VIA ACTUARIAL SOLUTIONS

Minnesota Legislative Commission on Pensions and Retirement

Replication of July 1, 2025 Minnesota State Retirement System State 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 State 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 State Employees Retirement Fund (MSRS General 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 General 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."**

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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 General 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 General 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.

Mark W. Schulte, FSA, EA, MAAA
Consulting Actuary

Emily M. Knutson, FSA, EA, MAAA
Consulting Actuary

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Executive Summary

This report summarizes our replication of the July 1, 2025 MSRS General 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 General Plan Actuarial Valuation	VIA Replication	Difference[1]
Participant data			
Active members	57,594	57,594	0.0%
Service retirements	43,282	43,282	0.0%
Survivors	4,925	4,925	0.0%
Disability retirements	1,618	1,618	0.0%
Deferred retirements	19,431	19,431	0.0%
Other non-vested terminations	12,066	12,066	0.0%
Total	**138,916**	**138,916**	0.0%
System assets ($1,000's)			
Market value of assets	$ 19,538,790	$ 19,538,790	0.0%
Actuarial Value of Assets	18,861,933	18,861,933	0.0%
System liabilities ($1,000's)			
Present Value of Future Benefits (PFVB)	23,800,043	23,801,492	0.0%
Present Value of Future Normal Costs (PVFNC)	3,948,348	4,108,440	4.1%
Actuarial Accrued Liability (AAL)	19,851,695	19,693,052	-0.8%
Normal Cost (NC)	484,643	483,105	-0.3%
System contributions (% of payroll)			
Normal cost rate	9.81%	9.74%	-0.07%
UAAL amortization payment	1.53%	1.51%	-0.02%
Expenses	0.30%	0.30%	0.00%
Total required contribution (Chapter 356)	11.64%	11.55%	-0.09%
Statutory contribution rate (Chapter 352)	12.25%	12.25%	0.00%
Contribution sufficiency/(deficiency)	0.61%	0.70%	0.09%

[1] The MSRS General 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 General 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 General 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 General 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 16 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 17-19 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 General 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 PFVB 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.**

Contribution Sufficiency/(Deficiency)

The MSRS General Plan's statutory pension contribution rates are defined in Chapter 352 of Minnesota Statues, 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 General 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 29 through 44. 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 23-25 of the July 1, 2025 actuarial valuation report describes the correct contribution calculation process, and our replication calculations (Appendix F 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 2018-2022 actuarial experience study dated June 29, 2023. 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 2018-2022 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 General 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 General 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 10, 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 General Plan data and the "scrubbed" actuarial data.

Summary of Participant Statistics

	Retained Actuary	System Data	Difference
Active members	**57,594**	**57,594**	**0**
Average age	45.9	45.9	0.0%
Average service	9.6	9.6	0.0%
Average salary	$ 78,711	$ 78,711	0.0%
Service retirements	**43,282**	**43,282**	**0**
Average age	74.2	74.2	0.0%
Average annual annuity	$ 22,100	$ 22,100	0.0%
Survivors	**4,925**	**4,925**	**0**
Average age	76.1	76.1	0.0%
Average annual annuity	$ 19,290	$ 19,283	0.0%
Disability retirements	**1,618**	**1,618**	**0**
Average age	69.6	69.6	0.0%
Average annual annuity	$ 16,239	$ 16,239	0.0%
Deferred retirements	**19,431**	**19,431**	**0**
Average age	51.7	51.7	0.0%
Average annual annuity	$ 8,175	$ 8,175	0.0%
Other non-vested terminations	**12,066**	**12,066**	**0**
Average refund	$ 3,970	$ 3,970	0.0%
Total	**138,916**	**138,916**	**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 16 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	1,489	76	7							**1,572**
Avg pay	42,425	57,935	76,352							**43,326**
25-29	3,191	867	378	1						**4,437**
Avg pay	54,310	62,436	70,203	50,983						**57,251**
30-34	2,897	1,094	1,759	194						**5,944**
Avg pay	63,603	69,956	76,098	83,056						**69,105**
35-39	2,656	996	2,268	1,193	179	3				**7,295**
Avg pay	69,478	78,246	84,294	89,149	92,330	69,358				**79,059**
40-44	2,326	858	2,147	1,499	977	181	3			**7,991**
Avg pay	72,573	81,732	90,068	97,098	96,518	93,413	135,389			**86,280**
45-49	1,683	661	1,679	1,207	1,026	668	209			**7,133**
Avg pay	73,303	82,853	90,623	95,362	100,104	101,485	99,329			**89,254**
50-54	1,383	571	1,360	1,001	865	671	564	89	2	**6,506**
Avg pay	72,243	83,200	90,836	95,785	101,429	100,145	105,075	95,347	86,093	**90,638**
55-59	1,259	514	1,325	1,007	885	690	808	470	152	**7,110**
Avg pay	73,522	82,185	87,596	91,323	95,527	96,655	101,952	106,564	103,020	**90,322**
60-64	726	391	1,000	902	811	661	700	498	651	**6,340**
Avg pay	67,757	79,236	85,828	90,315	92,124	92,893	98,042	99,576	98,160	**89,227**
65-69	266	123	450	373	332	241	210	183	302	**2,480**
Avg pay	58,219	72,136	80,926	87,783	89,199	94,419	92,581	98,858	93,691	**85,369**
70+	156	39	115	107	90	72	57	37	113	**786**
Avg pay	32,786	43,448	77,636	85,858	84,954	91,196	93,443	94,638	89,350	**73,868**
Total	**18,032**	**6,190**	**12,488**	**7,484**	**5,165**	**3,187**	**2,551**	**1,277**	**1,220**	**57,594**
Avg pay	**64,314**	**75,798**	**85,555**	**92,785**	**96,376**	**97,120**	**100,433**	**101,607**	**96,823**	**81,660**

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 17 from the July 1, 2025 actuarial report. We find that the entries compare well to those in the actuarial valuation report.

Years Since Retirement as of July 1, 2025

Age	<1	1-4	5-9	10-14	15-19	20-24	25+	Total
<50				3	4			**7**
Avg benefit				6,408	3,111			**4,524**
50-54		2	1	5	2			**10**
Avg benefit		3,663	4,558	9,656	1,544			**6,325**
55-59	65	158	8	2	3			**236**
Avg benefit	13,844	13,701	5,492	6,577	1,593			**13,248**
60-64	416	1,335	645	32	1		1	**2,430**
Avg benefit	21,879	22,983	20,387	12,707	762		6,224	**21,953**
65-69	1,185	4,505	2,543	999	26			**9,258**
Avg benefit	22,536	21,934	23,862	18,037	12,788			**22,094**
70-74	189	2,382	5,509	3,112	963	19		**12,174**
Avg benefit	21,708	21,998	22,607	23,817	19,413	16,209		**22,521**
75-79	32	359	1,853	4,436	2,492	966	25	**10,163**
Avg benefit	22,640	21,492	21,738	22,915	23,230	19,774	17,920	**22,416**
80-84	2	62	198	932	1,937	1,514	544	**5,189**
Avg benefit	9,484	24,568	19,440	21,604	21,521	22,252	18,930	**21,430**
85-89		9	40	106	326	1,002	1,023	**2,506**
Avg benefit		16,929	17,823	20,667	19,011	20,419	22,035	**20,852**
90+			7	17	31	142	1,112	**1,309**
Avg benefit			13,407	18,492	11,769	15,684	24,260	**22,901**
Total	**1,889**	**8,812**	**10,804**	**9,644**	**5,785**	**3,643**	**2,705**	**43,282**
Avg benefit	**21,997**	**21,954**	**22,525**	**22,492**	**21,640**	**20,803**	**22,281**	**22,100**

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 18 of the July 1, 2025 actuarial report. We find that the entries compare well to those in the actuarial valuation report.

Years Since Retiree Death as of July 1, 2025

Age	<1	1-4	5-9	10-14	15-19	20-24	25+	Total
<45	29	45	29	14	1			**118**
Avg benefit	9,457	11,590	5,773	3,416	13,896			**8,686**
45-49	12	25	17	16	4	1	2	**77**
Avg benefit	9,237	8,291	6,252	8,401	8,078	2,949	18,535	**8,197**
50-54	13	36	16	10	5	1		**81**
Avg benefit	13,314	9,486	4,943	11,133	9,432	29,013		**9,644**
55-59	13	55	28	12	5	4	3	**120**
Avg benefit	13,887	13,729	9,702	9,084	8,147	7,138	7,894	**11,744**
60-64	26	88	53	30	19	6	3	**225**
Avg benefit	18,810	15,871	15,003	9,955	12,961	8,727	5,639	**14,645**
65-69	33	162	126	64	37	18	13	**453**
Avg benefit	22,172	19,395	16,965	14,854	16,972	12,199	7,278	**17,448**
70-74	92	246	211	102	88	42	33	**814**
Avg benefit	21,177	19,531	20,292	20,909	15,872	13,465	12,036	**19,074**
75-79	87	326	215	130	106	85	44	**993**
Avg benefit	21,578	19,793	21,126	20,184	18,613	15,961	16,316	**19,681**
80-84	68	239	194	128	102	69	57	**857**
Avg benefit	21,054	20,999	22,102	17,910	18,132	15,930	18,375	**19,868**
85-89	45	159	133	125	68	59	79	**668**
Avg benefit	22,875	21,624	23,671	23,250	21,735	19,426	21,599	**22,234**
90+	15	104	102	87	73	46	92	**519**
Avg benefit	30,772	26,185	22,271	25,677	27,610	27,525	22,130	**25,063**
Total	**433**	**1,485**	**1,124**	**718**	**508**	**331**	**326**	**4,925**
Avg benefit	**20,110**	**19,395**	**19,652**	**19,277**	**19,136**	**17,420**	**18,641**	**19,290**

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 19 of the July 1, 2025 actuarial report. We find that the entries compare well to those in the actuarial valuation report.

Years Disabled as of July 1, 2025

Age	<1	1-4	5-9	10-14	15-19	20-24	25+	Total
<45	1	7	1					**9**
Avg benefit	8,382	6,511	13,797					**7,528**
45-49	2	5	5	2	2	2		**18**
Avg benefit	9,193	8,606	6,937	4,746	3,184	2,251		**6,470**
50-54	6	12	12	3	3			**36**
Avg benefit	9,347	14,829	9,646	10,440	4,139			**10,931**
55-59	13	28	16	11	9	6	2	**85**
Avg benefit	18,300	15,478	12,435	11,040	7,552	7,561	8,056	**13,189**
60-64	19	82	65	43	34	13	9	**265**
Avg benefit	17,908	17,939	17,261	13,585	10,518	10,341	7,198	**15,374**
65-69	4	61	110	104	49	50	24	**402**
Avg benefit	18,123	18,646	17,647	18,480	16,146	13,544	9,835	**16,859**
70-74	1		31	101	111	64	49	**357**
Avg benefit	7,907		13,471	17,791	19,338	12,716	13,678	**16,395**
75+		1		38	108	158	141	**446**
Avg benefit		5,472		15,704	19,242	16,640	18,173	**17,650**
Total	**46**	**196**	**240**	**302**	**316**	**293**	**225**	**1,618**
Avg benefit	**16,117**	**16,907**	**16,016**	**16,761**	**17,279**	**14,691**	**15,776**	**16,239**

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 12 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	549,156	549,156
Fixed income	4,523,547	4,523,547
Equity and private equity	14,435,976	14,435,976
Other	740,613	740,613
Total Assets in Trust	**20,249,292**	**20,249,292**
Assets Receivable	36,078	36,078
Amounts Payable	(746,580)	(746,580)
Net Assets Held in Trust for Pension Benefits	**$ 19,538,790**	**$ 19,538,790**

Appendix C – Actuarial Value of Assets Replication

The exhibit below compares the retained actuary's July 1, 2025 AVA calculation (see page 14 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**	**19,538,790**	**19,538,790**
2.	Determination of average asset balance		
	a. Total assets at beginning of year	18,137,220	18,137,220
	b. Total assets at end of year	19,538,790	19,538,790
	c. Net investment income for fiscal year	1,943,112	1,943,112
	d. Average balance (a. + b. - c.)/2	17,866,449	17,866,449
3.	Expected return (7.0% x 2.d.)	1,250,651	1,250,651
4.	Actual return	1,943,112	1,943,112
5.	Current year asset gain/(loss) (4. - 3.)	692,461	692,461
6.	Unrecognized asset returns:		
	Original Amount x Unrecognized %		
	a. FYE 2025: $692,461 x 80%	553,969	553,969
	b. FYE 2024: $849,130 x 60%	509,478	509,478
	c. FYE 2023: $207,491 x 40%	82,996	82,996
	d. FYE 2022: ($2,347,928) x 20%	(469,586)	(469,586)
	e. Total unrecognized amount	676,857	676,857
7.	**AVA at end of year (1. - 6.e.)**	**$ 18,861,933**	**$ 18,861,933**

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. The percent difference is not shown in situations comparing negative and positive liability amounts.

Present Value of Benefits (PVB) Liability	**Retained Actuary**	**VIA Replication**	**$ Difference**	**% Difference**
Active members				
Retirement annuities	$ 10,291,232	$ 10,252,825	$ (38,407)	-0.4%
Disability benefits	216,513	214,242	(2,271)	-1.0%
Survivor benefits	126,867	122,545	(4,322)	-3.4%
Deferred retirements	603,217	625,682	22,465	3.7%
Refunds	33,794	35,727	1,933	5.7%
Subtotal	$ 11,271,623	$ 11,251,021	$ (20,602)	-0.2%
Deferred retirements	1,148,438	1,154,294	5,856	0.5%
Former members without vested rights	29,207	28,792	(415)	-1.4%
Benefit recipients	11,334,862	11,351,440	16,578	0.1%
Contingent actuarial accrued liability - Unclassified Plan	15,913	15,945	32	0.2%
Total	**$ 23,800,043**	**$ 23,801,492**	**$ 1,449**	**0.0%**

Present Value of Future Normal Costs (PVFNC)	**Retained Actuary**	**VIA Replication**	**$ Difference**	**% Difference**
Active members				
Retirement annuities	$ 3,081,785	$ 3,243,928	$ 162,143	5.3%
Disability benefits	98,025	101,776	3,751	3.8%
Survivor benefits	45,908	45,084	(824)	-1.8%
Deferred retirements	607,528	617,008	9,480	1.6%
Refunds	115,102	100,644	(14,458)	-12.6%
Total	**$ 3,948,348**	**$ 4,108,440**	**$ 160,092**	**4.1%**

Actuarial Accrued Liability (AAL)	**Retained Actuary**	**VIA Replication**	**$ Difference**	**% Difference**
Active members				
Retirement annuities	$ 7,209,447	$ 7,008,897	$ (200,550)	-2.8%
Disability benefits	118,488	112,466	(6,022)	-5.1%
Survivor benefits	80,959	77,461	(3,498)	-4.3%
Deferred retirements	(4,311)	8,674	12,985	N/A
Refunds	(81,308)	(64,917)	16,391	-20.2%
Subtotal	$ 7,323,275	$ 7,142,581	$ (180,694)	-2.5%
Deferred retirements	1,148,438	1,154,294	5,856	0.5%
Former members without vested rights	29,207	28,792	(415)	-1.4%
Benefit recipients	11,334,862	11,351,440	16,578	0.1%
Contingent actuarial accrued liability - Unclassified Plan	15,913	15,945	32	0.2%
Total	$ 19,851,695	$ 19,693,052	**$ (158,643)**	**-0.8%**

Normal Cost	Retained Actuary	VIA Replication	$ Difference	% Difference
Active members				
Retirement annuities	$ 390,283	$ 392,693	$ 2,410	0.6%
Disability benefits	10,869	10,824	(45)	-0.4%
Survivor benefits	5,434	5,319	(115)	-2.1%
Deferred retirements	64,224	62,445	(1,779)	-2.8%
Refunds	13,833	11,824	(2,009)	-14.5%
Total	**$ 484,643**	**$ 483,105**	**$ (1,538)**	**-0.3%**

Appendix E – Special Groups

The exhibits below compare our replication of the special groups included the July 1, 2025 MSRS General Plan actuarial valuation report. We matched the participant counts for the Military Affairs and Fire Marshals special groups to those determined by the retained actuary. Because of the limited number of participants, the liability was not replicated.

Military Affairs

	Retained Actuary	VIA Replication
Number of active members	17	17
Average age	37.0	37.0
Average service	2.9	2.9

Fire Marshals

	Retained Actuary	VIA Replication
Number of active members	11	11
Average age	49.2	49.2
Average service	9.0	9.0

Unclassified Plan

The exhibits below compare our replication of the Unclassified Plan contingent liability to those calculated by the retained actuary.

	Retained Actuary	VIA Replication
Number of active members	1,245	1,245
Average age	43.2	43.2
Average service	6.8	6.8
Average Unclassified Plan account balance	$136,974	$136,974

		Retained Actuary	VIA Replication	$ Difference	% Difference
1.	Number of active members	1,245	1,245	0	0%
2.	Account balances for active eligible members	170,532	170,532	0	0%
3.	Accrued liability for active members	186,445	186,477	32	0%
4.	Contingent liability (3. - 2.)	15,913	15,945	32	0%

Appendix F – 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	$4,940,289	$4,957,801	$17,512

	% of Payroll	$ Amount	% of Payroll	$ Amount	% of Payroll Difference
1. Statutory Contributions - Chapter 352					
a. Employee contributions	6.00%	$ 296,417	6.00%	$ 297,468	0.00%
b. Employer contributions	6.25%	308,768	6.25%	309,863	0.00%
c. State contributions	0.00%	0	0.00%	0	0.00%
d. Total	12.25%	$ 605,185	12.25%	$ 607,331	0.00%
2. Required Contributions - Chapter 356					
a. Normal cost					
i. Retirement	7.90%	$ 390,283	7.91%	$ 392,693	0.01%
ii. Disability	0.22%	10,869	0.22%	10,824	0.00%
iii. Survivors	0.11%	5,434	0.11%	5,319	0.00%
iv. Deferred retirement	1.30%	64,224	1.26%	62,445	-0.04%
v. Refunds	0.28%	13,833	0.24%	11,824	-0.04%
vi. Total	9.81%	$ 484,643	9.74%	$ 483,105	-0.07%
b. Supplemental Contribution Amortization of UAAL	1.53%	$ 75,586	1.51%	$ 74,863	-0.02%
c. Allowance for Expenses	0.30%	14,821	0.30%	14,873	0.00%
d. Total	11.64%	$ 575,050	11.55%	$ 572,841	-0.09%
3. Contribution Sufficiency/(Deficiency)	0.61%	$ 30,135	0.70%	$ 34,490	0.09%