

Minnesota Legislative Commission on Pensions and Retirement

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

June 30, 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 Patrol 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 Patrol Retirement Fund (MSRS State Patrol 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 the 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 State Patrol 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 State Patrol 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 State Patrol 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 State Patrol 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 State Patrol Plan Actuarial Valuation	VIA Replication	Difference ¹
Participant data			
Active members	1,008	1,008	0.0%
Service retirements	945	945	0.0%
Survivors	156	156	0.0%
Disability retirements	99	99	0.0%
Deferred retirements	81	81	0.0%
Other non-vested terminations	69	69	0.0%
Total	2,358	2,358	0.0%
System assets (\$1,000's)			
Market value of assets	\$ 1,155,556	\$ 1,155,556	0.0%
Actuarial Value of Assets	1,114,694	1,114,694	0.0%
System liabilities (\$1,000's)			
Present Value of Future Benefits (PFVB)	1,661,470	1,666,249	0.3%
Present Value of Future Normal Costs (PVFNC)	344,680	350,792	1.8%
Actuarial Accrued Liability (AAL)	1,316,790	1,315,457	-0.1%
Normal Cost (NC)	38,008	37,772	-0.6%
System contributions (% of payroll)			
Normal cost rate	27.60%	27.32%	-0.28%
UAAL amortization payment	9.59%	9.55%	-0.04%
Expenses	0.21%	0.21%	0.00%
Total required contribution (Chapter 356)	37.40%	37.08%	-0.32%
Statutory contribution rate (Chapter 352B)	47.90%	47.89%	-0.01%
Contribution sufficiency/(deficiency)	10.50%	10.81%	0.31%

¹ The MSRS State Patrol 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 State Patrol 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 State Patrol 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 State Patrol 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 State Patrol 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.**

Contribution Sufficiency/(Deficiency)

The MSRS State Patrol Plan's statutory pension contribution rates are defined in Chapter 352B 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 State Patrol 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 and the increase in UAAL due to the change in post-retirement benefit increases enacted in 2025 are 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 352B describes the retirement benefits provided to MSRS State Patrol 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 State Patrol 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 State Patrol Plan data and the “scrubbed” actuarial data.

Summary of Participant Statistics

	Retained Actuary	System Data	Difference
Active members	1,008	1,008	0
Average age	40.5	40.5	0.0%
Average service	10.6	10.6	0.0%
Average salary	\$ 126,664	\$ 126,664	0.0%
Service retirements	945	945	0
Average age	70.0	70.0	0.0%
Average annual annuity	\$ 62,941	\$ 62,941	0.0%
Survivors	156	156	0
Average age	71.0	71.0	0.0%
Average annual annuity	\$ 39,883	\$ 39,883	0.0%
Disability retirements	99	99	0
Average age	57.8	57.8	0.0%
Average annual annuity	\$ 49,552	\$ 49,552	0.0%
Deferred retirements	81	81	0
Average age	46.2	46.2	0.0%
Average annual annuity	\$ 28,375	\$ 28,375	0.0%
Other non-vested terminations	69	69	0
Average refund	\$ 18,248	\$ 18,248	0.0%
Total	2,358	2,358	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.

Age	Years of Service as of July 1, 2025									Total
	<3	3-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	
<25	31									31
Avg pay	88,576									88,576
25-29	68	26	17							111
Avg pay	98,030	104,478	119,417							102,816
30-34	43	27	71	18						159
Avg pay	106,430	109,458	123,963	138,801						118,438
35-39	25	15	58	59	10					167
Avg pay	113,145	118,580	125,087	138,757	142,219					128,570
40-44	30	8	45	41	32	9				165
Avg pay	120,721	124,149	136,683	142,131	132,279	145,981				134,180
45-49	18	9	26	21	21	49	13			157
Avg pay	130,039	135,173	137,457	140,385	150,379	158,396	153,056			146,422
50-54	5	4	17	14	28	42	56	1		167
Avg pay	120,410	143,465	135,931	134,798	145,048	151,242	153,435	152,381		146,899
55-59	2	3	5	7	10	8	12	3		50
Avg pay	131,908	139,356	144,531	135,019	136,954	145,013	143,576	165,956		142,002
60-64						1				1
Avg pay						154,532				154,532
65-69										
Avg pay										
70+										
Avg pay										
Total	222	92	239	160	101	109	81	4		1,008
Avg pay	106,510	115,784	129,057	139,330	141,029	153,597	151,913	162,562		130,333

Most entries compare well with those shown in the actuarial valuation report. The exceptions are for average pay amounts in the "< 25" and "25-29" age bands in the "< 3" years of service category. We confirmed with the retained actuary that there was a small error in their data used to calculate these amounts. However, this discrepancy only affected the exhibit on page 17 of the actuarial valuation report and did not affect any of the actuarial liabilities or results shown elsewhere in the report.

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.

Years Since Retirement as of July 1, 2025								
Age	<1	1-4	5-9	10-14	15-19	20-24	25+	Total
<50								
Avg benefit								
50-54	3	5						8
Avg benefit	31,150	50,606						43,310
55-59	36	78	15					129
Avg benefit	80,298	71,122	26,298					68,471
60-64	5	24	109	30	1			169
Avg benefit	47,966	56,908	60,239	53,036	48,258			58,053
65-69		6	45	119	24			194
Avg benefit		39,406	57,020	65,240	46,888			60,264
70-74		2	3	40	88	18		151
Avg benefit		14,643	30,692	58,875	60,518	53,023		57,989
75-79					22	78	15	115
Avg benefit					58,504	61,831	64,371	61,526
80-84					5	18	76	99
Avg benefit					44,128	66,904	69,676	67,881
85-89						1	45	46
Avg benefit						13,725	75,729	74,381
90+							34	34
Avg benefit							83,062	83,062
Total	44	115	172	189	140	115	170	945
Avg benefit	73,273	64,626	55,921	61,956	57,192	60,828	73,487	62,941

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	2	8	5					15
Avg benefit	30,389	17,673	19,020					19,817
45-49		1	2					3
Avg benefit		46,885	46,147					46,393
50-54	1	1	1		3	2		8
Avg benefit	53,945	54,400	50,916		18,513	36,525		35,981
55-59			1					1
Avg benefit			61,852					61,852
60-64		2	2			2	1	7
Avg benefit		52,126	54,399			26,649	68,193	47,791
65-69	2	2	2	1		1	2	10
Avg benefit	41,319	31,592	46,623	29,343		15,600	30,287	34,458
70-74	1	2	5	3	2	3		16
Avg benefit	42,265	58,712	60,452	29,424	50,640	44,544		49,071
75-79	2	10	9	2	4	8	4	39
Avg benefit	45,960	54,760	45,705	33,238	39,252	23,558	49,307	42,565
80-84	3	6	3	4	2	6	3	27
Avg benefit	42,935	43,704	34,332	35,854	32,094	49,277	37,083	41,057
85-89		4	2	4	1	3	5	19
Avg benefit		48,868	35,366	41,543	56,230	39,205	30,511	39,935
90+		1	1	1		3	5	11
Avg benefit		30,000	58,082	32,035		41,601	39,808	40,360
Total	11	37	33	15	12	28	20	156
Avg benefit	41,850	42,239	43,867	35,048	36,187	35,790	39,442	39,883

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		10	1					11
Avg benefit		54,670	28,624					52,302
45-49	2	14	1	1				18
Avg benefit	24,197	53,724	49,894	54,972				50,300
50-54	1	10	2		1			14
Avg benefit	49,083	56,492	47,360		33,796			53,037
55-59		6	6	3	1			16
Avg benefit		57,093	56,092	43,841	41,368			53,250
60-64			3	5	5		1	14
Avg benefit			36,784	62,109	49,193		31,567	49,888
65-69				2	1	1		4
Avg benefit				37,890	50,893	46,144		43,204
70-74					2	4	5	11
Avg benefit					47,308	43,806	38,531	42,045
75+						8	3	11
Avg benefit						39,815	59,397	45,156
Total	3	40	13	11	10	13	9	99
Avg benefit	32,493	55,158	47,703	52,075	46,664	41,530	44,713	49,552

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	34,769	34,769
Fixed income	264,230	264,230
Equity and private equity	855,565	855,565
Other	42,609	42,609
Total Assets in Trust	1,197,173	1,197,173
 Assets Receivable	 2,218	 2,218
 Amounts Payable	 (43,835)	 (43,835)
 Net Assets Held in Trust for Pension Benefits	 \$ 1,155,556	 \$ 1,155,556

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	1,155,556	1,155,556
2. Determination of average asset balance		
a. Total assets at beginning of year	1,052,966	1,052,966
b. Total assets at end of year	1,155,556	1,155,556
c. Net investment income for fiscal year	113,875	113,875
d. Average balance (a. + b. - c.)/2	<u>1,047,324</u>	<u>1,047,324</u>
3. Expected return (7.0% x 2.d.)	73,313	73,313
4. Actual return	<u>113,875</u>	<u>113,875</u>
5. Current year asset gain/(loss) (4. - 3.)	40,562	40,562
6. Unrecognized asset returns:		
Original Amount x Unrecognized %		
a. FYE 2025: \$40,562 x 80%	32,450	32,450
b. FYE 2024: \$49,724 x 60%	29,834	29,834
c. FYE 2023: \$11,765 x 40%	4,706	4,706
d. FYE 2022: (\$130,640) x 20%	<u>(26,128)</u>	<u>(26,128)</u>
e. Total unrecognized amount	40,862	40,862
7. AVA at end of year (1. - 6.e.)	\$ 1,114,694	\$ 1,114,694

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	\$ 720,256	\$ 728,503	\$ 8,247	1.1%
Disability benefits	90,520	88,903	(1,617)	-1.8%
Survivor benefits	9,491	9,864	373	3.9%
Deferred retirements	14,527	15,694	1,167	8.0%
Refunds	4,376	4,136	(240)	-5.5%
Subtotal	\$ 839,170	\$ 847,100	\$ 7,930	0.9%
Deferred retirements	22,529	22,630	101	0.4%
Former members without vested rights	1,066	1,058	(8)	-0.8%
Benefit recipients	798,705	795,461	(3,244)	-0.4%
Total	\$ 1,661,470	\$ 1,666,249	\$ 4,779	0.3%

Present Value of Future Normal Costs (PVFNC)				
Liability	Retained Actuary	VIA Replication	\$ Difference	% Difference
Active members				
Retirement annuities	\$ 260,148	\$ 267,008	\$ 6,860	2.6%
Disability benefits	57,452	56,189	(1,263)	-2.2%
Survivor benefits	7,441	7,847	406	5.5%
Deferred retirements	13,168	13,650	482	3.7%
Refunds	6,471	6,098	(373)	-5.8%
Total	\$ 344,680	\$ 350,792	\$ 6,112	1.8%

Actuarial Accrued Liability (AAL)				
Liability	Retained Actuary	VIA Replication	\$ Difference	% Difference
Active members				
Retirement annuities	\$ 460,108	\$ 461,495	\$ 1,387	0.3%
Disability benefits	33,068	32,714	(354)	-1.1%
Survivor benefits	2,050	2,017	(33)	-1.6%
Deferred retirements	1,359	2,044	685	50.4%
Refunds	(2,095)	(1,962)	133	-6.3%
Subtotal	\$ 494,490	\$ 496,308	\$ 1,818	0.4%
Deferred retirements	22,529	22,630	101	0.4%
Former members without vested rights	1,066	1,058	(8)	-0.8%
Benefit recipients	798,705	795,461	(3,244)	-0.4%
Total	\$ 1,316,790	\$ 1,315,457	\$ (1,333)	-0.1%

Appendix D – Plan Liability Replications

Normal Cost	Retained Actuary	VIA Replication	\$ Difference	% Difference
Active members				
Retirement annuities	\$ 28,671	\$ 28,750	\$ 79	0.3%
Disability benefits	6,458	6,187	(271)	-4.2%
Survivor benefits	799	819	20	2.5%
Deferred retirements	1,460	1,456	(4)	-0.3%
Refunds	620	560	(60)	-9.7%
Total	\$ 38,008	\$ 37,772	\$ (236)	-0.6%

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	\$137,707		\$138,282		\$575

	% of Payroll	\$ Amount	% of Payroll	\$ Amount	% of Payroll Difference
1. Statutory Contributions - Chapter 352B					
a. Employee contributions	15.40%	\$ 21,207	15.40%	\$ 21,295	0.00%
b. Employer contributions	23.10%	31,810	23.10%	31,943	0.00%
c. Employer supplemental contributions	7.00%	9,639	7.00%	9,680	0.00%
d. State contributions	2.40%	3,300	2.39%	3,300	-0.01%
e. Total	47.90%	\$ 65,956	47.89%	\$ 66,218	-0.01%
2. Required Contributions - Chapter 356					
a. Normal cost					
i. Retirement	20.82%	\$ 28,671	20.80%	\$ 28,750	-0.02%
ii. Disability	4.69%	6,458	4.47%	6,187	-0.22%
iii. Survivors	0.58%	799	0.59%	819	0.01%
iv. Deferred retirement	1.06%	1,460	1.05%	1,456	-0.01%
v. Refunds	0.45%	620	0.41%	560	-0.04%
vi. Total	27.60%	\$ 38,008	27.32%	\$ 37,772	-0.28%
b. Supplemental Contribution	9.59%	\$ 13,206	9.55%	\$ 13,206	-0.04%
c. Amortization of UAAL					
d. Allowance for Expenses	0.21%	289	0.21%	290	0.00%
e. Total	37.40%	\$ 51,503	37.08%	\$ 51,268	-0.32%
3. Contribution Sufficiency/(Deficiency)	10.50%	\$ 14,453	10.81%	\$ 14,950	0.31%