



# Montana Public Employee Retirement Administration

2024 Actuarial Audit

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March 27, 2024

Board of Trustees  
Montana Public Employee Retirement Administration  
100 N Park Avenue, Suite 200  
Helena, MT 59620-0131

Re: **Actuarial Audit of June 30, 2023 Valuations  
Public Employees' Retirement System and Sheriffs' Retirement System**

Dear Members of the Board:

The enclosed report presents the findings from our actuarial audit of the June 30, 2023 actuarial valuations of the Public Employees' Retirement System (PERS) and the Sheriffs' Retirement System (SRS) prepared by the retained actuary for the Montana Public Employee Retirement Administration (MPERA), Cavanaugh Macdonald Consulting. An overview of our major recommendations is included in the Executive Summary section of the report. More detailed commentary on our review process is included in the latter sections.

All calculations are based on the statutory benefit provisions and the actuarial assumptions adopted by the Board of Trustees. Our actuarial audit uses the same benefit provisions, assumptions and methods as those disclosed in the retained actuary's June 30, 2023 valuation reports. As discussed in our report, we believe the package of actuarial assumptions and methods is reasonable, taking into account the experience of PERS and SRS and reasonable expectations for future experience. Nevertheless, the emerging costs will vary from those presented in this report to the extent that actual experience differs from that projected by the actuarial assumptions. Future actuarial measurements may differ significantly from the current measurements presented in this report due to factors such as the following:

- System experience differing from the actuarial assumptions,
- Future changes in the actuarial assumptions,
- Increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as potential additional contribution requirements due to changes in the PERS and SRS funded status), and
- Changes in the benefit provisions or accounting standards.

Due to the scope of this assignment, we did not perform an analysis of the potential range of such measurements.

In preparing this report, we relied, without audit, on information (some oral and some in writing) supplied by the MPERA staff and the retained actuary. This information includes, but is not limited to, statutory provisions, employee data, and financial information. In our examination of these data, we have found them to be reasonably consistent and comparable with data used for other purposes. Since the actuarial audit results are dependent on the integrity of the data supplied, the results can be expected to differ if the underlying data is incomplete or missing. It should be noted that if any data or other information is inaccurate or incomplete, our calculations may need to be revised.

Our replication of valuation results was developed using models intended for valuations that use standard actuarial techniques. We have reviewed the models, including their inputs, calculations, and outputs for consistency, reasonableness, and appropriateness to the intended purpose and in compliance with generally accepted actuarial practice and relevant actuarial standards of practice. When reviewing the long-term investment return assumption discussed in Section 6, we relied upon a model developed by Milliman colleagues who are credential investment professionals with expertise in capital market modeling.

On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices which are consistent with the principles prescribed by the Actuarial Standards Board and the *Code of Professional Conduct and Qualification Standards for Actuaries Issuing Statements of Actuarial Opinion in the United States*, published by the American Academy of Actuaries.

Milliman's work product was prepared exclusively for MPERA for a specific and limited purpose. It is a complex, technical analysis that assumes a high level of knowledge concerning MPERA's operations and uses data which Milliman has not audited. It is not for the use or benefit of any third party for any purpose. Any third-party recipient of Milliman's work product who desires professional guidance should not rely upon Milliman's work product, but should engage qualified professionals for advice appropriate to its own specific needs.

The consultants who worked on this assignment are actuaries. Milliman's advice is not intended to be a substitute for qualified legal or accounting counsel.

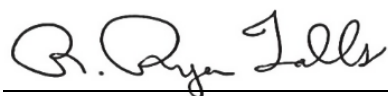
The signing actuaries are independent of MPERA. We are not aware of any relationship that would impair the objectivity of our work.

We would like to express our appreciation to both Cavanaugh Macdonald Consulting and MPERA staff for their assistance in supplying the data and information on which this report is based.

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

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

Sincerely,

Handwritten signature of R. Ryan Falls in blue ink.

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R. Ryan Falls, FSA, EA, MAAA  
Consulting Actuary

Handwritten signature of Scott Preppernau in blue ink.

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Scott Preppernau, FSA, EA, MAAA  
Consulting Actuary

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## 1. Summary of the Findings

### Purpose and Scope of the Actuarial Audit

In this actuarial audit, we will review the June 30, 2023 actuarial valuations for the Public Employees' Retirement System (PERS) and the Sheriffs' Retirement System (SRS) prepared for the Montana Public Employee Retirement Administration (MPERA) by the Systems' retained actuary. This review will focus on the following areas:

- Determine if the retained actuary's valuation procedures are technically sound and based on generally accepted actuarial standards.
- Determine if the methodology used by the retained actuary to validate and "normalize" census data is technically sound and based on generally accepted actuarial standards.
- Determine if the retained actuary's determinations of demographic and economic actuarial assumptions are reasonable and are based on generally accepted actuarial standards.
- Determine if the actuarial cost method and actuarial asset valuation method used by the retained actuary are reasonable, including whether different methods may be more appropriate.
- Determine if the retained actuary's valuations results can be verified, including:
  - verification that appropriate mathematical calculations are being made accurately; and
  - verification that plan liabilities and assets are being appropriately valued.
- Evaluate the adequacy of the retained actuary's methodology used to establish the actuarial factors provided to MPERB for the PERS and SRS plans to calculate the following: service and disability retirement, service purchases, early retirement, and survivorships. This evaluation shall include a review of the variables or assumptions used by the retained actuary to establish these factors.

### Actuarial Audit Conclusion

Based on our review of the census data, experience study documents, liability replications, and actuarial valuation reports, we believe the June 30, 2023 actuarial valuations for the Public Employees' Retirement System (PERS) and the Sheriffs' Retirement System (SRS) are reasonable, based on reasonable assumptions and methods, and the reports generally comply with the Actuarial Standards of Practice.

We offer the following observations and recommendations that we believe would further enhance the communication and funding of PERS and SRS going forward.

#### Membership Data

We performed tests on both the raw data supplied by MPERA and the processed data used by the retained actuary in the actuarial valuations. Based on this review, we believe the individual member data used is appropriate. A summary is shown in Exhibits 2-1 and 2-2.

We recommend that MPERA and the retained actuary work together to ensure that the most appropriate data is being communicated for the actuarial valuation of the PERS inactive and update the valuation data extract, as appropriate.

#### Actuarial Value of Assets

We have reviewed the calculation of the actuarial value of assets used in the June 30, 2023 actuarial valuations for PERS and SRS. We found the calculations to be reasonable and the methodology to be appropriate and in compliance with Actuarial Standards of Practice.

## Actuarial Liabilities

We independently calculated the normal cost and actuarial liabilities of PERS and SRS for an individual sample set of participants as well as for the entire plans in total. In general, we found that all significant benefit provisions were accounted for in an accurate manner, the actuarial assumptions and methods are being applied correctly, and that our liability replications closely matched those calculated by the retained actuary. As noted in Section 4, we have identified one sample record of a vested terminated member where it would be appropriate for the retained actuary to review that the benefit is being valued as intended based on the early retirement provisions for the member. If any changes or improvements are needed, the retained actuary should review whether there is a larger cohort of affected members that could benefit from the same changes.

## Funding

We reviewed the calculations of the Funding Period and Actuarially Determined Employer Contribution (ADEC) for PERS as well as the ADEC for SRS. Additionally, we also evaluated the application of the Actuarial Cost Method. We have the following recommendations to enhance the communication of the funded status and contribution requirements for PERS and SRS:

- The next time the Board reviews the Funding and Benefit Policy, we encourage the Board to work closely with the retained actuary to consider the current “rolling 30-year” amortization period and explore the most reasonable amortization period for the UAAL to be incorporated into the Policy.
- We recommend that the retained actuary enhance the PERS funding period discussion in the actuarial valuation report to discuss the impact of the statutory reductions in the employer and member contribution rates on the projected timeline for the elimination of the UAAL.
- We recommend that the retained actuary make it clear that the PERS ADEC rates provided in the actuarial valuation report are based on a member rate of 7.90% of pay for the entire period and, additionally, consider calculating the ADEC by incorporating the statutory reduction in the member contribution rate.
- The PERS ADEC rates are calculated assuming that the State appropriations continue for the entire amortization period. Disclosing this procedure would help to clarify the contribution requirements for PERS.

## Actuarial Assumptions (Economic)

We reviewed the economic assumptions used in the June 30, 2023 actuarial valuation and found them to be reasonable. The economic assumptions used were adopted based on the retained actuary’s Actuarial Experience Study for the period ending June 30, 2021.

In future experience study reports, we recommend that the retained actuary provide rationale for their recommendation of the payroll growth assumption.

## Actuarial Assumptions (Demographic)

We completed a high-level review of the demographic assumptions that were adopted based on the retained actuary’s Actuarial Experience Study for the period ending June 30, 2021. Based on this review, we believe the demographic assumptions used in the valuation are reasonable. We have the following recommendations for future actuarial experience studies:

- We recommend that the retained actuary note in the experience study report the number of active members who terminated employment for each cause and the number of annuitants who died, especially

for the mortality analysis. We believe this additional detail would provide additional context to the assumption analysis and enhance the readers' ability to judge the credibility of the underlying data.

- In order to follow a true “building block” approach to developing the merit, promotion and longevity salary increase assumption in future experience studies, the retained actuary should consider isolating the merit portion of the actual salary increases from the cost inflation and/or wage inflation during the experience study period as part of the experience analysis.
- Based on the sustained retirement decrement losses for SRS, both before and after making significant changes to the retirement assumption, it would appear that there is another source of the significant losses coming through as “age & service retirements”. We recommend that the retained actuary closely review the sources of the retirement losses for SRS in the next actuarial experience study and formulate a method to anticipate the losses in the actuarial valuation.

## Reports

The retained actuary's reports meet the applicable Standards of Practice. The discussion in Section 8 of this actuarial audit report includes recommended improvements for the next valuation that will enhance the overall communication and disclosure in the actuarial valuation report. These are all suggested improvements to the reporting and would not impact the results of the actuarial valuation.

## Adequacy of Actuarial Factor Methodology

We reviewed the actuarial factor methodology used by the retained actuary for PERS and SRS. The methodology and simplifying assumptions used to calculate the early retirement factors, optional form of payment factors, and the service purchase costs are reasonable. In order to help protect MPERA against the possibilities of anti-selection and adverse experience, MPERA Board could discuss the possibility of enhancing the calculation of the service purchase cost by incorporating: (1) the retirement age with the maximum value to the member, and (2) a risk premium for the plan accepting the investment and longevity risks of the purchase. MPERA should seek an opinion from legal advisors before making any changes to the service purchase methodology.

## 2. Membership Data

### Actuarial Audit Conclusion

We performed tests on both the raw data supplied by the MPERA staff and the processed data used by the retained actuary in the valuation. Based on this review, we feel the individual member data used is appropriate and complete.

We recommend that MPERA and the retained actuary work together to ensure that the most appropriate data is being communicated for the actuarial valuation of the PERS inactives and update the valuation data extract, as appropriate.

### Comments

Overall, the data process appears to be thorough and accurate. We would add the following comments:

- **Raw Data:** We were provided with the same data that was given by the MPERA staff to the retained actuary for use in the actuarial valuation.
- **Completeness:** The data contained all the necessary fields to perform the actuarial valuation.
- **Quality:** Although we did not audit the data at the source, we performed some independent checks to confirm the overall reasonableness of the data. We compared the total retiree and beneficiary benefit amounts on the plans' data with the actual benefit payments made, as reported in the MPERA's financial statements. We also compared the total active member compensation on the plans' data with the estimated active payroll for the prior year. Based on this analysis, we found the data to be reasonable.
- **Parallel Data Processing:** We performed independent edits on the raw data and then compared our results with the valuation data used by the retained actuary. We found our results to be consistent.

Our results did not match exactly; however, this is understandable since the retained actuary has more extensive data-editing procedures. Overall, each data key component matched within an acceptable level, and we believe the individual member data used by the retained actuary was appropriate for valuation purposes.

A summary of the data in aggregate is shown in Exhibit 2-1. The "Milliman" column reflects the plans' data after adjustments by Milliman. The "Retained Actuary" column reflects the actual data used in the retained actuary's valuation.

In our opinion, there was a very close match between the data provided by MPERA and the valuation data used by the retained actuary.



**Exhibit 2-1  
 PERS Member Statistics as of June 30, 2023**

	Retained Actuary	Milliman	Ratio of Retained Actuary / Milliman
<b>Active</b>			
Total number	29,614	29,622	100.0%
Average age	46.8	46.8	100.0%
Average service	8.2	8.2	100.0%
Covered Payroll (in thousands)	\$ 1,485,231	\$ 1,485,231	100.0%
<b>Terminated Members</b>			
Non-Vested Terminated	24,542	24,636	99.6%
Vested Terminated	4,964	4,982	99.6%
<b>Annuitants</b>			
Total number	25,554	25,689	99.5%
Annual Benefits (in thousands)	\$ 543,331	\$ 545,013	99.7%

**Exhibit 2-2  
 SRS Member Statistics as of June 30, 2023**

	Retained Actuary	Milliman	Ratio of Retained Actuary / Milliman
<b>Active</b>			
Total number	1,543	1,543	100.0%
Average age	38.5	38.5	100.0%
Average service	6.7	6.7	100.0%
Covered Payroll (in thousands)	\$ 104,211	\$ 104,211	
<b>Terminated Members</b>			
Non-Vested Terminated	979	981	99.8%
Vested Terminated	218	220	99.1%
<b>Annuitants</b>			
Total number	891	897	99.3%
Annual Benefits (in thousands)	\$ 28,413	\$ 28,509	99.7%
<b>Parallel Data Processing Detail</b>			

PERA provided Milliman with files as of June 30, 2023 that contained the current active members, current annuitants (service retirees, beneficiaries, and disability annuitants), and inactive members due a future benefit. In addition to the files that PERA provided to Milliman, the retained actuary provided Milliman the processed data files containing the final data used in the retained actuary's actuarial valuation. The retained actuary provided an Excel file with all members included in the actuarial valuation. The retained actuary also provided a description of the files provided and a key to the codes used on the files.

We compared the data in the PERA files to those used by the retained actuary on both an individual and an aggregate level. We found the data to be consistent between the two sets of files. We only compared fields that were directly used in the valuation. Differences on an individual level are to be expected in some records with a plan of this size. We found no differences on an individual level that would have a noticeable effect on the valuation results.

For active members, we compared the following fields: Date of Birth, Sex, Hire Date, and Salary. Over 99% of the other fields for active members match on an individual level.

For terminated employees, we compared the following fields: Date of Birth, Sex, Retirement Date, and Retirement Benefit. Over 99% of the other fields for terminated members matched on an individual level with one exception. The raw data file provided by MPERA for the PERS inactives did not appear to contain a field for "sex". Further, we noticed an unusual number of vested terminated records in the retained actuary's final valuation data where the "sex" field differed from what might be expected based on the participant name. The observation was based on a quick analysis of the first 25 male vested terminated records shown on the file. We recommend that MPERA and the retained actuary work together to ensure that the most appropriate data is being communicated for the actuarial valuation and update the valuation data extract, as appropriate, for the PERS inactives.

For annuitants, we compared the following fields: Date of Birth, Sex, Option Elected, Date of Retirement, Retirement Benefit, and Retirement Type (Retired, Beneficiary, or Disabled). Over 99% of all fields for annuitants matched on an individual level.

Our independent edits on the raw data provided by PERA resulted in data consistent with the final data provided by the retained actuary.

### 3. Actuarial Value of Assets

#### Actuarial Audit Conclusion

We have reviewed the calculation of the actuarial value of assets (AVA) used in the June 30, 2023 actuarial valuations of PERS and SRS. We found the calculations to be reasonable and the methodology to be appropriate and in compliance with actuarial standards of practice.

#### Comments

The market value of assets can experience significant short-term swings, which can cause large fluctuations in the development of the contributions necessary to eliminate a system's Unfunded Actuarial Accrued Liability (UAAL). Thus, many systems use an asset valuation method which dampens the short-term volatility to achieve more stability in the employer contribution. A good asset valuation method places value on a retirement system's assets which are related to the current market value, but which will also produce a smoother pattern of contributions.

ASOP No. 44, Selection and Use of Asset Valuation Methods for Pension Valuations, provides a framework for the determination of the actuarial value of assets (AVA), emphasizing that the method should: (1) bear a reasonable relationship to the market value of assets (MVA), (2) recognize investment gains and losses over an appropriate time period, and (3) avoid systematic bias that would overstate or understate the AVA in comparison to MVA.

The June 30, 2023 actuarial valuations of PERS and SRS determined the smoothed asset valuation method by spreading the difference between each year's expected return and actual return on the MVA over a four-year period. Specifically, the Actuarial Value of Assets is equal to the MVA at the actuarial valuation date, less the sum of the following:

1. 75% of the difference between the expected return and actual return in the first year preceding the valuation date,
2. 50% of the difference between the expected return and actual return in the second year preceding the valuation date, and
3. 25% of the difference between the expected return and actual return in the third year preceding the valuation date.

The Conference of Consulting Actuaries Public Plans Committee published a whitepaper on model actuarial funding policies which include guidelines for asset smoothing. In our opinion, the method used for PERS and SRS of smoothing over four years without a corridor falls in the "Acceptable Practice" category under these guidelines.

## 4. Actuarial Liabilities

### Actuarial Audit Conclusion

One purpose of this actuarial review is to verify the benefits and liabilities. Included in the information provided to us by the retained actuary were the individual liability amounts for 26 participants (10 active participants, six vested participants, and 10 annuitants) from PERS and 18 participants (six active participants, five vested participants, and seven annuitants) from SRS. We prepared an independent replication of the liabilities for these participants based on the plan provisions, the valuation assumptions, and actuarial cost method. We also replicated the liability for all plan participants in PERS and SRS based on the same procedures.

### Replication Process

We independently calculated the liabilities for the sample of participants, and the entire plan, based on the following:

**Data:** We used the same data used by the retained actuary in its valuation. As discussed in Section 2, we confirmed that this data was consistent with the data provided by the MPERA staff.

**Assumptions:** We used the assumptions disclosed in the June 30, 2023 actuarial valuation report and tables of assumed rates provided to us electronically by the retained actuary. We noted a few limited inconsistencies between the rates provided electronically and those disclosed in the actuarial valuation report and the most recent experience study report:

- The assumed PERS termination rates for 5 years of service through 11 years of service were shifted by one year in the electronic files compared to the rates shown in the valuation report. For example, the valuation report shows rate at 5 years of service to be 11% and the rate at 6 years to be 10%, while the electronic file shows the rate at 5 years to be 10%.
- The assumed PERS retirement rate at age 49 with 30+ years of service was shown as 15.75% in the electronic file provided by 10% in the valuation report.

We were not provided information to determine which version of the rates discussed above are correct in terms of what is used in the retained actuary's valuation system. Any potential difference is minor for purposes of our replication, but we recommend the retained actuary review its programming and confirm the valuation report is correctly documenting the assumptions actually applied.

**Methods:** We used the actuarial methods disclosed in the June 30, 2023 actuarial valuation report. This was supplemented by discussions between the retained actuary and Milliman on the technical application of these methods.

Note that there will always be differences in the calculated liabilities when different software is used by different actuaries; however, the results should not deviate significantly. Our findings show a high level of consistency between our independent results and the valuation, which should provide assurance that the results of the valuation reasonably reflect the aggregate liabilities of PERS and SRS based on the assumptions and methods.

**Benefits:** We obtained this information from the MPERA website and the relevant law.

### Comments

We received from the retained actuary the participant data used in the June 30, 2023 valuation. The employee census data is consistent with the information presented in the June 30, 2023 valuation report.

A comparison of the liabilities to those provided by the retained actuary is shown below, separated by PERS and SRS. As shown, we believe the liability calculations are reasonable.

**Exhibit 4-1: Sample Life Liability Comparison - PERS**

Comparison of 10 Active Sample Lives			
	Retained Actuary	Milliman	Ratio
Present Value of Future Benefits	\$ 660,689	\$ 656,821	99.4%
Actuarial Accrued Liability	\$ 463,703	\$ 465,148	100.3%
Normal Cost	\$ 30,755	\$ 30,093	97.8%
Comparison of 6 Inactive and 10 Annuitant Sample Lives			
	Retained Actuary	Milliman	Ratio
Inactive	\$ 717,007	\$ 691,638	96.5%
Annuitant	\$ 1,418,461	\$ 1,414,606	99.7%

In addition, we utilized the complete census files provided by the retained actuary to replicate the PERS liability for all plan participants. This process further confirmed that the liability calculations are reasonable.

**Exhibit 4-2: Total Liability Comparison - PERS**

Comparison of Total Actuarial Accrued Liability			
	Retained Actuary	Milliman	Ratio
Active participants	\$2,786,290,388	\$2,839,853,240	101.9%
Retired participants and beneficiaries	6,118,510,185	6,130,188,429	100.2%
Disabled participants	83,285,327	83,348,336	100.1%
Terminated vested participants	293,442,504	275,530,273	93.9%
Members due cash-out	79,687,238	79,687,238	100.0%
<b>Total</b>	<b>\$9,361,215,642</b>	<b>\$9,408,607,516</b>	<b>100.5%</b>

Our review of sample lives identified one issue for further review by the retained actuary:

- Our difference from the retained actuary's results on sample lives for inactive members is almost entirely due to one record where our replication showed a significantly lower liability than the retained actuary's work. This is for a member hired after July 1, 2011 for whom we understand normal retirement age should be 65. Based on the retained actuary's description of the valuation process, we understand the liability for this individual should be based on a deferred benefit payable at age 60, and that benefit should be reduced from age 65 on an actuarial equivalent basis. However, our liability calculated on that basis is much lower than that of the retained actuary's. We can replicate the retained actuary's results almost exactly if we ignore the actuarial reduction from age 65 to 60. We recommend the retained actuary review the coding for this individual and similarly situated records to determine if plan provisions are being correctly applied.

**Exhibit 4-3: Sample Life Liability Comparison - SRS**

Comparison of 10 Active Sample Lives			
	Retained Actuary	Milliman	Ratio
Present Value of Future Benefits	\$ 2,629,126	\$ 2,669,674	101.5%
Actuarial Accrued Liability	\$ 2,223,694	\$ 2,256,196	101.5%
Normal Cost	\$ 67,463	\$ 68,548	101.6%

Comparison of 5 Inactive and 7 Annuitant Sample Lives

	Retained Actuary	Milliman	Ratio
Inactive	\$ 208,926	\$ 198,648	95.1%
Annuitant	\$ 2,699,859	\$ 2,695,200	99.8%

**Exhibit 4-4: Total Liability Comparison - SRS**

Comparison of Total Actuarial Accrued Liability			
	Retained Actuary	Milliman	Ratio
Active participants	\$ 230,108,257	\$234,863,821	102.1%
Retired participants and beneficiaries	355,636,428	357,868,305	100.6%
Disabled participants	35,070,104	35,194,795	100.4%
Terminated vested participants	14,520,857	14,063,565	96.9%
Members due cash-out	6,326,770	6,326,770	100.0%
<b>Total</b>	<b>\$ 641,662,416</b>	<b>\$648,317,256</b>	<b>101.0%</b>

## 5. Funding

### Actuarial Audit Conclusion

We have reviewed the calculations of the Funding Period and Actuarially Determined Employer Contribution (ADEC) for PERS as well as the ADEC for SRS. Additionally, we have also evaluated the application of the Actuarial Cost Method. In this section, we have recommendations for: (1) communicating the impact of the statutory decreases in employer and member contribution rates for PERS, and (2) ensuring the calculation of the normal cost rate captures the cost of all benefits expected to be accrued during the year.

### PERA Board's Funding and Benefit Policy

The PERA Board most recently updated the Funding and Benefit Policy on August 13, 2020. The key aspects of the Policy include:

#### Funding Objectives

1. Ensure that the systems are financially sound and pay all benefits promised using assets accumulated from required employer and member contributions and investment income, and
2. Achieve a well-funded status with a range of safety to absorb market volatility without creating a UAL.

#### Funding Requirement

1. Reduce the difference between the Actuarial Accrued Liability (AAL) and the Actuarial Value of Assets (AVA) in a systematic manner.
2. The systems' Unfunded Actuarial Accrued Liability (UAAL) should be amortized over a reasonable period of time and should not exceed 30 years on a rolling basis.
3. Generally, the funding period should be constant or decreasing.

#### Policy Considerations

1. The Board aspires that the retirement systems it administers becomes 100% funded.
2. The Board will review existing funding levels for retirement systems with a funded ratio in excess of 120%.
3. It is the responsibility of the Board to report the financial solvency of the funds to the Legislature.
4. It is the obligation of the Board to recommend funding increases.

In general, we believe this is a reasonably constructed Funding and Benefit Policy. It is important to note that the actual contributions for PERS and SRS are not determined based on this policy. This policy provides the Board with a benchmark to compare the actual contributions.

The next time the Board reviews the Policy, we encourage the Board to work closely with the retained actuary to determine the most reasonable amortization period for the UAAL to be incorporated into the Policy. The "30-year rolling" amortization period currently outlined in the Policy was a very common funding standard for many decades but is no longer considered a preferred practice. Generally speaking, a plan with a 30-year funding period will be expected to have an increasing UAAL (in dollar terms) for at least 5-10 more years in most cases, even if all assumptions are met and all expected contributions are received. Further, resetting the amortization period back to 30 years would result in the UAAL actually increasing every year. Recent evolutions in pension funding best practices have encouraged Boards of Trustees and other stakeholders to identify funding goals of eliminating of UAAL over a set period of time or significantly reducing the UAAL over a sufficiently short period of time.

## Funding Results – PERS

### Current Sources of Contributions

PERS receives contributions from three primary sources:

1. *Employers currently contribute 9.17% of pay.* This contribution consists of a 6.90% of pay statutory contribution plus temporary additional contributions of 2.27% of pay. The additional contributions terminate following the Board's receipt of an actuarial valuation which indicates that terminating the additional contributions and reducing the employee contribution (noted below) would not cause the amortization period to exceed 25 years.
2. *Members currently contribute 7.90% of pay.* Each member's contribution must be reduced to 6.9% following the Board's receipt of an actuarial valuation which indicates that reducing the employee contribution and reducing the employer contribution (noted above) would not cause the amortization period to exceed 25 years.
3. *The State makes a statutory appropriation for PERS each year.* The contribution for FY2023 was approximately \$35 million. Each year the State appropriates 101% of the previous year's appropriation. According to statute, the Legislature will review performance of this appropriation and make any changes as necessary.

### Funding Period Calculation

The PERS June 30, 2023 actuarial valuation report indicates that the funding period, or the period until the UAAL is expected to be eliminated, is 28 years. This funding period is calculated assuming that the current employer contribution rate of 9.17% of pay and the member contribution rate of 7.90% of pay continues for all 28 years. Under this assumption, 28 years is a reasonable expectation for the elimination of the UAAL.

The statutes indicate that the employer and member contribution rates will be reduced to 6.90% of pay when the reduction will not cause the amortization period to exceed 25 years. We recommend that the retained actuary clearly state in their report that the calculation of the funding period is based on the assumption that the contribution rates will remain at current levels. While details of how the statutory reductions would be implemented may not be fully established at this point, it is important to recognize that if contribution rates are reduced when the *prospective* amortization period drops below 25 years, then the effective *overall* amortization period from the current valuation date will end up longer than 25 years. As a result, we also recommend the retained actuary enhance the funding period discussion in the actuarial valuation report to discuss the potential impact of the statutory reductions in the contribution rates on the elimination of the UAAL.

### Actuarial Determined Employer Contribution

In accordance with the Funding and Benefit policy, the Summary of Results in the actuarial valuation report indicates that an ADEC rate of 8.80% of pay would be necessary to amortize the UAAL over 30 years. Since PERS is funded through statutory fixed contribution rates, this ADEC is provided for illustration purposes and comparison to the statutory contribution rate.

In addition, the retained actuary notes on page 3 of the actuarial valuation report that the ADEC's 30-year amortization period may not follow the recent guidance from the Actuarial Standards of Practice No. 4 (ASOP 4) regarding a "reasonable actuarial determined contribution". As a result, the retained actuary notes that an actuarial determined employer contribution rate of 11.17% of pay would be expected to amortize the UAAL in 20 years. We agree with the retained actuary that the 20-year "reasonable ADEC" more closely follows the guidance of ASOP 4.

As an additional note, the 30-year and 20-year actuarial determined employer contributions are both calculated assuming that the member contribution rate remains 7.90% of pay for the entire amortization period. Both of these



ADEC rates would be higher if the statutory reduction in the member contribution rates was incorporated into the calculation of the ADEC. As noted, these rates are primarily provided for illustration purposes. However, we recommend that the retained actuary make it clear that the ADEC rates provided are based on a member rate of 7.90% of pay for the entire period and consider calculating the ADEC incorporating the statutory reduction in the member contribution rate.

Further, the ADEC rates are also calculated assuming that the State appropriations continue for the entire amortization period. This procedure should be disclosed as well.

## Funding Results – SRS

### Current Sources of Contributions

SRS receives contributions from three primary sources:

1. *Employers will contribute an actuarially determined amount beginning in FY2025 and beyond.* For FY2024, the employers will contribute 13.115% of pay. MCA 19-7-404 defines the ADEC to be the sum of:
  - a. the amount required on a level percent basis to amortize the June 30, 2023 UAAL (“Legacy Unfunded Liability”) over a closed 25-year amortization period beginning July 1, 2023,
  - b. the amount required on a level percent basis to amortize subsequent unexpected changes in the UAAL (“Contemporary Unfunded Liability”) over a layered amortization schedule so that each year’s layer is amortized over a closed 10-year period, and
  - c. the amount required on a level percent basis to pay the normal cost of benefits as determined in the annual actuarial valuation as the benefits accrue.

This ADEC is effective July 1 following the annual actuarial valuation completed in the prior calendar year. Additionally, the maximum annual increase in the ADEC will be 0.5% in any year.

2. *Members currently contribute 10.495% of pay.*

We believe this is a very strong funding policy for SRS. The Legislature, the employers, MPERA and their advisors should be commended for working together to develop a very thoughtful method of paying down the existing UAAL. We encourage the Legislature the employers to remain committed to the funding plan SRS and considering a similar funding plan for PERS.

## Actuarial Cost Method

The June 30, 2023 actuarial valuations for PERS and SRS prepared by the retained actuary use the Entry Age Actuarial Cost Method. This actuarial cost method is consistent with the guidance in the Board’s Funding and Benefit Policy. We agree that it is appropriate for valuing the costs and liabilities of PERS and STS and is the cost method that we usually recommend.

**Purpose of a Cost Method:** The purpose of any cost method is to allocate the cost of future benefits to specific time periods. Most public plans follow one of a group of generally accepted funding methods, which allocate the cost over the members’ working years. In this way, benefits are financed during the time in which services are provided.

**Most Common Public Plan Cost Method (Entry Age):** The most common cost method used by public plans is the Entry Age Actuarial Cost Method. The focus of the Entry Age Cost Method is the level allocation of costs over the member’s working lifetime. For a public plan, this means current taxpayers pay their fair share of the pensions of the public employees who are currently providing services. Current taxpayers are not expected to pay for services received by a past generation, nor are they expected to pay for the services that will be received by a future generation. The cost method does not anticipate increases or decreases in allocated costs.

The 2019 Public Fund Survey from the National Association of State Retirement Administrators shows that about 90% of the retirement systems surveyed are using the Entry Age Cost Method. We believe that the use of this cost method is reasonable.

For GASB Statements No. 67 and No. 68, the Entry Age Actuarial Cost Method is the only permissible cost method for financial reporting purposes.

## 6. Actuarial Assumptions (Economic)

### Actuarial Audit Conclusion

The purpose of the actuarial valuation is to analyze the resources needed to meet the current and future obligations of the plans administered by MPERA. To provide the best estimate of the long-term funded status of these plans, the actuarial valuation should be predicated on methods and assumptions that will estimate the future obligations of the plans in a reasonable manner.

An actuarial valuation uses various methods and two different types of assumptions: economic and demographic. Economic assumptions are related to the general economy and its long-term impact on the plans administered by MPERA, or to the operation of the plans themselves. Demographic assumptions are based on the emergence of the specific experience of plan members. This section of the report will focus on economic assumptions. The next section will address the demographic assumptions.

We reviewed the economic assumptions used in the June 30, 2023 actuarial valuation and found them to be reasonable. The economic assumptions used were adopted based on the retained actuary's Actuarial Experience Study for the period ending June 30, 2021.

In future experience study reports, we recommend that the retained actuary provide rationale for their recommendation of the payroll growth assumption.

The following portion of this report discusses some of the key economic assumptions.

### Actuarial Standard of Practice No. 27: Selection of Economic Assumptions

The Actuarial Standards Board has adopted Actuarial Standard of Practice (ASOP) No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*. This standard provides guidance to actuaries giving advice on selecting economic assumptions for measuring obligations under defined benefit plans, such as PERS and SRS.

As the future is unknown, the best an actuary can do is to use professional judgment to estimate possible future economic outcomes. These estimates are based on a mixture of past experience, future expectations, and professional judgment. The actuary should consider a number of factors, including the purpose and nature of the measurement, and appropriate recent and long-term historical economic data. ASOP 27 explicitly advises the actuary not to give undue weight to recent experience.

Each economic assumption should individually satisfy this Standard. Furthermore, with respect to any particular valuation, each economic assumption should be consistent with every other economic assumption over the measurement period.

After completing the selection process, the actuary should review the set of economic assumptions for consistency. This may entail the actuary using the same inflation component in each of the economic assumptions selected.

An actuary's estimate with respect to a particular measurement of pension obligations may change from time to time due to changing conditions or emerging plan experiences. Even if assumptions are not changed, we believe that the actuary should be satisfied that each of the economic assumptions selected for a particular measurement complies with ASOP 27, unless that assumption has been prescribed by someone with the authority to do so.

### Inflation

**Use in the Valuation:** Inflation, as referred to here, means price inflation. The inflation assumption has an indirect impact on the results of the actuarial valuation through the development of the assumptions for investment return and wage growth.

There is expected to be a long-term relationship between inflation and the investment return assumption. The basic principle is that the investors demand a “real return” – the excess of actual investment returns over inflation. If inflation rates are expected to be high, investors will demand expected investment returns that are also expected to be high enough to exceed inflation, while lower inflation rates will result in lower demanded expected investment returns, at least in the long run.

**Historical Perspective:** The data for inflation discussed below is based on the national Consumer Price Index, US City Average, All Urban Consumers (CPI-U) as published by the Bureau of Labor Statistics.

There are numerous ways to review historical data, with significantly differing results. The retained actuary points to this by showing many different lengths of historical periods, ending with June 30, 2021. Inflation has been very high for the past few years; however, we do not believe adding the experience of the past few years would meaningfully change the historical perspective.

**Forecasts of Inflation:** As noted by the retained actuary, it is possible to determine the approximate rate of inflation anticipated by the financial markets by comparing the yields on inflation indexed bonds with traditional fixed government bonds. As of March 31, 2022, the yield for 20-year inflation indexed Treasury bonds implied inflation of 2.79% per year. Additionally, the retained actuary noted that the “Survey of Professional Forecasters” published by the Philadelphia Federal Reserve Bank set the median expected annual rate of inflation for 10-years to be 2.50% as of January 1, 2022.

Although most investment consultants and economists forecast lower inflation, they are generally looking at a shorter time horizon than is appropriate for a pension valuation. To consider a longer, similar time frame, we looked at the expected increase in the CPI by the Office of the Chief Actuary for the Social Security Administration. In the 2022 and 2023 Trustees report, the projected ultimate average increase under the intermediate cost assumptions was 2.40%.

**Peer System Comparison:** Although assumptions should not be set based on what other systems are doing, it is informative to see how PERA compares.

According to the National Association of State Retirement Administrators (NASRA) Public Fund Survey (a survey of approximately 130 large municipal and statewide systems), the average inflation assumption for statewide systems has been steadily declining. In the March 2023 NASRA Issue Brief, the average inflation assumption was 2.52%.

**Conclusion:** We believe that a 2.75% assumption is reasonable for a June 30, 2023 actuarial valuation of a retirement system.

### General Wage Inflation

**Use in the Valuation:** Estimates of future salaries are based on two types of assumptions. Rates of increase in the general wage level of the membership are directly related to inflation, while individual salary increases due to promotion and longevity (referred to as the merit scale) occur even in the absence of inflation. This section will address the general wage inflation assumption (inflation plus productivity increases). The merit, promotion, and longevity increase assumption is discussed in Section 7 of this report (demographic assumptions).

The General Wage Inflation assumption was 3.50% for the June 30, 2023 actuarial valuation. This growth includes increases in wages through inflation of 2.75% plus a component for productivity of 0.75%.

**Historical Perspective:** As with inflation, historical measures for general wage inflation vary widely depending upon the data source, consideration of mean vs. median, and how far back it is measured. We have used statistics from the Social Security Administration on the National Average Wage. Using this data implies real wage

growth of about 0.6% over the past 50 years. The retained actuary presents a similar statistic for multiple historical time periods.

**Forecasts for Future Wage Growth:** Wage inflation has been projected by the Office of the Chief Actuary of the Social Security Administration. In the 2022 Trustees Report, the long-term ultimate annual increase in the National Average Wage was estimated to be 1.14% higher than the Social Security intermediate ultimate inflation assumption of 2.40% per year.

**Conclusion:** We believe that the current estimate of 0.75% falls within multiple data points for this assumption and serves as a reasonable estimate of future real wage growth.

### Payroll Increase Assumption

Payroll is projected to grow in the development of the years to fund the Unfunded Actuarial Accrued Liability. The current payroll increase assumption is equal to 3.25%, which is presumably based on 2.75% for inflation and an additional 0.50% to account for some portion of productivity increases offset by demographic changes. From our perspective, the payroll increase assumption should generally be more than that inflation assumption and less than, or equal to, the general wage inflation assumption. As a result, this assumption appears reasonable. However, the retained actuary does not include an analysis of this assumption in the experience study report. In future experience study reports, we recommend that the retained actuary provide rationale for its recommendation of the payroll growth assumption.

### Investment Return (Discount Rate)

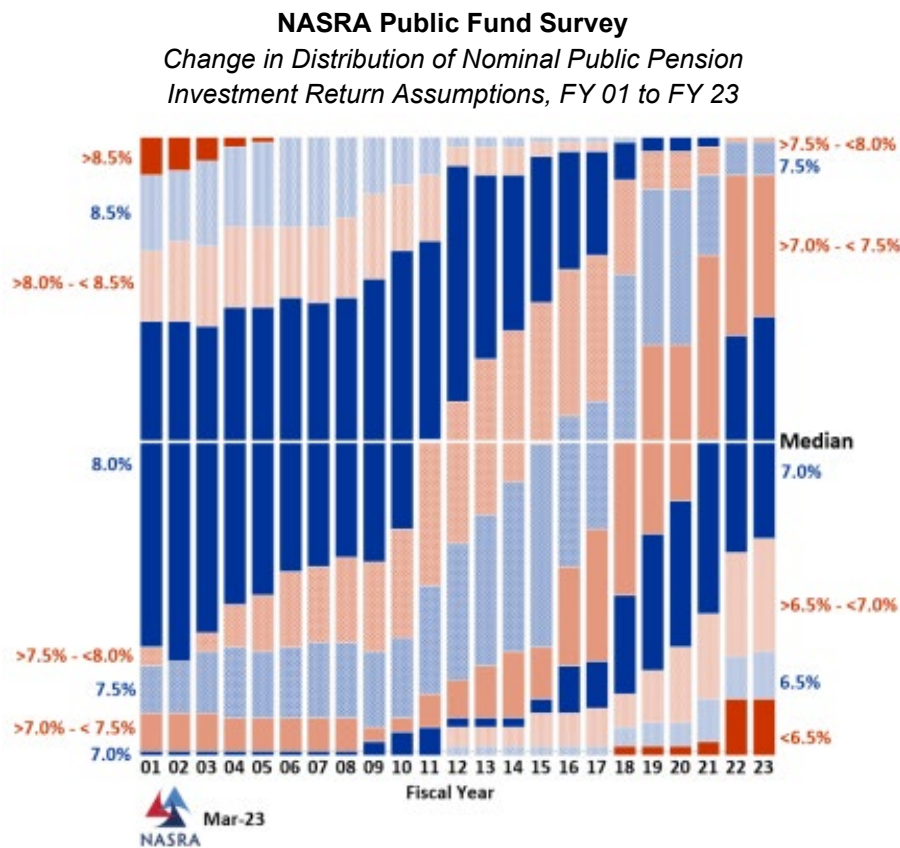
**Use in the Valuation:** The investment return assumption is one of the primary determinants in the calculation of the expected contribution rates to provide PERA benefits, providing a discount of the estimated future benefit payments to reflect the time value of money. This assumption has a direct impact on the calculations of actuarial accrued liabilities, normal cost rate, and member and employer contribution rates.

The discount rate is the rate used to discount future benefit payments into an actuarial present value. The traditional actuarial approach used for public sector funding sets the discount rate equal to the expected investment return. Under current standards set by the GASB, the “discount rate” should reflect the long-term expected rate of return on pension fund investments to the extent that the pension fund’s assets are expected to be sufficient to pay benefits.

The most recent recommendation for the net investment return assumption of 7.30% per year includes two components: (1) inflation of 2.75%, and (2) a real rate of return equal to 4.55%. This approach of splitting the net return into separate pieces is called the “building block” method.

**Long-term Expected Investment Return:** The assets for PERA are invested by the Montana Board of Investments. To develop an analytical basis for assessing the investment return assumption, the retained actuary used capital market expectations published in the *Survey of Capital Market Assumptions: 2021 Edition* which includes information from 39 investment advisors. Based on this analysis, the 50th percentile geometric annual real return was 4.66%. We agree that the geometric annual return is the appropriate measure. This is a reasonable approach to the analyses.

To provide some additional perspective on this assumption, the chart below shows the assumptions used by over 130 of the largest US public sector systems in a regularly updated survey published by the National Association of State Retirement Administrators (NASRA). As can be seen from the chart, the trend over time has been for systems to lower their investment return assumptions.



Based on Milliman’s current capital market assumption model as of June 30, 2023 and the Montana Board of Investment’s Asset Allocation ranges, we would expect a 10-year geometric assumed real return of 4.13% and a 30-year geometric assumed real return of 4.74%.

**Administrative and Investment-Related Expenses:** Since the trust fund pays investment and administrative expenses from plan assets, it is necessary to incorporate the expected expenses into the actuarial valuation. Plan expenses may be explicitly assumed as a direct increase to the annual normal cost or implicitly assumed by developing an investment return assumption as a net return after payment of plan expenses. The 2023 actuarial valuations include an implicit expense assumption for both administrative and investment-related expenses.

The forward-looking capital market assumptions and return forecasts developed by investment consulting firms generally reflect expected investment expenses. Their return estimates for core investments (i.e., fixed income, equities, and real estate) are generally based on anticipated returns produced by passive index funds that are net of investment related fees. Investment return expectations for the alternative asset class such as private equity and hedge funds are also generally reported as net of investment expenses. Therefore, it is generally not necessary to make additional adjustments to the investment return assumption to account for investment related expenses. This perspective also assumes that investment managers will generate enough “alpha” to cover the cost of the active management.

According to the most recent actuarial experience study, the expense ratio for administrative expenses has averaged 0.08%. The retained actuary correctly reduces the expected return of the investment portfolio in the analysis of the investment return assumption.

We believe that these are appropriate methods for the actuarial valuations.

**Conclusion:** We find the 4.55% real rate of return investment return assumption is reasonable for funding and financial reporting purposes. The 7.30% total investment return assumption is higher than the median investment return assumption in industry surveys which is primarily due to a somewhat higher assumption for inflation. The inflation assumption is consistently applied as a building block component of the other economic assumptions, so we believe the overall investment return assumption is reasonable.



## 7. Actuarial Assumptions (Demographic)

### Actuarial Audit Conclusion

We completed a review of the demographic assumptions that were adopted based on the retained actuary's Actuarial Experience Study for the period ending June 30, 2021. Based on this review, we believe the demographic assumptions used in the valuations are reasonable. In this section, we provide recommendations for setting and monitoring the mortality and retirement assumptions in future actuarial studies.

Note that we did not independently replicate the detailed analysis completed by the retained actuary as it was outside the scope of this actuarial audit.

### Overview of Actuarial Experience Studies

Actuarial experience studies are studies of demographic experience involving a detailed comparison of actual and expected experience. If the actual experience differs significantly from the overall expected results, or if the actual pattern does not follow the expected pattern, new assumptions are considered. Recommended revisions normally are not an exact representation of the experience during the observation period. Judgment is required to predict future experience from past trends and current evidence, including a determination of the amount of weight to assign to the most recent experience.

In an experience study, the actuary first determines the number of actual occurrences (i.e., deaths, terminations, retirements, etc.) that occurred during the experience period. Then the actuary determines the number that were expected to occur, based on the current actuarial assumptions. A comparison of the "actual occurrences" to the "expected occurrences" can determine the appropriateness of a particular assumption and is generally referred to as a "headcount-weighted" experience analysis. Selecting an assumption based on a headcount-weighted analysis is consistent with determining the *expected number of occurrences* in the actuarial valuation.

An actuary can enhance the "headcount-weighted" analysis by considering an "amount-weighted" experience analysis. An amount-weighted analysis will generally use an amount that is relevant to the plan, such as benefits or liabilities, to "weight" the occurrences reviewed as part of the analysis. By weighting the data, the actuary gives more weight to members who have larger benefits (and thus have larger liabilities). Selecting an assumption based on an amount-weighted analysis is consistent with *minimizing actuarial gains and losses* associated with a particular assumption in the actuarial valuation.

We noted that the retained actuary used an "amount-weighted" approach when analyzing the mortality, retirement and termination assumptions in the most recent experience study. The retained actuary thoroughly describes the appropriateness of each assumption, both before and after the recommended change, on an amount-weighted basis in the experience study report. We recommend that the retained actuary note in the experience study report the number of active members who terminated employment for each cause and the number of annuitants who died, especially for the mortality analysis. We believe this additional detail would provide additional context to the assumption analysis and enhance the readers ability to judge the credibility of the underlying data.

We did not independently perform the detailed calculations of the actual and expected rates that the retained actuary did, but we reviewed the assumptions based on our experience with similar systems.

### Actuarial Standard of Practice No. 35: Selection of Demographic Assumptions

Actuarial Standard of Practice No. 35 (ASOP 35) governs the selection of demographic and other noneconomic assumptions for measuring pension obligations. ASOP 35 states that the actuary should use professional judgment to estimate possible future outcomes based on past experience and future expectations, and select assumptions based upon application of that professional judgment. The actuary should select reasonable demographic assumptions in light of the particular characteristics of the defined benefit plan that is the subject of the measurement. A reasonable assumption is one that is expected to appropriately model the contingency being



measured and is not anticipated to produce significant cumulative actuarial gains or losses over the measurement period.

Note that in 2023, the Actuarial Standards Board approved an exposure draft of a revision to ASOP 27. That draft combined economic and demographic assumptions. When the proposed revision to ASOP 27 is adopted, it is expected that there will be a single assumption standard for pensions and ASOP 35 will be repealed; however, this change is not expected to affect the guidance included in the standard.

### Post-Retirement Mortality

Mortality rates are used to project the length of time benefits will be paid to current and future retirees and beneficiaries. The selection of a mortality assumption affects plan liabilities because the estimated value of retiree benefits depends on how long the benefit payments are expected to continue. There are clear differences in the mortality rates by gender, job categorization, non-annuitant versus annuitant, and non-disabled versus disabled retired members.

**Base Mortality Tables:** The Retirement Plans Experience Committee (RPEC) of the Society of Actuaries (SoA) issued the “Pub-2010” family of static base mortality tables in 2019. The ‘2010’ in the title refers to the central year of collected study data. These are the first tables published by the RPEC based solely on public sector experience. The RPEC created separate tables for public safety, teachers, and general employees.

For PERS, the retained actuary recommended the PUB-2010 General Employees Amount Weighted Healthy Retiree mortality table projected to 2021 with ages set forward one year and adjusted 104% for males and 103% for females. According to the experience study report, the resulting actual/expected ratios under the proposed mortality assumption are 100% and 101% for males and females, respectively.

For SRS, the retained actuary recommended the PUB-2010 Safety Amount Weighted Healthy Retiree mortality table projected to 2021 with ages set forward one year and adjusted 105% for males and with no adjustment for females. According to the experience study report, the resulting actual/expected ratios under the proposed mortality assumption are 106% and 92% for males and females, respectively.

**Mortality Improvement Scale:** It is difficult to predict how much future mortality will improve compared to mortality today. The SoA has created very precise projections of mortality improvement in “MP” tables that are generally updated each year. The SoA’s calculations feature a two-dimensional assumption to allow for varying improvements by age and calendar year. The SoA created new tables in 2014 through 2021. The retained actuary recommended the use of the MP-2021 version of the mortality improvement scale.

**Beneficiary Mortality:** The retained actuary identified the assumption for beneficiary mortality for PERS as the “PUB-2010 General Amount-Weighted Contingent Survivor mortality table” with ages set forward one year for males and females and for SRS as “PUB-2010 Safety Amount-Weighted Contingent Survivor mortality table” with ages set forward one year for males and no set forward for females. Both valuations project these assumptions generationally. After reviewing the selection and application of these assumptions, we have noted a few points for future consideration:

- The RPEC only published one set of Contingent Survivor mortality tables in the Pub-2010 study, which was based on experience of survivors of all three job types from the study (General and Safety along with Teachers). In future reports, it would be clearer if the references to “General” and “Safety” were removed from the descriptions of these tables, as it implies a difference in the underlying base tables for these groups that does not exist.
- The experience study report noted the number of exposures and deaths for this population was insufficient to provide full creditability for adjusting the published Contingent Survivor tables, but also recommended adopting tables that reflect a one-year set forward to three of the four tables (PERS male and female beneficiaries along with SRS male beneficiaries). It would be helpful for the retained actuary

to provide some support or rationale for the recommendation to apply set forwards, since they state the data by itself is not sufficient to be credible for such adjustments. In the absence of sufficiently credible data or another rationale for an adjustment, we would recommend using the tables without set forward or set back. If the practice of applying set forwards is retained, they should describe the rationale for assuming that male beneficiaries in both PERS and SRS are assumed to have identical mortality experience but that female SRS beneficiaries are assumed to have lower mortality than female PERS beneficiaries (this is the implication of applying the set forward to female beneficiaries for PERS but not for SRS).

- We understand the retained actuary also applies the Contingent Survivor mortality tables to the contingent annuitants of living retirees who are receiving a joint and survivor form of payment. As described in the Pub-2010 study, we understand these tables were developed based exclusively on experience after the death of the retired member and, as a result, the mortality rates are likely to be higher than if experience for contingent annuitants with living spouses were included due to what is sometimes known as the “grieving widow(er) effect.” The Pub-2010 study report discussed three possible alternatives for calculating the liability associated with joint and survivor annuities. The retained actuary’s approach of applying the Contingent Survivor mortality prior to the retiree death is one of the approaches discussed, but it is generally not an approach we recommend since it presents a risk of understating the liability for retirees with survivor forms of payment.

**Conclusion:** The retained actuary recommended mortality assumptions based on published mortality studies of applicable public sector employees. When incorporating forward-looking generational mortality improvements, we generally target an actual/expected ratio of close to, or above, 100%. The resulting actual/expected ratio of 92% for the public safety females is somewhat lower than we generally prefer but because there is very limited experience for this group in the experience study selecting the standard published mortality table for this purpose seems appropriate. As noted above, we recommend the retained actuary review their assumptions related to Contingent Survivor mortality tables (in particular the choices to apply a survivor mortality table prior to retiree death and to apply set forward adjustments) in the next experience study and provide additional description of the rationale or support for their recommended approach in the study report. In total, the base mortality and mortality improvement assumptions are reasonable.

### **Merit, Promotion, and Longevity Salary Increases**

The individual salary increase assumptions due to merit (longevity and promotion) are intended to anticipate the salary increases in addition to the assumed increases due to general wage inflation.

The experience study report notes that the actual/expected ratio for the expected salary increases was 99.9% for PERS and 100.1% for SRS over the experience study period. However, this analysis was based on the gross salary increases (general wage inflation plus merit). If the actual inflation and/or wage inflation during the experience study period were different than the assumption then this analysis on the total increase may not provide the most reasonable analysis for the merit portion of the salary increase assumption.

In order to follow a true “building block” approach to developing the merit, promotion and longevity salary increase assumption in future experience studies, the retained actuary should consider isolating the merit portion of the actual salary increases during the experience study period. This can be done by subtracting an estimate for the actual inflation and the actual wage inflation from the actual pay increases during the experience study period. Once the merit portion of the salary increases have been isolated, the increases can be compared to the merit increase assumption to determine the reasonability.

It should be noted that we looked at the magnitude of the assumed increases and they are in line with what we have seen with similar plans.

In total, we believe that the assumptions for merit salary increases are reasonable.

**Rates of Service Retirement**

We reviewed the rates of service retirement. The current assumptions vary by age and by whether the member had attained 30 years of service (or age 60 with 25 years of service). This assumption and the analysis in the experience study report seem reasonable.

The retained actuary currently applies one set of retirement rate assumptions to all members. However, members hired on or after July 1, 2011 have lower benefits and later retirement eligibility thresholds than members hired prior to that date. As a result, their retirement behavior can be expected to differ from patterns observed for pre-July 1, 2011 members. While there is limited retirement experience to this point for such members, in the next experience study the retained actuary should consider whether it would be warranted to introduce a separate assumption for the more recent group based on reasonable expectations about how their retirement patterns might differ. It may also make it easier to monitor and refine the assumption for this group in the future if they are considered separately.

Experience for SRS

We noted from *Table 13: Historical Actuarial (Gains) and Losses* in the actuarial valuation report that the actuarial loss from “age & service retirements” has been significant each of the last five years as a percentage of the beginning of year UAAL:

Year	Actuarial Loss	BOY UAAL	Loss as % of UAAL
FY2023	\$ 3.6	\$ 127.6	2.8%
FY2022	3.4	87.2	3.9%
FY2021	2.3	92.5	2.5%
FY2020	2.3	85.3	2.7%
FY2019	4.1	82.8	5.0%

*Amounts in millions*

In addition, the experience study report noted that the previous service retirement assumption for SRS yielded an actual/expected ratio of 159.0%. Additionally, the recommended assumption was noted to yield a ratio of 87.8%. Based on these ratios, the retained actuary almost doubled the SRS retirement rates in the most recent experience study (for the period ending in FY2021). Based on the sustained retirement decrement losses, both before and after making significant changes to the retirement assumption, it would appear that there is another source of the significant losses coming through in the analysis as “age & service retirements”. We recommend that the retained actuary closely review the sources of the retirement losses for SRS in the next actuarial experience study and formulate a method to anticipate the losses in the actuarial valuation.

**Rates of Disability Retirement**

We reviewed the rates of disability retirement. The current assumptions are low and increase with age. The low probabilities are supported by the data, and based on the retained actuary’s analysis, the disability assumptions appear reasonable.

**Rates of Termination (Refund and Vested Termination)**

We reviewed the rates of termination of employment. The current assumption varies by length of service. We agree that service is generally the most significant in anticipating termination rates. The retained actuary “weighted” the experience analysis by each individual’s salary and service which we believe is reasonable. Based on the retained actuary’s analysis, the termination rates are aligned with actual experience and the assumptions appear reasonable.

## 8. Content of the Valuation Report

### Actuarial Audit Conclusion

ASOP No. 4, *Measuring Pension Obligations and Determining Pension Plan Costs or Contributions*, and ASOP No. 41, *Actuarial Communications*, provide guidance for measuring pension obligations and communicating the results. These Standards list specific elements to be included, either directly or by references to prior communication, in pension actuarial communications. The retained actuary's reports meet the applicable Standards. We are recommending improvements for the next valuation that will enhance the overall communication and disclosure in the actuarial valuation report. These are all improvements to the reporting and would not impact the results of the valuation.

### Comments – PERS Report

Following our review of the retained actuary's actuarial valuation report for PERS, we have the following comments and recommendations for future actuarial valuation reports:

#### Certification Letter

In the second paragraph of the certification letter, the only purpose the retained actuary provides for the report "is to provide a summary of the funded status of the System". Additionally, Page 29 of the report notes that "the purpose of the valuation is to determine if the fixed contributions are sufficient to fund the system over time". We recommend that the retained actuary thoughtfully consider the main purposes for the actuarial valuation and coordinate the discussions in the report. Additional possibilities for the purposes of the valuation include: to provide the Actuarially Determined Employer Contribution (ADEC) rates, to project the adequacy of the System's funding policy set by statute, to review the experience under the plan for the valuation year, and/or to assess the funded position of the plan.

#### Summary of Results

When providing the Board's 30-year funding policy ADEC and the "reasonable" ADEC, the retained actuary should clearly describe the calculation of the contribution rates; specifically, the member contribution rate is assumed to continue at 7.90% of pay and the ADEC is in addition to the State appropriation.

#### Appendix A: Actuarial Procedures and Methods

The description of the Actuarial Cost Method states: "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."

Read literally, this description would imply that the normal cost is calculated for every active member on the valuation date (including a partial normal cost for those members expected to terminate during the year) and the payroll is the expected full-year pay for every active member on the valuation date (including full-year pay for members after they are expected to terminate).

For a plan receiving a fixed contribution (i.e., not an actuarially determined contribution), it is very important that the calculation of the funding period incorporates the cost of members expected to be hired throughout the upcoming year to replace the members expected to leave active service. If the cost of these new members is disregarded in the calculation of the ADEC and the funding period then subsequent annual valuations will have guaranteed actuarial losses each year (i.e., unexpected increases in UAAL) and the funding period will ultimately be longer than expected.

We recommend that the retained actuary review their procedure for calculating the normal cost rate, especially for PERS, to ensure that the normal cost rate is appropriately capturing the cost for all members expected to accrue service during the year. We believe the most appropriate procedure would be to, either: (1) divide the sum of the individual normal costs by the sum of the expected pay for each individual (incorporating expected terminations), or (2) apply a load to the sum of the individual normal costs.

#### Appendix B: Summary of Valuation Assumptions

As previously noted, the assumed PERS termination rates for 5 years of service through 11 years of service were shifted by one year in the electronic files compared to the rates shown in the valuation report. We recommend that the retained actuary determine the most appropriate termination rates for the actuarial valuation and ensure that the disclosure of the rates is consistent. The differences in the rates will not make a material impact on the actuarial valuation if they need to be updated.

We believe it would enhance the description of the assumptions in the actuarial valuation report if the retained actuary would note that deferred vested members are assumed to commence their benefit at age 60.

The Guaranteed Annual Benefit Adjustment (GABA) assumption for members hired on or after July 1, 2013 is reduced when the funded status of PERS is less than 90%. However, for purposes of the valuation it is assumed that no reductions apply, and the GABA is 1.50% every year. We believe this is a reasonable methodology, and believe it would enhance the assumption discussion to describe this assumption in the actuarial valuation report.

#### **Comments – SRS Report**

Following our review of the retained actuary's actuarial valuation report for SRS, we have the following comments and recommendations for future actuarial valuation reports:

#### Summary of Results

Under Amortization of the UAAL, the actuarial valuation report indicates that the amortization period at June 30, 2023 is 25 years. As noted in the Funding section of this actuarial audit report, the amortization schedule for the Legacy Unfunded Liability was calculated to eliminate in the UAAL in 25 years from July 1, 2024. As a result, the amortization period as of June 30, 2023 is actually 26. We recommend that the retained actuary align the calculation of the amortization period for the plan with the amortization schedule established as part of the ADEC calculation.

#### Appendix B: Summary of Valuation Assumptions

We believe it would enhance the description of the assumptions in the actuarial valuation report if the retained actuary would note the following:

- 10% of active deaths are assumed to be duty-related, and
- Deferred vested members are assumed to commence their benefit at age 60.

## 9. Adequacy of Actuarial Factor Methodology

As requested, we have evaluated the adequacy of the retained actuary's methodology used to establish the actuarial factors provided to MPERB for the PERS and SRS plans to calculate the following: service and disability retirement, service purchases, early retirement, and survivorships. This evaluation included a review of the variables or assumptions used by the retained actuary to establish these factors.

### Actuarial Audit Conclusion

We reviewed the actuarial factor methodology used by the retained actuary for PERS and SRS. The methodology and simplifying assumptions used to calculate the early retirement factors, optional form of payment factors, and the service purchase costs are reasonable. In order to protect MPERA against the possibilities of anti-selection and adverse experience, MPERA Board could discuss the possibility of enhancing the calculation of the service purchase cost by incorporating: (1) the retirement age with the maximum value to the member, and/or (2) a risk premium for the plan accepting additional investment and longevity risks following the purchase. MPERA should seek an opinion from legal advisors before making any changes to the service purchase methodology.

### Overview of Actuarial Factors

Milliman was asked to evaluate the adequacy of the retained actuary's methodology used to establish the actuarial factors provided to MPERB for the PERS and SRS plans to calculate the following: service and disability retirement, service purchases, early retirement, and survivorships. This evaluation included a review of the variables and assumptions used by the retained actuary to establish these factors.

#### Definition of Actuarial Equivalent

Optional forms of payment and service purchases are very important plan features for the plan members. For MPERA, it is important that the plan features are administered according to statute and are calculated based on the most appropriate assumptions.

MPERA offers plan members a series of options for their benefit on an actuarial equivalent basis. In this context, "actuarial equivalent" means that all the options are adjusted such that the present value. In other words, the liabilities of the plan are expected to be the same, regardless of the option elected by the plan member.

Incorrectly or inappropriately calculated factors for determining the cost of these plan features can either: (1) hamper the plan by paying out too much in benefits, or (2) unduly harm the member by applying too much reduction or charging too much for service purchases. The retained actuary must take great care to ensure the actuarial tables produced to administer optional forms of payment and service purchases are appropriate for the plan.

#### Simplifying Assumptions

The mortality assumptions the actuarial valuation of PERS and SRS incorporate a two-dimensional generational mortality improvement assumption. This means that the mortality assumption changes every year and changes by a different amount depending on the member's year of birth. As a result, incorporating actuarial equivalence factors based on exactly the same assumptions as the actuarial valuation would require updating the factors used by the retirement system every year. The most common approach is for the actuary to make a simplifying assumption regarding the mortality projection assumption and then regularly update the factors following an actuarial experience study. In addition, the under federal law actuarial equivalence factors are required to use a single table for males and females so the mortality assumptions must be blended.

The following table compares the actuarial valuation assumptions with the simplified assumptions for actuarial equivalence.



	Actuarial Valuation	Actuarial Equivalence
<b>Healthy Retiree Mortality (Base Table)</b>	<p><u>PERS</u>: Pub-2010 General Healthy Retiree Mortality</p> <p><u>SRS</u>: Pub-2010 Public Safety Healthy Retiree Mortality</p> <p><i>Additional adjustments made to both tables to match experience</i></p>	Same
<b>Mortality Improvement</b>	Generational improvement with MP-2021	Static projection to 2040 using Scale MP-2021
<b>Sex</b>	Sex-distinct tables	<p><u>PERS</u>: Blended 50% male and 50% female</p> <p><u>SRS</u>: Blended 85% male and 15% female</p>
<b>Interest Rate</b>	7.30%	Same
<b>GABA</b>	<p>Group 1: 3.00%- Pre2007</p> <p>Group 2: 1.50%- 7/1/2007-6/30/2011</p> <p>Group 3: 1.50%- 7/1/2011-6/30/2013</p> <p>Group 4: 1.50%- 07/01/2013</p>	Same, except that a GABA rate of 0.70% is used for Group 4

We believe these simplified assumptions are reasonable for the actuarial equivalence factors.

Service and Disability Retirement, Early Retirement, and Survivorships

Calculating the reduction factor for early retirement and the reduction factor for selecting an optional form of payment are generally straightforward calculations. The reduction factor is simply the ratio of: (1) the value of the annuity under the normal form of payment, to (2) the value of the annuity under the option form (either earlier commencement or a benefit continuing to a beneficiary).

Based on the simplifying assumptions noted above, we were able to closely replicate the factors for PERS and SRS at the core retirement ages.

Current Service Purchase Methodology (“Average Value” Method)

The current service purchase factors are produced by running hypothetical individuals through the retained actuary’s valuation software (for every possible age and service combination) to calculate the impact of purchasing service on the actuarial accrued liability. If the member paid the service purchase cost determined by this method and was reported with increased service for the next actuarial valuation, then the unfunded liability would be expected to be unimpacted by the purchase of service.

It is important to note that this service purchase cost incorporates the likelihood of all possible departures from active service. For a member who is not currently retirement eligible, this service purchase cost incorporates the possibility that the member terminates service before retirement eligibility and is only eligible for a less valuable deferred retirement benefit. Similarly, a member who is currently eligible to retire may be assumed to continue working for a few more years following the service purchase which could result in a less valuable benefit.

We will refer to this method as the “Average Value” method.

Even though the unfunded liability would be expected to be unimpacted using this method, there may be other methods for calculating service purchase costs for the Board to consider. These methods are discussed in the next section.

#### Maximum Value Method

The limitation of the “Average Value” method is that the method assumes the member purchasing the service will behave the same as the average plan participant both before and after the service purchase. However, the member purchasing service knows the most about their retirement plans and will likely only purchase the service if they believe it is financially in their best interest (and, by extension, not in the financial best interest of the plan). This natural behavior of the member acting on known information to gain an advantage is referred to as anti-selection.

It is reasonable to expect plan members to make decisions that are in their best interest. However, service purchase is an optional benefit and MPERA may want to avoid offering this optional benefit if it has the likelihood to incur a net cost to the plan.

In order to limit the anti-selection, the service purchase factors could be calculated based on the cost associated with the member purchasing service and then retiring at the most valuable retirement age (without the possibility of leaving active service at any other time). To be thorough, this may involve determining the value of the service purchase at both the first early retirement age and the first unreduced retirement age (the two most likely options for the maximum benefit value). Factors using this method could be calculated by the retained actuary and populated into a table in the same format as the current factors.

We will refer to this method as the “Maximum Value” method.

#### Risk Premium

Another perspective to consider is that, once this service purchase service occurs, MPERA assumes all the risk associated with this annuity (investment return, longevity, etc.). If adverse experience occurs, MPERA cannot go back to the member who purchased the service and ask for more money to make MPERA whole. Further, if adverse experience occurs, the residual cost of the service purchase falls to the employers and possibly the remaining active plan members.

Some retirement systems have taken the position that the plan should charge an additional “risk premium” to compensate the plan for taking on the additional risk and to protect the employers and remaining members. Often, this risk premium takes the form of a lower interest rate used to calculate the service purchase cost (anywhere from 50 basis points lower to 200 basis points lower).

Adopting this risk premium approach could result in a significant increase in the service purchase cost (depending on the level of the risk premium charged). However, the cost would still likely be significantly less than what an insurance company would charge for the same annuity.

Milliman recommends that MPERA seek an opinion from legal advisors before making any changes to the service purchase methodology. Milliman does not provide legal advice and recommends that others consult with their legal advisors regarding legal matters.