REPORT TO ORSC

ACTUARIAL AUDIT

of the

SCHOOL EMPLOYEES RETIREMENT SYSTEM OF OHIO

Actuarial Valuations as of June 30, 2024

and

Experience Study
for the 5-Year Period Ending June 30, 2020

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June 2025

June 30, 2025

Ohio Retirement Study Council
30 E. Broad Street, 2nd Floor
Columbus, OH 43215

Dear ORSC Members:

We have completed our actuarial audit of the School Employees Retirement System of Ohio (SERS) pursuant to O.R.C. §171.04(E). As shown in the attached findings, we have matched actuarial calculations quite closely and have several related comments. None of the comments reflects a critical concern. Our audit finds that actuarial calculations were reasonable, consistent and accurate.

None of the actuaries signing this report or anyone closely associated with them has a relationship with the Ohio Retirement Study Council (ORSC) or SERS, other than as consulting actuaries for this assignment, that would impair our independence.

The undersigned are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to provide this statement of actuarial opinion.

We are available to answer any questions you may have regarding our findings and recommendations of the actuarial audit.

Sincerely,

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cc: School Employees Retirement System of Ohio

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Section 1 – General Findings

The Ohio Revised Code §171.04(E) requires that the Ohio Retirement Study Council (ORSC) contract for an independent audit of the state retirement systems' actuaries not less than once every ten years. ORSC specified that the firm conducting the audit is to provide:

- An overall opinion as to the validity, completeness, and appropriateness of the demographic and financial information used by the consulting actuary to meet the School Employees Retirement System of Ohio (SERS') funding objectives;
- An overall opinion as to the reasonableness of the consulting actuary's conclusions and the conformance of the consulting actuary's work with generally accepted actuarial standards and practices;
- A detailed description of each audit exception and the estimated effects of each exception on SERS; and
- Detailed recommendations for improvement.

Our opinion is that these standards were met, as will be discussed in the following pages.

SERS provides retirement benefits and health care benefits to employees in K-12 schools, community colleges and the University of Akron. Actuarial values were reported through two actuarial reports:

- SERS Report on the Annual Basic Benefits Valuation prepared as of June 30, 2024, dated November 5, 2024
- SERS Report on the Retiree Health Care Valuation prepared as of June 30, 2024, dated November 7, 2024

Pension Trustee Advisors (PTA), KMS Actuaries (KMS) and Bolton Partners (Bolton), collectively PTA/KMS/Bolton, replicated these June 30, 2024 actuarial valuations conducted by Cavanaugh MacDonald, LLC (CavMac), SERS' actuary, and the results match within the acceptable thresholds for this type of exercise. This match confirms that CavMac has captured the complexity of SERS accurately and that SERS should have confidence in the actuarial calculations provided to them. In addition, we reviewed CavMac's 2020 Experience Study For the Five-Year Period Ending June 30, 2020 (the 2020 Experience Study) and its recommendations. We found that the assumptions proposed by CavMac and adopted by the Board were reasonable.

The primary purpose of an actuarial audit is to confirm that there are no significant errors in the actuarial calculations. Based on our replication, we report that **we have found no significant discrepancies and conclude that there are no significant errors**. This is confirmed on the tables and discussion below.

The following tables summarize the actuarial liabilities and normal costs produced by CavMac and PTA/KMS/Bolton actuarial valuations.

Section 1 – General Findings

Table 1.1
Actuarial Liabilities and Normal Cost as of June 30, 2024 ($ in thousands) – Pension Benefits

	CavMac	PTA/KMS/Bolton	% Diff.
Present Value of Benefits	28,043,269	28,103,922	0.22%
Actuarial Accrued Liability	23,820,119	23,593,668	-0.95%
Normal Cost (% of payroll)	10.75%	11.33%	5.38%

Table 1.2
Actuarial Liabilities and Normal Cost as of June 30, 2024 ($ in thousands) – Health Care Benefits

	CavMac	PTA/KMS/Bolton	% Diff.
Present Value of Benefits	$1,895,990	$1,864,156	-1.68%
Actuarial Accrued Liability	$1,325,702	$1,296,089	-2.23%
Normal Cost	$59,576	$57,183	-4.02%

The grand total actuarial liability calculated by PTA/KMS/Bolton was within 1% of the same calculated by CavMac. Our grand total normal cost was within 4.5% of that calculated by CavMac. Our grand total present value of benefits deviated by only $29 million, or 0.1%, from that calculated by CavMac. These are within actuarial norms and strong evidence that the CavMac actuarial valuations are reliable.

Section 1 – General Findings

The differences in present value of benefits and actuarial accrued liability are illustrated by the following charts:

Figure 1.1
Comparison of Present Value of Benefits and Actuarial Accrued Liability - Pension Benefits

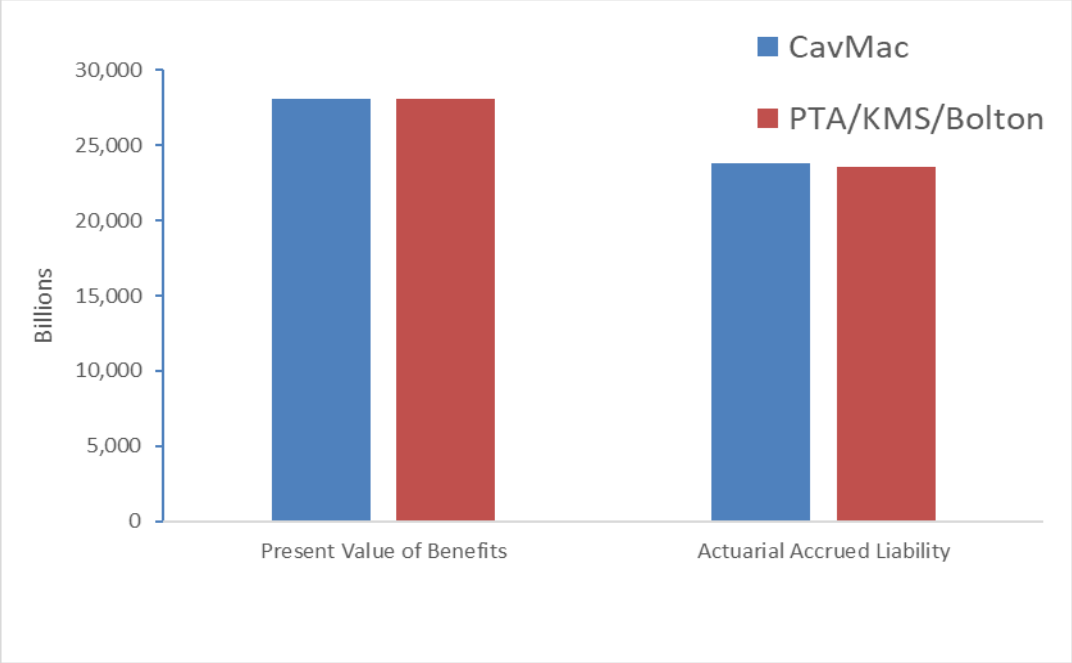
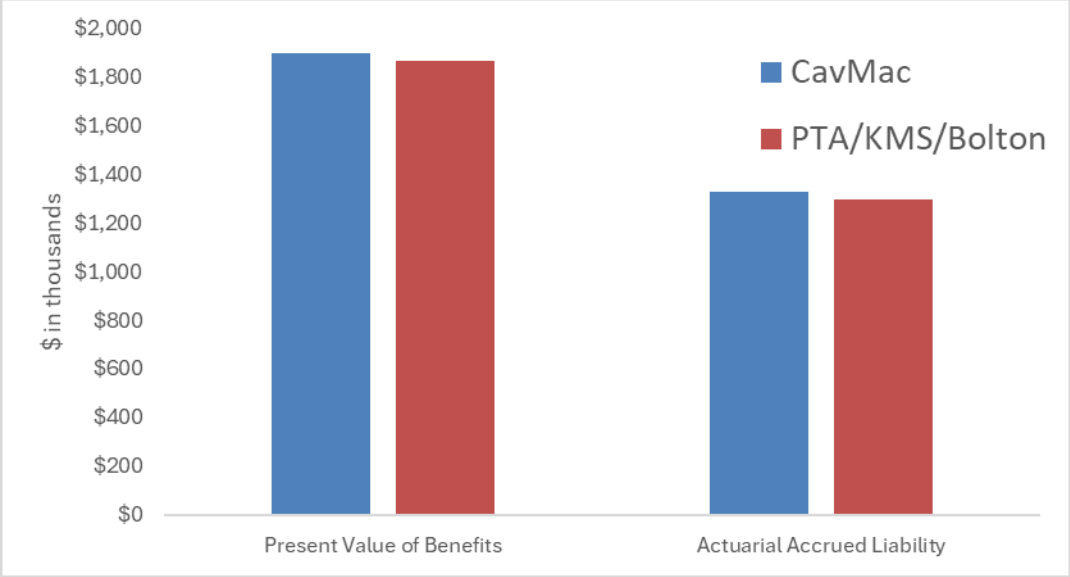


Figure 1.2
Comparison of Present Value of Benefits and Actuarial Accrued Liability - Health Care Benefits



Section 1 – General Findings

Although the match was reasonably close, there is still room for improvement. We make the following recommendations for enhancement in the accuracy of calculations and completeness in the reports:

- Correct minor calculations as discussed in the following pages
- Expand disclosure of methodology and assumptions more rigorously in the next actuarial experience study and valuation reports
- Consider the below updates to the actuarial methods and assumptions:
    - Implement an asset smoothing method for the Health Fund
    - Revise the ADC approach used for comparison with the fixed rate contribution
    - Update the assumed retirement patterns for non-grandfathered employees
    - Update the retirement rates for deferred vested members
    - The method of developing the health care claims cost assumptions is not clearly described in the reports.
    - Consider an assumption for the Health Premium Discount Program
    - Consider an assumption for future child dependents in the Health Benefits valuation

In the process of this actuarial audit, SERS notified us that certain benefits in pay status had been calculated using incorrect actuarial factors and have been subsequently corrected in the SERS administration system. A measurement of the actuarial valuation impact of this correction is beyond the scope of this audit, but our understanding is that it would be insignificant.

Section 2 – Audit of Actuarial Methods, Factors and Assumptions

The first step in the actuarial audit process is to review the actuarial methods, actuarial factors, and actuarial assumptions used in the actuarial valuations.

As part of the audit we referenced the Actuarial Standards of Practice (ASOPs) promulgated by the Actuarial Standards Board. There are several Standards that are particularly appropriate for pension plans and health programs in setting assumptions and methods for funding purposes:

- ASOP 4: Measuring Pension Obligations and Determining Pension Plan Costs or Contributions
- ASOP 6: Measuring Retiree Group Benefits Obligations and Determining Retiree Group Benefits Program Periodic Costs or Actuarially Determined Contributions
- ASOP 23: Data Quality
- ASOP 27: Selection of Economic Assumptions for Measuring Pension Obligations (note this standard was restated effective January 1, 2025)
- ASOP 35: Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations (note this standard was repealed and combined with ASOP 27 effective January 1, 2025)
- ASOP 41: Actuarial Communications
- ASOP 44: Selection and use of Asset Valuation Methods for Pension Valuations
- ASOP 51: Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions
- ASOP 56: Modeling

In addition, we reference the *Actuarial Funding Policies and Practices for Public Pension Plans* published by the Conference of Consulting Actuaries ("CCA White Paper Second Edition"). We also reviewed the 2021 actuarial audit that had been commissioned by SERS. This was completed by Milliman in December 2022 (Milliman audit).

Section 2 – Audit of Actuarial Methods, Factors and Assumptions

ACTUARIAL METHODS

CavMac uses several actuarial methods in determining costs and liabilities for SERS.

- The actuarial funding method is the Individual Entry Age actuarial cost method.
- The actuarial asset valuation method for pension is a four-year smoothed market value.
- The actuarial asset valuation method for health is market value.
- The plan is funded with a fixed rate contribution set by the Board and is within their policy.
- An ASOP 4 defined Actuarially Determined Contribution (ADC) is determined for comparison with the fixed rate contribution. The ADC uses an amortization of the unfunded actuarial accrued liability and is based on a level payroll, closed period method of 20 years as of July 1, 2024.

Actuarial Funding Method

The Individual Entry Age Normal actuarial cost method is used for both pension and health care actuarial valuations. This method is designed to maintain constant plan costs throughout each employee's career as a portion of pay. We believe this is a reasonable and appropriate method. It is the most common method used by large public pension systems such as SERS. CavMac is applying the method reasonably, consistently, and accurately. This approach is considered a "Model Practice" for a Level Cost Allocation Method in the CCA White Paper Second Edition.

Actuarial Asset Valuation Method

CavMac employs a four-year smoothed market value actuarial asset valuation method for the retirement plan actuarial valuation. Unlike actuarial funding methods, actuarial asset valuation methods are not precisely defined. Some actuaries use what could be categorized as a four-year or five-year smoothed market value actuarial asset valuation method as does CavMac, but might use different methods. We have reviewed the precise provisions of the method that CavMac employs and find them to be reasonable, consistently applied, and accurate.

The method is a conventional and appropriate application of a four-year smoothed method. The method spreads any investment gains or losses (relative to the actuarial assumption) over four years and applies a 20% maximum disparity from true market value. This is a reasonable and appropriate method.

This approach is considered a "Model Practice" for a Level Cost Allocation Method in the CCA White Paper Second Edition.

The Actuarial Standards Board has published ASOP 44 (effective March 15, 2008) to define the Selection and Use of Asset Valuation Methods for Pension Valuations. The selected approach fits within the provisions of this ASOP.

CavMac uses the Market Value of Assets (without smoothing) for the Health Fund valuation. This is also a reasonable method with regard to ASOP 44. We do note however, that given the current funding level of the Health Fund (62%) on a market value basis, the implementation of a smoothed asset approach might be advisable to reduce future cost volatility.

Determination of ASOP 4 Actuarially Determined Contribution (ADC)

The valuation determines an Actuarially Determined Contribution (ADC) meeting the requirements of ASOP 4. The ADC equals the employer paid Normal Cost plus the amortization of the unfunded liability (single layer fixed percentage of pay described below). This amount (9.56%) is less than the fixed rate employer contribution (14.00%) scheduled to be paid into the plan. As a result, the fixed rate amount is sufficient to fund the plan in a reasonable manner.

Amortization Method for Determining the ASOP 4 ADC Funding Amounts

In addition to the Entry Age Normal actuarial cost method, CavMac and SERS use a conventional method for amortizing components of unfunded liability. The method includes a closed period, which decreased from 28 years as of June 30, 2016, to 20 years as of June 30, 2024 with all changes in unfunded liabilities rolled into the same amortization base.

The other amortization feature being used is to amortize the costs as a constant percentage of payroll. With payroll growing at an assumed rate of 1.75% per year, this maintains steady costs as a percentage of payroll. We believe the level percent of payroll method is a reasonable approach for funding. With 20 years remaining, the amortization amount is large enough to cover the interest on the unfunded liability (7.00%) plus a part of the principal amount. The 1.75% payroll growth rate is reasonable in the aggregate based on a stable population and was analyzed in the 2020 Experience Study.

The current amortization method would be considered a “Non-recommended” approach for a Level Cost Allocation Method in the CCA White Paper Second Edition. The reasons for assigning this category are that:

1. The single closed amortization period approach is not sustainable. At a certain point, the amortization period will become so short that it will cause unmanageable volatility in the contribution determination. That typically leads to a restatement of the entire amortization period, effectively making it an open rolling amortization period.

2. The policy makes the approach less transparent and does not allow the Board to identify the sources of change in the UAAL (experience versus assumption changes versus plan changes, for example).

Those concerns aside, in this year for this valuation, we find the amortization method reasonable, consistent, and accurate but we do recommend the method be reviewed and a more sustainable approach be adopted for the future.

Section 2 – Audit of Actuarial Methods, Factors and Assumptions

ACTUARIAL ASSUMPTIONS

We have reviewed the actuarial assumptions used by the actuary and find them to be reasonable, consistent, and accurate. CavMac conducted the 2020 Experience Study. We encourage CavMac and the SERS Board to consider our comments in the process of adopting proposed assumption changes.

The actuary uses a large number of actuarial assumptions, including:

- Demographic Assumptions
  - Post-Retirement Mortality
  - Disabled Post-Retirement Mortality
  - Pre-Retirement Mortality
  - Withdrawal from Service Before Retirement
  - Retirement
  - Disability Retirement
  - Other Demographic Assumptions
- Economic Assumptions
  - Investment Return Rate
  - Inflation
  - Wage Inflation
  - Individual Salary Increases
- Post-Employment Healthcare Assumptions
  - Gross Claim Rate Derivation
  - Health Care Cost Trend Rate
  - Morbidity
  - Retiree – Paid Premiums
  - Health Plan Participation Rates and Elections

Detailed comments on each assumption are included below.

DEMOGRAPHIC ASSUMPTIONS

Demographic Experience Since the 2020 Experience Study

Experience in the past five years, since the 2020 Experience Study, indicates that the demographic actuarial assumptions have generated cumulative actuarial losses of 0.5% over five years. This is an indication that the demographic assumptions in the aggregate have been a reasonable measure of anticipated experience.

Table 2.1
Demographic Actuarial Gains/(Losses) By Component ($millions)

Source	FY 20	FY 21	FY 22	FY 23	FY 24	Total
Age & Service Retirements	(94.0)	(96.2)	(65.8)	(65.1)	(53.1)	(374.2)
Disability Retirements	(3.1)	(5.0)	(6.4)	(3.2)	(1.2)	(18.9)
Pre-Retirement Deaths	(5.4)	(4.7)	(7.0)	(5.4)	(7.4)	(29.9)
Withdrawal from Employment	(104.2)	(107.5)	(43.5)	(40.1)	(46.2)	(341.5)
Pay Increases	136.2	136.7	(212.3)	(139.7)	(105.3)	(184.4)
New Members	(22.2)	(16.6)	(52.6)	(66.3)	(63.7)	(221.4)
Death after retirement	28.9	59.8	82.7	54.5	43.0	268.9
Other	62.3	189.3	(25.2)	87.7	80.1	394.2
Total Gain/(Loss)	(1.5)	155.8	(330.1)	(177.6)	(153.8)	(507.2)
Actuarial Liability ($millions)	21,034	21,530	22,371	23,084	23,820	111,839
Gain/(Loss) as % of FYE Liability	0.0%	0.7%	-1.5%	-0.8%	-0.6%	-0.5%
	Loss	Gain	Loss	Loss	Loss	Loss

Rates of Post-Retirement Mortality

CavMac is using rates from the PUB 2010 family of mortality tables. As detailed in their 2020 Experience Study report, the benefit-weighted tables for below median compensated general public sector employees separated by gender formed a good fit to the actual five-year experience. The standard tables were adjusted by the use of an age set-forward and percentage adjustment to fit the experience for the groups. In addition, the MP–2020 mortality improvement projection scale is applied on a generational basis.

Many trends have contributed to lengthening life expectancies, including:

- Continued eradication of diseases
- Advances in medicine
- Advances in nutrition
- Improved access to medical care

But other trends may suggest that life expectancies may not continue to improve, including:

- Emergence of new diseases including COVID-19 and potential future variants
- Obesity
- Many factors which improved mortality are one-time, and cannot be repeated, for example, smoking cessation trends (one can only quit smoking once)
- More sedentary lifestyles
- Substance abuse
- Climate change

As a result of the uncertainty of these contrary trends, we encourage CavMac to continue to study the post-2020 period experience and the appropriate application of projection scales. They may choose to incorporate different short-term and long-term mortality improvement scales. The Society of Actuaries has also developed more recent projection scales such as MP-2021.

The table above illustrates that over the five-year period, the retiree mortality assumptions have generated actuarial gains of $269 million, while the current retiree actuarial liability is $14 billion. This is about 1.9% of the retiree liability. Based on the relatively small size of the gain, the assumed rates provide a good fit to the actual experience over the last five years.

The healthcare valuation uses amount-weighted mortality tables as opposed to the more generally accepted headcount-weighted tables for this type of valuation. We compared the liabilities when using headcount-weighted mortality, and the resulting liabilities only differed from those developed using amount-weighted mortality by around 1%. The difference is immaterial.

Despite the above finding, it is recommended that for the healthcare valuation, the headcount-weighted version of the mortality table be used. This avoids assessing different longevity rates due to the enrollment in more or less expensive medical plans.

Rates of Disabled Post-Retirement Mortality

CavMac is using rates from the PUB 2010 family of mortality tables. In this case they are using the tables applicable to disabled retirees with an age and percentage adjustment. These rates were developed as part of the 2020 Experience Study. In addition, the MP–2020 mortality improvement projection scale is applied on a generational basis. We find this approach reasonable.

Rates of Pre-Retirement Mortality

The pre-retirement mortality assumption also appears reasonable. Very few active members die, so the use of a standard mortality table is generally appropriate.

Withdrawal from Service before Retirement

We concur that the withdrawal tables developed by CavMac are reasonable, consistent, and accurate. CavMac uses a table based on service. We find that this is a sound methodology because research has shown that individuals do have higher likelihood of termination during their first few years of employment than later in their careers. Over the last five years, the turnover assumption has consistently generated actuarial losses indicating the assumption might be too aggressive. However, as a percentage, the loss has been less than one-half of a percent of the liability, so the difference is minor overall.

Retirement

We concur that the retirement tables used by CavMac are reasonable, consistent, and accurate. Varying retirement rates are used for grandfathered (employees with over 25 years of service on August 1, 2017) and non-grandfathered groups (employees with less than 25 years of service on August 1, 2017). For each group the assumption is age-based with separate assumptions for:

- Early retirement with less than 25 years of service
- Early retirement with more than 25 years of service
- First year of eligibility for Normal Retirement
- Normal retirement subsequent to first eligibility

Note that at the time of the 2020 Experience Study there was very little data on the retirement patterns of the non-grandfathered group. This data is likely more robust now and could provide a better determinant for the expected future retirement decrements.

The assumption has produced a consistent actuarial loss over the last five years possibly indicating that it is an aggressive assumption. However, as a percentage of liability the loss has been less than one half of a percent of the liability, so the difference is minor overall. Nevertheless, we recommend that CavMac pay particular attention to this assumption in the next experience study.

Other Demographic Assumptions

We reviewed the other demographic assumptions which could be analyzed by CavMac. We find their study reasonable, consistent, and accurate. These assumptions include:

Disability Rates – CavMac uses an assumption for disability retirement based on five-year experience. The assumption was somewhat conservative given the relatively small number of disability retirements and the relative size of the liability when a person does become disabled. Historical actuarial gains or losses have been minimal.

Marriage Rates – CavMac assumes 80% of future retirees would be married. Current retirees use actual marriage data at the time of valuation. We support this approach.

Age Difference between Husbands and Wives –CavMac assumes female retirees are three years younger than their husbands and that male retirees are three years older than their wives. We find this reasonable. Many retirement systems use three years as a widely established norm.

Number of Dependents – CavMac assumes that the spouse is the only dependent for the survivor benefit in the retirement plan. Because the pre-retirement death benefit is greater when there are dependent children, we recommend this assumption be reviewed in the next experience study.

For the health valuation, CavMac assumes that of those future retirees who elect to continue health coverage, 25% have an eligible spouse who also opts for health coverage at that time and no dependent children. We recommend that these assumptions be analyzed in future experience studies.

Retirement Age for Inactive Vested Participants – An assumption was not disclosed in the actuarial report. Nor was this reviewed in the experience study. We would recommend reviewing this assumption and disclosing what is being assumed.

Retiree Health Participation – CavMac assumes a range of future eligible retirees and inactive vested participants who do not cash out will elect health coverage at retirement. The ranges vary by the type of retirement, the number of years of service the retiree had and whether the retiree is over or under age 65. This is reasonable at this time, and an important assumption. CavMac included this assumption in the 2020 Experience Study and made changes based on recent experience.

Future Child Dependents – No assumption was made in the healthcare valuation. We recommend that CavMac implement an assumption given that current dependent children are already valued.

ECONOMIC ASSUMPTIONS

Investment Return Rate

In 2020, CavMac recommended a decrease in the investment return rate assumption from 7.50% to 7%. This assumption change was a bit "ahead of the curve" with respect to rates used by most systems in 2020, when 7.25% was the assumption most commonly used. Today, however, 7% is the median return according to the Public Funds Survey.

SERS adopted the 7% rate at that time.

Actuaries are required under their standards of practice to opine if they believe that the rate is not reasonable. Even though experience studies are typically conducted only every five years, this standard applies each year.

Currently, the rates used by the statewide systems in Ohio are:

- Ohio Police and Fire Pension Fund (OP&F) – 7.50% (reduced from 8.00% effective 2022)
- State Teachers Retirement System of Ohio (STRS) – 7.00%
- Ohio Public Employees Retirement System (OPERS) – 6.90%
- Ohio Highway Patrol Retirement System (HPRS) – 7.25%

A simple comparison of what other systems are using is helpful, but it is not sufficient criterion for establishing an assumed rate of investment return.

CavMac used a forward-looking "building block" method, where they developed an inflation assumption, a real return assumption and an assumption for expenses. Each of these components was calculated independently, then summed (net of expenses) to develop the net investment return assumption.

Their 7% net investment return assumption recommendation was comprised of 2.4% inflation plus 4.6% real return net of administrative expenses. Inflation is discussed in the section below, so we will focus on the real return component and the administrative expense component.

Based on our experience, investment consultants continue to pare back their expectations for future returns. This is partially a consequence of continued low inflation expectations and short-term fixed income rates, but can also be on a real return basis.

Recent inflation experience may result in changes in expected rates of return. We trust that CavMac rigorously analyzes both the expected real return as well as the inflation assumption.

According to state data from the Public Funds Survey as of March, 2024, the average real rate of return assumption for 119 state systems, 47 of which disclosed this, is 4.44%. Although not

specifically asked, this is presumably after a reduction for administrative expenses in most responses.

The 4.6% real rate currently used by SERS is consistent with the rates used by the other statewide systems in Ohio. The other systems' expected real rates of return are:

- Ohio Police and Fire Pension Fund (OP&F) – 4.30%
- State Teachers Retirement System of Ohio (STRS) – 4.60%
- Ohio Public Employees Retirement System (OPERS) – 4.55%
- Ohio Highway Patrol Retirement System (HPRS) – 4.75%

Administrative Expenses – SERS' anticipated administrative expenses are incorporated into its valuation by reducing the assumed rate of return by 0.22%. The investment return rate is thus assumed to be net of administrative expenses. CavMac incorporated a thorough analysis of this assumption in the 2020 Experience Study.

Health Care Plan Rate of Investment Return – CavMac uses the same 7% investment return assumption for the healthcare valuation as is the assumed return from plan assets.

Inflation

We reviewed the development of the 2.4% inflation rate developed by CavMac. We find that the assumption is reasonable. The CavMac investigation considered forward looking data such as the yields on inflation-indexed treasury bonds and economist forecasts to the extent that they are not purely short term.

According to the Public Funds Survey data cited above as of March, 2024, the median inflation assumption for those who reported their inflation rate is 2.47%.

A 2.4% rate is consistent with the other statewide systems in Ohio. The other systems' expected inflation rates are:

- Ohio Police and Fire Pension Fund (OP&F) – 2.75%
- State Teachers Retirement System (STRS) – 2.50%
- Ohio Public Employees Retirement System (OPERS) – 2.35%
- Ohio Highway Patrol Retirement System (HPRS) – 2.50%

Wage Inflation

CavMac uses a real wage inflation rate of 0.85%. When added to 2.4% inflation, this results in a base payroll growth assumption of 3.25%. We find this to be reasonable, consistent, and accurate. CavMac provided a robust analysis in support of this assumption in its 2020 Experience Study.

A different population level wage inflation assumption is also used for the amortization policy. For the amortization policy the level of wage growth is assumed to be 1.75%. This provides a more conservative ADC computation for purposes of the funding policy.

Individual Salary Increases

CavMac analyzed individual salary increase rates, and made recommendations for updates. CavMac utilized a "building block" approach and analyzed inflation, productivity (real wage increases) and merit/promotion. We found this approach to be appropriate.

POST-EMPLOYMENT HEALTHCARE ASSUMPTIONS

Gross Claim Rate Derivation

It is common practice for actuaries to project future claim costs by measuring past experience and adjusting it to reflect the effects of inflation and plan design. CavMac referenced 2025 premium levels in its report. Based on our review of the report, we find that the health care claim cost assumption is reasonable. We recommend that the development of the rates be more rigorously documented in the actuarial report.

Health Care Cost Trend Rate

To properly measure future liabilities, actuaries apply trend rates (health inflation) to the base claim costs described above. Standard practice is to use prevailing national trend rates and grade down to an ultimate trend rate that is slightly higher than prevailing CPI rates. In this case, CavMac set the initial trend rate using published annual health care inflation surveys in conjunction with actual plan experience, where credible, and developed the ultimate trend rate of 4.40% assuming a grading period of five to ten years and use of a "GDP+1.5%" to "GDP+2.5%" assumption.

We find this approach reasonable and the trend rates which it produces reasonable, but recommend CavMac provide support for the trend rates used in the actuarial report.

COVID has had a profound effect on healthcare costs. We encourage CavMac to consider this carefully in the next experience study. This might lead to projections based on long run trends, extrapolating from 2026 forward, leaving the intervening turbulence (years 2022 -2025) mostly unspecified.

Morbidity

In a health insurance valuation, morbidity is sometimes defined as the difference in claims costs at different ages. Morbidity rates are also known as aging factors. They are used to transform average health cost assumptions to health care cost assumptions which vary by age and gender. CavMac did not disclose in the valuation report what data was used for development of aging factors.

We encourage CavMac to review these factors in the next experience study to the extent data is available. At the very least, we would recommend that the experience study report discloses the process used for the choice of these aging factors. We reviewed the aging factors developed by CavMac and found them appropriate.

Retiree Contributions

The true measure of a plan's liability is the difference between total claims costs and the amount that retirees contribute to offset those total costs. In developing the Plan's liability, CavMac used the specific SERS subsidy provisions. We reviewed the methodology used by CavMac and found it

appropriate. However, additional detail could be provided directly in the report as we found it necessary to reference the retiree benefit booklets provided on the SERS website for clarification of the retiree contribution provisions. For clarity and transparency, we recommend that this information be included in the actuarial valuation report.

Health Plan Participation Rates and Elections

CavMac developed a participation election rate system that varies by whether the participant is over or under age 65, how many years of service they had at retirement and the type of retirement they incurred. The rates range from a low of 25% to as high as 90%. The election rates were part of the 2020 Experience Study and appear to be reasonable.

Child Dependents

Benefits are valued for current dependent children beginning at age 15, although no disclosures for benefit terms are provided in the report. We assumed children dependents not eligible for Medicare are eligible to receive benefits up to age 26 and children dependents eligible for Medicare are eligible to receive benefits for their lifetime. CavMac assumes 0% participation for future child dependents. Although the liability for child dependents is generally small, we recommend that CavMac consider an adjustment to value children younger than age 15 and review the assumption for 0% participation for future child dependents.

Health Premium Discount Program

Current Medicare-eligible service retirees, disabled benefit recipients, spouses and dependent children reported as qualifying for the Health Care Premium Discount Program were assumed to continue participating in the program for their lifetime but no assumption was made for any future eligible benefit recipients. We recommend CavMac consider an assumption for future benefit recipients who may qualify for the Discount Program.

Section 2 – Audit of Actuarial Methods, Factors and Assumptions

DISCLOSURE OF ACTUARIAL ASSUMPTIONS AND METHODOLOGY

CavMac's disclosure of actuarial assumptions (and methods) was robust, particularly given the complexity of SERS. However, there are some disclosures that are omitted from the report that we identify in Section 4 that we recommend CavMac consider including in future valuation reports.

If SERS were ever to change actuaries from CavMac, based on our experience with the audit, the new actuary would be able to confirm the reasonableness of CavMac's calculations.

Section 3 – Audit of Compilation of Actuarial Valuations

The cornerstone of an actuarial audit is a replication of the actuarial valuations. As mentioned above, we matched the costs and liabilities developed by CavMac for the retirement system within standard actuarial ranges. Consequently, we conclude that the valuation results are reasonable, consistent, and accurate.

The following table summarizes the present value of benefits, actuarial accrued liability and normal cost for the Pension Benefits produced by the CavMac and PTA/KMS/Bolton actuarial valuations.

Table 3.1
Liabilities as of June 30, 2024 ($ in thousands) – Pension Benefits

	CavMac	PTA/KMS/Bolton	% Diff.
Present Value of Benefits			
Active Members			
Pension Benefits	12,969,731	13,158,102	1.45%
Medicare Part B	243,316	246,558	1.33%
Post-Retirement Death Benefit	13,424	13,408	-0.12%
Total	13,226,471	13,418,068	1.45%
Retirees and Beneficiaries			
Pension Benefits	13,700,033	13,574,528	-0.92%
Medicare Part B	200,477	199,850	-0.31%
Post-Retirement Death Benefit	32,711	32,688	-0.07%
Total	13,933,221	13,807,065	-0.91%
Inactive and Deferred Vested Members			
Pension Benefits	858,410	853,629	-0.56%
Medicare Part B	23,906	23,897	-0.04%
Post-Retirement Death Benefit	1,261	1,262	0.11%
Total	883,577	878,789	-0.54%
Total of Present Value of Benefits	28,043,269	28,103,922	0.22%
Actuarial Accrued Liability			
Active Members			
Pension Benefits	8,837,164	8,742,768	-1.07%
Medicare Part B	157,570	156,507	-0.67%
Post-Retirement Death Benefit	8,587	8,539	-0.56%
Total	9,003,321	8,907,814	-1.06%
Retirees and Beneficiaries			
Pension Benefits	13,700,033	13,574,528	-0.92%
Medicare Part B	200,477	199,850	-0.31%
Post-Retirement Death Benefit	32,711	32,688	-0.07%
Total	13,933,221	13,807,065	-0.91%
Inactive and Deferred Vested Members			
Pension Benefits	858,410	853,629	-0.56%
Medicare Part B	23,906	23,897	-0.04%
Post-Retirement Death Benefit	1,261	1,262	0.11%
Total	883,577	878,789	-0.54%
Total Accrued Liability	23,820,119	23,593,668	-0.95%
Normal Cost (% of payroll)	10.75%	11.33%	5.38%

Section 3 – Audit of Compilation of Actuarial Valuations

The following table summarizes the present value of benefits, actuarial accrued liability and normal cost for the retiree health benefits produced by CavMac and PTA/KMS/Bolton actuarial valuations.

Table 3.2
Liabilities as of June 30, 2024 ($ in thousands) – Health Benefits

	CavMac	PTA/KMS/Bolton	% Diff.
Present Value of Benefits			
Active Members	$1,395,666	$1,382,431	-0.95%
Retirees, Spouses and Beneficiaries	479,899	461,183	-3.90%
Inactive Members	20,425	20,542	0.57%
Total	$1,895,990	$1,864,156	-1.68%
Actuarial Accrued Liability			
Active Members*	$825,378	$814,364	-1.33%
Retirees, Spouses and Beneficiaries	479,899	461,183	-3.90%
Inactive Members	20,425	20,542	0.57%
Total	$1,325,702	$1,296,089	-2.23%
Normal Cost	$59,576	$57,183	-4.02%

*Actuarial Accrued Liability for Active Members was not disclosed in the CavMac report. $825,378 was calculated as the difference of the total liability and liabilities for inactives and retirees/spouses/beneficiaries.

Table 3.3
Summary of Deviation of Results

	Pension Benefits Valuation Results	Retiree Health Valuation Results
Present Value of Benefits	0.22%	-1.68%
Accrued Liability	-0.95%	-2.23%
Normal Cost	5.38%	-4.02%

Actuaries generally use a 5% deviation as an acceptable range of error. As the total actuarial accrued liabilities and normal costs deviations calculated by PTA/KMS/Bolton were within this "margin of error," we are satisfied that the numbers are appropriate.

Although we did match within an acceptable range, there are several areas which we would encourage CavMac to explore further:

Section 3 – Audit of Compilation of Actuarial Valuations

Following are a few items we uncovered that could be corrected, but overall would be immaterial to the valuation results:

- CavMac uses the deferred allowance date provided in the data as the assumed commencement date for deferred vested members, which was not explicitly stated in the report. Further, we noted inconsistencies with these dates and the early retirement provisions. We would recommend that CavMac review these dates more closely and disclose in the report the assumed commencement dates.

- We were unable to closely match termination liabilities, particularly for grandfathered participants. We believe this may be related to how the entry age normal method was applied to the calculation of the refund benefits, but sufficient information was not given for us to determine what the source of the discrepancy was.

- We were not able to validate the source of the total annual converted disability benefits as it did not line up with the current benefit field in the data as we would have expected. As a result, our total annual disability benefits were slightly lower than those shown in the CavMac report.

- The pension normal cost in CavMac's report was not provided. Only percentages of payroll for specific benefits were reported. We used this information and the total annual salary from the report to determine the CavMac pension normal cost. Our match of the total normal cost for both pension and health (4.5%) was not as strong as our close match of the accrued liabilities (1%) and present value of future benefits (0.1%). If the pension normal cost dollar figure had been reported in detail, we would have been better able to understand their normal cost calculation nuances.

Section 4 – Audit of Member Data Used in Valuations

SERS provided us with the pension system data for all active members and pensioners. Detailed data layouts that identified all the data elements used by CavMac were provided for the pension valuation. CavMac also provided us with the data files they utilized in performing the valuations. In performing our replication, we used the data files provided by CavMac.

The following tables summarize the demographic statistics for the pension benefits valuation produced by CavMac and PTA/KMS/Bolton actuarial valuations:

Table 4.1
Active Members as of June 30, 2024 ($ in thousands) – Pension Benefits

Active Members	CavMac	PTA/KMS/Bolton	% Diff.
Number of Members	163,350	163,350	0.00%
Annual Salaries	4,547,316	4,553,337	0.13%
Average Annual Salary	28	28	0.13%
Average Age	46.80	46.73	-0.15%
Average Service	7.00	7.00	0.00%

Table 4.2
Retirees and Beneficiaries as of June 30, 2024 ($ in thousands) – Pension Benefits

Service Retirees	CavMac	PTA/KMS/Bolton	% Diff.
Number of Members	72,722	72,722	0.00%
Annual Allowance	1,241,322	1,241,325	0.00%
Average Allowance	17.07	17.07	0.00%

Survivors and Beneficiaries	CavMac	PTA/KMS/Bolton	% Diff.
Number of Members	4,049	4,049	0.00%
Annual Allowance	41,811	41,811	0.00%
Average Allowance	10.33	10.33	0.00%

Disability Retirees	CavMac	PTA/KMS/Bolton	% Diff.
Number of Members	5,719	5,719	0.00%
Annual Allowance	100,617	100,112	-0.50%
Average Allowance	17.59	17.51	-0.50%

Total	CavMac	PTA/KMS/Bolton	% Diff.
Number of Members	82,490	82,490	0.00%
Annual Allowance	1,383,750	1,383,248	-0.04%
Average Allowance	16.77	16.77	-0.04%

Table 4.3
Inactive Members as of June 30, 2024 – Pension Benefits

Inactive and Deferred Vested Members	CavMac	PTA/KMS/Bolton	% Diff.
Number of Members	6,607	6,607	0.00%
Annual Allowance	47,685	47,685	0.00%
Average Allowance	7.22	7.22	0.00%

Section 4 – Audit of Member Data Used in Valuations

SERS provided us with the health benefits system data for all active members and retirees. Detailed data layouts that identified all the data elements used by CavMac were provided for the health care valuation. CavMac also provided us with the data files they utilized in performing the valuations. In performing our replication, we utilized the data files provided by CavMac.

The following tables summarize the demographic statistics for the health benefits valuation produced by CavMac and PTA/KMS/Bolton actuarial valuations:

Table 4.4
Members as of June 30, 2024 – Health Benefits

Status	Number		
	CavMac	PTA/KMS/Bolton	% Diff.
Active Members	163,350	163,350	0.00%
Service Retirees	29,735	29,735	0.00%
Disability Retirees	2,575	2,575	0.00%
Spouses of Retirees	4,851	4,851	0.00%
Spouses of Deceased Retirees	1,322	1,322	0.00%
Survivor Benefit Recipients	489	489	0.00%
Non-Spouse Dependents	220	220	0.00%
Deferred Vested	6,607	6,607	0.00%
Grand Total	202,322	202,322	0.00%
In addition, CavMac valued the following pre-Medicare eligible retired members who are waiving coverage			
Waived-Service Retirees	3,119	3,119	0.00%
Waived-Disabled Retirees	1,429	1,429	0.00%

SAMPLE LIVES

Initially, a limited number of sample lives was provided by CavMac. We requested additional sample lives for various categories of SERS members, including active test lives at various ages and group, retirees with various payment forms and disabled lives. We matched most of the sample lives.

The following tables summarize the results of the sample lives valuations produced by CavMac and PTA/KMS/Bolton:

Table 5.1
Comparison of Present Value of Benefits ($ in thousands) – Pension Benefits

Sample Life Description	CavMac Liability (PVFB)	PTA/KMS/Bolton Liability (PVFB)	Ratio of PTA/KMS/Bolton To CavMac
Active Sample Lives			
Age 53, Not Grandfathered	37,323	38,859	104.12%
Age 64, Grandfathered	1,037,116	1,022,554	98.60%
Age 57, Grandfathered	52,833	52,186	98.78%
Age 49, Not Grandfathered	392,462	386,044	98.36%
Disabled Sample Lives			
Disabled under 65	155,993	157,302	100.84%
Disabled at least 65	58,804	58,396	99.31%
Retired Sample Lives			
Retiree with Straight Life, Male	35,586	35,101	98.64%
Retiree with Straight Life, Female	179,708	177,029	98.51%
Retiree with J&S	221,768	220,998	99.65%
Retiree with 10-Year Certain and Life	322,588	321,957	99.80%
Deferred Vested Sample Lives			
Age 48 Terminated Vested Employee	16,604	16,375	98.62%
Beneficiary Sample Lives			
Multiple Beneficiaries of Deceased Retiree	412,729	322,461	78.13%

We note the following regarding the pension benefit sample lives:

- We were unable to closely match the sample life for the pension survivor with multiple beneficiaries that was provided to us. Given this, we are uncertain of the method being used to value these survivors and if it is appropriate. This remains immaterial, however, as there are a very small number of these survivors.

Table 5.2
Comparison of Present Value of Benefits ($ in thousands) – Health Benefits

Test Life Description	CavMac Liability (PVFB)	PTA/KMS/Bolton Liability (PVFB)	Ratio of PTA/KMS/Bolton To CavMac
Active Test Lives			
Age 53, Not Grandfathered	2,023	2,150	106.28%
Age 64, Grandfathered	21,314	21,891	102.71%
Age 57, Grandfathered	63,687	64,357	101.05%
Age 49, Not Grandfathered	52,128	51,351	98.51%
Disabled Test Lives			
Disabled under 65	21,113	21,005	99.49%
Dependent under 26	67,099	59,148	88.15%
Waived Disabled Retiree	1,087	2,734	251.52%
Retired Test Lives			
Retiree with J&S reversionary	8,883	8,887	100.04%
Safety net, age 62, with spouse	61,632	61,628	99.99%
Waived Service Retiree	2,152	2,152	99.98%
Terminated Vested Test Lives			
Age 54 Terminated Vested Employee	1,319	1,346	102.06%
Age 67 Terminated Vested Employee	747	632	84.55%
Surviving Spouse Test Lives			
Spouse of Deceased Retiree	9,850	9,850	100.00%
Dependent over 26	2,024	7,986	394.55%

We note the following regarding the health benefit sample lives:

- The disabled sample life with a dependent under age 26 was low by 12%.
- The survivor sample life for a dependent over age 26 was high by 295%.
- The disabled and survivor sample lives without dependents were matched closely but we were unable to determine the cause of the dependent discrepancy because sample lives provided to us for retirees with dependents did not break out the liabilities by retiree and

dependents. Further, payment commencement and end ages were not disclosed in the report. Dependents' liabilities represent a small fraction of the total liability.

- Our valuation of the waived disabled test life was high by 152%. This suggests that our valuation of waived disabled retirees and/or their spouses (with a reversionary benefit) may be incorrect as no payment forms for these retirees were provided which determines the period over which spouses receive benefits. This error accounts for such a small fraction of the total liability that the discrepancy is likely immaterial.

Section 5 – Other Considerations

ACTUARIAL REPORT

We found the CavMac actuarial valuation reports to be well written, and focused on important issues. Actuarial Standard of Practice (ASOP) No. 41 provides extensive guidance to actuaries regarding actuarial communications. We find that the CavMac reports fully comply with the guidance of ASOP 41.

We recommend a few modifications to enhance the completeness of the actuarial valuation reports. These include items discussed in Section 3 as well as the following:

Pension Benefits:

- Breakout of liabilities by pre-65 and post-65 health care benefits.
- An explicit table of the early retirement factors for non-grandfathered retirees, especially since these factors have been readily calculated for use in benefit calculations.
- Whether any disabled retirees under age 65 are assumed to receive the Medicare Part B reimbursement and if so, at what age or after what period of time these disabled retirees would be assumed to go on Medicare, if applicable.
- The current year normal cost in the pension report in dollars.
- Clarification in the comments section of the report that the contributions "…consist of normal contributions and accrued liability contributions."

Health Benefits:

- Breakout of retiree, survivor and beneficiary present value of benefits and actuarial accrued liabilities by status, given that each status uses different participation rates, claims costs and cost-sharing methods.
- Details of the valuation of waived service and disabled retirees, including the selection of claims and contributions.
- Details of the valuation of Medicare-eligible dependents, including the selection of claims and contributions and duration of benefit payments.
- Disclosure of the active entry age normal accrued liability.
- Claims costs used for current retirees and spouses.
- Benefit commencement ages for terminated vested members.
- Coverage start dates for waived service retirees, disabled retirees and spouses.
- Termination of benefits for spouses of waived service and disabled retirees.
- More robust rationale for the trend rate selection.

Section 5 – Other Considerations

ACTUARIAL AUDIT PROCESS

Overall, CavMac has been cooperative in sharing individual calculations supporting the calculations reported in the actuarial valuation report. However, there were additional details that CavMac could have provided for specific individuals that would have helped in the replication process. The inactive test lives for the pension valuation provided results for the present value of future benefits and accrued liability broken out by pension benefits, Medicare Part B, and the lump sum death benefit. Additional details would have been helpful for unique cases like the survivor with multiple beneficiaries. The active pension test lives had slightly more detail as the present value of future benefits, accrued liability, and normal cost were broken out by benefits attributed to individual decrements as well, but details were lacking for specific benefits within those decrements. As a consequence of this lack of information, (1) we cannot confirm that CavMac is properly making the calculations, only that our calculations match within a reasonable margin, and (2) the audit process is much more tedious, time-consuming and drawn out than necessary. The test lives provided for the healthcare valuation also lacked details. For example, CavMac provided one single number for the present value of benefits for a retired test life with two dependents that we were not able to match.

We understand that there may be sound business, competitive, or legal reasons for CavMac to have a non-disclosure policy. We also understand that at some other major actuarial firms (some of which do not consult to public pensions) have a similar policy. However, it is important to point out that this policy can make actuarial audits more problematic, lengthy and dubious than normal, as indicated in the previous paragraph. It would probably be helpful if future auditors were aware of the limits on shared information in advance. This issue is not unique to SERS and CavMac. Actuarial firms are more often taking this approach of limiting detailed information that is shared. While most of the more than 20 audits that we have conducted in the last 20 years have not had this issue, many of the ones we have conducted in the last five years do have this issue.

Section 5 – Other Considerations

CONCLUSIONS

We found CavMac's work to be reasonable, consistent, and accurate. We do not believe that any methods, assumptions, or calculations are erroneous to the level of necessary recalculations.

CavMac, the ORSC, and the SERS staff were fully cooperative and responsive, which assisted in the process. Finally, we wish to reaffirm that the work done by CavMac was reasonable, consistent, and accurate.