

Minnesota Legislative Commission on Pensions and Retirement

Replication of July 1, 2025 Minnesota State Retirement
System Correctional Employees Retirement Fund
Actuarial Valuation Report

July 6, 2026





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Minnesota Legislative Commission on Pensions and Retirement
Centennial Office Building, 1st floor
658 Cedar St.
St. Paul, MN 55155

Attn: Susan Lenczewski, Executive Director

Re: Replication of July 1, 2025 Minnesota State Retirement System Correctional Employees Retirement Fund Actuarial Valuation Report

This report presents our replication of the July 1, 2025 actuarial valuation report for the Minnesota State Retirement System Correctional Employees Retirement Fund (MSRS Correctional Plan or Plan). It provides various exhibits illustrating the degree to which we were able to replicate both (1) the retained actuary's liability calculations and (2) their use of those liabilities to determine contribution rates and sufficiency.

In our professional opinion, we were able to reasonably replicate the retained actuary's data inputs, liability calculations, and contribution determinations. We did not find any meaningful differences or deficiencies in their calculations, and we provide commentary on areas where subsets of our results diverged from the retained actuary. In general, these instances were very limited.

Purpose of the Study

This study was prepared at the request of the Legislative Commission on Pensions and Retirement (LCPR). Its sole purpose is to replicate the 7/1/2025 MSRS Correctional Plan actuarial valuation calculations for reasonableness, accuracy, and compliance with applicable Minnesota Statutes; LCPR standards for actuarial work; and relevant Actuarial Standards of Practice (ASOPs).

The report is intended to comply with Minnesota Statute 356.214 Subd. 4(b) which states that the auditing actuary shall:

"audit the valuation reports submitted by the actuary retained by each governing or managing board or administrative official, and provide an assessment of the reasonableness, reliability, and areas of concern or potential improvement in the specific reports reviewed, the procedures utilized by any particular reporting actuary, or general modifications to standards, procedures, or assumptions that the commission may wish to consider."

This report may not be used for any other purpose, and VIA Actuarial Solutions is not responsible for the consequences of any unauthorized use. Its content may not be modified, incorporated into or used in other materials, or otherwise provided, in whole or in part, to any other person or entity, without our permission.

Data Used in the Analysis

The results in this report are based on the following data sources:

- July 1, 2025 actuarial valuation report prepared by the MSRS Correctional Plan's retained actuary;
- July 1, 2025 census data files provided by MSRS, and "scrubbed" census files provided by the retained actuary; and
- July 1, 2025 asset and financial data found in the MSRS Correctional Plan's audited financial statements.

Although we reviewed all data sources for reasonableness, we have not audited the underlying data and are relying on its substantial accuracy. If any data supplied is not accurate or complete, then our conclusions in this actuarial valuation replication may differ significantly.

We wish to thank all the parties involved for providing information in a timely manner and for answering our questions.

Actuarial Certification

To the best of our knowledge, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices.

Upon receipt of the report, the LCPR should notify us if you disagree with any information contained in the report or if you are aware of any information that would affect the results that has not been communicated to us. The report will be deemed final and acceptable to the LCPR unless you immediately notify us otherwise.

The undersigned credentialed actuaries are members of the American Academy of Actuaries and meet the Academy's Qualification Standards to render the actuarial opinion contained herein. We are available to answer questions on the material contained in the report or to provide explanations or further detail, as may be appropriate. We are not aware of any financial interest or relationship that could create a conflict of interest or impair the objectivity of our work.

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Executive Summary

This report summarizes our replication of the July 1, 2025 MSRS Correctional Plan actuarial valuation report. We conclude that the retained actuary reasonably determined the Plan's July 1, 2025 actuarial liabilities and contribution sufficiency/(deficiency).

We did not find any meaningful differences or deficiencies in the retained actuary's data or calculations. Overall liabilities and contributions were replicated with sufficient accuracy, and we provide commentary on the few areas where subsets of our results diverged from the retained actuary. In general, these instances were very limited.

	MSRS Correctional Plan Actuarial Valuation		VIA Replication	Difference ¹
Participant data				
Active members		4,724	4,724	0.0%
Service retirements		3,676	3,676	0.0%
Survivors		346	346	0.0%
Disability retirements		345	345	0.0%
Deferred retirements		1,665	1,665	0.0%
Other non-vested terminations		1,698	1,698	0.0%
Total		12,454	12,454	0.0%
System assets (\$1,000's)				
Market value of assets	\$	1,985,814	\$ 1,985,814	0.0%
Actuarial Value of Assets		1,914,959	1,914,959	0.0%
System liabilities (\$1,000's)				
Present Value of Future Benefits (PFVB)		2,885,000	2,898,437	0.5%
Present Value of Future Normal Costs (PVFNC)		487,576	516,461	5.9%
Actuarial Accrued Liability (AAL)		2,397,424	2,381,976	-0.6%
Normal Cost (NC)		70,097	69,806	-0.4%
System contributions (% of payroll)				
Normal cost rate		17.34%	17.19%	-0.15%
UAAL amortization payment		7.81%	7.76%	-0.05%
Expenses		0.33%	0.33%	0.00%
Total required contribution (Chapter 356)		25.48%	25.28%	-0.20%
Statutory contribution rate (Chapter 352)		28.45%	28.45%	0.00%
Contribution sufficiency/(deficiency)		2.97%	3.17%	0.20%

¹ The MSRS Correctional Plan contribution comparisons are absolute differences presented as a percent of payroll. All other comparisons are the relative differences between our replication results and the retained actuary.

Process Overview

The purpose of this report is to replicate (1) the technical calculation of the Plan's actuarial liabilities and (2) the contribution rates and sufficiency results based on those liabilities.

Our report focuses on replicating the following items:

1. Census data summaries;
2. Market asset data and Actuarial Value of Assets calculations;
3. Calculation of Plan liabilities;
4. Calculation of contribution sufficiency/(deficiency);
5. Confirmation of actuarial assumptions, methods, and plan provisions; and
6. Review of additional compliance items.

The table below summarizes how our valuation replication report incorporates each of these items.

Census data	▪ Compare participant category counts and summary statistics for the retained actuary vs. system census data files ▪ Compare detailed participant distributions for the retained actuary's census file vs. the valuation report summaries
Plan assets	▪ Compare market asset values in the valuation report to those in MSRS Correctional Plan's audited financial statements ▪ Replicate retained actuary's Actuarial Value of Assets calculations
Plan liabilities	▪ Replicate technical liability calculations, including Present Value of Future Benefits (PVFB), Present Value of Future Normal Costs (PVFNC), Actuarial Accrued Liability (AAL), and Normal Cost (NC) ▪ Compare liability calculations for various member status groups
Contribution sufficiency/(deficiency)	▪ Replicate the required normal cost and supplemental contribution rate calculations ▪ Replicate retained actuary's contribution sufficiency/(deficiency) determination
Assumptions, methods, and plan provisions	Verify that the actuarial assumptions, methods, and plan provisions used in the July 1, 2025 actuarial valuation are consistent with applicable Minnesota Statutes and MSRS Correctional Plan's recent actuarial experience studies.
Additional compliance requirements	Confirm that other aspects of the valuation report comply with applicable Minnesota Statutes, the LCPR's Standards for Actuarial Work, and relevant actuarial standards of practice (ASOPs).

Census Data

Census data is a foundational input for actuarial calculations. While it is not practical for data to be perfect, it should be reviewed for overall accuracy and reasonableness.

Guidance on actuarial data is provided by Actuarial Standard of Practice No. 23, Data Quality (ASOP 23). It provides, in summary, that “The actuary should use available data that, in the actuary’s professional judgment, allow the actuary to perform the desired analysis. However, if material data limitations are known to the actuary, the actuary should disclose those limitations and their implications”.

To validate the census data used in the July 1, 2025 actuarial valuation report, we used the following process:

- Request separate census files from the retained actuary and MSRS;
- Compare overall census counts and summary statistics for various member classes (e.g., active members, service retirements, etc.); and
- Prepare detailed participant statistical distribution tables and compare them to those found in the retained actuary’s July 1, 2025 actuarial valuation report.

Overall, we found that the census data used by the retained actuary was consistent with the census data provided by MSRS. Our census data comparisons and tables can be found in **Appendix A**. These exhibits are described below, along with some brief commentary.

Summary of participant statistics: This table summarizes and compares participant counts and high-level participant category statistics for the retained actuary and MSRS Correctional Plan census files. It shows that the two files were very closely aligned.

Distribution of active members: This table summarizes the retained actuary’s active member data by classifying them in various age/service categories, along with the average pay for each classification. We found that this data was consistent with a similar summary table on page 17 of the July 1, 2025 actuarial valuation report.

Distributions of service retirements, survivors, and disability retirements: These tables summarize the retained actuary’s inactive member data by classifying them by age and service since retirement/death/disability, along with the average annual benefit for each classification. We found that the data in each of these tables was consistent with similar tables found on pages 18-20 of the July 1, 2025 actuarial valuation report.

Plan Assets

Asset data is another foundational input for actuarial calculations. In addition to the Market Value of Assets, many public sector pension plans also use a smoothed Actuarial Value of Assets (AVA). The purpose of AVA methods is to stabilize contribution rates by smoothing investment returns – generally over a five-year period.

Guidance on asset smoothing methods is provided by Actuarial Standard of Practice No. 44, Selection and Use of Asset Valuation Methods for Pension Plans (ASOP 44). It provides considerations for selecting an actuarial asset method, including:

- Purpose of the measurement;
- Objectives of the employer and/or retirement system;
- Use of different methods/assumptions and adjustment for timing differences; and
- Other considerations such as the plan's expected future cash flows and liquidity needs.

Actuarial Standard of Practice No. 4, Measuring Pension Obligations and Determining Pension Plan Costs or Contributions (ASOP 4) also provides guidance, but generally defers to ASOP 44. The specific methodology for determining the AVA is prescribed in Minnesota Statutes, Section 356.215, Subd.1(f).

To validate the asset data and AVA calculations used in the July 1, 2025 actuarial valuation report, we used the following process:

- Review audited financial data and compare it to the information disclosed in the actuarial valuation report; and
- Replicate the AVA calculations shown in the July 1, 2025 actuarial valuation report.

We found that the asset data used by the retained actuary was consistent with MSRS Correctional Plan's audited asset information. We were also able to replicate the AVA calculation prepared by the retained actuary and confirm it follows the methods prescribed in Minnesota Statutes. Our asset data comparison can be found in Appendix B, and the AVA replication can be found in Appendix C.

Plan Liabilities

Actuarial liabilities are calculated by programming actuarial software with a retirement system's data, assumptions, methods, and plan provisions. This is a complex process which involves substantial effort and actuarial programming experience.

For the replication, we independently programmed our valuation software based on our understanding of the data, assumptions, methods, and plan provisions used in the July 1, 2025 actuarial valuation report, Minnesota Statutes, and the LCPR's standards for actuarial work. The primary results we replicated are:

- **Present Value of Future Benefits (PVFB):** plan liability equal to the discounted value of all projected future benefit payments (based on current participant group with projected compensation and service accruals).
- **Normal Cost (NC):** the portion of the PVFB attributed to the valuation year based on current compensation levels.
- **Present Value of Future Normal Costs (PVFNC):** the portion of the PVFB attributed to future years based on the present value of projected participant compensation.
- **Actuarial Accrued Liability (AAL):** the portion of the PVFB attributed to prior years based on each participant's historical and projected compensation.

We expect some liability calculation differences even if we used the exact same inputs as the retained actuary. This is because each actuarial software program may have slightly different ways of applying actuarial formulas. As a general rule, we would like to match the overall PVFB and AAL within 2% and PVFNC and Normal Cost within 5% of the retained actuary's results.

Results for member subgroups or split by benefit source may differ by larger magnitudes depending on how each actuary interprets and programs their actuarial software. We believe these differences are acceptable as long as they are small relative to the overall plan.

The tables in **Appendix D** summarize and compare the liability measurements for different membership groups. **Our overall results are very close to those presented in the July 1, 2025 actuarial valuation, and we believe that the retained actuary is reasonably calculating plan liabilities.**

The PVFB, AAL, and NC were all well within our preferred replication margins. The PVFNC calculation was slightly outside our standard 5% threshold, but we believe the results are still reasonable. The PVFNC difference is modest relative to the total plan liability, and the discrepancy has minimal effect on overall plan results and the evaluation of contribution sufficiency.

Contribution Sufficiency/(Deficiency)

The MSRS Correctional Plan's statutory pension contribution rates are defined in Chapter 352 of Minnesota Statutes, but the retained actuary is also required to calculate "required contributions" per Chapter 356.215 of Minnesota Statutes. The required contribution rates are those which are expected to fully fund the pension plan by the statutory full funding date.

We replicated the contribution sufficiency/(deficiency) calculations as follows:

- **Statutory contributions:** We calculated the estimated dollar value of the statutory normal cost contributions based on the retained actuary's blended statutory normal cost contribution rates applied to our replication of projected payroll. These amounts are added to the statutory supplemental contribution rates to determine the total statutory contribution rate.
- **Required contributions:** We calculated the estimated "percent of payroll" and dollar value of the contributions required to fully fund the plan based on the Chapter 356.215 required contribution rates. These consist of normal cost contributions plus the required supplemental contribution rate. The normal cost and supplemental components of the required contributions were based on our replication of the MSRS Correctional Plan's normal cost, Unfunded Actuarial Accrued Liability, and projected payroll. The specific unfunded liability source amounts were based on those presented by the retained actuary and were not calculated independently. However, we did separately match all of the amortization amounts and supplemental rate calculations.
- **Contribution sufficiency/(deficiency):** We compare our contribution sufficiency calculation (i.e., difference between the statutory and required contributions) to those determined by the retained actuary in the July 1, 2025 actuarial valuation report.

The tables in **Appendix E** summarize and compare our calculations. **Our overall results are close to those calculated by the retained actuary, and we believe that the retained actuary is reasonably calculating the contribution sufficiency/(deficiency).**

Assumptions, Methods, and Plan Provisions

The retained actuary's July 1, 2025 actuarial valuation report contains a detailed description of the actuarial assumptions, methods, and plan provisions used to prepare their results. These items are summarized in their report on pages 27 through 41. We do not reprint all the assumptions, methods, and plan provisions in this replication report, but we do provide a high-level commentary below.

Actuarial Methods

Actuarial Cost Method: Minnesota Statutes, Section 356.215 Subd.1(b) and (d) require that MSRS use the Entry Age Normal level percent of pay actuarial cost method. In this method, the actuarial Present Value of Future Benefits (PVFB) for each individual is allocated as a level percent of pay from entry age (hire age, for most employees) to decrement age (e.g., expected age at termination or retirement).

The portion of the PVFB allocated to the valuation year is called the Normal Cost (NC). The portion of the PVFB allocated to past years is called the Actuarial Accrued Liability (AAL). The retained actuary documents using this cost method in their report, and the closeness of our replication liabilities (Appendix D) indicate that it was applied appropriately.

Asset valuation method: The asset valuation method is used to smooth market fluctuations over time to create contribution stability. Minnesota Statutes, Section 356.215 Subd.1(f) requires using an Actuarial Value of Assets that smooths investment gains and losses over a five-year period. We confirmed that the retained actuary described and used the statutory asset smoothing method, and our replication calculations can be found in Appendix C of this report.

Contribution method: The contribution method specifies a process for funding the current year incurred liabilities (the Normal Cost) plus paying down/amortizing a portion of unfunded past liabilities (the Unfunded Actuarial Accrued Liability, or UAAL amortization).

These contribution parameters are defined in Minnesota Statutes, Section 356.215 Subd.5 and Subd.11. They specify that (1) the Normal Cost must be expressed as a level percent of payroll and (2) the required supplemental contribution must be calculated by amortizing the UAAL as a level percent of payroll over the following periods:

1. experience gain or loss: 15 years;
2. assumption or method change: 20 years;
3. benefit change for active members: 15 years;
4. long-term benefit change for inactive members: 15 years;
5. short-term benefit change for inactive members: the number of years during which the benefit change will be in effect; and
6. an annual contribution that is more or less than the actuarially determined contribution: 15 years.

Except that the pension plan's unfunded actuarial accrued liability as of July 1, 2024, must be amortized over a period that ends June 30, 2048.

We confirmed that pages 24-26 of the July 1, 2025 actuarial valuation report describes the correct contribution calculation process, and our replication calculations (Appendix E of this report) indicate that the retained actuary applied the methods and assumptions appropriately.

Actuarial Assumptions

Demographic assumptions: We verified that the demographic assumptions described in the July 1, 2025 actuarial valuation report were based on those developed in the 2019-2023 actuarial experience study dated July 16, 2024. The allowance for Combined Service Annuity assumptions are based on the separate report prepared by VIA Actuarial Solutions dated February 19, 2025.

Economic assumptions: We verified that the economic assumptions described in the July 1, 2025 actuarial valuation report were based on those developed in the 2019-2023 experience study, and an investment return assumption and discount rate per Minnesota Statute, Section 356.215 Subd.8(a). They also include the COLA, salary scale, payroll growth, and other assumptions described in 356.215 Subd.8(b)-(d) and Subd.9

We also confirmed that demographic and economic assumptions used in the valuation are consistent with those described in Appendix A (effective July 1, 2025) to the LCPR's Standards for Actuarial Work. These assumptions include 2.25% price inflation, 3.0% payroll growth, service-based salary increase table, and PUB-2010 mortality tables.

Plan Provisions

Minnesota Statutes, Chapter 352 describes the retirement benefits provided to MSRS Correctional Plan members, and the primary service annuity formulas. We reviewed the plan provisions summarized in the July 1, 2025 actuarial valuation report and believe they are consistent with our understanding of the benefits described in Minnesota Statutes.

Additional Compliance Requirements

In addition to correctly summarizing and applying the assumptions, methods, and plan provisions, the actuarial valuation report must comply with other statutory requirements and professional standards. We reviewed the July 1, 2025 MSRS Correctional Plan actuarial valuation report for compliance with applicable Minnesota Statutes, LCPR Actuarial Standards, and relevant Actuarial Standards of Practice. We found that the report complied with all major guidance in these sources. The primary items we reviewed, along with any relevant observations, are summarized in the tables below.

Minnesota Statute Compliance

The applicable Minnesota Statutes include Sections 356.214 (actuarial valuation preparation) and 356.215 (actuarial valuations and experience studies). We confirmed compliance with the following requirements as described below.

Normal cost	Calculated as a level percentage of payroll per 356.215 Subd.5
Amortization of unfunded liabilities	Specific sources of actuarial gain or loss are amortized as a level percent of payroll over closed periods per 356.215 Subd.11
Measurement of actuarial gains and losses	Required gain/loss items measured per 356.215 Subd.12
Report contents	Consistent with the remaining requirements of 356.215 Subd. 4 through 18. These include presentation of the accrued liability, membership tabulations, and summary of plan provisions.

LCPR Actuarial Standards Compliance

In addition to specific actuarial assumptions (described earlier in this report), the LCPR's Standards for Actuarial Work and its Appendix A specify actuarial cost methods and detailed report contents. We confirmed compliance with these requirements as described below.

Actuarial cost methods	Entry age cost method, benefits recognized, and contribution rates calculated per Standards, Section III
Actuarial assumptions	Valuation assumptions are consistent with those described in Appendix A to the Actuarial Standards
Report contents	All required elements included per Standards, Section IV

Actuarial Standards of Practice Compliance

Actuarial Standards of Practice (ASOPs) provide broad standards that all actuaries must follow as part of our professional standards. The relevant ASOPs for pension actuarial reports include:

- ASOP 4, Measuring Pension Obligations and Determining Pension Plan Costs or Contributions
- ASOP 23, Data Quality
- ASOP 27, Selection of Assumptions for Measuring Pension Obligations
- 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

We reviewed the report and believe that it adequately complies with all relevant Actuarial Standards of Practice, including ASOPs 4, 23, 27, 41, 44, 51, and 56.

We specifically note GRS's compliance with revised ASOP 4 which is effective for actuarial reports with measurement dates on or after February 15, 2023. ASOP 4 requires presentation and discussion of additional pension risk information. This includes disclosure of a Low-Default-Risk Obligation Measure (LDROM) and commentary about any concerns with the Actuarially Determined Contribution (ADC) or funding policy. The actuarial valuation report includes an LDROM analysis on page 11, and addresses implications of the contribution allocation procedures and funding policy in the "Other Observations" section of page 4 of the transmittal letter.

Appendix A – Census Data Comparisons

The exhibits below compare the participant counts and certain data statistics between the “raw” MSRS Correctional Plan data and the “scrubbed” actuarial data.

Summary of Participant Statistics

	Retained Actuary	System Data	Difference
Active members	4,724	4,724	0
Average age	41.7	41.7	0.0%
Average service	8.8	8.8	0.0%
Average salary	\$ 78,274	\$ 78,274	0.0%
Service retirements	3,676	3,676	0
Average age	68.4	68.4	0.0%
Average annual annuity	\$ 24,708	\$ 24,708	0.0%
Survivors	346	346	0
Average age	70.3	70.3	0.0%
Average annual annuity	\$ 18,650	\$ 18,650	0.0%
Disability retirements	345	345	0
Average age	61.5	61.5	0.0%
Average annual annuity	\$ 22,627	\$ 22,627	0.0%
Deferred retirements	1,665	1,665	0
Average age	47.5	47.5	0.0%
Average annual annuity	\$ 11,093	\$ 11,093	0.0%
Other non-vested terminations	1,698	1,698	0
Average refund	\$ 6,218	\$ 6,218	0.0%
Total	12,454	12,454	0

Note: The results above are a comparison of the data files prior to adjustments outlined in the actuarial valuation report, including:

- Annualizing salary for members with less than one year of service.
- Combined service annuity loads.
- Assumptions for unknown data for certain members.

Distribution of Active Member Data

The table below summarizes our review of the retained actuary's active member data by age and years of service, and it also includes the average earnings for each grouping. It can be compared to the similar summary table on page 17 from the July 1, 2025 actuarial report. We find that the entries compare well to those in the actuarial valuation report.

Years of Service as of July 1, 2025										
Age	<3	3-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	Total
<25	272	21								293
Avg pay	60,156	66,665								60,623
25-29	300	97	75							472
Avg pay	64,738	69,481	73,675							67,133
30-34	248	76	207	37						568
Avg pay	68,377	74,555	76,663	85,093						73,312
35-39	196	60	176	187	20					639
Avg pay	70,932	75,837	83,947	86,124	90,316					80,030
40-44	183	51	154	168	210	56				822
Avg pay	71,453	75,803	82,262	90,258	98,209	93,891				85,955
45-49	145	57	117	100	147	126	22			714
Avg pay	74,402	86,917	86,073	89,395	95,714	98,737	109,246			89,169
50-54	101	38	88	79	105	108	95	13		627
Avg pay	74,294	90,189	86,265	94,737	92,946	100,847	104,373	102,454		92,352
55-59	67	25	71	63	57	39	19	13		354
Avg pay	70,972	84,019	83,546	85,687	95,379	98,817	100,183	105,612		86,872
60-64	41	9	44	27	33	12	3	1		170
Avg pay	74,666	83,247	81,005	86,488	92,826	103,758	133,201	112,030		85,470
65-69	11	1	14	18	8	1	2		1	56
Avg pay	72,086	108,314	97,286	93,224	100,355	87,757	90,705		134,262	91,921
70+	1	2	3	2		1				9
Avg pay	39,617	34,761	59,849	99,559		107,841				66,183
Total	1,565	437	949	681	580	343	141	27	1	4,724
Avg pay	68,154	76,959	81,704	88,768	95,797	98,789	104,988	104,329	134,262	81,601

Distribution of Service Retirements

The table below summarizes our review of the retained actuary's service retirement data by age and years since retirement, and it also includes the average annual pension benefit for each grouping. It can be compared to the similar summary table on page 18 from the July 1, 2025 actuarial report. We find that the entries compare well to those in the actuarial valuation report.

Age	Years Since Retirement as of July 1, 2025							Total
	<1	1-4	5-9	10-14	15-19	20-24	25+	
<50		1						1
Avg benefit		15,168						15,168
50-54	11	20		1				32
Avg benefit	22,872	17,356		9,625				19,010
55-59	86	328	47	5				466
Avg benefit	39,951	38,754	14,975	7,633				36,243
60-64	26	236	380	101	2		1	746
Avg benefit	29,590	28,493	31,557	20,079	2,923		4,361	28,852
65-69	33	149	264	409	57		1	913
Avg benefit	15,149	18,427	22,477	24,099	21,242		31,454	22,210
70-74	9	37	140	206	288	63		743
Avg benefit	13,704	19,174	15,244	19,674	23,146	24,219		20,473
75-79		9	23	84	91	241	18	466
Avg benefit		26,146	14,033	12,164	17,299	23,053	22,471	19,559
80-84			2	21	38	49	97	207
Avg benefit			20,929	11,321	13,173	19,686	27,541	21,335
85-89				1	12	9	49	71
Avg benefit				10,376	15,997	17,232	30,882	26,347
90+			1			1	29	31
Avg benefit			2,673			7,476	30,626	28,978
Total	165	780	857	828	488	363	195	3,676
Avg benefit	30,788	30,113	24,657	20,839	20,798	22,614	28,273	24,708

Distribution of Survivors

The table below summarizes our review of the retained actuary's survivor data by age and years since retiree death, and it also includes the average annual pension benefit for each grouping. It can be compared to the similar summary table on page 19 of the July 1, 2025 actuarial report. We find that the entries compare well to those in the actuarial valuation report.

Age	Years Since Retiree Death as of July 1, 2025							Total
	<1	1-4	5-9	10-14	15-19	20-24	25+	
<45	4	4	4	6		1		19
Avg benefit	13,418	8,282	11,114	3,375		0		7,974
45-49		2	3	1	2			8
Avg benefit		15,085	14,745	2,068	5,199			10,859
50-54	2	5	3	5				15
Avg benefit	41,960	16,073	6,702	19,044				18,641
55-59	5	3	4	3	2	1		18
Avg benefit	31,544	26,836	17,054	22,088	5,629	19,837		22,434
60-64	7	5	5	2	2	1		22
Avg benefit	15,347	23,221	13,817	12,660	10,466	0		15,403
65-69	1	13	11	11	2	5	3	46
Avg benefit	17,445	20,925	19,977	22,290	11,787	11,930	11,610	18,966
70-74	9	20	18	13	9	6	3	78
Avg benefit	16,053	20,404	20,153	22,586	13,715	18,128	15,311	19,065
75-79	4	22	14	4	4	13	6	67
Avg benefit	16,888	21,981	12,147	28,095	19,083	14,495	22,276	18,388
80-84		11	5	5	6	4	5	36
Avg benefit		15,644	17,107	24,046	24,707	20,268	11,782	18,502
85-89	2	9	5	1	2	2	3	24
Avg benefit	25,933	20,194	34,840	16,515	52,018	11,383	28,600	26,539
90+	2	3	3	1	2		2	13
Avg benefit	11,955	33,767	21,755	56,384	21,537		3,920	22,906
Total	36	97	75	52	31	33	22	346
Avg benefit	19,667	20,197	17,649	20,259	18,106	14,561	16,681	18,650

Distribution of Disability Retirements

The table below summarizes our review of the retained actuary's disability retirement data by age and years since disability retirement, and it also includes the average annual pension benefit for each grouping. It can be compared to the similar summary table on page 20 of the July 1, 2025 actuarial report. We find that the entries compare well to those in the actuarial valuation report.

Age	Years Disabled as of July 1, 2025							Total
	<1	1-4	5-9	10-14	15-19	20-24	25+	
<45	5	10	2					17
Avg benefit	23,278	21,340	18,169					21,537
45-49	1	7	7	3	2			20
Avg benefit	43,928	31,392	21,127	16,759	18,199			24,912
50-54	4	10	13	7	3	5		42
Avg benefit	37,933	25,442	24,567	21,069	21,518	21,605		24,895
55-59	1	12	15	15	12	7	4	66
Avg benefit	37,267	25,325	23,850	18,349	20,942	21,922	28,277	22,606
60-64	2	3	13	17	12	5	9	61
Avg benefit	29,218	12,360	21,138	23,056	19,656	17,060	23,967	21,298
65-69		2	14	19	13	13	6	67
Avg benefit		13,438	15,495	23,144	22,061	26,463	20,235	21,429
70-74				12	9	18	8	47
Avg benefit				21,778	24,165	20,825	25,329	22,475
75+				2	2	10	11	25
Avg benefit				21,650	15,934	25,315	25,901	24,529
Total	13	44	64	75	53	58	38	345
Avg benefit	31,365	23,987	21,142	21,458	21,213	22,738	24,678	22,627

Appendix B – Market Value of Assets Comparison

The exhibit below compares the market value of assets from the system’s annual financial report to the amounts used by the retained actuary (see page 13 in the July 1, 2025 valuation report). We find that the entries compare well, which indicates that the market asset data used in the valuation report was correct. All amounts shown are in \$1,000’s.

	Retained Actuary	System Financials
Assets in Trust		
Cash, equivalents, short term securities	59,709	59,709
Fixed income	451,307	451,307
Equity and private equity	1,474,679	1,474,679
Other	73,145	73,145
Total Assets in Trust	2,058,840	2,058,840
 Assets Receivable	 3,639	 3,639
 Amounts Payable	 (76,665)	 (76,665)
 Net Assets Held in Trust for Pension Benefits	 \$ 1,985,814	 \$ 1,985,814

Appendix C – Actuarial Value of Assets Replication

The exhibit below compares the retained actuary's July 1, 2025 AVA calculation (see page 15 in the July 1, 2025 valuation report) to our replication. The calculations match and are consistent with relevant Minnesota Statutes, Section 356.215, Subd.1(f) so we believe they were prepared correctly. All amounts shown are in \$1,000's.

	Retained Actuary	VIA Match
1. Market value of assets available for benefits	1,985,814	1,985,814
2. Determination of average asset balance		
a. Total assets at beginning of year	1,792,602	1,792,602
b. Total assets at end of year	1,985,814	1,985,814
c. Net investment income for fiscal year	195,154	195,154
d. Average balance (a. + b. - c.)/2	<u>1,791,631</u>	<u>1,791,631</u>
3. Expected return (7.0% x 2.d.)	125,414	125,414
4. Actual return	<u>195,154</u>	<u>195,154</u>
5. Current year asset gain/(loss) (4. - 3.)	69,740	69,740
6. Unrecognized asset returns:		
Original Amount x Unrecognized %		
a. FYE 2025: \$69,740 x 80%	55,792	55,792
b. FYE 2024: \$84,049 x 60%	50,429	50,429
c. FYE 2023: \$20,300 x 40%	8,120	8,120
d. FYE 2022: (\$217,431) x 20%	<u>(43,486)</u>	<u>(43,486)</u>
e. Total unrecognized amount	70,855	70,855
7. AVA at end of year (1. - 6.e.)	\$ 1,914,959	\$ 1,914,959

Appendix D – Plan Liability Replications

The exhibits below compare our replication of the plan liabilities to those calculated by the retained actuary. We believe that the overall closeness of the results indicates the July 1, 2025 actuarial valuation report liabilities are reasonable. There are a couple of small benefit subclasses with larger differences (e.g., deferred retirement decrements and refunds for active members) but these are very small relative to the overall plan. All amounts shown are in \$1,000's.

Present Value of Benefits (PVB)			\$	%
Liability	Retained Actuary	VIA Replication	Difference	Difference
Active members				
Retirement annuities	\$ 1,291,683	\$ 1,302,516	\$ 10,833	0.8%
Disability benefits	73,150	73,989	839	1.1%
Survivor benefits	9,542	9,717	175	1.8%
Deferred retirements	71,090	73,368	2,278	3.2%
Refunds	10,953	11,160	207	1.9%
Subtotal	\$ 1,456,418	\$ 1,470,750	\$ 14,332	1.0%
Deferred retirements	181,808	182,919	1,111	0.6%
Former members without vested rights	12,850	12,793	(57)	-0.4%
Benefit recipients	1,233,924	1,231,975	(1,949)	-0.2%
Total	\$ 2,885,000	\$ 2,898,437	\$ 13,437	0.5%
Present Value of Future Normal Costs (PVFNC)			\$	%
	Retained Actuary	VIA Replication	Difference	Difference
Active members				
Retirement annuities	\$ 337,760	\$ 363,626	\$ 25,866	7.7%
Disability benefits	50,681	52,095	1,414	2.8%
Survivor benefits	3,237	3,484	247	7.6%
Deferred retirements	63,852	68,811	4,959	7.8%
Refunds	32,046	28,445	(3,601)	-11.2%
Total	\$ 487,576	\$ 516,461	\$ 28,885	5.9%
Actuarial Accrued Liability (AAL)			\$	%
	Retained Actuary	VIA Replication	Difference	Difference
Active members				
Retirement annuities	\$ 953,923	\$ 938,890	\$ (15,033)	-1.6%
Disability benefits	22,469	21,894	(575)	-2.6%
Survivor benefits	6,305	6,233	(72)	-1.1%
Deferred retirements	7,238	4,557	(2,681)	-37.0%
Refunds	(21,093)	(17,285)	3,808	-18.1%
Subtotal	\$ 968,842	\$ 954,289	\$ (14,553)	-1.5%
Deferred retirements	181,808	182,919	1,111	0.6%
Former members without vested rights	12,850	12,793	(57)	-0.4%
Benefit recipients	1,233,924	1,231,975	(1,949)	-0.2%
Total	\$ 2,397,424	\$ 2,381,976	\$ (15,448)	-0.6%

Appendix D – Plan Liability Replications

Normal Cost	Retained Actuary	VIA Replication	\$ Difference	% Difference
Active members				
Retirement annuities	\$ 49,157	\$ 49,702	\$ 545	1.1%
Disability benefits	7,519	7,242	(277)	-3.7%
Survivor benefits	445	445	-	0.0%
Deferred retirements	8,368	8,579	211	2.5%
Refunds	4,608	3,838	(770)	-16.7%
Total	\$ 70,097	\$ 69,806	\$ (291)	-0.4%

Appendix E – Contribution Sufficiency/(Deficiency) Replication

The exhibit below compares our replication of the contribution calculations to the retained actuary's results. We believe that the overall closeness of the results indicates the July 1, 2025 actuarial valuation report calculations are reasonable. All amounts shown are in \$1,000's.

	Retained Actuary		VIA Replication		\$ Difference
Projected annual payroll for FY2025-2026	\$404,253		\$406,020		\$1,767

	% of Payroll	\$ Amount	% of Payroll	\$ Amount	% of Payroll Difference
1. Statutory Contributions - Chapter 352					
a. Employee contributions	9.60%	\$ 38,808	9.60%	\$ 38,978	0.00%
b. Employer contributions	14.40%	58,212	14.40%	58,467	0.00%
c. State contributions	4.45%	17,989	4.45%	18,068	0.00%
d. Total	28.45%	\$ 115,009	28.45%	\$ 115,513	0.00%
2. Required Contributions - Chapter 356					
a. Normal cost					
i. Retirement	12.16%	\$ 49,157	12.24%	\$ 49,702	0.08%
ii. Disability	1.86%	7,519	1.78%	7,242	-0.08%
iii. Survivors	0.11%	445	0.11%	445	0.00%
iv. Deferred retirement	2.07%	8,368	2.11%	8,579	0.04%
v. Refunds	1.14%	4,608	0.95%	3,838	-0.19%
vi. Total	17.34%	\$ 70,097	17.19%	\$ 69,806	-0.15%
b. Supplemental Contribution	7.81%	\$ 31,572	7.76%	\$ 31,507	-0.05%
c. Amortization of UAAL					
Allowance for Expenses	0.33%	1,334	0.33%	1,340	0.00%
d. Total	25.48%	\$ 103,003	25.28%	\$ 102,653	-0.20%
3. Contribution Sufficiency/(Deficiency)	2.97%	\$ 12,006	3.17%	\$ 12,860	0.20%