming experience follows the actuarial assumptions, the amortization period is projected to decline.

### 3) Ultimate Goal

- a) The Funding and Benefits Policy states: “It is the desire of the Board to fully fund the System. However, until the System becomes fully funded, any unfunded liabilities will be amortized over a closed period of no more than 30 years and funded as a level percent of pay. At such time as the System becomes fully funded and has as stabilization reserve of at least 10% of the actuarial accrued liability, the allowed amortization period for any subsequent unfunded liabilities will be reduced to a closed period of not greater than 20 years.”
- b) Analysis: If all the assumptions are met, the amortization period on an actuarial value of asset basis is 24 years and is anticipated to decline.



#### 4) Benefit Enhancements

- a) The Funding and Benefits Policy states: “Any recommendation for a benefit enhancement must include recommendations for necessary additional funding or other benefit reduction to cover any increase in normal cost arising from the recommended enhancement and to amortize any increase in the unfunded actuarial accrued liabilities arising from the recommended enhancement over a period not to exceed 25 years.

The Board will determine its position with respect to supporting or opposing legislation, on a case-by-case basis, and will apply this policy, actuarial funding standards, and other industry-standard information and resources it finds persuasive, as decision guides. The Board may not support legislation to enhance benefits if the funded ratio is less than 85%, and the amortization period is greater than 20 years.”

- b) Analysis: Since the funded ratio at July 1, 2023 of 72.49% is below 85% the Board’s Funding and Benefits policy does not currently support enhanced benefits.



## Sensitivity to Future Experience

The valuation results are projections based on the actuarial assumptions. Actual experience will differ from these assumptions, either increasing or decreasing the ultimate cost. The following illustrations provide simple analyses on how the costs are sensitive to changes in the assumed rate of return.

Investment Return – The investment return generally has the largest impact on the funding of the System.

Impact of Assuming 1.0% Higher Investment Return			
	<u>Funded Ratio</u>	<u>Amortization Period</u>	<u>Actuarially Determined Employer Contribution (Millions \$)*</u>
Current Assumption 7.30%	72.49%	24 Years	\$117.6
Higher Assumption 8.30%	<u>80.32%</u>	<u>11 Years</u>	<u>56.6</u>
Change - Increase / (Decrease)	7.83%	(13)Years	(\$61.0)
Impact of Assuming 0.5% Higher Investment Return			
	<u>Funded Ratio</u>	<u>Amortization Period</u>	<u>Actuarially Determined Employer Contribution (Millions \$)*</u>
Current Assumption 7.30%	72.49%	24 Years	\$117.6
Higher Assumption 7.80%	<u>76.38%</u>	<u>16 Years</u>	<u>84.7</u>
Change - Increase / (Decrease)	3.89%	(8) Years	(\$32.9)
Impact of Assuming 0.5% Lower Investment Return			
	<u>Funded Ratio</u>	<u>Amortization Period</u>	<u>Actuarially Determined Employer Contribution (Millions \$)*</u>
Current Assumption 7.30%	72.49%	24 Years	\$117.6
Lower Assumption 6.80%	<u>68.67%</u>	<u>37 Years</u>	<u>145.9</u>
Change - Increase / (Decrease)	(3.82)%	13 Years	\$28.3
Impact of Assuming 1.0% Lower Investment Return			
	<u>Funded Ratio</u>	<u>Amortization Period</u>	<u>Actuarially Determined Employer Contribution (Millions \$)*</u>
Current Assumption 7.30%	72.49%	24 Years	\$117.6
Lower Assumption 6.30%	<u>64.93%</u>	<u>71 Years</u>	<u>179.7</u>
Change - Increase / (Decrease)	(7.56)%	47 Years	\$62.1

\* Amounts reflect estimated increase/(decrease) in FY 2024 employer contributions only, in order to maintain the 24-year amortization period.



The future funding status of the System will be determined by the System's experience. The System's actual asset returns and retirement rates, as well as member longevity, salary increases, withdrawal rates, disability rates and future legislation will all impact the funding status of the System. The entry age normal cost method and four-year smoothing of asset gains and losses will help to provide a more orderly funding of the System's liabilities but will not change the actual experience. The amortization period of the UAAL is not likely to decrease by the expected 1.0 year with each passing actuarial valuation. Instead, the amortization period is expected to decrease more or less than 1.0 years each year, reflecting gains and losses due to experience different than the actuarial assumptions.

### **Assumption Changes**

There have been no assumption changes since the previous valuation that would have a material effect on the liabilities of the System.

### **Benefit Changes**

There have been no benefit changes since the previous valuation that would have a material effect on the liabilities of the System.

### **Contribution Changes**

An employer supplemental contribution of 1% of compensation is required beginning in fiscal year 2014 which will increase by 0.10% each subsequent fiscal year through 2024. For fiscal years beginning after June 30, 2024, the supplemental employer contribution will equal 2.00% of compensation.

### **Method Changes**

There have been no method changes since the previous valuation.



## Impact of Changes

The following table summarizes how experience has changed the UAAL since the July 1, 2022 Actuarial Valuation. Further detail can be found in Table 12.

### Changes in the Unfunded Actuarial Accrued Liability (UAAL)

(In millions)

July 1, 2022 Valuation UAAL	\$ 1,891.7
Expected Decrease	<u>(17.1)</u>
Expected July 1, 2023 UAAL	\$ 1,874.6
Experience Loss on Actuarial Liabilities	\$ 28.6
Experience Gain on Actuarial Assets	(16.8)
Assumption & Method Changes	0.0
Plan Changes	<u>0.0</u>
Total Loss	<u>11.8</u>
July 1, 2023 Valuation UAAL	\$ 1,886.4



## Teachers' Retirement System State of Montana

### Summary

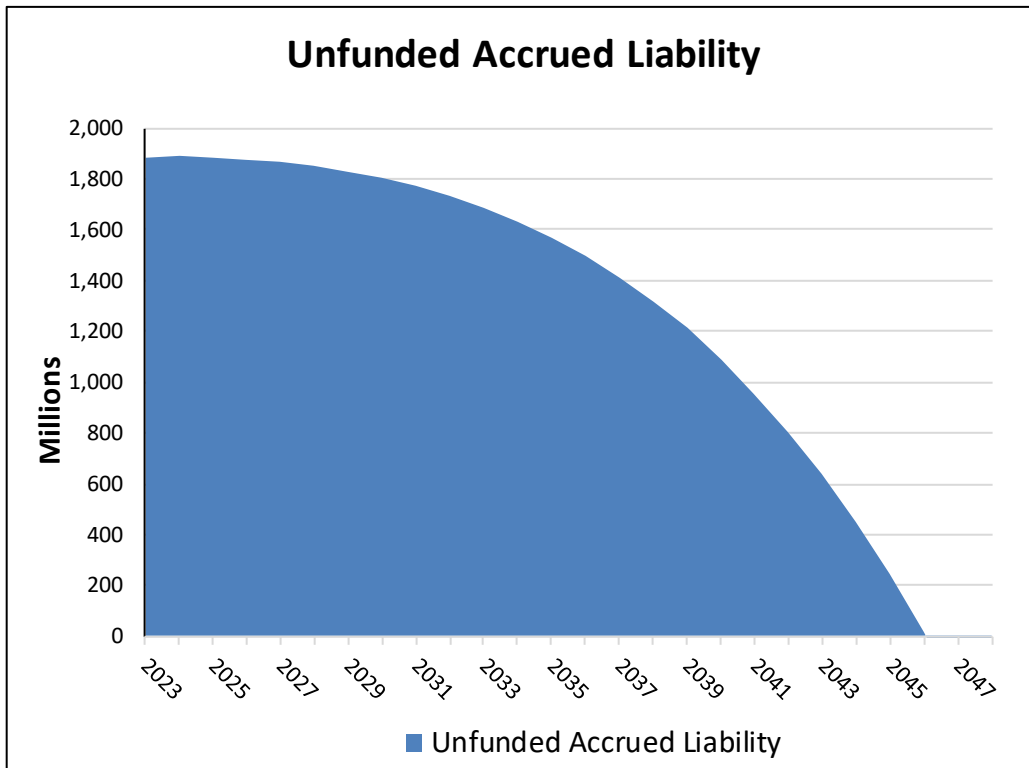
- \* The System's actuarial value investment return of 7.66% for the year ended June 30, 2023 is 0.36% more than the actuarial assumption of 7.30%. This represents an asset gain of \$16.8 million due to investment return greater than anticipated. The actuarial value of assets is not allowed to be greater than 120% or less than 80% of the market value of assets. As of July 1, 2023, the market value of assets was \$4,920.8 million. As of July 1, 2023 the preliminary actuarial value of assets was \$4,971.9 million. Since the preliminary actuarial value is within the corridor no adjustment is required to the preliminary actuarial value of assets. The July 1, 2023 market value of assets is \$51.1 million less than the actuarial value of assets. This 51.1 million will be recognized in future actuarial valuations unless it is offset by returns greater than the 7.30% assumption.
- \* As of July 1, 2023 the amortization period of the UAAL is 24 years. Prior to this valuation the funding period was 25 years. The ultimate goal of the Board's Funding and Benefits Policy is to increase the current net funded ratio of 72.49% above 110% to encourage stable contribution rates.
- \* The funding of the retirement system will be impacted by future experience which will sometimes be more favorable than the actuarial assumptions and sometimes less favorable. In particular, investment returns larger and smaller than the 7.30% assumption are expected to have significant impacts on the System's funding progress. In the long term, the favorable experience is needed to offset the less favorable experience. This is the reason for using an actuarial value of assets that smooths gains and losses over four years.
- \* The unfunded actuarial accrued liability is amortized using a level percentage of payroll method over the amortization period. Under the level percentage of payroll method, amortization payments will not be large enough to cover interest on the UAAL in the beginning of the amortization schedule, which means that as a dollar amount, the UAAL is expected to grow. After a period of time, amortization payments will be large enough that the amortization payments will cover both interest and principal, and the UAAL as a dollar amount will be projected to decrease in each subsequent year. The payroll growth assumption is used to determine the percentage of payroll required over the remaining amortization period to fully amortize the UAAL. The payroll growth assumption is 3.25%.



## Teachers' Retirement System State of Montana

### Projected Progress Toward 100% Funding

The table below shows the projected progress toward reaching 100%. When the System is 100% funded the Unfunded Actuarial Accrued Liability will be fully amortized. This is scheduled to occur within 24 years. The ultimate goal of the TRS System is to become at least 100% funded and to establish a reserve equal to 10% of the System's Actuarial Accrued Liability.







# Teachers' Retirement System State of Montana

## Section 2

### Assets

In many respects, an actuarial valuation can be regarded as an inventory process. The inventory is taken as of the actuarial valuation date, which for this valuation is July 1, 2023. On that date, the assets available for the payment of benefits are appraised. These assets are compared with the actuarial liabilities. The actuarial process thus leads to a method of determining what contributions by members and their employers are needed to strike a balance.

The asset valuation method being used is a four-year smoothing method. The expected return is determined each year based on the beginning of year market value and actual cash flows during the year. Any difference between the expected market value return and the actual market value return is recognized evenly over a period of four years. The actuarial value of assets is not allowed to be greater than 120% or less than 80% of the market value of assets.

Table 1 lists the assets held and their market value for the past two years. Table 2 summarizes the fund's activity during the past two years. Table 3 summarizes the determination of the actuarial value of assets. Table 4 summarizes historical asset returns for the last 15 years including the amount recognized by the actuarial asset valuation method which was greater or lesser than the actuarial investment return assumption. Table 5 summarizes the historical asset returns since 2000 on market value and actuarial value basis. Table 5 also shows the assumed rate of return since 2000 which was reduced to 7.75%, 7.50%, and 7.30% in Fiscal Years Ending 2005, 2019, and 2023, respectively. Table 6 summarizes the historical asset values on a market value and actuarial value basis.



**Teachers' Retirement System  
State of Montana**

**Table 1**

**Statement of Fiduciary Net Assets**

	<b>TOTAL TRS 2023</b>	<b>TOTAL TRS 2022</b>
<b>ASSETS</b>		
Cash/Cash Equivalents-Short Term		
Investment Pool	\$ 63,011,378	\$ 55,768,650
Receivables:		
Accounts Receivable	24,571,800	24,114,711
Interest Receivable	266,894	62,190
Total Receivables	<u>\$ 24,838,694</u>	<u>\$ 24,176,901</u>
Investments, at fair value:		
Investment Pools	4,835,048,177	4,645,886,890
Other Investments	-	-
Securities Lending Collateral	49,737,244	48,067,890
Total Investments	<u>\$ 4,884,785,421</u>	<u>\$ 4,693,954,780</u>
Assets Used in Plan Operations:		
Land and Buildings	\$ 243,881	\$ 243,881
Less: Accumulated Depreciation	(121,940)	(87,100)
Equipment	187,918	599,838
Less: Accumulated Depreciation	(16,286)	(16,286)
Intangible Right to Use Building	2,810,123	2,810,123
Less: Accumulated Depreciation	(330,603)	(165,301)
Total Other Assets	<u>2,773,093</u>	<u>3,385,155</u>
<b>TOTAL ASSETS</b>	<u><b>\$ 4,975,408,586</b></u>	<u><b>\$ 4,777,285,486</b></u>
Pension Deferred Outflows	\$ 336,218	\$ 435,767
OPEB Deferred Outflows	\$ 168,376	\$ 183,763
<b>LIABILITIES</b>		
Accounts Payable	\$ 179,747	\$ 134,481
Accrued Liability	-	-
Securities Lending Liability	49,737,244	48,067,890
Compensated Absences	218,004	216,437
OPEB Implicit Rate Subsidy	53,547	235,221
Net Pension Liability	1,851,315	1,394,111
Standard Lease	2,595,185	2,702,071
<b>TOTAL LIABILITIES</b>	<u><b>\$ 54,635,042</b></u>	<u><b>\$ 52,750,211</b></u>
Pension Deferred Inflows	\$ 135,533	\$ 574,861
OPEB Deferred Inflows	\$ 299,492	\$ 130,460
<b>NET ASSETS HELD IN TRUST</b>		
<b>FOR PENSION BENEFITS</b>	<u><b>\$ 4,920,843,113</b></u>	<u><b>\$ 4,724,449,484</b></u>



**Teachers' Retirement System  
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**Table 2**

**Statement of Changes in Fiduciary Net Assets**

	<u>TOTAL TRS 2023</u>	<u>TOTAL TRS 2022</u>
<b>ADDITIONS</b>		
Contributions:		
Employer	\$ 113,441,533	\$ 109,672,148
Plan Member	87,024,738	85,736,884
Other	48,437,855	47,999,525
Total Contributions	<u>\$ 248,904,126</u>	<u>\$ 243,408,557</u>
Misc Income	\$ 55,137	\$ 36,921
Investment Income:		
Net Appreciation/(Depreciation) in Fair Value of Investments	\$ 412,780,805	\$ (173,973,344)
Investment Earnings	2,241,955	231,722
Security Lending Income	2,670,499	505,851
Investment Income/(Loss)	<u>\$ 417,693,259</u>	<u>\$ (173,235,771)</u>
Less: Investment Expense	27,623,923	34,094,176
Less: Security Lending Expense	1,623,360	111,143
Net Investment Income/(Loss)	<u>\$ 388,445,976</u>	<u>\$ (207,441,090)</u>
Total Additions	<u>\$ 637,405,239</u>	<u>\$ 36,004,388</u>
<b>DEDUCTIONS</b>		
Benefit Payments	\$ 429,121,173	\$ 414,346,628
Withdrawals	7,830,941	10,338,308
Administrative Expense	3,745,792	3,555,107
OPEB Expenses	7,070	25,401
Pension Expense	306,634	138,568
Total Deductions	<u>\$ 441,011,610</u>	<u>\$ 428,404,012</u>
<b>NET INCREASE (DECREASE) IN PLAN NET ASSETS</b>	\$ 196,393,629	\$ (392,399,624)
<b>NET ASSETS HELD IN TRUST FOR PENSION BENEFITS BEGINNING OF YEAR</b>	\$ 4,724,449,484	\$ 5,116,849,108
<b>ADJUSTMENT</b>	-	-
<b>END OF YEAR</b>	<u>\$ 4,920,843,113</u>	<u>\$ 4,724,449,484</u>



**Teachers' Retirement System**  
**State of Montana**  
**Table 3**  
**Determination of Actuarial Value of Assets**

Valuation Date July 1:	2022	2023	2024	2025	2026
A. Actuarial Value Beginning of Year	\$ 4,616,374,427	\$ 4,799,596,681			
B. Market Value End of Year	4,724,449,484	4,920,843,113			
C. Market Value of Beginning of Year	5,116,849,108	4,724,449,484			
D. Cash Flow					
D1. Contributions	243,408,557	248,904,126			
D2. Benefit Payments	(424,684,936)	(436,952,114)			
D3. Administrative Expenses	(3,555,107)	(3,745,792)			
D4. Pension and OPEB Expenses	(163,969)	(313,704)			
D5. Net	<u>\$ (184,995,455)</u>	<u>\$ (192,107,484)</u>			
E. Investment Income					
E1. Market Total: B. - C. - D5.	\$ (207,404,169)	\$ 388,501,113			
E2. Assumed Rate	7.50%	7.30%			
E3. Amount for Immediate Recognition	376,826,354	342,080,557			
E4. Amount for Phased-in Recognition	(584,230,523)	46,420,556			
F. Phased-In Recognition of Investment Income					
F1. Current Year: 0.25 * E4.	\$ (146,057,631)	\$ 11,605,139	\$ -	\$ -	\$ -
F2. First Prior Year	206,238,312	(146,057,631)	11,605,139	-	-
F3. Second Prior Year	(49,450,922)	206,238,312	(146,057,631)	11,605,139	-
F4. Third Prior Year	(19,338,404)	(49,450,922)	206,238,312	(146,057,631)	11,605,139
F5. Total Recognized Investment Gain	<u>\$ (8,608,645)</u>	<u>\$ 22,334,898</u>	<u>\$ 71,785,820</u>	<u>\$ (134,452,492)</u>	<u>\$ 11,605,139</u>
G. Preliminary Actuarial Value End of Year A. + D5. + E3. + F5.	\$ 4,799,596,681	\$ 4,971,904,652			
H. Corridor					
H1. 80% of Market Value	\$ 3,779,559,587	\$ 3,936,674,490			
H2. 120% of Market Value	5,669,339,381	5,905,011,736			
I. Actuarial Value End of Year G. Not Less than H1. or Not Greater than H2.	\$ 4,799,596,681	\$ 4,971,904,652			
J. Difference Between Market & Actuarial Values	\$ (75,147,197)	\$ (51,061,539)			



**Teachers' Retirement System  
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**Table 4**

**Historical Investment Returns\***

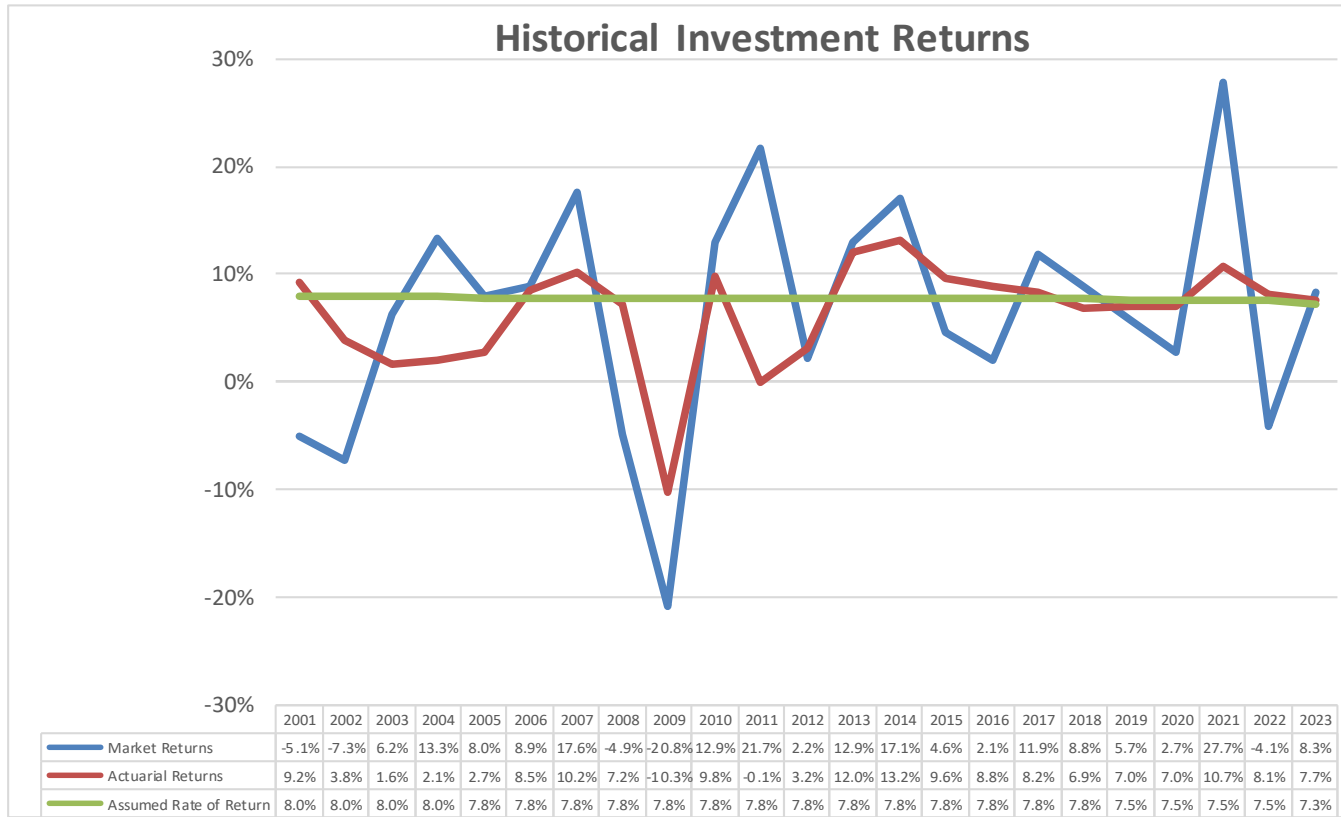
<b>Fiscal Year Ending</b>	<b>Market Returns</b>	<b>Actuarial Returns</b>	<b>Actuarial Return Over 7.75% Assumption</b>
June 30, 2009	(20.8)%	(10.3)%	(18.0)%
June 30, 2010	12.9%	9.8%	2.0%
June 30, 2011	21.7%	(0.1)%	(7.9)%
June 30, 2012	2.2%	3.2%	(4.6)%
June 30, 2013	12.9%	12.0%	4.3%
June 30, 2014	17.1%	13.2%	5.5%
June 30, 2015	4.6%	9.6%	1.8%
June 30, 2016	2.1%	8.8%	1.0%
June 30, 2017	11.9%	8.2%	0.5%
June 30, 2018	8.8%	6.9%	(0.9)%
<b>Fiscal Year Ending</b>	<b>Market Returns</b>	<b>Actuarial Returns</b>	<b>Actuarial Return Over 7.50% Assumption</b>
June 30, 2019	5.7%	7.0%	(0.5)%
June 30, 2020	2.7%	7.0%	(0.5)%
June 30, 2021	27.7%	10.7%	3.2%
June 30, 2022	(4.1)%	8.1%	0.6%
<b>Fiscal Year Ending</b>	<b>Market Returns</b>	<b>Actuarial Returns</b>	<b>Actuarial Return Over 7.30% Assumption</b>
June 30, 2023	8.3%	7.7%	0.4%
15 Year Average	7.0%	6.6%	(1.0)%

\* Returns reflect all investment returns, including investment income and realized and unrealized investment gains and losses, and are net of investment expenses and administrative expenses paid by the System.



**Teachers' Retirement System  
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**Table 5**

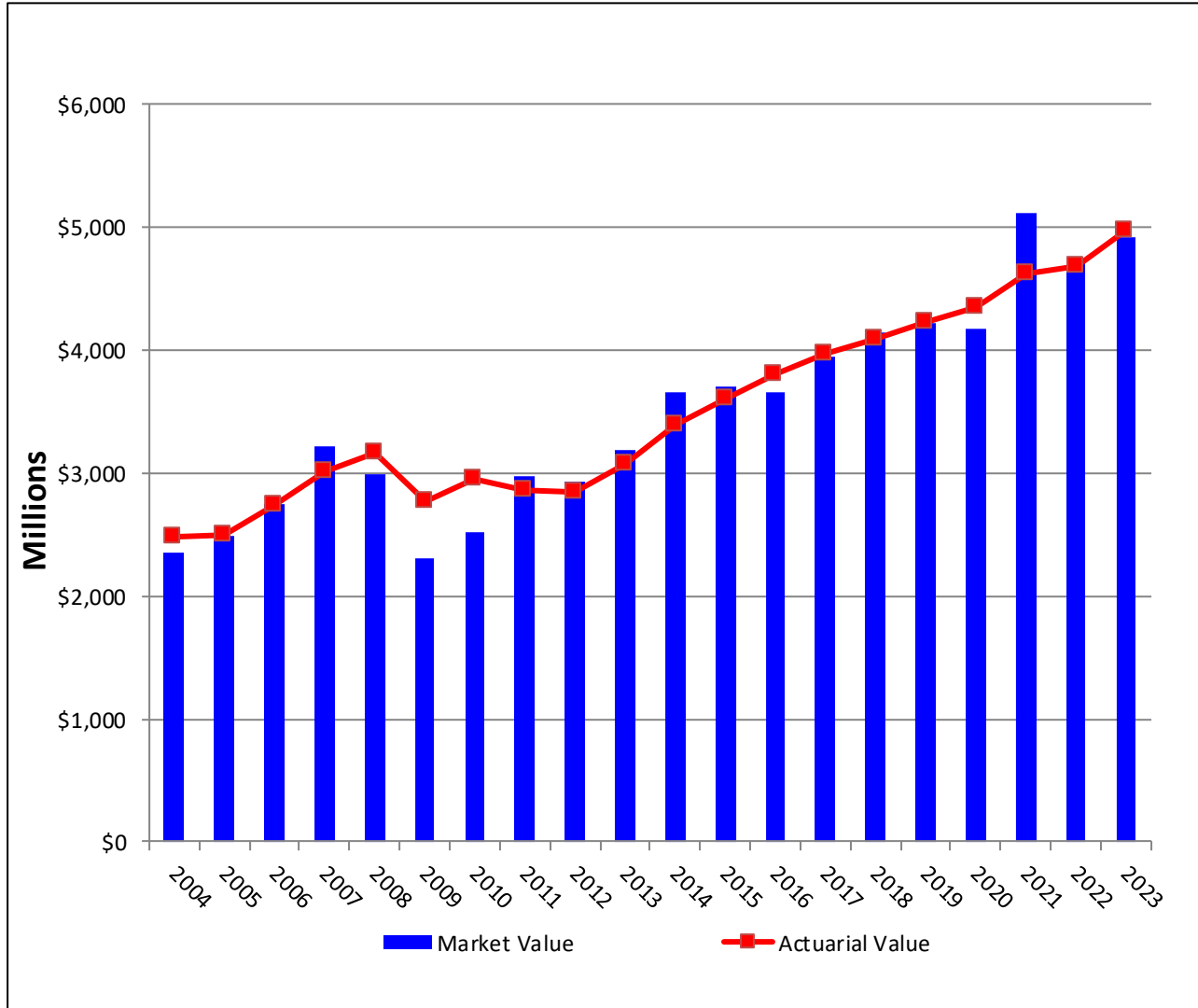




# Teachers' Retirement System State of Montana

Table 6

Market Value of Assets vs. Actuarial Value of Assets





## **Teachers' Retirement System State of Montana**

### **Section 3**

#### **Actuarial Present Value of Future Benefits**

In the previous section, an actuarial valuation was related to an inventory process and an analysis was given of the inventory of assets of the System as of the valuation date. In this section, the discussion will focus on the commitments of the System, which will be referred to as its actuarial liabilities.

Table 7 contains an analysis of the actuarial present value of all future benefits for contributing members, for former contributing members, and for beneficiaries. The analysis is given by type of benefit.

The actuarial liabilities summarized in Table 7 include the actuarial present value of all future benefits expected to be paid with respect to each member covered as of the valuation date. For an active member, this value includes a measure of both benefits already earned and future benefits to be earned. Thus, for all members, active and retired, the value extends over benefits earnable and payable for the rest of their lives and, if an optional benefit is chosen, for the lives of their surviving beneficiaries.

The actuarial valuation does not recognize liabilities for employees who become members and participate in the System after the valuation date.





**Teachers' Retirement System  
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**Table 7**

**Actuarial Present Value of Future Benefits  
for Contributing Members, Former Contributing  
Members, and Beneficiaries**

(All amounts are actuarial present values in millions)

	<u>July 1, 2023</u> <u>Total</u>	<u>July 1, 2022</u> <u>Total</u>
<b>A. Active Members</b>		
Service Retirement	\$ 2,755.7	\$ 2,721.6
Disability Retirement	19.8	17.8
Survivors' Benefits	31.0	30.7
Vested Retirement	94.4	90.4
Refund of Member Contributions	14.3	13.2
Total	\$ 2,915.2	\$ 2,873.7
<b>B. Inactive Members and Annuitants</b>		
Service Retirement	\$ 4,358.5	\$ 4,254.6
Disability Retirement	23.7	25.5
Beneficiaries*	293.8	277.7
Vested Terminated Members	153.4	132.4
Refund of Member Contributions	15.9	14.6
Total	\$ 4,845.3	\$ 4,704.8
<b>C. Grand Total</b>	<b>\$ 7,760.5</b>	<b>\$ 7,578.5</b>

\* Includes survivors of active and retired members and children's benefits



## **Teachers' Retirement System State of Montana**

### **Section 4**

#### **Employer Contributions**

In the previous two sections, attention has been focused on the assets and the present value of all future benefits of the System. A comparison of Tables 3 and 7 indicates that there is a shortfall in current actuarial assets to meet the present value of all future benefits for current members and beneficiaries.

In an active system, there will always be a difference between the assets and the present value of all future benefits. An actuarial valuation sets a schedule of future contributions that will deal with this funding in an orderly fashion.

The method used to determine the incidence of the contributions in various years is called the actuarial cost method. For this valuation, the entry age actuarial cost method has been used. A description of the entry age actuarial cost method is provided in Appendix A. Under this method, or essentially any actuarial cost method, the contributions required to meet the difference between current assets and the present value of all future benefits are allocated each year between two elements:

- A normal cost amount, which ideally is relatively stable as a percentage of salary over the years;
- An amount which is used to amortize the UAAL.

The two items described above, normal cost and UAAL, are the keys to understanding the actuarial cost method. Let us first discuss the normal cost.

The normal cost is the theoretical contribution rate, which will meet the ongoing costs of a group of average new employees. Suppose that a group of new employees were covered under a separate fund from which all benefits and to which all contributions and associated investment return were to be paid. Under the entry age actuarial cost method, the normal cost contribution rate is that level percentage of pay which would be exactly right to maintain this fund on a stable basis. If experience were to follow the actuarial assumptions exactly, the fund would be completely liquidated with the last payment to the last survivor of the group.

The assumed investment rate of return is 7.30%, net of investment and administrative expenses.

We have determined the normal cost rates separately by type of benefit under the System. These are summarized in Table 8. In Table 8 we also provide a summary of the member and employer statutory contributions.

The term "fully funded" is often applied to a system where contributions for everyone at the normal cost rate will fully pay for the benefits of existing as well as new employees. Often, systems are not fully funded, either because of benefit improvements in the past that have not been completely



paid for or actuarial deficiencies that have occurred because experience has not been as anticipated. Under these circumstances, a UAAL exists.

Table 9 shows how the UAAL was derived for the System. Lines A and B show, respectively, the total present value of future benefits and the portion of the future liability that is expected to be paid from future normal cost contributions, both employer and employee. Line C shows the actuarial accrued liability. Line D shows the amount of assets available for benefits. Line E shows the UAAL.

The amortization of the UAAL assumes university supplemental contributions are made as a percent of pay for members of the Montana University System Retirement Program (MUS-RP). Under Section 19-20-621, periodic separate valuations are to be performed to measure the liabilities of benefits to be paid under the Teachers' Retirement System (TRS) for MUS-RP members. The MUS-RP valuations calculate contribution rates that finance the university member benefits with university contributions and reflect actual experience including investment returns. In the prior valuations, the Supplemental Contribution of 4.72% of MUS-RP payroll was assumed to cease in 2033. It is our understanding the contribution will not stop unless legislative action is taken. The university supplemental contribution rate has varied from time to time. Recently it has varied as follows:

<b>Supplemental University Contribution Rate</b>	<b>Fiscal Years Ending</b>
2.81%	June 30, 1998
3.12%	June 30, 1999
3.42%	June 30, 2000
3.73%	June 30, 2001
4.04%	June 30, 2002 to June 30, 2007
4.72%	After June 30, 2007

The UAAL at any date after establishment of a system is affected by any actuarial gains or losses arising when the actual experience of the system varies from the experience anticipated by the actuarial assumptions used in the valuations. To the extent actual experience as it develops differs from the assumptions used, so also will the actual emerging costs differ from the estimated costs. The impact of these differences in actual experience from the assumptions is included in Section 1, the Summary of Findings.



**Teachers' Retirement System  
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**Table 8**

**Normal Cost Contribution Rates  
As Percentages of Salary**

	<b>July 1, 2023 Total</b>	<b>July 1, 2022 Total</b>
Service retirement	8.93%	8.97%
Disability retirement	0.10%	0.09%
Survivors' benefits	0.14%	0.15%
Vested retirement	0.86%	0.85%
Refund of member contributions	<u>0.72%</u>	<u>0.81%</u>
Total Normal Rate	<u><u>10.75%</u></u>	<u><u>10.87%</u></u>
Employee Normal Rate	8.15%	8.15%
Employer Normal Rate	2.60%	2.72%

The normal rate for members hired on or after July 1, 2013 is 10.39%. As current members retire or terminate from the System and are replaced by new hires, the normal rate of the System will decline which will increase the amount of the employer contribution that is used to eliminate the unfunded actuarial accrued liability.



**Teachers' Retirement System  
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**Table 9**

**Unfunded Actuarial Accrued Liability  
(Dollar amounts in millions)**

	<b>July 1, 2023</b>	<b>July 1, 2022</b>
A. Actuarial present value of all future benefits for present and former members and their survivors (Table 7)	\$ 7,760.5	\$ 7,578.5
B. Less actuarial present value of total future normal costs for present members	<u>902.2</u>	<u>887.2</u>
C. Actuarial accrued liability	\$ 6,858.3	\$ 6,691.3
D. Less assets available for benefits	<u>4,971.9</u>	<u>4,799.6</u>
E. Unfunded actuarial accrued liability	\$ 1,886.4	\$ 1,891.7



## **Teachers' Retirement System State of Montana**

### **Section 5**

#### **Cash Flows**

The fundamental equation for funding a retirement system is that benefits and administrative expenses must be provided for by contributions (past and future) and investment income. When a retirement system matures, benefits and administrative expenses often exceed contributions. In this case we say the system has a “negative cash flow.” Mature systems are characterized by negative cash flows and large pools of assets. This is natural. Actuarial funding is designed to accumulate large pools of assets which will in turn provide investment income and finance negative cash flows when systems mature. If the fund is looked at as a whole, investment income is usually larger than the difference between contributions and benefit payments. The retirement system’s investment strategy should maximize potential returns at a prudent level of risk while providing for needed cash flows.

Table 10 shows the System had a positive cash flow for the year ended June 30, 2023. The System’s total cash flow including benefits payments and investment earnings was \$200.4 million. Of the \$200.4 million, \$(437.0) million was due to benefit payments, which were offset by \$248.9 in contributions and \$388.5 in investment returns. Table 11 shows the System is projected to have a positive cash flow in all future years.

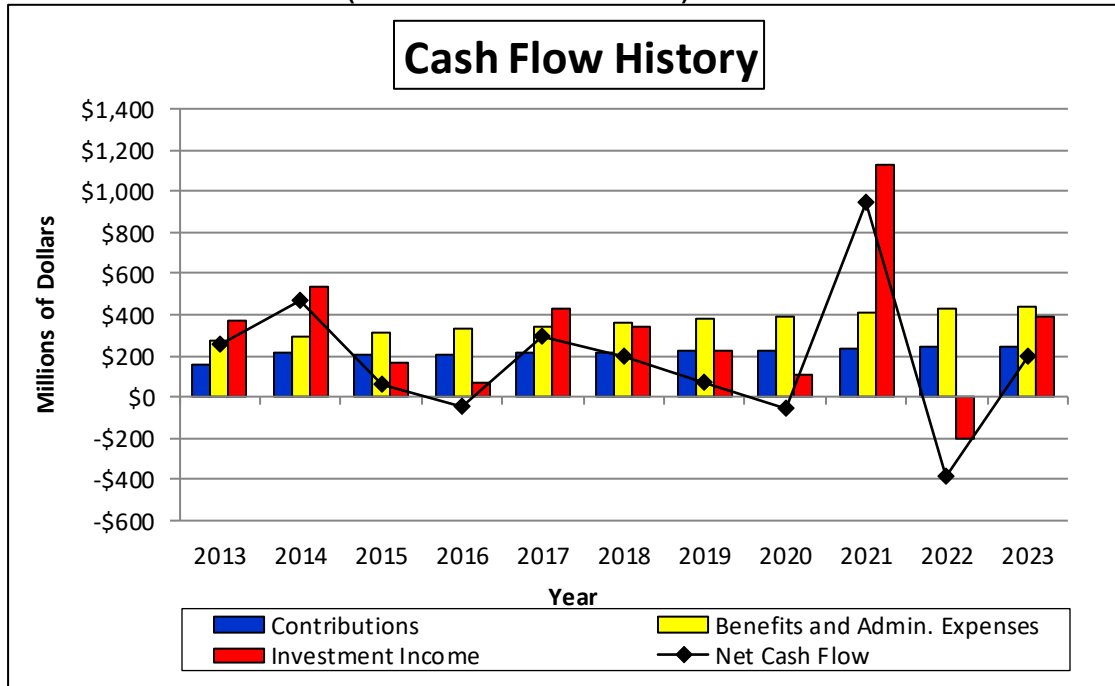
As long as the System had a positive cash flow, there was no need to plan where the funds would come from to pay benefits since benefits could be paid by incoming contributions. A negative cash flow, as defined above, requires planning what funds will be used to pay the difference between benefits and contributions. We are providing these projections to aid in developing the investment strategy for the System’s assets.



**Teachers' Retirement System  
State of Montana**

**Table 10**

**Cash Flow History  
(Dollar amounts in millions)**



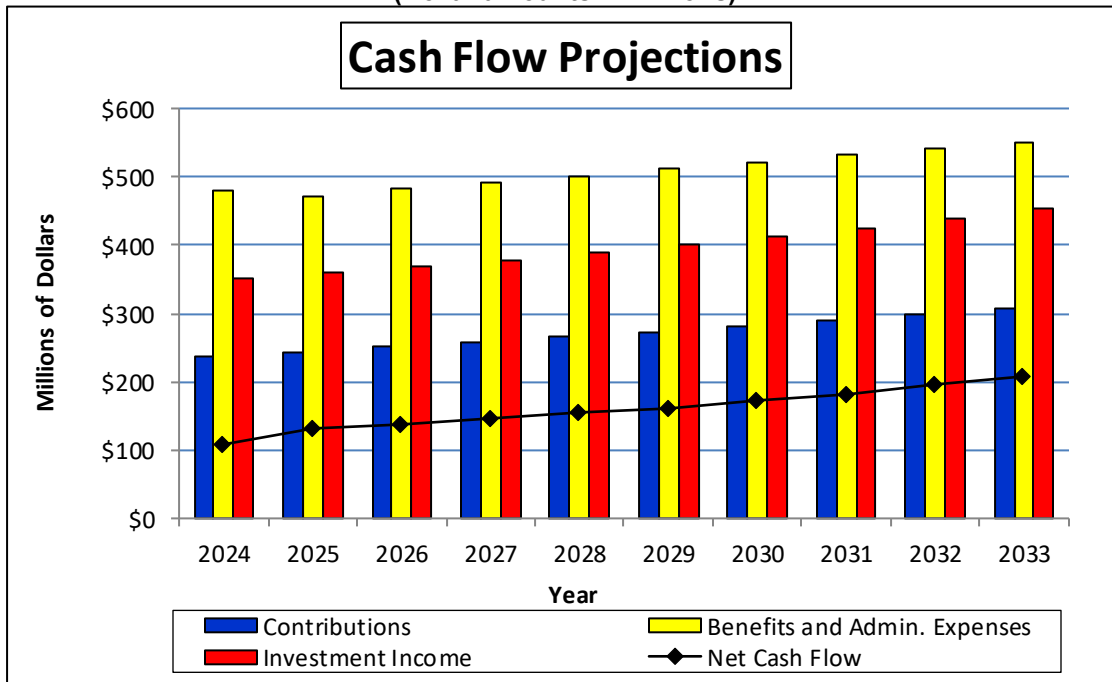
Year Ended June 30	Historical Cash Flows			
	Contributions	Benefits & Administrative Expenses	Investment Income	Net Cash Flow
2013	\$ 154.5	\$ 275.4	\$ 373.7	\$ 252.8
2014	218.8	292.1	540.3	467.0
2015	202.9	311.2	165.7	57.4
2016	205.3	328.4	71.5	(51.6)
2017	210.5	343.7	427.0	293.8
2018	214.8	361.2	343.7	197.3
2019	220.9	376.9	227.9	71.9
2020	228.6	393.5	112.6	(52.3)
2021	231.4	413.1	1,129.8	948.1
2022	243.4	428.4	(207.4)	(392.4)
2023	248.9	437.0	388.5	200.4



**Teachers' Retirement System  
State of Montana**

**Table 11**

**Cash Flow Projections  
(Dollar amounts in millions)**



Year Ended June 30	Projected Cash Flows			Net Cash Flow
	Contributions	Benefits & Administrative Expenses	Assumed Investment Income	
2024	\$ 236.9	\$ 479.1	\$ 351.3	\$ 109.1
2025	243.8	471.4	359.8	132.2
2026	250.9	482.0	369.3	138.2
2027	258.2	492.0	379.3	145.5
2028	265.8	501.5	389.8	154.1
2029	273.6	512.1	401.0	162.5
2030	281.7	522.6	412.8	171.9
2031	290.0	532.6	425.2	182.6
2032	298.7	542.2	438.6	195.1
2033	307.5	551.2	452.8	209.1





## **Teachers' Retirement System State of Montana**

### **Section 6**

#### **Actuarial Gains or Losses**

An analysis of actuarial gains or losses is performed in conjunction with all regularly scheduled valuations.

The developments of the gains or losses related to the actuarial liability and the assets are shown in Table 12. The results of our analysis of the financial experience of the System in the three most recent regular actuarial valuations are presented in Table 13. Each gain or loss shown represents our estimate of how much the given type of experience caused the Unfunded Actuarial Accrued Liability or Funding Reserve to change in the period since the previous actuarial valuation.

Gains and losses shown due to demographic sources are approximate. Demographic experience is analyzed in greater detail in our periodic assumption studies.

Non-recurring gains and losses result from changes in the actuarial assumptions and benefit improvements.



**Teachers' Retirement System  
State of Montana**

**Table 12  
Analysis of Actuarial Gains or Losses\***

<b>A. ACTUARIAL ACCRUED LIABILITY (GAIN) / LOSS ANALYSIS</b>	
1. Actual Actuarial Accrued Liability as of June 30, 2022:	\$ 6,691,274,850
2. Normal Cost for this Plan Year:	95,850,764
3. Interest on items 1 and 2 [(1+2) x 7.30%]:	495,460,170
4. Benefit Payments for this Plan Year:	(436,952,114)
5. Interest on item [4 x 7.30% x .5]:	(15,948,752)
6. Expected Actuarial Accrued Liability as of June 30, 2023:	<u>\$ 6,829,684,918</u>
7. Changes due to:	
a. Assumption changes:	\$ 0
b. Plan amendments:	0
c. Method changes:	0
d. Actuarial (Gain) / Loss:	28,621,052
8. Actual Actuarial Accrued Liability as of June 30, 2023:	<u><u>\$ 6,858,305,970</u></u>
9. Items Affecting Calculation of Actuarial Accrued Liability:	
a. Benefit provisions reflected in the actuarial accrued liability (see Appendix B)	
b. Actuarial assumptions and methods used to determine actuarial accrued liability (see Appendix A)	
<b>B. ASSET (GAIN) / LOSS ANALYSIS</b>	
1. Actuarial Value of Assets as of June 30, 2022:	\$ 4,799,596,681
2. Interest on item [1 x 7.30%]:	350,370,558
3. Contributions for this Plan Year:	248,904,126
4. Interest on item [3. x 7.30% x .5]:	9,085,001
5. Benefit Payments for this Plan Year:	(436,952,114)
6. Interest on item [5. x 7.30% x .5]:	(15,948,752)
7. Expected Actuarial Value of Assets as of June 30, 2023:	<u>\$ 4,955,055,500</u>
8. Actuarial Value of Assets as of June 30, 2023:	<u>\$ 4,971,904,652</u>
9. (Gain) / Loss	<u>\$ (16,849,152)</u>
<b>C. UNFUNDED ACTUARIAL ACCRUED LIABILITY (GAIN) / LOSS ANALYSIS</b>	
1. Actual Unfunded Actuarial Accrued Liability as of June 30, 2022:	\$ 1,891,678,169
2. Normal Cost for this Plan Year:	95,850,764
3. Contributions for this Plan Year:	(248,904,126)
4. Interest on items 1 - 3: [(1+2) x 7.30% + (3 x 7.30% x .5)]:	136,004,611
5. Expected Unfunded Actuarial Accrued Liability as of June 30, 2023:	<u>\$ 1,874,629,418</u>
6. Changes due to:	
a. Assumption changes:	\$ 0
b. Plan amendments:	\$ -
c. Method changes:	0
d. Actuarial (Gain) / Loss:	11,771,900
7. Actual Unfunded Actuarial Accrued Liability as of June 30, 2023:	<u><u>\$ 1,886,401,318</u></u>

\* Effects related to gains are shown in parentheses. Numerical results are expressed as a (decrease) increase in the Unfunded Actuarial Accrued Liability (UAAL). Gains decrease the UAAL and losses increase the UAAL.



**Teachers' Retirement System  
State of Montana**

**Table 13**

**Historical Actuarial Gains or Losses\***  
(Dollar amounts in millions)

	UAAL (Gain)/Loss		
	June 30, 2023	June 30, 2022	June 30, 2021
<b>Investment Income</b>			
Investment income was (greater) less than expected based on actuarial value of assets.	\$ (16.8)	\$ (28.9)	\$ (135.1)
<b>Pay Increases</b>			
Pay increases were (less) greater than expected.	(1.1)	5.9	16.0
<b>Age &amp; Service Retirements</b>			
Members retired at (older) younger ages or with (less) greater final average pay than expected	26.9	27.0	22.1
<b>Disability Retirements</b>			
Disability claims were (less) greater than expected	-	0.3	0.3
<b>Death-in-Service Benefits</b>			
Survivor claims were (less) greater than expected	(0.5)	(0.5)	(3.0)
<b>Withdrawal From Employment</b>			
(More) less reserves were released by withdrawals than expected	16.4	17.6	17.4
<b>Death After Retirement</b>			
Retirees (died younger) lived longer than expected	5.3	8.3	13.3
<b>Data Adjustments and Benefit Payment Timing</b>			
Service purchases, data corrections, etc.	(24.8)	(40.2)	(45.3)
<b>Other</b>			
Miscellaneous (gains) and losses	6.4	(0.3)	(0.9)
<b>Total (Gain) or Loss During Period From Financial Experience</b>	\$ 11.8	\$ (10.8)	\$ (115.2)
<b>Non-Recurring Items.</b>			
Changes in actuarial assumptions and methods	-	78.1	-
Changes in benefits caused a (gain) loss	-	-	-
<b>Composite (Gain) Loss During Period</b>	\$ 11.8	\$ 67.3	\$ (115.2)

\* Effects related to gains are shown in parentheses. Numerical results are expressed as a (decrease) increase in the Unfunded Actuarial Accrued Liability (UAAL). Gains decrease the UAAL and losses increase the UAAL.



## Teachers' Retirement System State of Montana

### Section 7

#### Risk Considerations

A typical retirement plan faces many different risks, but the greatest risk is the inability to make benefit payments when due. If plan assets are depleted, benefits may not be paid which could create legal and litigation risk or the plan could become “pay as you go.” The term “risk” is most commonly associated with an outcome with undesirable results. However, in the actuarial world, risk can be translated as uncertainty. The actuarial valuation process uses many actuarial assumptions to project how future contributions and investment returns will meet the cash flow needs for future benefit payments. Of course, we know that actual experience will not unfold exactly as anticipated by the assumptions and that uncertainty, whether favorable or unfavorable, creates risk. ASOP 51 defines risk as the potential of actual future measurements to deviate from expected results due to actual experience that is different than the actuarial assumptions.

The various risk factors for a given plan can have a significant impact – positive or negative – on the actuarial projection of liability and contribution rates.

There are a number of risks inherent in the funding of a defined benefit plan. These include:

- economic risks, such as investment return and price inflation;
- demographic risks such as mortality, payroll growth, aging population including impact of baby boomers, and retirement ages;
- contribution risk, i.e., the potential for contribution rates to be too high for the plan sponsor/employer to pay and
- external risks such as the regulatory and political environment.

There is a direct correlation between healthy, well-funded retirement plans and consistent contributions that are sufficient to fund the System. The System is primarily funded by member, employer, and State contributions to the trust fund, together with the earnings on these accumulated contributions. These contributions fund benefit accruals for current active members and administrative expenses. The remainder of the contributions amortizes the unfunded actuarial accrued liability. The contributions are set in statute and are intended to provide the needed amounts to fund the System over time. The purpose of the valuation is to determine if these contributions are sufficient to fund the System. Due to the fixed nature of the contributions, actuarial gains and losses are reflected in the amortization period. Generally, the largest source of actuarial gains and losses are caused by investment volatility. In addition, the unfunded liability is amortized as a level percentage of pay assuming payroll will grow by 3.25% per year. A key risk factor to the System's funding is that over time, the Statutory Contribution Rates will be insufficient to accumulate enough funds, with investment income, to fund the promised benefits. The funding insufficiency can be caused by amortization periods that are too long or by payroll not growing at the assumed rate.



The other significant risk factor for the System is investment return because of the volatility of returns and the size of plan assets compared to payroll. This is to be expected, given the underlying capital market assumptions and the System's asset allocation. To the extent that the investment return on the market value of assets cannot achieve the assumed investment rate of return, there is a risk of change to the discount rate which determines the present value of liabilities and actuarial valuation results. Please see the summary of results of this report which demonstrates the sensitivity of valuation results to differing discount rates.

Under the revised Actuarial Standards of Practice (ASOP) No. 4 effective for valuations after February 15, 2023, we include a low-default-risk obligation measure of the System's liability in our funding valuation report. This is an informational disclosure as described below and would not be appropriate for assessing the funding progress or health of the plan. This measure uses the unit credit cost method and reflects all the assumptions and provisions of the funding valuation except that the discount rate is derived from considering low-default-risk fixed income securities. We considered the FTSE Pension Discount Curve based on market bond rates published by the Society of Actuaries as of June 30, 2023 and with the 30-year spot rate used for all durations beyond 30. Using these assumptions, we calculate a liability of \$ 8,102.1 million. This amount approximates the termination liability if the plan (or all covered employment) ended on the valuation date and all of the accrued benefits had to be paid with cash-flow matched bonds. This assurance of funded status and benefit security is typically more relevant for corporate plans than for governmental plans since governments rarely have the need or option to completely terminate a plan.

A key demographic risk for the Retirement System is improvements in mortality (longevity) greater than anticipated. While the actuarial assumptions reflect a margin for improvement in mortality experience these assumptions are refined every experience study, the risk arises because there is a possibility of some sudden shift, perhaps from a significant medical breakthrough that could quickly increase liabilities. Likewise, there is some possibility of a significant public health crisis that could result in a significant number of additional deaths in a short time period, which would also be significant, although more easily absorbed. While either of these events could happen, it represents a small probability and thus represents much less risk than the volatility associated with investment returns.

The exhibits on the following pages summarize some historical information that helps indicate how certain key risk metrics have changed over time. Many are due to the maturing of the retirement system.



### Historical Asset Volatility Ratios

As a retirement system matures, the size of the market value of assets increases relative to the covered payroll of active members, on which the System is funded. The size of the plan assets relative to covered payroll, sometimes referred to as the asset volatility ratio, is an important indicator of the contribution risk for the System. The higher this ratio, the more sensitive a plan's contribution rate is to investment return volatility. In other words, it will be harder to recover from investment losses with increased contributions.

<b>Actuarial Valuation Date</b>	<b>Market Value of Assets</b>	<b>Estimated Plan Year Payroll</b>	<b>Asset Volatility Ratio</b>
7/1/2015	3,708,385,838	768,718,699	4.82
7/1/2016	3,656,830,798	795,920,906	4.59
7/1/2017	3,950,704,563	818,122,561	4.83
7/1/2018	4,148,324,206	829,708,595	5.00
7/1/2019	4,220,285,752	857,467,932	4.92
7/1/2020	4,167,839,558	880,667,830	4.73
7/1/2021	5,116,849,108	922,764,585	5.55
7/1/2022	4,724,449,484	960,836,370	4.92
7/1/2023	4,920,843,113	983,749,464	5.00

The assets at July 1, 2023 are 500% of payroll, so underperforming the investment return assumption by 1.00% (i.e., earn 6.30% for one year) is equivalent to 5.00% of payroll. While the actual impact in the first year is mitigated by the asset smoothing method and amortization of the UAAL, this illustrates the risk associated with volatile investment returns.



### Historical Cash Flows

Plans with negative cash flows will experience increased sensitivity to investment return volatility. Cash flows, for this purpose, are measured as contributions less benefit payments. If the System has negative cash flows and then experiences returns below the assumed rate, there are fewer assets to be reinvested to earn the higher returns that typically follow. While any negative cash flow will produce such a result, it is typically a negative cash flow of more than 5% of MVA that may cause significant concerns. The System has negative cash flows which has been growing over the prior seven years. This trend needs to be monitored going forward.

<b>Fiscal Year End</b>	<b>Market Value of Assets (MVA)</b>	<b>Contributions</b>	<b>Benefit Payments</b>	<b>Net Cash Flow</b>	<b>Net Cash Flow as a Percentage of MVA</b>
6/30/2015	3,708,385,838	202,896,194	311,078,740	(108,182,546)	(2.92%)
6/30/2016	3,656,830,798	205,286,917	328,215,892	(122,928,975)	(3.36%)
6/30/2017	3,950,704,563	210,520,833	343,448,519	(132,927,686)	(3.36%)
6/30/2018	4,148,324,206	214,833,474	361,026,194	(146,192,720)	(3.52%)
6/30/2019	4,220,285,752	220,949,305	376,738,054	(155,788,749)	(3.69%)
6/30/2020	4,167,839,558	228,563,253	393,336,385	(164,773,132)	(3.95%)
6/30/2021	5,116,849,108	231,360,444	412,724,347	(181,363,903)	(3.54%)
6/30/2022	4,724,449,484	243,408,557	428,240,043	(184,831,486)	(3.91%)
6/30/2023	4,920,843,113	248,904,126	436,952,114	(188,047,988)	(3.82%)



### Liability Maturity Measurement

Most public sector retirement systems have been in operation for many years. As a result, they have aging plan populations, and in some cases declining active populations, resulting in an increasing ratio of retirees to active members and a growing percentage of retiree liability. The retirement of the remaining baby boomers over the next decade is expected to further exacerbate the aging of the retirement system population. As more of the total liability begins to reside with retirees, investment volatility has a greater impact on the funding of the system since it is more difficult to restore the system financially after losses occur when there is comparatively less payroll over which to spread costs. Below are two tables which demonstrate the ratio of the System's retiree liability compared to the total accrued liability and the ratio of the number of retirees and beneficiaries to the number of active members.

<b>Valuation Date</b>	<b>Retiree Liability (a)</b>	<b>Total Actuarial Accrued Liability (b)</b>	<b>Retiree Percentage (a) / (b)</b>
7/1/2015	3,609,722,311	5,351,391,599	67.5%
7/1/2016	3,748,186,878	5,483,673,777	68.4%
7/1/2017	3,888,518,484	5,636,841,900	69.0%
7/1/2018	4,223,371,459	6,004,434,112	70.3%
7/1/2019	4,350,787,062	6,148,556,456	70.8%
7/1/2020	4,509,517,581	6,310,005,115	71.5%
7/1/2021	4,622,070,514	6,463,246,950	71.5%
7/1/2022	4,704,836,476	6,691,274,850	70.3%
7/1/2023	4,845,296,148	6,858,305,970	70.6%

### Historical Member Statistics

<b>Valuation Date July 1,</b>	<b>Number of</b>		<b>Active/ Retired</b>
	<b>Active</b>	<b>Retired</b>	
2015	18,316	14,839	1.23
2016	19,048	15,164	1.26
2017	18,917	15,566	1.22
2018	19,267	15,933	1.21
2019	19,686	16,256	1.21
2020	19,751	16,605	1.19
2021	19,658	16,985	1.16
2022	19,975	17,369	1.15
2023	19,978	17,707	1.13





## **Teachers' Retirement System State of Montana**

### **Appendix A**

#### **Actuarial Procedures and Assumptions**

The assumptions for investment return, price inflation, wage inflation, mortality, retirement and withdrawal reflect the experience study for the period ending July 1, 2021 adopted by the Board in May 2022.

The current asset valuation method was adopted for the July 1, 2007 valuation.

Tables A-3 through A-5 give rates of decrement for service retirement, disablement, other terminations of employment, and probability of remaining membership.

#### **Actuarial Cost Method**

The actuarial valuation was prepared using the entry age actuarial cost method. Under this method, the actuarial present value of the projected benefits of each individual included in the valuation is allocated as a level percentage of the individual's projected compensation between entry age and assumed exit. The portion of this actuarial present value allocated to a valuation year is called the normal cost. The normal cost was first calculated for each individual member. The normal cost rate is defined to equal the total of the individual normal costs, divided by the total pay rate.

The portion of this actuarial present value not provided for at a valuation date by the sum of (a) the actuarial value of the assets and (b) the actuarial present value of future normal costs is called the UAAL. The UAAL is amortized as a level percentage of the projected salaries of present and future members of the System.

#### **Records and Data**

The data used in the valuation consist of financial information; records of age, sex, service, salary, contribution rates, and account balances of contributing members; and records of age, sex, and amount of benefit for retired members and beneficiaries. All of the data were supplied by the System and are accepted for valuation purposes without audit.



### **Replacement of Terminated Members**

The ages at entry and distribution by sex of future members are assumed to average the same as those of the present members they replace. If the number of active members should increase, it is further assumed that the average entry age of the larger group will be the same, from an actuarial standpoint, as that of the present group. Under these assumptions, the normal cost rates for active members will not vary with the termination of present members.

### **Employer Contributions**

At the time of this valuation, the total employer contribution rate for normal costs and amortization of the UAAL was 11.96% of members' salaries. The employer contribution rate will increase by 0.10% each year beginning July 1, 2014 until the total employer contribution rate equals 11.96%.

### **Administrative and Investment Expenses**

The administrative and investment expenses of the System are assumed to be funded by investment earnings in excess of 7.30% per year.

### **Valuation of Assets - Actuarial Basis**

The actuarial asset valuation method spreads asset gains and losses over four years. The expected return is determined each year based on the beginning of year market value and actual cash flows during the year. Any difference between the expected market value return and the actual market value return is recognized evenly over a period of four years. The actuarial value of assets is not allowed to be greater than 120% or less than 80% of the market assets. (Adopted effective July 1, 2007.)

### **Investment Earnings**

The annual rate of investment earnings of the assets of the System is assumed to be 7.30% per year net of administrative and investment expenses, compounded annually. (Adopted effective May 2022)

### **Interest on Member Contributions**

Interest on member contributions is assumed to accrue at a rate of 4.00% per annum, compounded annually. This assumption was set as of July 1, 2023.

### **Postretirement Benefit Increases**

Tier 1 Members:

On January 1 of each year, the retirement allowance payable is increased by 1.5% if the retiree has received benefits for at least 36 months prior to January 1 of the year in which the adjustment is to be made.

Tier 2 Members:

On January 1 of each year, the retirement allowance payable is assumed to increase by 0.5% if the retiree has received benefits for at least 36 months prior to January 1 of the year in which the adjustment is to be made.



### **Future Salaries**

The rates of annual salary increase assumed for the purpose of the valuation are illustrated in Table A-2. In addition to increases in salary due to merit and longevity, this scale includes an assumed 3.50% annual rate of increase in the general wage level of the membership. The merit and longevity increases for the MUS members did not show a pattern of increasing or decreasing with service at the time of our most recent study. Therefore, the MUS members have a flat 0.75% merit and longevity assumption. The general wage increase assumption and merit and longevity scales were adopted in May 2022.

Montana University System (MUS) members are assumed to have a 0.63% higher average final compensation to account for the larger than average annual compensation increases observed in the years immediately preceding retirement.

### **Service Retirement**

Table A-3 shows the annual assumed rates of retirement among members eligible for service retirement. Separate rates are used when a member is eligible for reduced benefits, for the first year a member is eligible for full benefits, and for the years following the first year a member is eligible for full benefits. The rates were adopted May 2022.

### **Disablement**

The rates of disablement used in this valuation are illustrated in Table A-4. These rates were adopted May 2010.

### **Mortality**

A written description of each mortality table used in this valuation is included in Table A-1. These rates were adopted May 2022.

### **Other Terminations of Employment**

The rates of assumed future withdrawal from active service for reasons other than death, disability or retirement are shown for representative ages in Table A-5. These rates were adopted May 2022.



### **Part-Time Employees**

The valuation data for active members identify part-time members. For part-time members earning more than \$1,000, total credited service is adjusted based on the ratio of actual earnings to annualized earnings. The liability and normal cost calculations for these members are based on the adjusted service and actual earnings for the prior year.

Part-time members earning less than \$1,000 during the last year were valued at their current member contribution balance.

### **Montana University System Retirement Program (MUS-RP)**

MUS-RP payroll as of June 30, 2023 was \$288,172,574.

Effective for fiscal years after June 30, 2007, the MUS-RP contribution rate is 4.72%, pursuant to MCA 19-20-621. It is our understanding the contribution will not stop unless legislative action is taken.

### **Buybacks, Purchase of Service, and Military Service**

The active liabilities and normal cost (excluding liabilities and normal cost in respect of Return of Employee Contributions) were increased to 100.5% of their original value to fund this additional service based on a study of the System's experience for the five calendar years 1995 through 1999. Effective July 1, 2008.

### **Probability of Marriage & Dependent Children**

If death occurs in active status, all members are assumed to have an eligible surviving spouse and two children. The spouse is assumed to be the same age as the member. For members who die prior to age 50, dependent children are assumed to be eight years old. For members who die after age 50 but prior to age 55, children are assumed to be 13 years old. Members who die after age 55 are assumed to have no dependent children under the age of 18.

### **Records with no Birth Date**

New records with no birth date are assumed to be 25 years old. Records that are not new and have no birth date used the same birth date as the prior year's valuation.



**Teachers' Retirement System  
State of Montana  
Table A-1  
Summary of Valuation Assumptions**

I. Economic assumptions		
A.	General wage increases*	3.50%
B.	Investment return	7.30%
C.	Price Inflation Assumption	2.75%
D.	Payroll Growth Assumption	3.25%
E.	Growth in membership	0.00%
F.	Postretirement benefit increases (Starting three years after retirement)	
	Tier One	1.50%
	Tier Two	0.50%
G.	Interest on member accounts	4.00%
II. Demographic assumptions		
A.	Individual salary increase due to promotion and longevity	Table A-2
B.	Retirement	Table A-3
C.	Disablement	Table A-4
D.	Mortality among contributing members. PUBT-2010 General Employee mortality table projected to 2021. Projected generationally using MP-2021.	
D.	Mortality among service retired members. PUBT-2010 Retiree mortality projected to 2021 adjusted 102% for males and 103% for females. Projected generationally using MP-2021.	
E.	Mortality among beneficiaries. PUBT-2010 Contingent Survivor table projected to 2021. Projected generationally using MP-2021.	
F.	Mortality among disabled members. PUBT-2010 Disabled Retiree mortality table projected to 2021.	
G.	Other terminations of employment	Table A-5

\* Montana University System (MUS) members are assumed to have a 0.63% higher average final compensation to account for the larger than average annual compensation increases observed in the years immediately preceding retirement.



**Teachers' Retirement System  
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**Table A-2**

**Future Salaries**

Years of Service	General Members			University Members		
	Individual Merit & Longevity	General Wage Increase	Total Salary Increase	Individual Merit & Longevity	General Wage Increase	Total Salary Increase
1	5.50%	3.50%	9.00%	0.75%	3.50%	4.25%
2	4.50	3.50	8.00	0.75	3.50	4.25
3	3.50	3.50	7.00	0.75	3.50	4.25
4	3.50	3.50	7.00	0.75	3.50	4.25
5	2.50	3.50	6.00	0.75	3.50	4.25
6	2.50	3.50	6.00	0.75	3.50	4.25
7	2.50	3.50	6.00	0.75	3.50	4.25
8	1.50	3.50	5.00	0.75	3.50	4.25
9	1.50	3.50	5.00	0.75	3.50	4.25
10	1.50	3.50	5.00	0.75	3.50	4.25
11	1.50	3.50	5.00	0.75	3.50	4.25
12	1.50	3.50	5.00	0.75	3.50	4.25
13	0.50	3.50	4.00	0.75	3.50	4.25
14	0.50	3.50	4.00	0.75	3.50	4.25
15	0.50	3.50	4.00	0.75	3.50	4.25
16	0.50	3.50	4.00	0.75	3.50	4.25
17	0.50	3.50	4.00	0.75	3.50	4.25
18	0.00	3.50	3.50	0.75	3.50	4.25
19	0.00	3.50	3.50	0.75	3.50	4.25
20	0.00	3.50	3.50	0.75	3.50	4.25
21	0.00	3.50	3.50	0.75	3.50	4.25
22 & Up	0.00	3.50	3.50	0.75	3.50	4.25



**Teachers' Retirement System  
State of Montana**

**Table A-3**

**Retirement  
Annual Rates**

All Members			
Age	Eligible for Reduced Benefits	First Year Eligible for Full Benefits	Thereafter
45		7.0%	8.0%
46		7.0	8.0
47		7.0	8.0
48		7.0	8.0
49	*	7.0	6.0
50	5.0%	7.0	6.0
51	5.0	7.0	6.3
52	5.0	7.0	9.0
53	5.0	7.0	9.0
54	5.0	7.0	9.0
55	5.0	8.0	10.0
56	5.0	8.0	11.3
57	5.0	15.0	12.5
58	5.0	15.0	13.1
59	5.0	15.0	14.8
60	*	13.5	20.0
61		18.0	24.0
62		18.0	23.0
63		18.0	23.0
64		35.0	27.5
65		35.0	39.0
66		30.0	25.0
67		30.0	25.0
68		30.0	25.0
69		30.0	25.0
70		**	**

\* All benefits are unreduced after attaining age 60. Reduced benefits are not available before age 50.

\*\* Immediate retirement is assumed at age 70 or over.



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**Table A-4**

**Disablement  
Annual Rates**

Age	All Members
25	.005%
30	.005
35	.008
40	.028
45	.044
50	.063
55	.084
60	.100





**Teachers' Retirement System  
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**Table A-5**

**Other Terminations of Employment  
Among Members Not Eligible to Retire  
Annual Rates**

<u>Years of Service</u>	<u>Full-time Members</u>	<u>Part-time Members</u>
Less than 1	28.0%	30.0%
1	16.0	23.0%
2	12.0	19.0
3	9.0	16.0
4	7.0	13.0
5	6.0	11.5
6	5.0	10.5
7	4.0	10.0
8	3.0	9.0
9	3.0	9.0
10	3.0	9.0
11	2.0	9.0
12	2.0	8.0
13	2.0	8.0
14	2.0	8.0
15	2.0	8.0
16	2.0	8.0
17	2.0	8.0
18	2.0	8.0
19	1.0	8.0
20	1.0	8.0
21	1.0	8.0
22	1.0	8.0
23	1.0	8.0
24	1.0	8.0



**Teachers' Retirement System  
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**Appendix B**

**Summary of Benefit Provisions**

**Effective Date**

September 1, 1937.

**Vesting Period**

Five years. No benefits are payable unless the member has a vested right, except the return of employee contributions with interest.

**Tier One Member**

A person who became a member before July 1, 2013 and who has not withdrawn the member's account balance.

**Tier Two Member**

A person who became a member on or after July 1, 2013, or who after withdrawing the member's account balance, became a member again after July 1, 2013.

**Final Compensation**

Tier One Members

Average of highest three consecutive years of earned compensation.

Tier Two Members

Average of highest five consecutive years of earned compensation.

**Normal Form of Benefits**

Life only annuity. All benefits cease upon death; however, in no event will the member receive less than the amount of employee contributions with interest.



## **Normal Retirement Benefits**

### **Tier One Members**

**Eligibility:** 25 years of service or age 60 with five years of service.

**Benefit:** The retirement benefit is equal to 1/60 of final compensation for each year of service.

### **Tier Two Members**

**Eligibility:** Age 55 with 30 years of service or age 60 with five years of service.

**Benefit:** A member age 60 with at least 30 years of creditable service will receive a retirement allowance equal to 1.85% of final compensation for each year of service. Otherwise, the multiplier used to calculate the retirement allowance will equal 1/60 of final compensation for each year of service.

## **Early Retirement Benefits**

### **Tier One Member**

**Eligibility:** Five years of service and age 50.

**Benefit:** The retirement benefit is calculated in the same manner as described for normal retirement, but the benefit is actuarially reduced by the lesser of the number of years equal to the age of the participant at the early retirement subtracted from age 60 or the number of years of service at early retirement subtracted from 25 years of service.

### **Tier Two Member**

**Eligibility:** Five years of service and age 55.

**Benefit:** The retirement benefit is calculated in the same manner as described for normal retirement, but the benefit is actuarially reduced by the lesser of the number of years equal to the age of the participant at the early retirement subtracted from age 60 or the number of years of service at early retirement subtracted from 30 years of service.



#### Death Benefit

Eligibility: Five years of service.

Benefit: The death benefit is equal to  $\frac{1}{60}$  of final compensation for each year of service accrued at date of death, with an actuarial adjustment based on the relation of the member's age at death to the beneficiary's age. A monthly benefit of \$200 is paid to each child until age 18. In addition, a lump-sum benefit of \$500 is paid upon the death of an active or retired member.

#### Disability Benefit

Eligibility: Five years of service.

Benefit: The disability benefit is equal to  $\frac{1}{60}$  of final compensation for each year of service accrued at date of disability. The minimum benefit is  $\frac{1}{4}$  of the final compensation. A Tier Two Member is not eligible for a disability retirement if the member is or will be eligible for a service retirement on or before the member's date of determination.

#### Withdrawal Benefits

With less than five years of service, the accumulated employee contributions with interest are returned. With more than five years, the member may elect a refund of contributions with interest or leave the contributions and interest in the System and retain a vested right to retirement benefits.

#### Contributions

Tier One Member: 7.15% of compensation. Tier One members are required to contribute a Supplemental Contribution equal to an additional 1% of compensation. The Board may decrease the Supplemental Contribution if the average funded ratio of the System based on the last three actuarial valuations is equal to or greater than 90% and the period necessary to amortize the unfunded liabilities of the System based on the most recent actuarial valuation is less than 15 years. Following one or more decreases in the supplemental contribution the Board may increase the supplemental contribution to a rate not to exceed 1% if the average funded ratio of the System based on the last three annual actuarial valuations is equal to or less than 80% and the period necessary to amortize all liabilities of the System based on the most recent annual actuarial valuation is greater than 20 years.



Tier Two Member: 8.15% of compensation. The Board may require a Tier Two member to contribute a Supplemental Contribution if the average funded ratio of the System based on the last three actuarial valuations is equal to or less than 80% and the period necessary to amortize the unfunded actuarial accrued liability is greater than 20 years and a State or employer contribution rate increase or a flat dollar contribution to the System has been enacted which is equivalent to or greater than the Supplemental Contribution Rate imposed by the Board. A single Tier Two Supplemental Contribution Rate increase cannot exceed 0.5% of compensation and in total cannot exceed 9.15% of compensation. The Board may decrease the Supplemental Contribution if the average funded ratio of the System based on the previous three annual actuarial valuations is equal to or greater than 90%; and the period necessary to amortize the unfunded actuarial accrued liability is less than 15 years.

Employer: 9.96% of compensation. Employers are required to contribute a supplemental contribution equal to 1% for fiscal year 2014 and increase by 0.1% each fiscal year through 2024. The Board may decrease the Employer Supplemental Contribution if the average funded ratio of the System based on the last three actuarial valuations is equal to or greater than 90% and the period necessary to amortize the unfunded actuarial accrued liability based on the most recent valuation is less than 15 years and the GABA has been increased to the maximum allowable. Following one or more decreases in the Supplemental Contribution Rate the Board may increase the Supplemental Contribution Rate to a rate not to exceed 1% if the average funded ratio of the System based on the last three actuarial valuations is equal to or less than 80% and the period necessary to amortize the unfunded actuarial accrued liability is greater than 20 years.

MCA 19-20-604 specifies that the employer contribution rate will be reduced by 0.11% when the amortization period of the System's UAAL is 10 years or less according to the System's latest actuarial valuation.

State Supplemental Contribution: \$25 million per year on an annual basis payable on July 1<sup>st</sup> of each year.



Re-employed Retirees: Each employer is required to contribute 9.85% of total compensation paid to all re-employed TRS retirees employed in a TRS reportable position. This amount shall increase by 1.00% for fiscal year 2014 and increase by 0.10% each fiscal year through 2024 until the total employer contribution is equal to 11.85% of re-employed retiree compensation.

Interest on Member contributions

Effective July 1, 2023, the interest credited on member contributions increased from 0.25% to 4.00% per annum.

Guaranteed Annual Benefit Adjustment (GABA)

On January 1 of each year, if the retiree has received benefits for at least 36 months prior to January 1 of the year in which the adjustment is to be made, for Tier One Members, the retirement allowance will be increased by 1.5%.

For Tier Two Members, the retirement allowance will be increased by an amount equal to or greater than 0.5% but no more than 1.5% if the most recent actuarial valuation shows the System to be at least 90% funded and the provisions of the increase is not projected to cause the funded ratio to be less than 85%.



**Teachers' Retirement System  
State of Montana**

**Appendix C**

**Valuation Data**

This valuation is based upon the membership of the System as of July 1, 2023. Membership data were supplied by the System and accepted for valuation purposes without audit. However, tests were performed to ensure that the data are sufficiently accurate for valuation purposes.

<u>Active Members</u>	<u>Number</u>	<u>Annual Salaries in Millions</u>
Full-Time Members	13,814	\$ 824.2
Part-Time Members*	<u>5,719</u>	<u>110.8</u>
Total Contributing Members*	19,533	\$ 935.0
Active Members with Annual Compensation less than \$1,000	445	
Total Active Members	19,978	

\* Excludes part-time members with annual compensation less than \$1,000.

Table C-1 contains summaries of the data for contributing members. For full-time members, values shown in the tables are the numbers of members and their total and average annual salaries. For part-time members, only the numbers of members are shown.

Table C-2 presents distributions of the following:

- Members receiving service retirement benefits.
- Members receiving disability retirement benefits.
- Survivors of deceased retired members receiving benefits.
- Survivors of deceased active members.
- Child beneficiaries.
- Terminated vested members.

Table C-3 is a reconciliation of membership data from July 1, 2022 to July 1, 2023.



The following is a summary of retired members and beneficiaries currently receiving benefits:

Type of Annuitant	Number	Annual Benefits in Thousands	Average Annual Benefits
Service Retirement	15,465	\$ 408,387	\$ 26,407
Survivors of Deceased Retired Members*	<u>1,574</u>	<u>29,913</u>	<u>19,005</u>
Total Service Retirement (including survivors)	17,039	\$ 438,300	\$ 25,723
Disability Retirement	172	2,302	13,383
Survivors of Deceased Active Members	487	5,656	11,613
Child Beneficiaries	<u>9</u>	<u>22</u>	<u>2,402</u>
Total Annuitants	17,707	\$ 446,280	\$ 25,204

Terminated Members with Contributions Not Withdrawn	Number
Vested Terminated Members	2,214
Non-Vested Terminated Members	<u>5,854</u>
Total Terminated Members	8,068

Deceased Members Pending Account Settlement	Number
Active/Terminated Deceased Pending	361
Retired Deceased Pending	<u>46</u>
Total Deceased Pending	407

\* Includes 153 Alternate Payees





**Teachers' Retirement System  
State of Montana**

**Table C-1**

**Active Members Distribution of  
Full-Time Employees and Salaries  
as of July 1, 2023**

**Number of Employees**

Age	<u>Completed Years of Service</u>											Totals		
	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39		40+	
<25	96	238	96	18										448
25 to 29	65	221	315	526	303									1,430
30 to 34	54	152	162	243	918	215								1,744
35 to 39	40	128	133	190	532	624	159							1,806
40 to 44	47	106	123	199	463	505	595	107						2,145
45 to 49	25	92	72	128	352	334	414	525	89					2,031
50 to 54	21	54	48	114	243	224	290	332	400	74				1,800
55 to 59	30	53	39	60	151	128	178	204	190	218	35			1,286
60 to 64	16	36	32	38	109	72	101	115	103	78	76	15		791
65 to 69	12	17	14	19	41	14	22	28	26	18	15	22		248
70 and up	5	11	3	11	8	4	6	10	5	4	6	12		85
Totals	411	1,108	1,037	1,546	3,120	2,120	1,765	1,321	813	392	132	49		13,814



**Teachers' Retirement System  
State of Montana**

**Table C-1**

**Active Members Distribution of  
Full-Time Employees and Salaries  
as of July 1, 2023**

**Annual Salaries in Thousands**

Age	Completed Years of Service												Totals	
	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40+		
<25	2,188	8,624	3,697	701										15,210
25 to 29	1,899	9,004	13,195	23,286	14,579									61,963
30 to 34	1,627	6,542	7,345	11,489	49,631	13,376								90,009
35 to 39	1,075	5,262	5,994	9,603	29,851	40,202	11,374							103,360
40 to 44	1,272	4,536	5,909	10,098	26,125	32,930	43,046	8,367						132,282
45 to 49	606	4,357	3,627	6,957	19,951	22,023	30,622	40,430	6,983					135,555
50 to 54	505	2,507	2,321	5,868	14,368	14,536	21,085	25,581	31,809	5,749				124,329
55 to 59	912	2,648	2,034	3,272	8,909	8,521	12,537	14,995	14,554	17,465	2,560			88,406
60 to 64	385	1,480	1,528	1,836	5,969	4,602	6,839	7,998	7,790	6,157	5,861	1,162		51,607
65 to 69	423	670	531	1,074	2,317	856	1,332	2,124	1,990	1,689	1,211	1,928		16,145
70 and up	338	355	65	435	468	250	365	682	354	273	510	1,276		5,372
Totals	11,232	45,985	46,245	74,618	172,167	137,297	127,199	100,176	63,480	31,333	10,142	4,366		824,237



**Teachers' Retirement System  
State of Montana**

**Table C-1**

**Active Members Distribution of  
Full-Time Employees and Salaries  
as of July 1, 2023**

**Average Annual Salary**

Age	<u>Completed Years of Service</u>											Totals		
	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39		40+	
<25	22,796	36,237	38,507	38,935										33,951
25 to 29	29,217	40,743	41,889	44,270	48,115									43,331
30 to 34	30,129	43,041	45,338	47,279	54,064	62,214								51,611
35 to 39	26,884	41,107	45,064	50,540	56,110	64,426	71,534							57,231
40 to 44	27,074	42,789	48,041	50,743	56,425	65,208	72,345	78,192						61,670
45 to 49	24,244	47,359	50,370	54,350	56,680	65,937	73,965	77,009	78,460					66,743
50 to 54	24,060	46,420	48,353	51,474	59,126	64,893	72,707	77,052	79,523	77,685				69,072
55 to 59	30,409	49,954	52,155	54,533	58,998	66,571	70,433	73,507	76,598	80,113	73,132			68,745
60 to 64	24,036	41,109	47,756	48,315	54,761	63,919	67,715	69,543	75,634	78,934	77,116	77,477		65,242
65 to 69	35,229	39,415	37,956	56,528	56,508	61,171	60,539	75,848	76,536	93,853	80,726	87,628		65,101
70 and up	67,667	32,310	21,753	39,576	58,477	62,599	60,757	68,183	70,763	68,254	85,064	106,310		63,198
Totals	27,327	41,502	44,595	48,265	55,182	64,763	72,067	75,833	78,081	79,930	76,831	89,096		59,667



**Teachers' Retirement System  
State of Montana**

**Table C-1**

**Active Members Distribution of  
Part-Time Employees  
as of July 1, 2023**

**Number of Employees**

Age	<u>Completed Years of Service</u>											Totals		
	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39		40+	
<25	296	122	45	22	1									486
25 to 29	166	94	78	71	36									445
30 to 34	176	136	71	71	89	10								553
35 to 39	179	139	75	111	107	41	9	1						662
40 to 44	135	168	75	127	177	54	29	4						769
45 to 49	108	102	68	98	164	53	29	27	4					653
50 to 54	85	65	49	77	127	76	53	21	14	4				571
55 to 59	65	49	37	66	110	63	74	47	16	6	1			534
60 to 64	61	47	48	60	92	60	69	45	21	13	9			525
65 to 69	34	43	28	37	62	18	32	19	13	9	2	2		299
70 and up	35	27	23	33	40	23	13	16	5	5		2		222
<b>Totals</b>	<b>1,340</b>	<b>992</b>	<b>597</b>	<b>773</b>	<b>1,005</b>	<b>398</b>	<b>308</b>	<b>180</b>	<b>73</b>	<b>37</b>	<b>12</b>	<b>4</b>		<b>5,719</b>



**Teachers' Retirement System  
State of Montana**

**Table C-2**

**Distribution of Inactive Lives**

**Members Receiving Service Retirement Benefits as of July 1, 2023**

<u>Age</u>	<u>Number of Persons</u>	<u>Annual Benefits in Thousands</u>	<u>Average Annual Benefits</u>
<50	20	\$ 683	\$ 34,146
50 to 54	201	6,191	30,799
55 to 59	559	18,462	33,027
60 to 64	1,718	44,707	26,023
65 to 69	2,945	75,694	25,703
70 to 74	3,815	100,759	26,411
75 to 79	3,070	84,470	27,515
80 to 84	1,797	47,044	26,179
85 to 89	871	21,118	24,246
90 and up	469	9,260	19,744
Totals	15,465	\$ 408,388	\$ 26,407

**Members Receiving Disability Retirement Benefits as of July 1, 2023**

<u>Age</u>	<u>Number of Persons</u>	<u>Annual Benefits in Thousands</u>	<u>Average Annual Benefits</u>
<50	4	\$ 51	\$ 12,777
50 to 54	14	230	16,423
55 to 59	24	367	15,283
60 to 64	22	342	15,556
65 to 69	22	264	12,010
70 to 74	40	531	13,286
75 to 79	22	245	11,123
80 to 84	12	143	11,890
85 to 89	8	88	11,014
90 and up	4	41	10,168
Totals	172	\$ 2,302	\$ 13,383



**Teachers' Retirement System  
State of Montana**

**Table C-2**

**Distribution of Inactive Lives**

**Survivors of Deceased Retired Members as of July 1, 2023**

<u>Age</u>	<u>Number of Persons</u>	<u>Annual Benefits in Thousands</u>	<u>Average Annual Benefits</u>
<50	49	\$ 323	\$ 6,594
50 to 54	22	273	12,420
55 to 59	48	628	13,083
60 to 64	62	963	15,527
65 to 69	142	2,368	16,677
70 to 74	230	4,551	19,788
75 to 79	300	6,565	21,883
80 to 84	315	6,700	21,269
85 to 89	228	4,324	18,964
90 and up	178	3,219	18,086
Totals	1,574	\$ 29,914	\$ 19,005

**Survivors of Deceased Active Members as of July 1, 2023**

<u>Age</u>	<u>Number of Persons</u>	<u>Annual Benefits in Thousands</u>	<u>Average Annual Benefits</u>
<50	121	\$ 899	\$ 7,428
50 to 54	26	300	11,525
55 to 59	26	319	12,251
60 to 64	50	477	9,550
65 to 69	71	945	13,312
70 to 74	68	1,076	15,822
75 to 79	61	769	12,610
80 to 84	32	500	15,639
85 to 89	17	186	10,933
90 and up	15	185	12,311
Totals	487	\$ 5,656	\$ 11,613



**Teachers' Retirement System  
State of Montana**

**Table C-2**

**Distribution of Inactive Lives**

**Terminated Vested Members as of July 1, 2023**

<u>Age</u>	<u>Number of Persons</u>
<25	
25 to 29	20
30 to 34	166
35 to 39	228
40 to 44	351
45 to 49	325
50 to 54	398
55 to 59	429
60 to 64	169
65 to 69	99
70 and above	<u>29</u>
Total	2,214

**Child Beneficiaries as of July 1, 2023**

<u>Age</u>	<u>Number of Persons</u>
<5	1
5 to 6	2
7 to 8	
9 to 10	1
11 to 12	2
13 to 14	2
15 to 16	1
17 to 18	<u></u>
Total	9



**Teachers' Retirement System  
State of Montana**

**Table C-3**

**Data Reconciliation**

	<u>Active Contributing Members*</u>	<u>Terminated Vested Members</u>	<u>Service Retired Members</u>	<u>Disabled Members</u>	<u>Survivors and Beneficiaries</u>
<b>July 1, 2022 Valuation</b>	19,552	2,015	15,203	183	1,983
Refunds and Non-Vested Terminations	(1,779)	(34)			
Change to Annual Pay Under \$1,000	(100)	(2)			
Vested Terminations	(448)	448			
Service Retirements	(552)	(100)	652		
Disability Retirements	(2)	(1)		3	
Deaths with Beneficiary	(15)	(5)	(137)	(10)	167
Deaths without Beneficiary	(2)	(2)	(253)	(4)	(109)
New Entrants	2,121				
Rehires	498	(103)	(6)		
Other	260	(2)	6	-	29
<b>July 1, 2023 Valuation</b>	19,533	2,214	15,465	172	2,070

\* Excludes active members with annual compensation less than \$1,000





**Teachers' Retirement System  
State of Montana**

**Appendix D**

**Comparative Schedules**

This section contains tables that summarize the experience of the System shown in present and past valuation reports.

Table D-1 shows a summary of the active members covered as of the various valuation dates.

Table D-2 shows a summary of the retired and inactive members as of the various valuation dates.

Table D-3 summarizes the contribution rates determined by each annual actuarial valuation.



**Teachers' Retirement System  
State of Montana**

**Table D-1**

**Active Membership Data**

Valuation Date (July 1)	Full-Time Members	Part-Time Members*	Total Contributing Members*	Part-Time Members Annual Compensation less than \$1,000	Annual Full-Time Salaries in Thousands	Average Full-Time Annual Salary	Average Age*	Average Years of Service*	Average Hire Age*
2005	12,523	5,019	17,542	697	523,909	41,836	45.8	12.4	33.4
2006	12,715	4,840	17,555	544	549,268	43,198	46.0	12.5	33.5
2007	12,634	4,994	17,628	548	568,351	44,986	46.2	12.5	33.7
2008	12,694	5,077	17,771	521	592,514	46,677	46.1	12.3	33.8
2009	12,673	5,270	17,943	513	613,077	48,377	46.2	12.4	33.8
2010	12,711	5,642	18,353	600	630,444	49,598	45.9	12.2	33.8
2011	12,506	5,400	17,906	578	633,005	50,616	46.2	12.4	33.8
2012	12,202	5,534	17,736	636	622,140	50,987	46.0	12.4	33.6
2013	12,229	5,387	17,616	633	628,832	51,421	45.8	12.2	33.6
2014	12,286	5,428	17,714	558	712,802	51,967	45.6	11.6	34.0
2015	12,468	5,337	17,805	511	729,653	52,551	45.4	11.3	34.1
2016	12,769	5,563	18,332	716	673,891	52,776	45.2	10.9	34.3
2017	12,808	5,576	18,384	533	689,638	53,844	45.0	10.8	34.2
2018	13,027	5,619	18,646	621	706,351	54,222	45.0	10.6	34.4
2019	13,196	5,798	18,994	692	728,831	54,231	44.9	10.4	34.5
2020	13,515	5,531	19,046	705	751,479	55,603	44.7	10.3	34.4
2021	13,803	5,358	19,161	497	787,155	57,028	44.2	10.1	34.1
2022	13,765	5,787	19,552	423	806,077	58,560	44.1	9.9	34.2
2023	13,814	5,719	19,533	445	824,237	59,667	44.1	9.8	34.3

\* Excludes part-time active members with annual compensation less than \$1,000.



**Teachers' Retirement System  
State of Montana**

**Table D-2**

**Retired and Inactive Membership Data**

Valuation Date (July 1)	Number	All Annuitants					Terminated Members	
		Annual Benefits in Thousands	Average Annual Benefit	Average Current Age	Average Age at Retirement	Average Service at Retirement	Number Vested Terminated	Number Non-Vested Terminated
2005	10,664	170,129	15,954	69.3	56.7	*	1,649	8,569
2006	11,019	181,114	16,436	69.3	56.5	*	1,684	8,542
2007	11,356	195,237	17,192	69.3	56.6	*	1,671	8,963
2008	11,788	208,985	17,729	69.4	56.7	*	1,649	9,574
2009	12,036	219,267	18,218	69.7	57.5	25.5	1,640	9,868
2010	12,440	234,048	18,814	69.9	57.6	25.5	1,553	10,304
2011	12,899	250,500	19,420	70.0	57.8	25.5	1,580	10,727
2012	13,363	267,851	20,044	70.2	57.9	25.5	1,566	11,172
2013	13,868	284,333	20,503	70.4	58.0	25.5	1,566	11,710
2014	14,349	302,272	21,066	70.6	58.2	25.5	1,654	12,308
2015	14,839	321,511	21,667	70.9	58.3	25.4	1,664	12,839
2016	15,164	336,465	22,188	71.1	58.5	25.4	1,704	12,888
2017	15,566	352,005	22,614	71.4	58.6	25.3	1,779	13,712
2018	15,933	367,990	23,096	71.6	58.7	25.3	1,772	13,967
2019	16,256	383,495	23,591	72.0	58.9	25.2	1,791	14,261
2020	16,605	400,111	24,096	72.3	59.0	25.2	1,828	14,941
2021	16,985	415,545	24,465	72.6	59.1	25.1	1,955	7,869
2022	17,369	430,947	24,811	72.9	59.2	25.0	2,015	5,656
2023	17,707	446,280	25,204	73.1	59.3	24.9	2,214	5,854

\* Not available



**Teachers' Retirement System  
State of Montana**

**Table D-3**

**Contribution Rates**

Valuation Date (July 1)	Contribution Rates			Normal Cost Rate <sup>1</sup>	UAAL Rate <sup>2</sup>
	Employee	Employer	Total		
2006	7.15	7.58	14.73	10.37	4.36
2007	7.15	9.58	16.73	10.40	6.33
2008	7.15	9.58	16.73	10.87	5.86
2009	7.15	9.96	17.11	10.69	6.42
2010	7.15	9.96	17.11	9.74	7.37
2011	7.15	9.96	17.11	9.64	7.47
2012	7.15	9.96	17.11	9.64	7.47
2013	8.15	10.96	19.11	9.20	9.91
2014	8.15	11.06	19.21	9.44	9.77
2015	8.15	11.16	19.31	9.49	9.82
2016	8.15	11.26	19.41	10.18	9.23
2017	8.15	11.36	19.51	10.15	9.36
2018	8.15	11.46	19.61	10.32	9.29
2019	8.15	11.56	19.71	10.14	9.57
2020	8.15	11.66	19.81	10.20	9.61
2021	8.15	11.76	19.91	10.13	9.78
2022	8.15	11.86	20.01	10.87	9.14
2023	8.15	11.96	20.11	10.75	9.36

<sup>1</sup> Effective July 1, 2014 through July 1, 2021, the Normal Cost Rate includes the administrative expense load.

<sup>2</sup> The UAAL rate is the amount available to amortize the UAAL. It is equal to the total contribution rate, minus the normal cost rate.

<sup>3</sup> The 1999 Legislation which passed the 1.5% GABA, also added a 0.11% state general fund contribution.



## **Teachers' Retirement System State of Montana**

### **Appendix E**

#### **Glossary**

The following definitions are largely excerpts from a list adopted in 1981 by the major actuarial organizations in the United States. In some cases the definitions have been modified for specific applicability to the Montana Teachers' Retirement System. Defined terms are capitalized throughout this Appendix.

#### **Accrued Benefit**

The amount of an individual's benefit (whether or not vested) as of a specific date, determined in accordance with the terms of a pension plan and based on compensation and service to that date.

#### **Actuarial Accrued Liability**

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 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; procedures used to determine the Actuarial Value of Assets; and other relevant items.

#### **Actuarial Cost Method**

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

#### **Actuarial Gain (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 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 Valuation**

The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, 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.

**Actuarially Equivalent**

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

**Amortization Payment**

That portion of the pension plan contribution which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.

**Entry Age Actuarial Cost Method**

A method under which the Actuarial Present Value of the Projected Benefits of each individual included in an Actuarial Valuation is allocated on a level basis over the earnings of the individual between entry age and assumed exit ages. The portion of this Actuarial Present Value allocated to a valuation year is called the Normal Cost. The portion of this Actuarial Present Value not provided for at a valuation date by the Actuarial Present Value of future Normal Costs is called the Actuarial Accrued Liability.

**Market Value of Assets**

The fair value of cash, investments and other property belonging to a pension plan that could be acquired by exchanging them on the open market.

**Normal Cost**

That portion of the Actuarial Present Value of pension plan benefits and expenses which is allocated to a valuation year by the Actuarial Cost Method.

**Projected Benefits**

Those pension plan benefit amounts which are 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 and past and anticipated future compensation and service credits.

**Unaccrued Benefit**

The excess of an individual's Projected Benefits over the Accrued Benefits as of a specified date.

**Unfunded Actuarial Accrued Liability**

The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets.