STATE OF WISCONSIN
Legislative Audit Bureau
NONPARTISAN • INDEPENDENT • ACCURATE

Report 25-07
April 2025

Wisconsin Retirement System Actuarial Audit

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Wisconsin Retirement System
Actuarial Audit

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Legislative Audit Bureau

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The Legislative Audit Bureau supports the Legislature in its oversight of Wisconsin government and its promotion of efficient and effective state operations by providing nonpartisan, independent, accurate, and timely audits and evaluations of public finances and the management of public programs. Bureau reports typically contain reviews of financial transactions, analyses of agency performance or public policy issues, conclusions regarding the causes of problems found, and recommendations for improvement.

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Contact the Bureau at 22 East Mifflin Street, Suite 500, Madison, Wisconsin 53703; *AskLAB@legis.wisconsin.gov;* or (608) 266-2818.

Contents

Letter of Transmittal

Actuarial Audit Performed by Cheiron, Inc.

Response

From the Secretary of the Department of Employee Trust Funds

STATE OF WISCONSIN
Legislative Audit Bureau

Joe Chrisman
State Auditor

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April 29, 2025

Senator Eric Wimberger and
Representative Robert Wittke, Co-Chairpersons
Joint Legislative Audit Committee
State Capitol
Madison, Wisconsin 53702

Dear Senator Wimberger and Representative Wittke:

The Legislative Audit Bureau is required by s. 13.94 (1) (dc), Wis. Stats., to contract for the performance of an actuarial audit of the Wisconsin Retirement System (WRS) at least once every five years. The actuarial audit involves engaging the services of an outside actuary to review the work of the WRS consulting actuary. Actuarial audits provide independent assurance that the work was performed in accordance with Actuarial Standards of Practice (ASOP), which are prescribed by the Actuarial Standards Board. Actuarial audits may also provide recommendations to improve the actuarial process, including how information is presented in the actuarial report.

After a formal request-for-proposal process, the Bureau awarded a contract to Cheiron, Inc., (Cheiron) for an independent audit of the December 31, 2023 actuarial valuation for non-retired and retired participants, and the three-year experience study covering the period from January 1, 2018, through December 31, 2020. An actuarial valuation is used to assess the long-term viability of the WRS and to establish the contribution rates that are needed to meet current and future obligations of the WRS. An experience study assesses whether the actual experience of the WRS, such as the rate at which participants leave WRS-covered employment, indicates that the actuarial assumptions used in the actuarial valuation should be updated.

Under the contract, Cheiron verified and analyzed the completeness and validity of the data used in the actuarial valuation and performed a "full-scope" actuarial audit of the December 31, 2023 actuarial valuation. As part of the actuarial audit, the original actuarial valuation was replicated based on the same participant data, assumptions, and actuarial valuation methods that were used by the Department of Employee Trust Funds (ETF) and its consulting actuary, Gabriel, Roeder, Smith & Company (GRS). Cheiron also assessed the reasonableness of the actuarial assumptions that were validated and updated through the three-year experience study. The actuarial audit was conducted in accordance with ASOP.

This report (report 25-07) includes the results of the actuarial audit performed by Cheiron. Bureau staff managed the audit contract but were not involved in the fieldwork, analysis, or writing of the actuarial audit report.

Cheiron found that the results of the December 31, 2023 actuarial valuation report were reasonable and generally conformed to ASOP (page 3). With the exception of the salary increase assumption (page 2), Cheiron found the assumptions included in the three-year experience study were reasonable. Cheiron found that the actual salary experience for certain employment classifications was significantly higher than the current assumption and recommended that the salary increase assumption be increased for certain employment classifications (page 17).

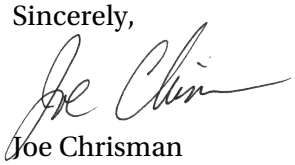
To improve the actuarial valuation and the overall evaluation of the WRS experience, Cheiron also provided other comments and recommendations to be considered by ETF and GRS. Cheiron recommended that GRS provide an assessment that considers specific circumstances of the WRS for the risks identified in the actuarial valuation report (page 10). Cheiron noted that the risks currently identified are generic and could apply to any plan. In our last contracted audit (report 20-2), a similar recommendation was made related to the discussion of risk and maturity measures included in the December 31, 2018 actuarial valuation.

Cheiron also noted areas in which further disclosures in regards to actuarial methods may be required to comply with ASOP 4, *Measuring Pension Obligations and Determining Pension Plan Costs or Contributions*. Cheiron recommended that the funding method used in the actuarial valuation be clarified and other areas of the actuarial valuation be reviewed for consistency (page 20). Cheiron further recommended that additional disclosures related to certain actuarial methods be included in the actuarial valuation report (pages 21 and 22).

Finally, Cheiron identified other areas where additional disclosures or clarifying language could be included to assist readers of the actuarial valuation report or experience study. For example, Cheiron recommended that projections and discussion of the funded status of the WRS be included in the actuarial valuation report (page 10), additional information be included related to demographic assumptions in the next experience study (pages 18 and 19), discussion of the amortization period be included in the next experience study (page 20), and that additional details on the methodology used to determine dividends for retired participants be provided in the actuarial valuation report (page 21).

We appreciate the courtesy and cooperation extended to us by Cheiron, ETF, and GRS in the performance of this independent actuarial audit. A response from ETF's consulting actuary and a response from the Secretary of ETF follow Cheiron's report.

Sincerely,



Joe Chrisman
State Auditor

JC/ES/ss

CHEIRON *Classic Values, Innovative Advice*

State of Wisconsin Legislative Audit Bureau

Actuarial Audit Report on the Wisconsin Retirement System December 31, 2023 Actuarial Valuation and Peer Review of the Three-Year Experience Study for the Period Ending December 31, 2020

Produced by Cheiron

April 2025

www.cheiron.us 1.877.CHEIRON (243.4766)

TABLE OF CONTENTS

Section *Page*

Letter of Transmittal i

Section I Report Scope 1

Section II Executive Summary 2

Section III Results of the Actuarial Valuation Replication 3

Section IV Audit of the Actuarial Assumptions and Methods 13

Appendices

Appendix A Funding Policy 23

Appendix B Information Relied upon in Preparing this Report 30

Appendix C Glossary of Terms 31

April 7, 2025

Mr. Joe Chrisman
State Auditor
State of Wisconsin Legislative Audit Bureau
22 East Mifflin Street, Suite 500
Madison, Wisconsin 53703

Dear Mr. Chrisman:

Cheiron has performed an independent full replication audit of the December 31, 2023 Actuarial Valuation of the Wisconsin Retirement System (WRS or System) and a review of the January 1, 2018 to December 31, 2020 Experience Study prepared by Gabriel Roeder Smith (GRS).

The purpose of this report is to present the results of our audit. Section I of this report describes the project scope and Section II summarizes our findings. Section III provides the detailed results of Cheiron's replication of the December 31, 2023 Actuarial Valuation. Section IV presents Cheiron's findings on our review of the actuarial assumptions and methods recommended in the January 1, 2018 to December 31, 2020 Experience Study.

We would like to thank the Wisconsin Legislative Audit Bureau, the Wisconsin Department of Employee Trust Funds (ETF) and GRS for providing us with information and explanations that facilitated the actuarial audit process and ensured that our findings are accurate.

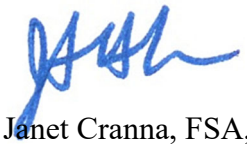
Based on our review, we believe the December 31, 2023 Actuarial Valuation is accurate and produces reasonable required employer contributions, based on the assumptions and methods in effect at the time the valuation was prepared. However, we have recommendations for GRS and/or ETF to consider. None of these recommendations would materially change the valuation results. More details on these key findings will follow in this report.

In preparing this report, we relied on information (some oral and some written) supplied by ETF and GRS. This information includes census data, the actuarial assumptions and methods adopted by the System, plan provisions, the December 31 annual actuarial valuation reports, and the Experience Study covering the three-year period ending December 31, 2020. A detailed description of all information provided for this review is contained in Appendix B.

This report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices and our understanding of the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board as well as applicable laws and regulations. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys, and our firm does not provide any legal services or advice.

This report was prepared exclusively for the State of Wisconsin Legislative Audit Bureau for the purpose described herein. Other users of this report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to such other users.

Sincerely,
Cheiron



Janet Cranna, FSA, FCA, EA, MAAA
Principal Consulting Actuary

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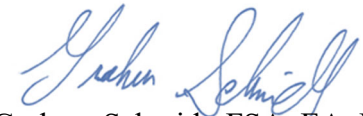


Graham Schmidt, FSA, EA, MAAA
Principal Consulting Actuary

SECTION I – REPORT SCOPE

Cheiron was retained by the State of Wisconsin Legislative Audit Bureau (SWLAB) to perform the following actuarial audit services:

- Conduct a full replication of the WRS Actuarial Valuation as of December 31, 2023 (which includes both the *41st Annual Actuarial Valuation of Retired Lives* and the *43rd Annual Actuarial Valuation and Gain/Loss Analysis*),
- Determine if the demographic and financial information used by GRS in the valuation is valid, complete and appropriate,
- Determine if the calculations reflect all statutory requirements governing the WRS,
- Review the experience study performed for the three years ending December 31, 2020,
- Determine if the actuarial valuation assumptions and methods are reasonable and consistent with generally accepted actuarial standards and practices, and are appropriate based on WRS experience,
- Determine whether the valuation was performed in accordance with Actuarial Standards of Practice (ASOP), and
- Determine whether the System's financial objectives are being met.

In conducting the 2023 actuarial valuation replication, Cheiron received the complete December 31, 2023 actuarial valuation census data and financial information from ETF. Additionally, Cheiron received the processed actuarial valuation census data, and information related to actuarial assumptions and methods from GRS. With this information, we coded our valuation software to independently calculate and verify the December 31, 2023 actuarial valuation results.

For purposes of this replication of the valuation results, Cheiron utilized ProVal, an actuarial valuation software leased from Winklevoss Technologies (WinTech) to calculate liabilities and project benefit payments. We have relied on WinTech as the developer of ProVal. We have reviewed ProVal and have used ProVal in accordance with its original intended purpose. We have not identified any material inconsistencies in assumptions or output of ProVal that would affect these results.

This audit report includes projections of future assets, liabilities, funded status and contributions for the purpose of assessing whether the funding objectives of the Board are being met. The projections utilize *P-Scan*, our proprietary projection software. These projections are based on the same census data and financial information as of December 31, 2023 which were provided to us. The projections assume continuation of the plan provisions and actuarial assumptions in effect as of December 31, 2023 and do not reflect the impact of any changes in benefits or actuarial assumptions that may be adopted after December 31, 2023 unless otherwise indicated. The future outcomes become increasingly uncertain over time, and therefore, the general trends and not the absolute values should be considered in the review of these projections.

SECTION II – EXECUTIVE SUMMARY

Our primary findings are as follows:

1. Cheiron's replication of the December 31, 2023 Actuarial Valuation results was extremely close to the results presented by GRS. Cheiron's calculations of total System liabilities were within 1% of the GRS liabilities. This is well within the tolerance expected for actuarial replications.

2. The actuarial valuation was performed in accordance with principles and practices prescribed by the Actuarial Standards Board and Actuarial Standards of Practice (ASOP).

3. With respect to the actuarial assumptions, we found that GRS's recommended assumptions shown in the December 31, 2020 Experience Study, with the exception of the salary increase assumption, were reasonable and performed in accordance with the ASOPs. We recommend that the salary increase assumption be increased for certain member classifications.

4. With respect to the actuarial methods, including the calculation of actuarial determined contribution, Cheiron has performed projections for WRS and confirmed that the employer and employee contributions are expected to be sufficient to appropriately fund the system, assuming all assumptions are met. However, with regard to certain elements of the funding policy, we believe additional disclosures may be required to comply with ASOP 4.

5. We find that the actuarial valuation reports prepared by GRS generally meet the professional standards set out by the ASOPs. However, throughout this report we note where additional disclosures may be warranted, and have made some recommendations to improve the clarity of the report.

SECTION III – RESULTS OF THE ACTUARIAL VALUATION REPLICATION

This section provides the detailed results of Cheiron's replication of the December 31, 2023 Actuarial Valuation.

Valuation Results

Overall, we find that the results in the December 31, 2023 Actuarial Valuation, including the calculations of the liabilities, actuarial value of assets, funded status, and employee and employer contribution rates, based on the current funding policies, methods and assumptions, are reasonable and generally conform to Actuarial Standards of Practice (ASOPs). This is based on our full replication of the December 31, 2023 Actuarial Valuation, our review of the reports, the census data used in the valuation, the economic and demographic assumptions, and the funding methods. Our determination of the gross normal cost rate (sum of employer and employee rates) is slightly lower than GRS's calculation.

Census Data

ETF provided us with the data that was sent to GRS for the December 31, 2023 Actuarial Valuation. GRS also provided us with the final data used in the valuation, after reflecting adjustments they deemed necessary based on their review of the initial data provided by ETF. We find that the data used in the valuation is valid, complete and contains the necessary data elements.

SECTION III – RESULTS OF THE ACTUARIAL VALUATION REPLICATION

The table below shows the comparison of the final GRS data used in the valuation and the original data provided to Cheiron by WRS, after excluding non-participants.

Wisconsin Retirement System
December 31, 2023
Membership Data
$ in Millions

	GRS	Cheiron	Ratio
Number of Actives	263,737	264,581	1.003
Average Age	44.2	44.2	1.001
Average Service	10.7	10.7	1.001
Total Current Earnings	$ 17,136	$ 17,978	1.049
Number of Inactives	186,977	186,977	1.000
Average Service	3.5	3.5	1.000
Money Purchase Balance	$ 22,026	$ 22,411	1.017
Total Annuities being Paid			
Number of Retirees	229,091	229,295	1.001
Annual Amount	$ 6,864.0	$ 6,860.0	0.999
Number of Disabilities	7,532	7,196	0.955
Annual Amount	$ 203.0	$ 203.1	1.001
Number of Death-In-Service	1,488	1,407	0.946
Annual Amount	$ 30.0	$ 29.0	0.967

GRS confirmed that the Current Earnings of $17.136 billion, as shown on page B-2 of the Annual (Active) Actuarial Valuation, was based on the annualized actual earnings reported to WRS by the employers for calendar year 2023 and does not include any adjustments for expected salary increases for 2024. GRS used this amount to calculate the Pooled Amortization Rate for the coming year in the valuation.

On the other hand, our projected pay amount - $17.978 billion – does include an adjustment for expected salary increases for the coming year, based on the Plan's pay growth assumption. When the dollar amount of the amortization payment represents the amount expected to be collected for

the coming year (as is the case in the amortization payments amounts GRS and Cheiron calculate), we expect the payroll used in the calculation of contribution rates to include the overall anticipated wage growth for the Plan, so that the pay used as the divisor in the amortization rate calculation will match the pay upon which those contributions are expected to be collected.

The methodology used by GRS produces an amortization rate that is slightly conservative. However, because of the well-funded status of the Plan, the amount of conservatism is minimal, since the overall amortization rate would only decrease by 0.02% of pay if GRS were to include a full year of expected wage growth to the pay used in their calculation. We believe it would improve the clarity of the report if GRS were to explicitly state what the "Current Earnings" item in the table on page B-2 represents and provide an explanation for why this result is appropriate for determining the amortization rate.

Plan Provisions

We compared the summary of benefit and contribution provisions shown on pages G-1 to G-3 of the December 31, 2023 Annual Actuarial Valuation and Gain/Loss Analysis (Annual Actuarial Valuation) to what is contained in the Wisconsin Statutes, the member handbooks and other information provided by WRS. We found that the benefit and contribution provisions matched our source documents.

Liabilities, Normal Cost and Contribution Rates

Based on our replication of the December 31, 2023 Annual Actuarial Valuation, we find that the calculations of the present value of future benefits, the actuarial liability, normal cost, assets and contribution rates are reasonable.

The following tables show the comparison of the calculation of present value of future benefits, actuarial liability, and employer contribution rates in GRS's valuation and Cheiron's replication in total and by General, Executives, and Elected Officials, Protective with Social Security and Protective without Social Security.

We note larger percentage differences in the Unfunded Actuarial Liability (UAL) and associated amortization rates due to the System's strong funded status, which amplifies differences in UAL calculations. Similarly, the Normal Cost (NC) rates for smaller groups, such as Protective with and without Social Security, show greater variability. However, the Present Value of Benefits (PVB) and overall NC rates remain within 5%, with employer contribution rate differences further leveraged by the fact that member contribution rates are closely aligned (within 1%). These differences are not material to the overall funding of the System.

SECTION III – RESULTS OF THE ACTUARIAL VALUATION REPLICATION

Wisconsin Retirement System
December 31, 2023
$ in Millions

Total System	GRS	Cheiron	Ratio
Record Counts			
Actives	263,737	264,581	1.00
Inactive, not Retired	186,977	186,977	1.00
Retired	238,111	237,898	1.00
Total	688,825	689,456	1.00
Present Value of Future Benefits			
Actives	$ 65,692.7	$ 65,780.8	1.00
Inactive, not Retired	$ 10,321.5	$ 9,488.1	0.92
Additional Contributions	$ 294.0	$ 294.0	1.00
Retired	$ 80,672.8	$ 81,038.3	1.00
Total	$ 156,981.0	$ 156,601.2	1.00
Entry Age Normal Actuarial Liability			
Actives	$ 42,706.1	$ 42,953.3	1.01
Inactive, not Retired	$ 10,321.5	$ 9,488.1	0.92
Additional Contributions	$ 294.0	$ 294.0	1.00
Retired	$ 80,672.8	$ 81,038.3	1.00
Total	$ 133,994.4	$ 133,773.7	1.00
Future Entry Age Normal Costs	$ 22,986.6	$ 22,827.5	0.99
Current Earnings	$ 17,136.2	$ 17,977.8	1.05
Pesent Value Future Earnings	$ 162,482.4	$ 164,118.7	1.01
Assets for Funding	$ 132,132.8	$ 132,132.8	1.00
Entry Age Unfunded Liability	$ 1,861.6	$ 1,640.9	0.88
Frozen Initial Liability	$ 5.0	$ 5.0	1.00
Pooled Unfunded Liability (EAR)	$ 1,856.6	$ 1,635.9	0.88
Pooled Amortization Rate	0.77%	0.65%	0.84
Pooled Entry Age Normal Cost Rate	14.15%	13.91%	0.98
Total Pooled Rate	14.92%	14.56%	0.98
2025 FIL Normal Cost Rates			
Participant	6.95%	6.86%	0.99
Employer Normal Cost Rate	7.97%	7.70%	0.97
Total	14.92%	14.56%	0.98
Entry Age Funded Ratio	98.61%	98.77%	1.00

SECTION III – RESULTS OF THE ACTUARIAL VALUATION REPLICATION

Wisconsin Retirement System
December 31, 2023
$ in Millions

General, Executives and Elected	GRS	Cheiron	Ratio
Record Counts			
Actives	241,527	242,317	1.00
Present Value of Future Benefits			
Actives	$ 55,007.6	$ 55,398.1	1.01
Inactive, not Retired	$ 9,396.2	$ 8,618.7	0.92
Variable Adjustment	$ 811.5	$ 815.2	1.00
Total	$ 65,215.3	$ 64,832.0	0.99
Future Entry Age Normal Costs	$ 19,434.9	$ 19,386.7	1.00
Current Earnings	$ 15,200.3	$ 15,950.0	1.05
Present Value Future Earnings	$ 143,101.8	$ 144,692.8	1.01
Pooled Entry Age Normal Cost Rate	13.58%	13.40%	0.99
Entry Age Accrued Liability	$ 45,780.4	$ 45,445.3	0.99
Assets for Funding	$ 45,049.4	$ 45,049.4	1.00
Total Entry Age Unfunded Liability	$ 731.0	$ 712.6	0.97
Frozen Initial Liability Portion	$ 4.3	$ 4.3	1.00
Pooled Unfunded Liability (EAR)	$ 726.7	$ 708.3	0.97
20-year Amortization Factor	14.0212	14.0187	1.00
Pooled Amortization Rate	0.34%	0.32%	0.93
Total Pooled Rate	13.90%	13.72%	0.99
2025 FIL Normal Cost Rates			
Participant	6.95%	6.86%	0.99
Employer Normal Cost Rate	6.95%	6.86%	0.99
Total	13.90%	13.72%	0.99
Entry Age Funded Ratio	98.4%	99.1%	1.01

SECTION III – RESULTS OF THE ACTUARIAL VALUATION REPLICATION

Wisconsin Retirement System
December 31, 2023
$ in Millions

Protective with Social Security	GRS	Cheiron	Ratio
Record Counts			
Actives	19,338	19,387	1.00
Present Value of Future Benefits			
Actives	$ 8,023.2	$ 7,775.2	0.97
Inactive, not Retired	$ 846.0	$ 793.4	0.94
Variable Adjustment	$ 71.1	$ 67.6	0.95
Total	$ 8,940.3	$ 8,636.3	0.97
Future Entry Age Normal Costs	$ 2,899.4	$ 2,806.2	0.97
Current Earnings	$ 1,670.0	$ 1,750.0	1.05
Present Value Future Earnings	$ 16,501.0	$ 16,473.9	1.00
Pooled Entry Age Normal Cost Rate	17.57%	17.03%	0.97
Entry Age Accrued Liability	$ 6,040.9	$ 5,830.1	0.97
Assets for Funding	$ 5,029.6	$ 5,029.6	1.00
Total Entry Age Unfunded Liability	$ 1,011.3	$ 841.1	0.83
Frozen Initial Liability Portion	$ 0.7	$ 0.7	1.00
Pooled Unfunded Liability (EAR)	$ 1,010.6	$ 840.4	0.83
20-year Amortization Factor	14.0212	14.0187	1.00
Pooled Amortization Rate	4.32%	3.43%	0.79
Total Pooled Rate	21.90%	20.46%	0.93
2025 FIL Normal Cost Rates			
Participant	6.95%	6.86%	0.99
Employer Normal Cost Rate	14.95%	13.60%	0.91
Total	21.90%	20.46%	0.93
Entry Age Funded Ratio	83.3%	86.3%	1.04

SECTION III – RESULTS OF THE ACTUARIAL VALUATION REPLICATION

Wisconsin Retirement System
December 31, 2023
$ in Millions

Protective without Social Security	GRS	Cheiron	Ratio
Record Counts			
Actives	2,872	2,877	1.00
Present Value of Future Benefits			
Actives	$ 1,764.2	$ 1,709.8	0.97
Inactive, not Retired	$ 79.3	$ 75.9	0.96
Variable Adjustment	$ 15.1	$ 15.0	0.99
Total	$ 1,858.6	$ 1,800.7	0.97
Future Entry Age Normal Costs	$ 652.3	$ 634.6	0.97
Current Earnings	$ 265.9	$ 277.8	1.04
Present Value Future Earnings	$ 2,879.6	$ 2,951.9	1.03
Pooled Entry Age Normal Cost Rate	22.65%	21.50%	0.95
Entry Age Accrued Liability	$ 1,206.3	$ 1,166.1	0.97
Assets for Funding	$ 1,087.0	$ 1,087.0	1.00
Total Entry Age Unfunded Liability	$ 119.3	$ 87.2	0.73
Frozen Initial Liability Portion	$ -	$ -	
Pooled Unfunded Liability (EAR)	$ 119.3	$ 87.2	0.73
20-year Amortization Factor	14.0212	14.0187	1.00
Pooled Amortization Rate	3.20%	2.24%	0.70
Total Pooled Rate	25.90%	23.74%	0.92
2025 FIL Normal Cost Rates			
Participant	6.95%	6.86%	0.99
Employer Normal Cost Rate	18.95%	16.88%	0.89
Total	25.90%	23.74%	0.92
Entry Age Funded Ratio	90.1%	93.2%	1.03

SECTION III – RESULTS OF THE ACTUARIAL VALUATION REPLICATION

Funding Objective

As stated in the funding policy document, shown in Appendix A:

> *"The main financial objective of the WRS is to fully fund the long-term cost of benefits provided by statute, through disciplined and timely accumulation of sufficient assets to deliver earned benefits on a continuing basis."*

This funding policy seeks to balance three main objectives:

- Contribution Adequacy — Contributions and current plan assets must be sufficient to provide for all benefits expected to be paid to members and their beneficiaries when due.
- Contribution Stability and Predictability — Contribution volatility must be controlled to the extent reasonably possible, consistent with other policy goals.
- Inter-Generational Equity — Costs of benefits should be paid for by the generation that receives the benefits."

We recommend that GRS identify and assess key risks to the system as required by ASOP 51, *Assessment and Disclosure of Risk Associated With Measuring Pension Obligations and Determining Pension Plan Contributions.* Section 3.2 of ASOP 51 requires the actuary to identify risks that "may **reasonably be anticipated to significantly affect** the plan's future financial condition." [emphasis added]. The risks currently identified on page B-9 of the Annual Actuarial Valuation appear to largely duplicate the list of examples in ASOP 51 and could apply to almost any pension plan. For each risk identified above, Section 3.3 of ASOP 51 requires the actuary to provide an assessment that takes into account "circumstances specific to the plan." For the identified risks, the actuary has only provided a generic statement that could apply to any plan. We recommend that for each identified risk the actuary provide an assessment, preferably quantitative, that considers the specific circumstances of this plan.

In order to evaluate whether the objectives of the System are expected to be achieved, we have performed projections. Actuarial projections are based on a set of assumptions about future economic and demographic experience and a set of actuarial methodologies used to calculate the System's funded status and actuarially determined contributions. We used the same actuarial assumptions and methods used in the actuarial valuation to perform our projections. These assumptions represent a reasonable estimate of future experience, but actual future experience will undoubtedly be different and may be significantly different. We recommend that GRS include projections of assets, liabilities and contributions in their reports and provide a discussion about the funded status of the System.

Assuming the experience of the System follows expectations, including investment returns of 6.8% each year, Cheiron projects WRS will remain close to 100% funded through 2043 if the actuarially determined contribution rate continues to be made each year. However, a relatively small shortfall is expected to continue during this period, due to current differences between the assets and liabilities, the presence of deferred losses in the current smoothed actuarial asset value, and the

SECTION III – RESULTS OF THE ACTUARIAL VALUATION REPLICATION

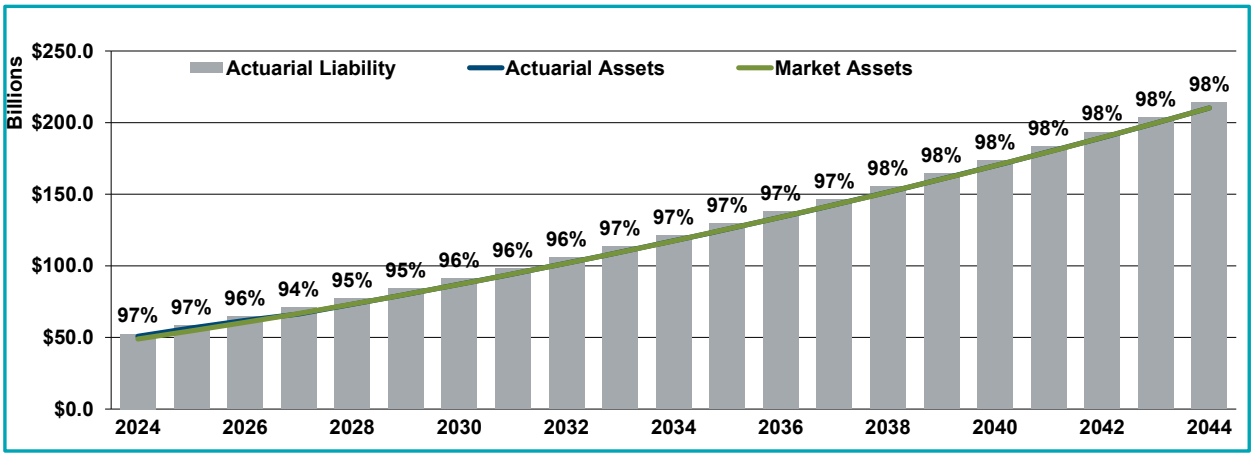
amortization policy used in the calculation of the contribution rates. While this level of shortfall is not expected to represent a significant risk to the System, in large part because of the System's built-in risk-sharing mechanisms, we believe the presence of the shortfall should be disclosed and its causes understood.

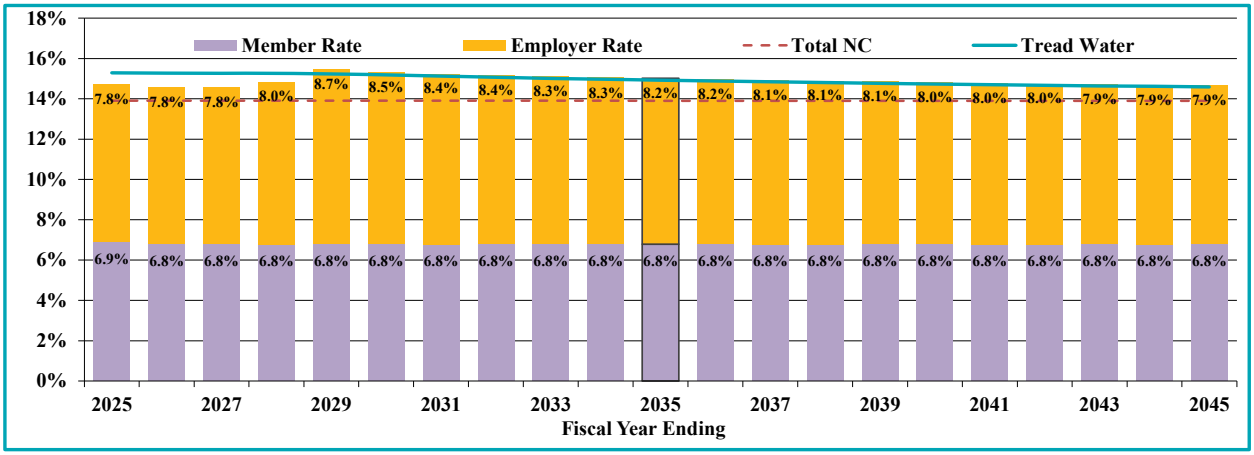
Our projections are summarized in the following two graphs. The first graph shows the projected actuarial assets and market assets (blue and green lines) and liabilities (gray bars) for WRS, with the Retired Lives Liabilities and Assets excluded, since those are automatically adjusted to remain in balance. The percents above the bars represent the Actuarial Value of Assets (AVA) funded ratio. Since this projection assumes the market asset return is as expected each year, after five years the market assets and actuarial assets are the same since all previous unrecognized asset gains and losses will be fully recognized.

The second graph shows the projected employer contributions (gold bars) and member contributions (purple bars) as a percent of payroll. For WRS, the member plus employer contributions, which equal the Actuarially Determined Contributions, are the sum of the EAN normal cost and the amortization of the unfunded actuarial liability using a rolling 20-year level percent of payroll method, based on our understanding of the actual determination of the annual contribution rate. Additionally, we show the total normal cost (dashed red line) and the Tread Water contribution (solid teal line). The difference between the dashed red line and the purple bars is the employer portion of the normal cost.

The Tread Water contribution is the normal cost plus the interest on the unfunded actuarial liability on a market value of assets (MVA) basis. This amount shows the minimum contributions that are needed to avoid an increase in the unfunded actuarial liability (UAL), if the UAL were to be determined using the market value of assets. The difference between the solid teal line and the dashed red line is the interest on the unfunded actuarial liabilities. When the contributions exceed the solid teal line the unfunded actuarial liability is expected to decrease, and the funded ratio is expected to increase. In the years where contributions fall below the teal line, then the unfunded actuarial liability is expected to increase and the funded ratio is expected to decrease. Since the current method to determine contributions is so close to Tread Water, the increase in funded ratio is very slow.

SECTION III – RESULTS OF THE ACTUARIAL VALUATION REPLICATION





SECTION IV – AUDIT OF THE ACTUARIAL ASSUMPTIONS AND METHODS

In this section, we provide detailed analysis of the assumptions and methods recommended in the January 1, 2018 to December 31, 2020 Experience Study. These assumptions were first effective with the December 31, 2021 Actuarial Valuations.

Economic Assumptions

We find that the recommended economic assumptions are reasonable and in compliance with ASOP 27 *Selection of Economic Assumptions for Measuring Pension Obligations*.

1. Interest Rate

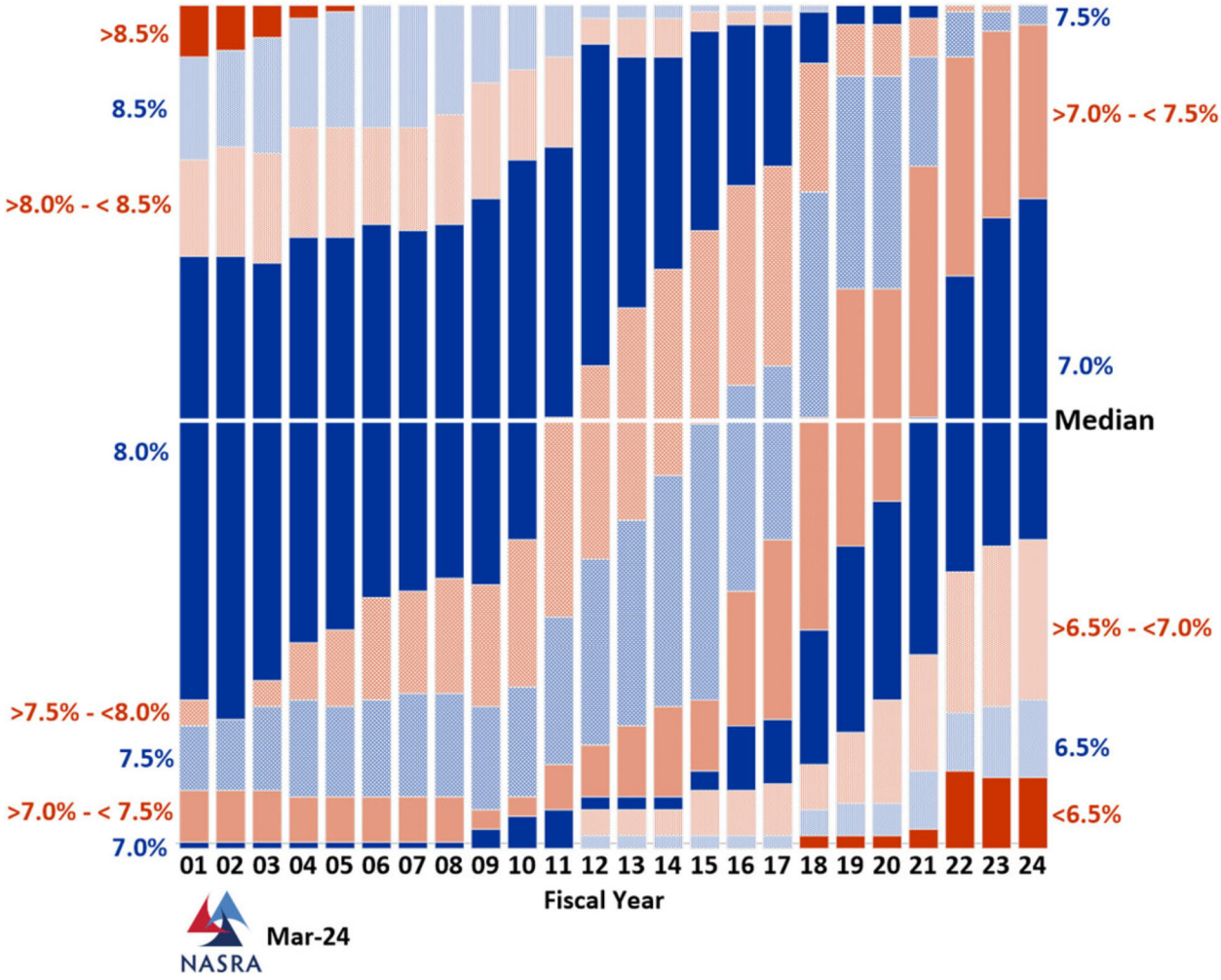
The interest rate assumption (also called the investment return or discount rate) is the most impactful assumption affecting the actuarial valuation. The 2023 Actuarial Valuation uses a 6.8% interest rate assumption, prior to retirement, and a 5.0% interest rate assumption post retirement. The 5.0% interest rate assumption is mandated by Section 40.02 of the Wisconsin Statutes.

Our rationale for supporting GRS's investment rate recommended range of 6.20% to 6.80% is as follows:

- In the December 31, 2020 Experience Study, GRS performed their analysis using the GRS 2021 Capital Market Assumption Modeler (CMAM). Their analysis also compared the CMAM results to the SWIB/NEPC Forecast. The CMAM analysis showed an expected 10-year average geometric rate of return of 6.19% and a 20-30 year average geometric return of 7.26%. compared to SWIB/NEPC geometric returns of 5.40% (10 year) and 6.60% (30 year). Based on these returns GRS developed a reasonable range of 5.4% to 7.0% and a recommended range of 6.2% to 6.8%.

- While the discount rate assumption should be based on the future expected investment returns for the System's investment portfolio, survey information can provide an important context for evaluating the assumption. The National Association of State Retirement Administrators (NASRA) conducts an annual survey of public funds. The latest Public Fund Survey covers 131 large retirement plans. The following graphic from the survey shows the distribution of investment return assumptions since 2001. Each colored bar shows the percentage of retirement plans in a year that assumed an investment return range. In 2008 the median assumption was 8.0% with only 1 plan assuming 7.0%. By 2023 no plans were assuming 8.0% and 7.0% was the median assumption. The latest data includes results collected through March 2024.

SECTION IV – AUDIT OF THE ACTUARIAL ASSUMPTIONS AND METHODS



Over the period shown in this survey, there continues to be a pattern of reducing the investment return assumption partially reflecting long-term changes in capital markets, interest rates and underlying inflation. Of the 131 plans shown, 94, or 72% have reduced their assumed rate of return since 2020, and all have done so since 2010. The average return assumption is 6.91%. The data is consistent with the experience of other Cheiron clients, which have generally shown a significant trend of reducing their investment return assumptions over the last several years.

- As is the case with most maturing pension plans, the System is experiencing negative cash flows, measured as contributions less benefits and administrative expenses. A negative cash flow increases the impact of investment risk to a pension system, as it can magnify losses during a market decline: as assets are being depleted to pay benefits in down markets, there is less principal available to be reinvested during favorable return periods.

SECTION IV – AUDIT OF THE ACTUARIAL ASSUMPTIONS AND METHODS

However, a negative cash flow is an expected characteristic for a well-funded mature plan, as the investment earnings reduce the contributions needed to pay benefits. The System's negative cash flow rate of 3.7% of assets represents a larger net negative cash flow than that of the median large public plan in the most recent survey (-2.2%, as of 2023[1]); largely a result of the System's strong funded status requiring lower contributions than other systems. This does not represent an existential threat to the System; it just means that the System's investments are subject to the potential for more significant fluctuations in the face of market downturns than a similarly invested plan in a more positive cash flow position.

1 https://publicplansdata.org/

SECTION IV – AUDIT OF THE ACTUARIAL ASSUMPTIONS AND METHODS

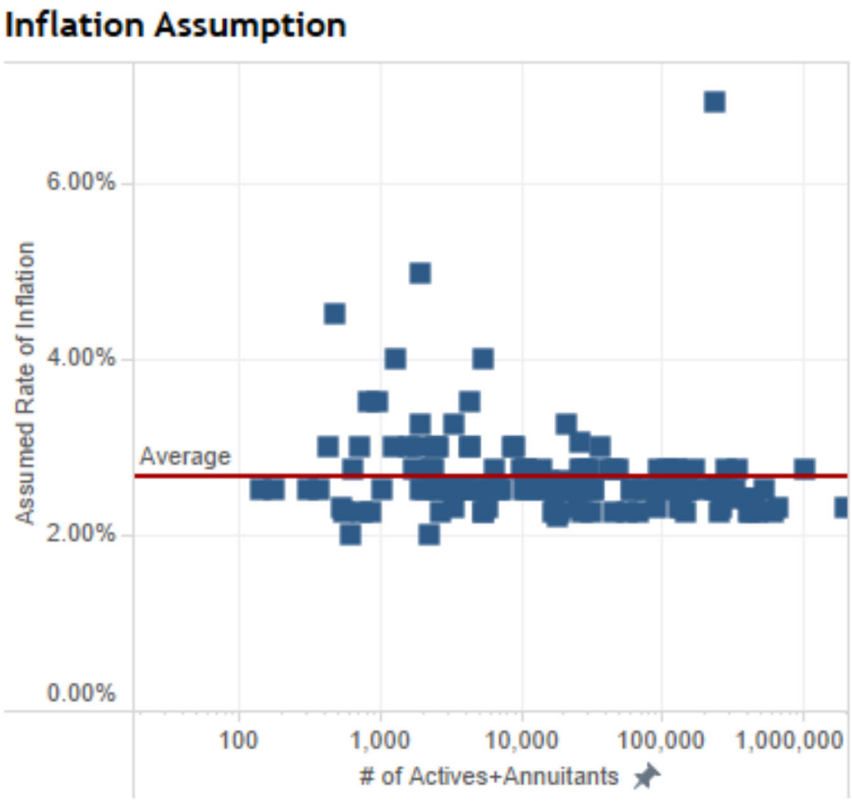
2. *Inflation Assumption*

The inflation assumption impacts the discount rate and salary increase assumptions.

We find the inflation assumption of 2.40% reasonable.
Our rationale for concurring with the 2.40% assumption:

- The May 2024 Old-Age, Survivors, and Disability Insurance (OASDI) Trustees Report projects that over the long-term (next 75 years) inflation will average somewhere between 1.8% and 3.0%. The Social Security Administration uses an assumption of 2.4% under the intermediate cost projection.

- The *National Conference on Public Employers Retirement Systems* (NCPERS) 2024 Public Retirement System Study includes the following graphic of respondents' inflation assumptions:



Each square shows the inflation assumption for an individual retirement system. This shows that the recommended assumption of 2.40% is in line with the inflation assumptions used among the 157 systems that responded to this study. The average of all systems was 2.7%.

SECTION IV – AUDIT OF THE ACTUARIAL ASSUMPTIONS AND METHODS

3. Salary Increase Assumption (Merit and Longevity Portion)

The salary increase assumption is based on service and varies by employment classification as follows:

1. General Non-State
2. General State
3. Public Schools Non-State
4. University State
5. Protective with Social Security Non-State
6. Protective with Social Security State
7. Protective without Social Security Non-State
8. Executive and Elected Non-State
9. Executive and Elected State

GRS recommended no change to the salary increase assumptions in the Experience Study for the period ending December 31, 2020. However, the actual salary experience for classifications 2, 3, 5, 6, 8 and 9 shown in that study was significantly higher than the assumptions. Page 4 of the Experience Study Report notes that the actual experience was slightly impacted for the study period as some members had 27 pay periods during 2020; however, this would not significantly impact the experience over the three-year period. In addition, there were salary experience losses in four out of the last five most recent actuarial valuations. We strongly recommend that the salary increase assumption be increased for these classifications.

4. Wage Inflation

In the December 31, 2020 Experience Study, GRS recommended maintaining the wage inflation assumption of 3.00%. Based on the analysis in the Experience Study, we find this assumption reasonable.

SECTION IV – AUDIT OF THE ACTUARIAL ASSUMPTIONS AND METHODS

Demographic Assumptions

The December 31, 2020 Experience Study covers the period January 1, 2018 through December 31, 2020. GRS notes that there is insufficient data to analyze all assumptions by employment classification.

We find the recommended demographic assumptions reasonable and in compliance with ASOP 35 *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations,* which effective January 1, 2025, is now part of *ASOP 27, Selection of Assumptions for Measuring Pension Plans.* We recommend that GRS, in the next experience study, add the following:

- A discussion of credibility to address whether there is enough data to discern an actual trend in behavior,
- Graphs showing actual, current and recommended rates to make it easier for the reader to understand the analysis,
- Results showing the A/E ratio for the current and recommended assumptions (actual observances to that which is expected based on the assumption).

We have the following observations on the demographic assumptions:

1. *Mortality*

   Post-retirement mortality for healthy service retirements is based on the 2020 WRS Experience Tables for Healthy Retirees, with a blend based on benefit weighted and population weighted experience. For disabled annuitants, post-retirement mortality is based on the 2020 WRS Experience Tables for Disabled Retirees, with a blend based on benefit weighted and population weighted experience. For pre-retirement actives, mortality is based on the 2020 WRS Experience Tables for Active Employees, with a blend based on benefit weighted and population weighted experience. Mortality improvements for each table are based on 100% of the Society of Actuaries MP-2021 scale, projected generationally from a base year of 2010.

   The Society of Actuaries (SOA) completed an extensive mortality study of public pension plan experience and issued a set of mortality tables named the Pub-2010 mortality tables which provide insights into the composition of gender-specific pension mortality by factors such as job category (e.g., General Employees, Teachers, Public Safety), salary/benefit amount, and health status (e.g., healthy or disabled). Mortality studies in the U.S. have also shown that individuals with higher salaries if active, or higher benefit income if retired, have longer life expectancies than individuals with lower income. In the Experience Study, GRS indicates that they used the Pub-2010 Tables for comparison and to determine the best fit and shape to the Wisconsin experience.

   We find GRS's pre and post-retirement mortality assumptions reasonable.

SECTION IV – AUDIT OF THE ACTUARIAL ASSUMPTIONS AND METHODS

2. *Deferred Retirement Age for Terminated Vested Participants*

   This assumption was not analyzed in the December 31, 2020 Experience Study. We recommend that this assumption be reviewed in the next experience study.

With the exception of the above comments, we have concluded that the following other demographic assumptions used in the valuation appear reasonable and meet the requirements of ASOP 35. These other demographic assumptions are as follows:

1. *Normal Retirement and Reduced Retirement*

   Service retirement rates are based on age, gender (except for Protective and Executive and Elective), employment classification and State vs Non-State employment.

2. *Withdrawal*

   Withdrawal rates are based on age (if 10 or more years of service), service (if less than 10 years of service), gender (except for Protective and Executive and Elective), employment classification and State vs Non-State employment.

3. *Disability Retirement*

   Disability rates are based on age, gender (except for Protective and Executive and Elective), employment classification and State vs Non-State employment.

Actuarial Methods

Actuarial methods typically consist of three components: (1) the funding method, which is the allocation of total costs to past, current, and future years; (2) the amortization basis of the Unfunded Actuarial Liability; and (3) the method of calculating the actuarial value of assets (i.e., asset smoothing).

Funding Method

GRS states that the System uses the Frozen Initial Liability (FIL) funding method, also known as the Frozen Entry Age Method. Under this method, the remaining unfunded actuarial liability is adjusted for amortization payments, interest and any additional liability created by new employers. We find the Frozen Initial Liability funding method reasonable.

However, based on the actual calculation used to determine the contributions rates, the method is more typically referred to as Aggregate Entry Age. This is because the unfunded liability – shown as the difference between the System's assets and Entry Age Accrued Liability, net of the very small FIL base of approximately $5 million – is amortized over a period as specified in the

SECTION IV – AUDIT OF THE ACTUARIAL ASSUMPTIONS AND METHODS

Experience Amortization Reserve (EAR) policy. This means that experience gains or losses are amortized over the EAR amortization period and are **not** spread over the average future working lifetime of the active participant group, which appears to conflict with the statement made by GRS in their description of the System's actuarial funding method on page F-6 of the Annual Actuarial Valuation report.

We recommend that GRS clarify the funding method used in the valuation report, and review the statement referenced above regarding the amortization of gains and losses for accuracy. Also see our additional comments below related to the amortization method.

Amortization Method

It is our understanding that the FIL balances are maintained by ETF. Each subsequent experience gain or loss and assumption change is reflected in the normal cost; therefore, typically under the Frozen Initial Liability Method, they would be amortized over the average future working lifetime of the active participant group as a level percent of payroll. However, under the Wisconsin Funding Policy, the standard amortization period is set at 20 years, rather than using the average future working lifetime. This is more typical of the Entry Age Normal Funding Method, as noted above.

GRS states on page F-6 of the Annual Actuarial Valuation that the amortization period is reconsidered as part of each triennial experience study under the WRS Funding Policy. The minimum and maximum amortization periods are 10 and 30 years, respectively. We did not find a discussion of the amortization period in the Experience Study. We recommend that this discussion be included in the next experience study.

Also, we note that because the standard amortization period is reset to 20 years each year, this constitutes a rolling amortization period. Actuarial Standard of Practice No. 4 (ASOP 4) includes the following guidance for selecting an amortization method:

> *When selecting an **amortization method**, the actuary should select an **amortization method** that is expected to produce total amortization payments that are expected to fully amortize the unfunded **actuarial accrued liability** within a reasonable time period or reduce the unfunded **actuarial accrued liability** by a reasonable amount within a sufficiently short period.*
>
> *The actuary should assess whether the unfunded **actuarial accrued liability** is expected to be fully amortized.*

Using a rolling amortization period will result in a payment not expected to fully amortize the unfunded liability, because the period is reset each year. Even if a review of the EAR policy were to result in a reduction in the amortization period, the funding policy states that the minimum amortization period is 10 years, resulting in an unfunded liability that is not expected to be fully amortized. Thus, the amortization method does not satisfy the first condition described in the ASOP 4 language above.

SECTION IV – AUDIT OF THE ACTUARIAL ASSUMPTIONS AND METHODS

In addition, the use of a 20-year period results in an amortization payment that barely exceeds the interest on the unfunded liability, resulting in very little reduction of the principal balance. Therefore, the amortization policy also does not satisfy the second condition for a reasonable amortization method.

We note that we find that the methods used to determine the contributions – including the amortization method – still result in a contribution expected to achieve the financing objectives of the System, in particular because the System's risk sharing mechanisms are designed the keep the System well-funded, and thus the unfunded liability balances and associated payments should constitute a minor portion of the overall funding requirements.

However, ASOP 4 does require the Actuary to disclose if the amortization method is not consistent with the guidance reflected in the standard. In addition, the standard requires a specific disclosure if the unfunded liability is not expected to be fully amortized (Section 4.1.s). We recommend that GRS include these disclosures in future reports as appropriate.

Asset Smoothing Method

There are generally two types of asset values disclosed in an actuarial valuation, the market value of assets and the actuarial value of assets. The market value represents a "snap-shot" or "cash-out" value which provides the principal basis for measuring financial performance from one year to the next. Market values, however, can fluctuate widely with corresponding swings in the marketplace. As a result, market values are usually not as suitable for long-range planning as are the actuarial value of assets which reflect smoothing of annual investment returns.

The actuarial value of Core assets is a five-year smoothed market value. Unanticipated changes in market value are recognized over a five-year closed period in the actuarial value of Core assets. The adjusted Effective Earnings Rate is used to determine Core dividends in each fiscal year.

Assets in the Variable Investment Trust are not smoothed and are marked to market each year. The adjusted Effective Earnings Rate is used to determine Variable Dividends each fiscal year.

This smoothing method complies with ASOP 44 *Selection and Use of Asset Valuation Methods for Pension Valuation*. Smoothing the market gains and losses over a reasonable period of time to determine the actuarial value of assets is a generally accepted approach, and we concur with its use.

Dividend (Core Annuity Fund) and Variable Annuity

The Discussion of Dividend (Core Annuity Fund) and the Discussion of Variable Annuity Change sections of the Retired Lives Valuation report both contain items (4,7,8 and 10) which we could not independently verify from the source documents we were provided. Given the importance of the dividends in the operation of the System, we recommend the report be changed to contain sufficient details of the methodology used to determine the dividends so an independent reader can review the calculation of these items.

SECTION IV – AUDIT OF THE ACTUARIAL ASSUMPTIONS AND METHODS

Actuarial Standards of Practice No. 4, Measuring Pension Obligations and Determining Pension Plan Costs or Contributions

We recommend the Annual Actuarial Valuation report include a statement on whether the computed contribution rates meet the definition of a reasonable actuarially determined contribution, as defined in ASOP 4. If the computed contribution rate does not meet the definition of a reasonable actuarially determined contribution, GRS will need to compute one and describe any material assumptions or methods used in the calculation that are not disclosed elsewhere. GRS should also discuss how the particular conditions of the System are taken into account in making this determination.

APPENDIX A – FUNDING POLICY

FUNDING POLICY OF THE WISCONSIN RETIREMENT SYSTEM

Reprinted from WRS Funding Policy: approved December 11, 2014; revised March 24, 2022

The financing objective of the Wisconsin Retirement System is defined below:

FINANCIAL OBJECTIVE

The main financial objective of the WRS is to fully fund the long-term cost of benefits provided by statute, through disciplined and timely accumulation of sufficient assets to deliver earned benefits on a continuing basis.

FUNDING GUIDELINES

This funding policy seeks to balance three main objectives:

- **Contribution Adequacy** — Contributions and current plan assets must be sufficient to provide for all benefits expected to be paid to members and their beneficiaries when due.
- **Contribution Stability and Predictability** — Contribution volatility must be controlled to the extent reasonably possible, consistent with other policy goals.
- **Inter-Generational Equity** — Costs of benefits should be paid for by the generation that receives the benefits.

FUNDING METHODS AND PRINCIPLES

The following methods and principles, most of which are stipulated by statute, will be used to implement this policy:

- Actuarial Cost Method – [Wis. Stat. § 40.05(2)]. Normal cost[1] for the WRS is calculated using the *frozen initial liability* method, modified to adjust the normal cost by the amortization of the Experience Amortization Reserve (EAR)[2].

[1] "Normal cost" refers the amount of money that must be set aside for future payment of pension benefits that have accrued this year. Normal cost is calculated differently depending on the cost method chosen.

[2] The EAR is a reserve created in the mid-1980's by ETF Secretary, Gary Gates, under authority granted in Wis. Stat. § 40.04(1). The EAR helps reduce volatility in contribution rates. It allows an actuarial loss to be absorbed in what would be the unfunded actuarial liability under the entry age actuarial cost method. The resulting liability can then be amortized over an extended period to mitigate the effects of short-term negative experience.

APPENDIX A – FUNDING POLICY

Under the Frozen Initial Liability method as modified, normal costs are determined in the aggregate. The first component of normal cost is equal to a level percentage of payroll, which is determined in the aggregate as the ratio of the present value of future entry age normal costs for all participants divided by the present value of expected future pay for all participants. The second component of normal cost is equal to an amortization of the EAR over a period of years, which is reconsidered with each triennial experience study.

- Asset Smoothing Method – [Wis. Stat. § 40.04(3)]. Asset smoothing reduces volatility in contribution rates by increasing the period over which asset gains and losses are recognized. The WRS's Market Recognition Account (MRA) annually distributes 20% of each year's Core Fund annual gains and losses over/under the Assumed Rate. Therefore, the actual market gain or loss experienced in a given year is fully recognized by the Core Fund in five years. The Variable Fund is not smoothed and recognizes actual gains or losses each year.

- Assumed Rate – [Wis. Stat. § 40.02(7)]. The Assumed Rate is the expected rate of return on Core Fund assets. The anticipated rate of investment earnings for the Core Fund is 6.8%[3].

- Assumed Benefit Rate – [Wis. Stat. § 40.02(6)]. The anticipated rate of investment earnings for the Core Fund's annuity reserve is 5%. The Assumed Benefit Rate is used for calculating reserve transfers at the time of retirement.

- Funding Target – The funding objective is to reach and maintain 100% funding measured against the Entry Age Normal Actuarial Cost Method.

- Amortization – [Wis. Stat. § 40.05(2)(b)]. For employers who joined the WRS prior to 2009, the entry age unfunded actuarial accrued liability (UAAL) is amortized as a level percentage of payroll over 40 years. UAAL for employers who joined the WRS beginning in 2009 is amortized over 30 years.

- Discount Rate – Active and inactive member liabilities are discounted at the same rate as the Assumed Rate. Post-retirement liabilities are discounted using the Assumed Benefit Rate.

- Dividend Liability – Dividend Liability refers to the present value of all previously-granted post-retirement annuity adjustments.

[3] Approved by the ETF Board December 9, 2021.

APPENDIX A – FUNDING POLICY

RISK MANAGEMENT

As with all retirement plans, the WRS is subject to risks. These risks include demographic risk, economic risk, benefit risk, governance risk, and dividend liability risk. Methods for managing and minimizing these risks are outlined here. The Board will periodically engage the Board's actuary to undertake stress testing and scenario testing or review the results of stress and scenario testing performed by the SWIB in order to gain an understanding of the potential effects of major risks that may affect the WRS.

Demographic Risk: *the possibility that the plan's experience related to retirement patterns, mortality and other demographic factors will not match actuarial assumptions.*

The Board approves actuarial assumptions based on recommendations of the actuary. Regular review of actuarial assumptions is a best practice in the management of demographic risks. Wisconsin law provides that the actuary must make a general investigation at least once every three years of the experience of the WRS relating to mortality, disability, retirement, separation, interest, employee earnings rates, and of any other factors deemed pertinent to the administration of the system. [Wis. Stat. § 40.03(5)(b)]. The Board will use the results of the experience studies to adopt assumptions for future valuations. The demographic portion of the experience study will include these principal areas of risk assumption:

- Rates of mortality among participants, retirees, and beneficiaries.
- Rates of withdrawal of active participants.
- Rates of disability among participants.
- Patterns of salary increases to be experienced by participants.
- Age and service distribution of actual retirements.

As noted in the "Funding Methods and Principles" section above, the triennial experience study also investigates the EAR amortization period. The ETF Secretary may, in consultation with the Board's actuary, adjust the operation of the EAR, including the EAR amortization period. For example, if the EAR is underfunded, the amortization period will be set to minimize the amount of negative amortization that would otherwise occur.

Economic Risk: *investment, price inflation, and wage inflation risk.*

Investment risk relates to market returns differing from actuarial assumptions. Price inflation and wage inflation risks relate to unexpected movements in underlying inflation that will create variation in contribution rates and potential loss of purchasing power for members.

APPENDIX A – FUNDING POLICY

The financial assets that are accumulated to pay the pensions of WRS participants are invested by an independent state entity: the State of Wisconsin Investment Board (SWIB). SWIB is required to prudently invest the assets in a diversified manner to meet funding needs while minimizing the risk of large losses. SWIB establishes asset allocation policies, investment guidelines, and performance benchmarks. SWIB is subject to these additional requirements:

- Annual review of the WRS asset allocation and report to ETF on the market value of the assets of the Core and Variable Funds.

- For any change in investment policies or guidelines, provide a summary report to the Joint Legislative Audit Committee, the Joint Committee on Finance, and the chief clerk of each house of the legislature.

- Annual report to Legislature with a description of the Board's annual investment goals and long-term investment strategies; an assessment of the Board's progress in meeting its annual investment goals; information on the types of investments held by the Board, including the market values and degree of risk associated with the investments.

The ETF Board and its actuary will review economic assumptions (for example, long-term rates of investment income likely to be generated by fund assets and wage assumptions) based on recommendations from SWIB and will consider appropriate adjustments to ensure assumptions comport with the WRS asset allocation and the principles of long-term stability and predictability. The review of economic assumptions, including the Assumed Rate, occurs with each experience study (see description under Demographic Risk section).

Benefit Risk: *the risk that benefit changes will result in future contributions that are unaffordable.*

The Board and ETF will review legislative proposals and consult with the actuary as appropriate to determine possible impacts on the WRS. If it is determined that a legislative proposal might materially affect plan funding, the Board may recommend to the Joint Survey Committee on Retirement Systems (JSCRS; see description below) that an actuarial valuation be conducted, and ask that the results of the valuation be reflected in JSCRS' written report of the proposed legislation.

Governance Risk: *the risk that the plan's administrative policies and procedures are not fully appropriate for carrying out the functions of the plan.*

APPENDIX A – FUNDING POLICY

Management of governance risk requires sufficient administrative structures for monitoring compliance with this policy and ensuring that actuarially determined contributions are made. Mitigation of governance risk also requires that structures be in place to determine long-term costs of benefit changes before passage of any law that materially affects plan funding. For the WRS, such risk is addressed by the following:

- Joint Survey Committee on Retirement Systems (JSCRS): serves as the legislative oversight committee for all matters relating to proposed statutory changes to state-operated public employee pension plans. Current law prohibits the Legislature from acting on any bill or amendment which would create, modify, or in any way provide for the retirement or payment of pensions to public employees unless the proposal has first been referred to the JSCRS, and the Committee has provided a written report on the bill or amendment.

- Legislative Council: provides legal and research assistance to the JSCRS and may prepare fiscal estimates on bills referred to the JSCRS. The Legislative Council staff must prepare a comparative study of major public employee retirement systems in the U.S. every two years. The Legislative Council consults with groups representing participants in the WRS and suggests to the Joint Legislative Council subjects for study or investigation of public employee retirement issues. Finally, funds may be appropriated to enable the Legislative Council staff to contract for actuarial studies approved by the JSCRS.

- Consulting Actuary to the ETF Board: serves as the technical advisor for the Board and ETF on actuarial matters affecting the soundness or operation of the retirement fund. The actuary is required under contract to provide periodic reports, including:
    - *Retired Lives Valuation* - Annual valuation of core and variable fund annuities being paid from the Wisconsin Retirement System. (each March).
    - *Active Lives Valuation* and Gain/Loss Analysis - Annual valuation of liabilities and costs associated with non-retired participants of the Wisconsin Retirement System and analysis of experience among participants. (each June).
    - *Valuation to meet plan and employer disclosure requirements under Governmental Accounting Standards Board Statements 67 and 68.* - (each June).
    - *Three-Year Experience Study*.

- Legislative Audit Bureau (LAB) Oversight of Actuarial Services to the ETF Board: The Legislative Audit Bureau is required by Wis. Stat. § 13.94(1)(dc) to contract for the performance of an actuarial audit of the WRS at least once every five years. The purpose of the audit is to review the actuarial methods, assumptions and procedures employed by the WRS. LAB also performs an annual financial audit of ETF to ensure that ETF's financial statements and internal controls are in compliance with applicable statutes, policies, and

guidelines The LAB also conducts an annual audit of SWIB to ensure that their financial statements and internal controls comply with applicable statutes, policies, and guidelines.

- Ensuring Contributions are Made: WRS contributions are required to be made under Wis. Stat. § 40.05(1) and (2), according to the assumptions the actuary recommends and that the Board approves.

- Determination of Long-Term Costs: The Board's actuary periodically produces a 50-year projection study that uses stochastic projections that compares future benefits with future contributions against a range of investment returns. The Board will use the results of this and other such studies to make recommendations to JSCRS when relevant and appropriate to any proposed legislation.

- Funding Policy Review: This WRS Funding Policy will, at a minimum, be formally reviewed by the ETF Board in conjunction with each three-year experience study.

Dividend Liability Risk: *the risk that the Dividend Liability will decrease to a very low level.*

While it is considered normal for the level of Dividend Liability to fluctuate with annual investment return gains and losses, it is of concern if the Dividend Liability level becomes very low. When the Dividend Liability is very low, the effect of future adverse investment experience can potentially have a magnified effect on contribution rates. At zero, all annuities would be at their base "guaranteed floor" levels and would have no inflation protection. To monitor Dividend Liability risk, the Board and ETF will review Dividend Liability levels and consult with the actuary at a minimum, as a part of the biennial Stress Testing and the annual Retired Lives Valuation discussions.

Risk Measures

Risk measures allow the quantification of the risks in this policy. Risk measures will be included in annual valuation reports in accordance with actuarial standards of practice and also investigated whenever evaluating legislative proposals. Many risk sharing features inherent in the WRS plan design mitigate some of the items below. Examples of risk measures include:

- Funded Ratio (Assets/Accrued Liabilities): The funded ratio is the most widely known measure of a plan's financial strength, but the trend in the funded ratio is much more important than the absolute ratio. The funded ratio should trend to 100%. As it approaches 100%, it is important to re-evaluate the level of investment risk in the portfolio and potentially to re-evaluate the Assumed Rate.

APPENDIX A – FUNDING POLICY

- Total Unfunded Actuarial Accrued Liabilities as a Percentage of Total Payroll: Gives an indication of the plan sponsor's ability to pay off the unfunded liability. A ratio above approximately 300% or 400% may indicate difficulty in discharging the unfunded liability within a reasonable time frame.

- Annuitant Liabilities as a Percentage of Total Accrued Liabilities: Gives an indication of the maturity of the system. As the ratio increases, cash flow needs increase, and the investment policy may need to change. A ratio on the order of 50% indicates a maturing system.

- Other Measures: Other measures as deemed appropriate by the Actuary and the Board consistent with Actuarial Standards of Practice are included in the annual valuations of the retirement system.

APPENDIX B – INFORMATION RELIED UPON IN PREPARING THIS REPORT

- Wisconsin Statutes:
  - Chapter 40
  - Member Benefit brochures found on the ETF website
- Files received from ETF (either directly or from the website):
  - Actuarial Valuation Reports as of December 31, 2023
  - Experience Study for the Period January 1, 2018 to December 31, 2020
  - December 31, 2023 Annual Comprehensive Financial Report
  - Valuation data for the December 31, 2023 Actuarial Valuations
  - Actuarial Equivalence Factors
  - Sample retirement calculations
  - WRS Funding Policy
- Files received from GRS:
  - Valuation data for the December 31, 2023 Actuarial Valuation
  - Assumptions used in the December 31, 2023 Actuarial Valuation
  - Detailed liability results by division
- Other:
  - 2024 *National Conference on Public Employees Retirement Systems* (NCPERS) Public Retirement Systems Study
  - March 2024 Survey published by the National Association of State Retirement Agencies (NASRA)
  - 2024 *Old-Age, Survivors and Disability Insurance Trustees Report* (OASDI)

APPENDIX C – GLOSSARY OF TERMS

1. Actuarial Assumptions

Assumptions as to the occurrence of future events affecting pension costs, such as: mortality, withdrawal, disability, and retirement; changes in compensation; inflation; rates of investment earnings, and asset appreciation or depreciation; and other relevant items.

2. Actuarial Cost Method

A procedure for determining the Actuarial Present Value of pension plan benefits and expenses and for developing an allocation of such value to each year of service, usually in the form of a Normal Cost and an Actuarial Liability.

3. 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.

4. Actuarial Liability (also known as Actuarial Accrued Liability and Accrued Liability)

The portion of the Actuarial Present Value of Projected Benefits which will not be paid by future Normal Costs. It represents the value of the past Normal Costs with interest to the valuation date.

5. Actuarial Present Value

The value as of a given date of a future amount or series of payments. The Actuarial Present Value discounts the payments to the given date at the assumed investment return and includes the probability of the payment being made. As a simple example: assume you owe $100 to a friend one year from now. Also, assume there is a 1% probability of your friend dying over the next year, in which case you won't be obligated to pay him. If the assumed investment return is 10%, the actuarial present value is:

Amount		Probability of Payment		1/(1+Investment Return)		
$100	x	(1 - .01)	x	1/(1+.1)	=	$90

6. Actuarial Valuation

The determination, as of a specified date, of the Normal Cost, Actuarial Liability, Actuarial Value of Assets, and related Actuarial Present Values for a pension plan.

APPENDIX C – GLOSSARY OF TERMS

7. 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. The purpose of an Actuarial Value of Assets is to smooth out fluctuations in market values. This way long-term costs are not distorted by short-term fluctuations in the market.

8. Amortization Payment

The portion of the pension plan contribution which is designed to pay interest and principal on the Unfunded Actuarial Liability in order to pay for that liability in a given number of years.

9. Entry Age Normal Cost Method

A method under which the Actuarial Present Value of Future Benefits of each individual included in an actuarial valuation is allocated on a level basis over the earnings or service of the individual between entry age and assumed exit age(s). The portion of this Present Value of Future Benefits allocated to a valuation year is called the Normal Cost. The portion of this Present Value of Future Benefits not provided for at a valuation date by the Present Value of Future Normal Costs is called the Actuarial Liability. This is the method used under Governmental Accounting Standards Board (GASB) Statement Nos. 67 and 68.

10. Frozen Initial Liability Cost Method

A method under which a Frozen Initial Liability is initially established at the time the method is first adopted, typically based on the difference between the Actuarial Value of Assets and the Actuarial Present Value of Benefits at that time. This initial liability is then amortized over a specified period. In subsequent years, the difference between the Present Value of Benefits and the Actuarial Value of Benefits, net of the remaining balance of the Frozen Initial Liability, is funded as the Present Value of Future Normal Costs and generally spread out over the Present Value of Future Salaries. Changes in the liability due to actuarial gains or losses or changes in actuarial assumptions are typically funded through the Present Value of Future Normal Costs, rather than being separately amortized. As a result, this method becomes what is generally known as the Aggregate Funding Method once the initial liability is fully amortized.

11. Funded Ratio

The ratio of the Actuarial Value of Assets to the Actuarial Liabilities.

12. Market Value of Assets

The fair value of the Plan's assets assuming that all holdings are liquidated on the measurement date.

APPENDIX C – GLOSSARY OF TERMS

13. Normal Cost

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

14. Projected Benefits

Those pension plan benefit amounts which are expected to be paid in the future under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age and increases in future compensation and service credits.

15. Unfunded Actuarial Liability (UAL)

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

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April 3, 2025

Mr. Joe Chrisman
State of Wisconsin Legislative Audit Bureau
22 East Mifflin Street, Suite 500
Madison, WI 53703

Re: Full Replication Actuarial Audit of the December 31, 2023 Actuarial Valuation of the Wisconsin Retirement System (WRS) and Peer Review of the January 1, 2018 to December 31, 2020 Experience Study

Dear Mr. Chrisman:

Thank you for forwarding the Cheiron independent review of our work in connection with the December 31, 2023 Actuarial Valuation of the WRS and the January 1, 2018 to December 31, 2020 Experience Study. As stated in the cover letter of their revised report dated March 27, Cheiron stated:

> "*Based on our review, we believe the December 31, 2023 Actuarial Valuation is accurate and produces reasonable required employer contributions, based on the assumptions and methods in effect at the time the valuation was prepared. However, we have recommendations for GRS and/or ETF to consider. None of these recommendations would materially change the valuation results."*

The auditing actuary's primary recommendations follow:

1. Page 5: "…we expect the payroll used in the calculation of contribution rates to include the overall anticipated wage growth for the Plan….. we believe it would improve the clarity of the report if GRS were to explicitly state what the "Current Earnings" item in the table on page B-2 represents and provide an explanation for why this result is appropriate for determining the amortization rate."

   GRS Response: *GRS tabulates "current earnings" as the sum of the (annualized) pays that WRS reported to us. We use current earnings in amortizing the EAR as a simplification to avoid the necessity of projecting the EAR and the payroll and the amortization factor forward to the contribution begin date. Doing so would not affect the result materially. We will, however, add a description of Current Earnings and review the methodology to determine whether or not a change is warranted.*

2. Page 10: "We recommend that GRS identify and assess key risks to the system as required by ASOP 51, Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions…The risks currently identified on page B-9 of the Annual Actuarial Valuation Report appear to largely duplicate the list of examples in ASOP 51 and could apply to almost any pension plan…. We recommend that for each identified risk the actuary

provide an assessment, preferably quantitative, that considers the specific circumstances of this plan."

GRS Response: *GRS has provided quantitative risk measures on pages B-11 and B-12 of the* Annual Actuarial Valuation *report that correlate to some of the risks identified on page B-9. In addition, many of these risks are also assessed in the biennial stress test studies performed in connection with the State of Wisconsin Investment Board (see reference on page 2 of the 2023 valuation Cover Letter). The results of these studies are also shared with Wisconsin Retirement Board. We will review again in the next annual valuation and consider adding additional commentary and/or references to the identified risks.*

3. Page 10: "We recommend that GRS include projections of assets, liabilities and contributions in their reports and provide a discussion about the funded status of the System."

   GRS Response: *GRS performs an extensive stochastic projection of assets, liabilities and contributions every two years in connection with the State of Wisconsin Investment Board and ETF (see reference on page 2 of the 2023 valuation Cover Letter) and provides a summary of the results to the Board. We regularly discuss additional items to include in this projection with ETF.*

4. Page 17: "GRS recommended no change to the salary increase assumptions in the Experience study for the period ending December 31, 2020. However, the actual salary experience for classifications 2, 3, 5, 6, 8 and 9 is significantly higher than the current assumption. … In addition, there were salary experience losses in four out of the last five most recent actuarial valuations. We strongly recommend that the salary increase assumption be increased for these classifications."

   GRS Response: *In our judgement at the time, we noted that experience varied by group and provided a fairly reasonable match to current assumptions. We agree that there were salary experience losses in four of the last five actuarial valuations as of 2023. However, the Gain/Loss Analysis at the time of the 2020 experience study indicated overall salary gains in 6 of the prior 8 years. With respect to the comment "*there were salary experience losses in four out of the last five most recent actuarial valuations*", we did change this assumption in connection with the 2023 experience study and will continue to monitor this assumption carefully.*

5. Page 18: "We recommend that GRS, in the next experience study, add the following:
   - A discussion of credibility to address whether there is enough data to discern an actual trend in behavior;
   - Graphs showing actual, current and recommended rates to make it easier for the reader to understand the analysis; and
   - Results showing the A/E ratio for the current and recommended assumptions (actual observances to that which is expected based on the assumption)."

GRS Response: *GRS does show actual, current, and proposed rates in the experience study. We will consider adding graphs and information on credibility and Actual/Expected ratios in the next experience study.*

6. Page 19 regarding the Deferred Retirement Age for Terminated Vested Participants "We recommend that this assumption be reviewed in the next experience study."

   GRS Response: *GRS will investigate in the next experience study.*

7. Page 20: "We recommend that GRS clarify the funding method used in the valuation report, and review the statement referenced above regarding the amortization of gains and losses for accuracy." (Regarding the statement on page F-6 of the Annual Actuarial Valuation report regarding the amortization of gains and losses being spread over the average future working lifetime of the active participant group.)

   GRS Response: *It is important to note that the funding method for the WRS has historically been referred to as the 'modified' Frozen Initial Liability Method. We agree that over time, as the frozen initial liability reduces, this modified method more closely resembles the Entry Age Normal method. GRS will clarify the description of the funding method in the next annual actuarial valuation.*

8. Page 20: "We did not find a discussion of the amortization period in the Experience Study. We recommend that this discussion be included in the next experience study."

   GRS Response: *GRS periodically reviews the amortization period as part of regular funding policy review that occurs separately and after the experience study. We can add additional language in our report to document and inform the reader regarding the amortization period recommendations.*

9. Page 21: "In addition, the standard requires a specific disclosure if the unfunded liability is not expected to be fully amortized (Section 4.1.s). We recommend that GRS include these disclosures in future reports as appropriate."

   GRS Response: *The WRS is, for all intents and purposes already fully funded, and the benefit design is expected to keep it that way. In fact, over the last 16 years, the System's funded status on an entry age normal cost basis has averaged 99.5% (with a high of 102% and a low of 98%) despite tremendous investment market volatility. As Cheiron noted on page 21 of their revised report, "the System's risk sharing mechanisms are designed to keep the System well-funded, and thus the unfunded liability balances and associated payments should constitute a minor portion of the overall funding requirements". But we do agree that ASOP 4 technically requires an additional disclosure and can add that in the next valuation if applicable.*

10. Page 21: "The Discussion of Dividend (Core Annuity Fund) and the Discussion of Variable Annuity Change sections of the Retired Lives Valuation report both contain items (4,7,8 and 10) which we could not independently verify from the source documents we were provided. Given the importance of the dividends in the operation of the System, we recommend the report be changed to contain sufficient details of the methodology used to determine the dividends so an independent reader can review the calculation of these items."

    GRS Response: *The Dividend adjustment can be verified by taking the ratio of the assets to liabilities as shown on page 4 of the Retired Lives Valuation. Page 6 of the Retired Lives Valuation is simply an illustration of the different factors when calculating rates of return and meant to be illustrative in nature (not exact calculations). Additional detail and explanation of these items can be found on pages 30 and 31 of the Retired Lives Valuation. GRS can add additional language on page 6 of the Retired Lives Valuation to clarify that this page is an illustration and not a calculation of the dividend adjustment.*

11. Page 22: "We recommend the Annual Actuarial Valuation Report include a statement on whether the computed contribution rates meet the definition of a reasonable actuarially determined contribution, as defined in ASOP 4."

    GRS Response: *GRS will add additional disclosures in the next annual valuation.*

We are pleased that the auditing actuary has validated our reports and appreciate the suggestions made by the auditing firm. Thank you for the opportunity to comment on the audit report.

Mark Buis, James D. Anderson and Richard C. Koch Jr. are Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

This communication shall not be construed to provide tax advice, legal advice or investment advice.

Sincerely,
Gabriel, Roeder, Smith & Company

Mark Buis, FSA, EA, FCA, MAAA

James D. Anderson, FSA, EA, FCA, MAAA

Richard C. Koch Jr., FSA, EA, FCA, MAAA

MB/JDA/RCK:sc

cc: Cindy Klimke, ETF
Janet Cranna, Cheiron
Michael Noble, Cheiron
Graham Schmidt, Cheiron

Response

STATE OF WISCONSIN
Department of Employee Trust Funds
A. John Voelker
SECRETARY

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April 25, 2025

Joe Chrisman, State Auditor
Legislative Audit Bureau
22 E Mifflin St, Suite 500
Madison, WI 53703

Dear Mr. Chrisman,

Thank you for the opportunity to address the conclusions and recommendations provided by Cheiron, Inc. (Cheiron) in their review of Wisconsin Retirement System (WRS) actuarial reports and experience study completed by Gabriel Roeder Smith and Company (GRS). The objective of this type of audit is to validate that the liabilities and contribution rates of the WRS are reasonable and calculated as intended. The Government Finance Officers Association recommends actuarial audits be conducted at least once every five years. We are pleased this independent review confirms the work of GRS.

Cheiron concluded "Based on our review, we believe the December 31, 2023, Actuarial Valuation is accurate and produces reasonable required employer contributions, based on the assumptions and methods in effect at the time the valuation was prepared." (Cheiron's letter to State Auditor dated April 7, 2025). They further stated none of their recommendations would materially change the valuation results.

The review included a full replication of the December 31, 2023, valuation results. As noted in Cheiron's report, their replication of the valuation results was extremely close to the results presented by GRS and well within the tolerance expected for actuarial replications. These findings enhance the credibility of the actuarial valuation process used by the WRS.

Cheiron made helpful recommendations to improve the clarity and understanding of the valuation reports they reviewed. While the GRS response addresses each of Cheiron's recommendations, I would also like to briefly comment on a few of them. Cheiron recommended an increase to the salary increase assumption. GRS recently conducted an experience study, for the period ending December 31, 2023, and based on recent experience they recommended, and the board approved, an increase in this assumption. In GRS' judgement, the data reviewed during the prior experience study, which was the study covering January 1, 2018, through December 31, 2020, reviewed by Cheiron, did not support a change to the assumption.

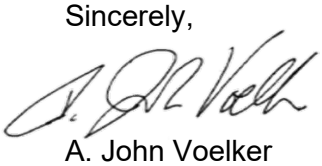
Cheiron also recommended improving the risk assessment disclosures specific to the WRS, noting the disclosures on page 10 of the actuarial valuation report are generic. As GRS has commented, the risk disclosures continue on page 11 and 12 of the actuarial valuation report, some of which are specific to the WRS. Furthermore, every two years GRS works with ETF and the State of Wisconsin Investment Board (SWIB) to review and analyze specific risks of the WRS. The risk assessment study is referenced in the actuarial valuation report, but we understand was not within the scope of Cheiron's review. We will work with GRS to evaluate whether adding more commentary on the identified risks within the actuarial valuation report would be valuable, rather than only referencing the risk assessment study.

Cheiron also recommended the inclusion of projections for assets, liabilities, and contributions in the valuation reports. The risk assessment studies referenced above include extensive stochastic projections of this data for which results are presented to the ETF Board.

Lastly, Cheiron referenced two pages within the Retired Lives Valuation (Discussion of Dividend and Discussion of Variable Annuity Change), referring to them as the methodology used to determine dividends for retirees. As explained in GRS' response, this page is an illustration meant to help a reader understand the various factors when calculating rates of return and the differences between the investment return and dividend. It is not the methodology or calculation of the dividend. We will work with GRS to add language within the report explaining this purpose.

We appreciate the work of Cheiron and the assistance of the LAB in facilitating this audit. We are pleased with the results and will be working with GRS to further improve information presented in future actuarial valuations to make them more useful and understandable to readers.

Sincerely,



A. John Voelker
Secretary