Public Employees Retirement Association of Minnesota

Actuarial Valuation Reports as of July 1, 2022

Public Employees Retirement Association of Minnesota

General Employees Retirement Plan
Actuarial Valuation Report as of July 1, 2022

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November 8, 2022

Public Employees Retirement Association of Minnesota
Trustees of the General Employees Retirement Plan
St. Paul, Minnesota

Dear Trustees of the General Employees Retirement Plan:

The results of the July 1, 2022 annual actuarial valuation of the General Employees Retirement Plan are presented in this report. This report was prepared at the request of the Board and is intended for use by the Board and staff and those designated or approved by the Board. This report may be provided to parties other than the Board and staff only in its entirety and only with permission of the Board. GRS is not responsible for unauthorized use of this report.

The purpose of the valuation is to measure the Plan's funding progress and to determine the required contribution rate for the fiscal year beginning July 1, 2022 according to the prescribed assumptions. Note that the impact of GASB Statements No. 67 and No. 68 is provided in a separate report.

Actuarial assumptions, including discount rates, mortality tables and others identified in this report, are prescribed by Minnesota Statutes Section 356.215, the Legislative Commission on Pensions and Retirement (LCPR), and the Trustees. These parties are responsible for selecting the plan's funding policy, actuarial valuation methods, asset valuation methods, and assumptions. The policies, methods and assumptions used in this valuation are those that have been so prescribed and are described in the Actuarial Basis section of this report. PERA is solely responsible for communicating to GRS any changes required thereto.

In our professional judgment, the statutory investment return assumption of 7.5% used in the report deviates materially from the guidance set forth in Actuarial Standards of Practice No. 27 (ASOP No. 27). In a 2022 analysis of long-term rate of investment return and inflation assumptions, GRS suggested that an investment return assumption in the range of 5.64% to 6.84% would be reasonable for this valuation. Please see our letter dated July 12, 2022 for additional information. For informational purposes, note that results based on a 6.50% investment return assumption are shown on page 6.

The contribution rate in this report is determined using the actuarial assumptions and methods disclosed in the Actuarial Basis section of this report. This report includes risk metrics on pages 7 through 10, but does not include a more robust assessment of the risks of future experience differing materially from the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment.

The valuation assumed the continuing ability of the plan sponsor to make the contributions necessary to fund this plan. A determination regarding whether or not the plan sponsor is actually able to do so is outside our scope of expertise and was not performed.

The findings in this report are based on data and other information through June 30, 2022. The valuation was based upon information furnished by the Public Employees Retirement Association of Minnesota (PERA), concerning benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by PERA.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of such future measurements.

This report should not be relied on for any purpose other than the purpose described herein. Determinations of the financial results associated with the benefits described in this report in a manner other than the intended purpose may produce significantly different results.

This report reflects the impact of COVID-19 through June 30, 2022. It does not reflect the ongoing impact of COVID-19, which is likely to influence demographic and investment experience, at least in the short term. We will continue to monitor these developments and their impact on the plan.

This report was prepared using our proprietary valuation model and related software which, in our professional judgment, has the capability to provide results that are consistent with the purposes of the valuation and has no material limitations or known weaknesses. We performed tests to ensure that the model reasonably represents that which is intended to be modeled.

The signing actuaries are independent of the plan sponsor. We are not aware of any relationship that would impair the objectivity of our work.

Brian B. Murphy, Bonita J. Wurst and Sheryl L. Christensen are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. In addition, GRS meets the requirements of "approved actuary" under Minnesota Statutes Section 356.215, Subdivision 1, Paragraph (c).

This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. To the best of our knowledge and belief, the information contained in this report is accurate and fairly presents the actuarial position of the General Employees Retirement Plan as of the valuation date and was performed in accordance with the requirements of Minnesota Statutes Section 356.215, and the requirements of the Standards for Actuarial Work established by the LCPR. All calculations have been made in conformity with generally accepted actuarial principles and practices, with the Actuarial Standards of Practice issued by the Actuarial Standards Board, and with applicable statutes.

We are available to answer any questions or provide further details.

Respectfully submitted,
Gabriel, Roeder, Smith & Company

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Bonita J. Wurst

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Sheryl Christensen

Sheryl L. Christensen, FSA, EA, FCA, MAAA

BBM/BJW:sc

Other Observations

General Implications of Contribution Allocation Procedure or Funding Policy on Future Expected Plan Contributions and Funded Status

Given the plan's contribution allocation procedure, if there are no changes in benefits, Chapter 356 required contributions are made, and all actuarial assumptions are met (including the assumption of the plan earning 7.50% on an actuarial value of assets, as prescribed by statutes), it is expected that:

(1) The normal cost of the plan is expected to remain approximately level as a percent of pay;
(2) The funded status of the plan is expected to gradually improve and is expected to be 100% funded within the next 26 years; and
(3) The unfunded liability is expected to grow initially as a dollar amount before beginning to decline.

Limitations of Funded Status Measurements

Unless otherwise indicated, a funded status measurement presented in this report is based upon the actuarial accrued liability and the actuarial value of assets. Unless otherwise indicated, with regard to any funded status measurements presented in this report:

(1) The measurement is inappropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations; in other words, of transferring the obligations to an unrelated third party in an arm's length market value type transaction.
(2) The measurement is dependent upon the actuarial cost method which, in combination with the plan's amortization policy, affects the timing and amounts of future contributions. The amounts of future contributions will most certainly differ from those assumed in this report due to future actual experience differing from assumed experience based upon the actuarial assumptions. A funded status measurement in this report of 100% is not synonymous with no required future contributions. If the funded status were 100%, the plan would still require future normal cost contributions (i.e., contributions to cover the cost of the active membership accruing an additional year of service credit).
(3) The measurement would produce a different result if the market value of assets were used instead of the actuarial value of assets.

Limitations of Project Scope

Actuarial standards do not require the actuary to evaluate the ability of the plan sponsor or other contributing entity to make required contributions to the plan when due. Such an evaluation was not within the scope of this project and is not within the actuary's domain of expertise. Consequently, the actuary performed no such evaluation.

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Summary of Valuation Results

Contributions

The following table summarizes important contribution information as described in the Development of Costs section.

Contributions	Actuarial Valuation as of July 1, 2022	July 1, 2021
Statutory Contributions - Chapter 353 (% of Payroll)	14.51%	14.53%
Required Contributions - Chapter 356 (% of Payroll)	11.25%	11.73%
Sufficiency/(Deficiency)	3.26%	2.80%

Statutory contributions represent the amount actually contributed to the fund and include fixed percentage of payroll contributions plus any supplemental contributions. Required contributions are defined in statutes and the LCPR Standards for Actuarial Work, and represent the amount needed to fully fund the plan within 26 years (normal cost, expenses, and a payment to amortize the unfunded liability). When member contributions of 6.50% of pay are reflected, the remaining employer statutory contribution is 8.01% of pay, and the remaining employer required contribution is 4.75% of pay.

The statutory contribution sufficiency improved from 2.80% of payroll to 3.26% of payroll. The increase is primarily due to recognition of deferred investment gains in the actuarial value of assets.

Based on the actuarial value of assets, scheduled contribution rates, and actuarial assumptions described in this report, statutory contributions are expected to bring the plan to full funding within the 26-year amortization period.

These results are based on the statutory return assumption of 7.50%, which in our professional judgment, deviates significantly from guidance in ASOP No. 27. If an investment return assumption within the reasonable range were used in this valuation instead of 7.50%, liabilities and required contributions would be higher than shown, and the contribution sufficiency would be lower than shown, and possibly even become deficiency (see 6.5% interest rate results on page 6).

The Plan Assets section provides detail on the plan assets used for the valuation including a development of the Actuarial Value of Assets (AVA). The Market Value of Assets (MVA) earned approximately -6.3% for the plan year ending June 30, 2022. The AVA earned approximately 9.3% for the plan year ending June 30, 2022 compared to the assumed rate of 7.50%.

Participant reconciliation and statistics are detailed in the Membership Data section. The Actuarial Basis section includes a summary of plan provisions and actuarial methods and assumptions used for the calculations in this report.

Accounting information prepared according to GASB Statements No. 67 and No. 68 will be provided in a separate report.

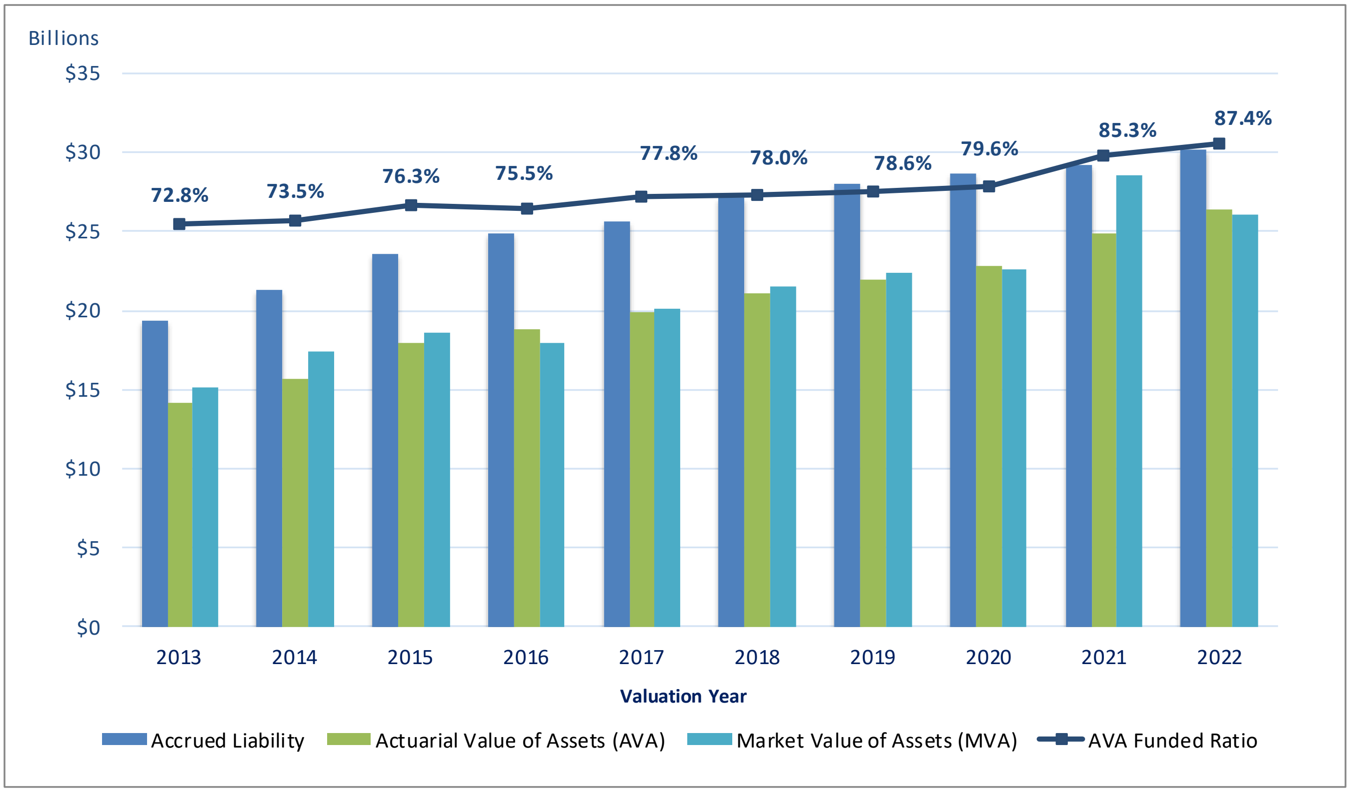
Summary of Valuation Results

A summary of principal valuation results from the current valuation and the prior valuation follows. Any changes in Plan provisions, actuarial assumptions or valuation methods and procedures between the two valuations are described after the summary.

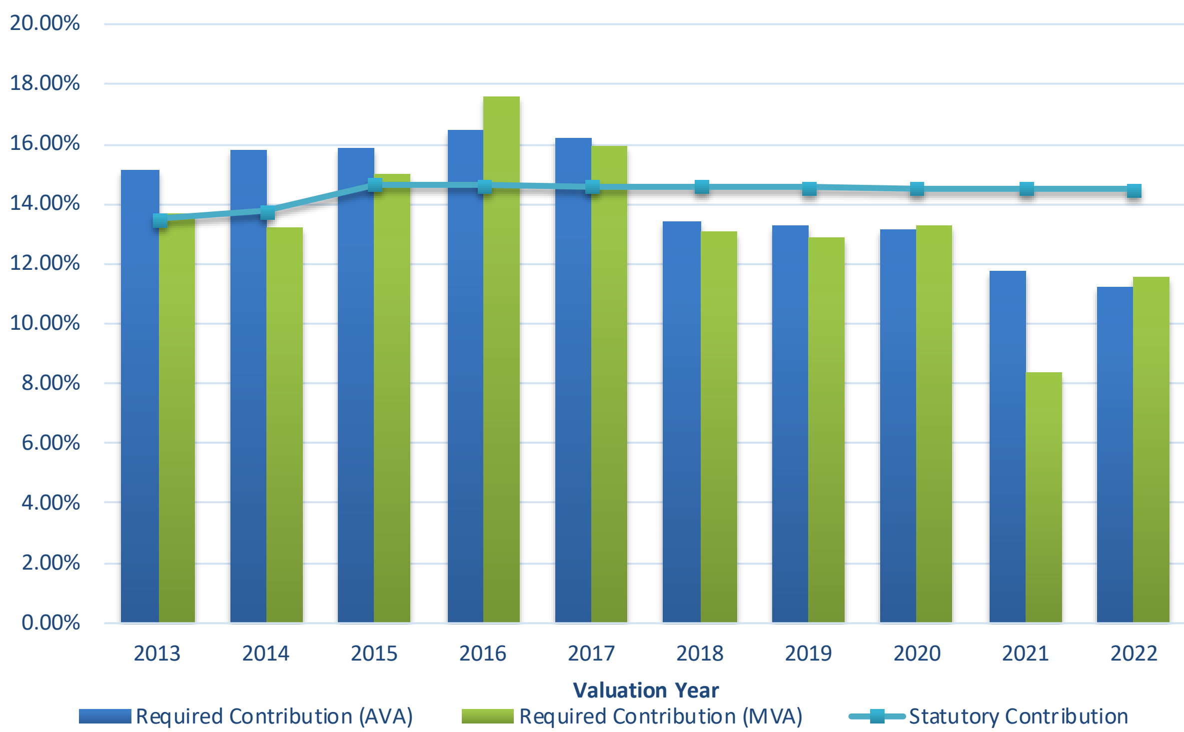
	Actuarial Valuation as of	
	July 1, 2022	July 1, 2021
Contributions (*% of Payroll*)		
Statutory - Chapter 353	14.51%	14.53%
Required - Chapter 356	11.25%	11.73%
Sufficiency/(Deficiency)	3.26%	2.80%
Funding Ratios (*dollars in thousands*)		
Accrued Benefit Funding Ratio		
- Current assets (AVA)	$ 26,397,045	$ 24,909,060
- Current benefit obligations	$ 28,766,826	$ 27,822,964
- Funding ratio	91.76%	89.53%
Accrued Liability Funding Ratio		
- Current assets (AVA)	$ 26,397,045	$ 24,909,060
- Market value of assets (MVA)	$ 26,034,185	$ 28,587,653
- Actuarial accrued liability	$ 30,189,649	$ 29,215,560
- Funding ratio (AVA)	87.44%	85.26%
- Funding ratio (MVA)	86.24%	97.85%
Projected Benefit Funding Ratio		
- Current and expected future assets	$ 37,888,799	$ 36,170,001
- Current and expected future benefit obligations	$ 34,264,018	$ 33,116,896
- Projected benefit funding ratio	110.58%	109.22%
Participant Data		
Active members		
- Number	149,987	149,281
- Actual covered payroll (GASB) *(000s)*	$ 7,042,154	$ 6,761,354
- Annual valuation earnings *(000s)*	$ 6,895,502	$ 6,635,540
- Average annual valuation earnings	$ 45,974	$ 44,450
- Projected annual earnings *(000s)*	$ 7,211,205	$ 6,938,337
- Average projected annual earnings	$ 48,079	$ 46,478
- Average age	45.9	46.2
- Average service	9.3	9.6
Service retirements	103,121	99,441
Survivors	9,370	9,214
Disability retirements	3,489	3,577
Deferred retirements	68,636	66,048
Non-vested terminations eligible for refund only	84,675	81,052
Total	**419,278**	**408,613**

Summary of Valuation Results

Funded Ratio History



Contribution Rate History (% of Pay)



Summary of Valuation Results

Effects of Changes

The following change in actuarial assumptions was recognized as of July 1, 2022:

- The mortality projection scale was updated from MP-2020 to MP-2021.

The assumption change increased the unfunded accrued liability by $59 million and increased the total required contribution by 0.06% of pay, as follows:

($ in billions)	Before Changes	After Changes
Normal Cost Rate, % of Pay	7.64%	7.65%
Amortization of Unfunded Accrued Liability,		
Level % of Pay to 2048	3.36%	3.41%
Expenses (% of Pay)	0.19%	0.19%
Total Required Contribution, % of Pay	11.19%	11.25%
Accrued Liability Funding Ratio	87.6%	87.4%
Projected Benefit Funding Ratio	110.8%	110.6%
Unfunded Actuarial Accrued Liability	$3.7	$3.8

Summary of Valuation Results

Valuation of Future Post-Retirement Benefit Increases

The 2018 Omnibus Pension Bill, which was passed during the 2018 legislative session, revised the post-retirement benefit increases payable to retirees in the General Employees Retirement Plan (GERP). Effective January 1, 2019, benefit recipients receive a future annual post-retirement benefit increase equal to 50% of the Social Security Cost of Living Adjustment, not less than 1% and not more than 1.5%.

To determine an assumption regarding a future change in the post-retirement benefit increase, we examined the capital market inflation assumptions for 14 investment firms based on the GRS Capital Market Assumption Modeler (CMAM). Because GRS is a benefits consulting firm and does not develop or maintain its own capital market expectations, we request and monitor forward-looking expectations developed by several major investment firms. We update our CMAM on an annual basis. The capital market assumptions in the 2019 CMAM that were the basis for this analysis are from the following investment firms (in alphabetical order): Aon, BlackRock, BNY Mellon, Callan, Cambridge, JPMorgan, Marquette, Meketa, Mercer, NEPC, RVK, Veras, Voya, and Wilshire.

The average assumption for inflation was 2.24%, with a range of 1.70% to 3.00%, and the standard deviation was 1.79% (note that not every investment firm provided a standard deviation).

We normalized these parameters slightly so that they would correspond to the current inflation assumption of 2.25%. Then, based on a Monte Carlo simulation (1,000 simulations) of the post-retirement benefit increases as described above, we determined that an annual COLA assumption of 1.25% would be appropriate to model the effect of the post-retirement benefit increases. This is only an assumption; actual increases will depend on actual experience.

Actual benefit increases since this plan provision was enacted are summarized in the table below:

Effective Date	Benefit Increase
January 1, 2019	1.4%
January 1, 2020	1.0%
January 1, 2021	1.0%
January 1, 2022	1.5%

The January 1, 2023 benefit increase of 1.5% will first be reflected in the valuation as of July 1, 2023.

Summary of Valuation Results

Sensitivity Tests

During the 2017 legislative session, the Legislative Commission on Pensions and Retirement (LCPR) enacted a new sensitivity disclosure requirement for PERA's valuations. Per the LCPR's requirement, we have calculated the liabilities associated with the following scenarios:

1) 6.50% interest rate assumption
2) 8.50% interest rate assumption

We also included an alternate post-retirement benefit increase scenario for informational purposes. The maximum benefit increase paid under current plan provisions is 1.5% per year. The financial impact of a 1.5% post-retirement benefit increase compared to the baseline assumption of 1.25% is shown below.

In each case, all other assumptions were unchanged from those used to develop the final valuation results in this report. Note that we believe the 7.50% and 8.50% interest rate assumptions do not comply with Actuarial Standards of Practice.

$ in billions	Final Valuation Assumptions (7.5% Interest)	Final Valuation Assumptions with 6.5% Interest	Final Valuation Assumptions with 8.5% Interest	Final Valuation Assumptions with 1.5% COLA for All Future Years
Normal Cost Rate, % of Pay	7.65%	9.38%	6.39%	7.77%
Amortization of Unfunded Accrued Liability, Level % of Pay to 2048	3.41%	6.14%	0.68%	4.00%
Expenses, % of Pay	0.19%	0.19%	0.19%	0.19%
Total Required Contribution, % of Pay	11.25%	15.71%	7.26%	11.96%
Contribution Sufficiency/(Deficiency), % of Pay	3.26%	-1.20%	7.25%	2.55%
Accrued Liability Funding Ratio	87.4%	77.7%	97.5%	85.6%
Present Value of Projected Benefits	$34.3	$39.4	$30.3	$35.0
Present Value of Future Normal Costs	4.1	5.4	3.2	4.2
Actuarial Accrued Liability	$30.2	$34.0	$27.1	$30.8
Unfunded Accrued Liability	$ 3.8	$ 7.6	$ 0.7	$ 4.4

Summary of Valuation Results

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

The determination of the accrued liability and the actuarially determined contribution requires the use of assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the actuarially determined contribution that result from the differences between actual experience and the actuarial assumptions.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions due to changing conditions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the Plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the plan's future financial condition include:

1. **Investment Risk** – actual investment returns may differ from the expected returns;
2. **Asset/Liability Mismatch** – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
3. **Contribution Risk** – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. **Salary and Payroll Risk** – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. **Longevity Risk** – members may live longer or shorter than expected and receive pensions for a period of time other than assumed; and
6. **Other Demographic Risks** – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example, if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise, if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

Summary of Valuation Results

The Required Contribution rate shown on page 1 may be considered as a minimum contribution rate that complies with Minnesota Statutes and the requirements of the Standards for Actuarial Work published by the LCPR. The timely receipt of the actuarially determined contributions is critical to support the financial health of the plan. Users of this report should be aware that contributions made at the actuarially determined rate do not necessarily guarantee benefit security.

PLAN MATURITY MEASURES

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Generally accepted plan maturity measures include the following. Additional maturity measures are shown on page 9.

	2022	2021
Ratio of market value of assets to total payroll	3.70	4.23
Ratio of actuarial accrued liability to total payroll	4.29	4.32
Ratio of actives to retirees and beneficiaries	1.29	1.33
Ratio of net cash flow to market value of assets	-3.1%	-2.6%
Approximate modified duration* of:		
▪ Total projected benefits:	13.29	13.27
▪ Actuarial accrued liability:	11.39	11.39
▪ Retiree liability:	7.78	7.77

* *Based on 7.50% interest.*

RATIO OF MARKET VALUE OF ASSETS TO PAYROLL

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 5.0 times the payroll, a return on assets 5% different than assumed would equal 25% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.

RATIO OF ACTUARIAL ACCRUED LIABILITY TO PAYROLL

The relationship between actuarial accrued liability and payroll is a useful indicator of the potential volatility of contributions for a fully funded plan. A funding policy that targets a funded ratio of 100% is expected to result in the ratio of assets to payroll and the ratio of liability to payroll converging over time.

The ratio of liability to payroll may also be used as a measure of sensitivity of contribution rates to liability gains and losses. For example, if the actuarial accrued liability is 5.0 times the payroll, a change in liability 2% other than assumed would equal 10% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

Summary of Valuation Results

RATIO OF ACTIVES TO RETIREES AND BENEFICIARIES

A young plan with many active members and few retirees will have a high ratio of actives to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

RATIO OF NET CASH FLOW TO MARKET VALUE OF ASSETS

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means benefits and expenses exceed contributions, and existing funds may be used to make payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

DURATION OF ACTUARIAL LIABILITIES

The modified duration (as opposed to the Macaulay duration) may be used to approximate the sensitivity of the liability to a small change in the assumed rate of return. For example, a modified duration of 10 indicates that the liability would change by approximately 10% if the assumed rate of return were changed by 1% (i.e., from 7.5% to 6.5%).

ADDITIONAL RISK ASSESSMENT

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability. We would be please to perform such assessments upon request.

Summary of Valuation Results

Risk Measures Summary (Dollars in Thousands)

Valuation Date (6/30)	(1) Accrued Liabilities (AAL)	(2) Market Value of Assets	(3) Market Value Unfunded AAL	(4) Actual Covered Payroll	(5) Market Value Funded Ratio (2)/(1)	(6) Retiree Liabilities	(7) RetLiab/ AAL (6)/(1)	(8) AAL/ Payroll (1)/(4)	(9) Assets/ Payroll (2)/(4)
2013	$19,379,769	$15,084,608	$4,295,161	$5,246,928	77.8%	$ 9,351,606	48.3%	369.4%	287.5%
2014	21,282,504	17,404,822	3,877,682	5,351,920	81.8%	10,229,051	48.1%	397.7%	325.2%
2015	23,560,951	18,581,795	4,979,156	5,549,255	78.9%	12,092,665	51.3%	424.6%	334.9%
2016	24,848,409	17,994,909	6,853,500	5,773,708	72.4%	13,066,753	52.6%	430.4%	311.7%
2017	25,615,722	20,100,579	5,515,143	6,156,985	78.5%	13,896,408	54.2%	416.0%	326.5%
2018	27,101,067	21,553,477	5,547,590	6,298,815	79.5%	15,150,455	55.9%	430.3%	342.2%
2019	27,969,744	22,440,968	5,528,776	6,523,754	80.2%	15,839,879	56.6%	428.7%	344.0%
2020	28,626,916	22,631,459	5,995,457	6,698,754	79.1%	16,366,077	57.2%	427.3%	337.8%
2021	29,215,560	28,587,653	627,907	6,761,354	97.9%	16,945,813	58.0%	432.1%	422.8%
2022	30,189,649	26,034,185	4,155,464	7,042,154	86.2%	17,771,557	58.9%	428.7%	369.7%

Valuation Date (6/30)	(10) Portfolio Std Dev	(11) Std Dev % of Pay (9) x (10)	(12) Unfunded AAL/Payroll (3) / (4)	(13) Non-Investment Cash Flow (NICF)	(14) NICF/ Assets (13)/(2)	(15) SBI Market Rate of Return	(16) SBI 5-Year Average	(17) SBI 10-Year Average
2013			81.9%	$(396,791)	(2.6%)	14.2%	6.2%	N/A
2014			72.5%	(441,245)	(2.5%)	18.6%	14.5%	N/A
2015	14.1%	47.2%	89.7%	(492,445)	(2.7%)	4.4%	12.3%	N/A
2016	14.1%	43.9%	118.7%	(566,466)	(3.1%)	-0.1%	7.7%	N/A
2017	14.1%	46.0%	89.6%	(577,882)	(2.9%)	15.1%	10.2%	6.2%
2018	14.1%	48.2%	88.1%	(610,740)	(2.8%)	10.3%	9.4%	7.8%
2019	14.3%	49.2%	84.7%	(659,887)	(2.9%)	7.3%	7.3%	10.8%
2020	14.3%	48.3%	89.5%	(740,817)	(3.3%)	4.2%	7.2%	9.7%
2021	13.9%	58.8%	9.3%	(756,698)	(2.6%)	30.3%	13.1%	10.3%
2022	14.0%	51.8%	59.0%	(804,424)	(3.1%)	-6.4%	8.5%	9.4%

(5) The Funded ratio is the most widely known measure of a plan's financial strength, but the trend in the funded ratio is much more important than the absolute ratio. The funded ratio should trend to 100%. As it approaches 100%, it is important to re-evaluate the level of investment risk in the portfolio and potentially to re-evaluate the assumed rate of return.

(6) and (7) The ratio of Retiree liabilities to total accrued liabilities gives an indication of the maturity of the system. As the ratio increases, cash flow needs increase, and the liquidity needs of the portfolio change. A ratio on the order of 50% indicates a maturing system.

(8) and (9) The ratios of liabilities and assets to payroll gives an indication of both maturity and volatility. Many systems have ratios between 500% and 700%. Ratios significantly above that range may indicate difficulty in supporting the benefit level as a level % of payroll.

(10) and (11) The portfolio standard deviation measures the volatility of investment return. When multiplied by the ratio of assets to payroll it gives the effect of a one standard deviation asset move as a percent of payroll. This figure helps users understand the difficulty of dealing with investment volatility and the challenges volatility brings to sustainability.

(12) The ratio of unfunded liability to payroll gives an indication of the plan sponsor's ability to actually pay off the unfunded liability. A ratio above approximately 300% or 400% may indicate difficulty in discharging the unfunded liability within a reasonable time frame.

(13) and (14) The ratio of Non-Investment Cash Flow to assets is an important measure of sustainability. Negative ratios are common and expected for a maturing system. In the longer term, this ratio should be on the order of approximately -4%. A ratio that is significantly more negative than that for an extended period could be a leading indicator of potential exhaustion of assets.

(15) (16) and (17) Investment return is probably the largest single risk that most systems face. The year by year return and the 5-year and 10-year geometric average give an indicator of past performance. Of course, past performance is not a guarantee of future results, may not even be reflective of potential future results, and historical averages are very sensitive to the time period chosen. The performance data for the Combined Funds (pooled investments of major Minnesota Public Retirement Systems) is presented in these columns. The source of this data is the Minnesota State Board of Investment.

Supplemental Information

The remainder of the report includes information supporting the results presented in the previous sections.

- **Plan assets** presents information about the Plan's assets as reported by the Public Employees Retirement Association of Minnesota. The assets represent the portion of total fund liabilities that has been funded.

- **Membership data** presents and describes the membership data used in the valuation.

- **Development of costs** shows the liabilities for Plan benefits and the derivation of the contribution amount.

- **Actuarial basis** describes the Plan provisions, as well as the methods and assumptions used to value the Plan. The valuation is based on the premise that the Plan is ongoing.

- **Additional schedules** shows the Schedule of Funding Progress and Schedule of Contributions.

- **Glossary** defines the terms used in this report.

Plan Assets

Statement of Fiduciary Net Position *(Dollars in Thousands)*

	Market Value	
Assets in Trust	**June 30, 2022**	**June 30, 2021**
Cash, equivalents, short term securities	$ 478,533	$ 440,891
Fixed income	$ 5,965,549	$ 6,483,990
Equity	$ 13,017,805	$ 16,668,905
Private Markets	$ 6,547,264	$ 4,959,308
Other	$ 5,508	$ 5,968
Total Assets in Trust	**$ 26,014,659**	**$ 28,559,062**
Assets Receivable*	$ 30,670	$ 40,407
Amounts Payable	$ (11,144)	$ (11,816)
Net Assets Held in Trust for Pension Benefits	**$ 26,034,185**	**$ 28,587,653**

** Includes Employer Supplemental Contribution receivable to be paid by the City of Minneapolis.*

Plan Assets

Reconciliation of Plan Assets *(Dollars in Thousands)*

The following exhibits show the revenue, expenses and resulting assets of the Fund as reported by the Public Employees Retirement Association for the prior two fiscal years.

Change in Assets	**Market Value**	
Year Ending	**June 30, 2022**	**June 30, 2021**
1. Fund balance at market value at beginning of year	$ 28,587,653	$ 22,631,459
2. Contributions		
a. Member	$ 457,740	$ 439,488
b. Employer*	$ 546,291	$ 524,685
c. Other sources	$ 16,000	$ 16,000
d. Total contributions	$ 1,020,031	$ 980,173
3. Investment income		
a. Investment income/(loss)	$ (1,719,032)	$ 6,739,822
b. Investment expenses	$ (30,154)	$ (27,112)
c. Net subtotal	$ (1,749,186)	$ 6,712,710
4. Other	$ 142	$ 182
5. Total income: *(2.d.) + (3.c.) + (4.)*	**$ (729,013)**	**$ 7,693,065**
6. Benefits Paid		
a. Annuity benefits	$ (1,737,905)	$ (1,666,103)
b. Refunds	$ (73,152)	$ (58,027)
c. Total benefits paid	$ (1,811,057)	$ (1,724,130)
7. Expenses		
a. Other	$ -	$ -
b. Administrative	$ (13,398)	$ (12,741)
c. Total expenses	$ (13,398)	$ (12,741)
8. Total disbursements: *(6.c.) + (7.c.)*	**$ (1,824,455)**	**$ (1,736,871)**
9. Fund balance at market value at end of year	**$ 26,034,185**	**$ 28,587,653**
10. Approximate return on market value of assets	-6.3%	30.3 %

** Includes Employer Supplemental Contribution receivable to be paid by the City of Minneapolis.*

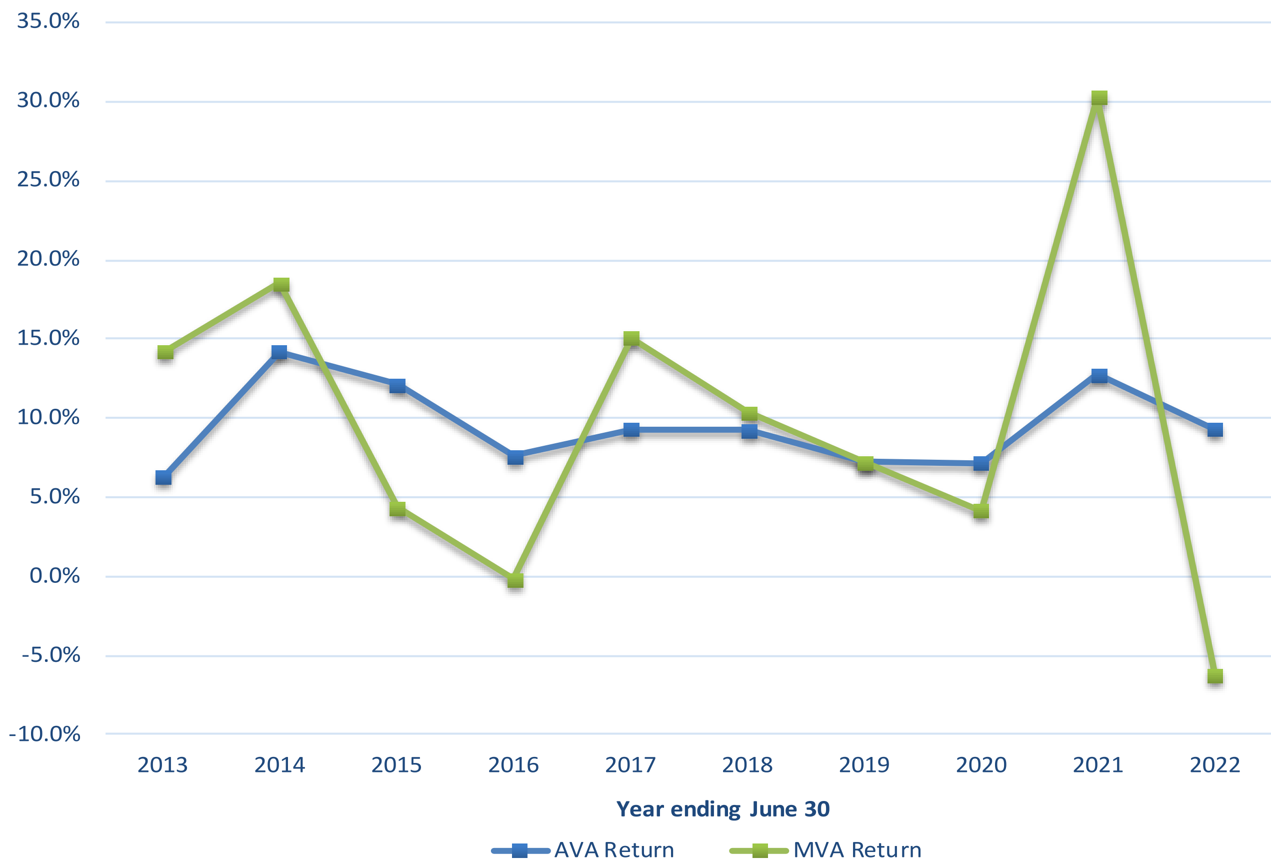
Plan Assets

Actuarial Asset Value *(Dollars in Thousands)*

	Original Amount	June 30, 2022	June 30, 2021
1. Market value of assets available for benefits		$ 26,034,185	$ 28,587,653
2. Determination of average balance			
a. Total assets available at beginning of year		$ 28,587,653	$ 22,631,459
b. Total assets available at end of year		$ 26,034,185	$ 28,587,653
c. Net investment income for fiscal year		$ (1,749,186)	$ 6,712,710
d. Average balance *[a. + b. - c.] / 2*		$ 28,185,512	$ 22,253,201
3. Expected return *[7.5% x 2.d.]*		$ 2,113,913	$ 1,668,990
4. Actual return		$ (1,749,186)	$ 6,712,710
5. Current year asset gain/(loss) *[4. - 3.]*		$ (3,863,099)	$ 5,043,720
6. Unrecognized asset returns			
	Original Amount	**Unrecognized Amount**	
a. Year ended June 30, 2022	$ (3,863,099)	$ (3,090,479)	N/A
b. Year ended June 30, 2021	$ 5,043,720	$ 3,026,232	$ 4,034,976
c. Year ended June 30, 2020	$ (724,261)	$ (289,704)	$ (434,557)
d. Year ended June 30, 2019	$ (44,547)	$ (8,909)	$ (17,819)
e. Year ended June 30, 2018	$ 479,963	N/A	$ 95,993
f. Unrecognized return adjustment		$ (362,860)	$ 3,678,593
7. **Actuarial value at end of year** *(1. - 6.f.)*		**$ 26,397,045**	**$ 24,909,060**
8. Approximate return on actuarial value of assets during fiscal year		9.3%	12.8%
9. Ratio of actuarial value of assets to market value of assets		1.01	0.87

Plan Assets

10-Year History of AVA and MVA Asset Returns



Membership Data

Distribution of Active Members (Total)

	Years of Service as of June 30, 2022									
Age	**<3***	**3 - 4**	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25 - 29**	**30 - 34**	**35+**	**Total**
< 25	7,692	450	40							**8,182**
Avg. Earnings	$ 18,045	$ 30,406	$ 30,730							**$ 18,787**
25 - 29	7,724	2,446	1,394	12						**11,576**
Avg. Earnings	$ 29,059	$ 42,598	$ 45,456	$ 53,017						**$ 33,919**
30 - 34	6,454	2,833	4,654	584	16					**14,541**
Avg. Earnings	$ 32,796	$ 47,155	$ 54,540	$ 56,831	$ 55,549					**$ 43,543**
35 - 39	6,078	2,697	5,519	2,150	704	12				**17,160**
Avg. Earnings	$ 30,766	$ 45,874	$ 57,610	$ 66,006	$ 67,754	$ 57,411				**$ 47,725**
40 - 44	5,167	2,528	5,203	2,381	2,052	678	10			**18,019**
Avg. Earnings	$ 30,645	$ 43,358	$ 53,990	$ 66,524	$ 73,988	$ 73,088	$ 82,512			**$ 50,472**
45 - 49	3,645	1,980	4,437	2,148	1,928	1,898	379	5		**16,420**
Avg. Earnings	$ 30,893	$ 42,953	$ 48,861	$ 57,281	$ 72,256	$ 79,377	$ 76,410	$ 62,249		**$ 52,176**
50 - 54	3,234	1,666	4,049	2,635	2,332	2,191	1,546	425	16	**18,094**
Avg. Earnings	$ 31,762	$ 41,852	$ 46,891	$ 50,112	$ 61,838	$ 75,585	$ 79,812	$ 75,167	$ 85,476	**$ 53,104**
55 - 59	2,691	1,493	3,326	2,539	2,848	2,656	1,821	1,385	417	**19,176**
Avg. Earnings	$ 29,536	$ 40,548	$ 45,218	$ 46,730	$ 51,080	$ 60,785	$ 73,162	$ 80,538	$ 73,659	**$ 51,704**
60 - 64	2,320	1,221	2,628	2,006	2,445	2,826	1,939	1,309	979	**17,673**
Avg. Earnings	$ 24,640	$ 35,890	$ 41,938	$ 46,112	$ 47,586	$ 52,989	$ 61,064	$ 75,437	$ 77,738	**$ 48,834**
65 - 69	1,256	571	1,168	677	649	754	560	331	339	**6,305**
Avg. Earnings	$ 17,420	$ 26,794	$ 36,206	$ 40,872	$ 46,411	$ 47,582	$ 51,831	$ 62,937	$ 76,531	**$ 39,483**
70+	820	375	641	311	211	185	111	80	107	**2,841**
Avg. Earnings	$ 12,235	$ 15,606	$ 19,872	$ 23,169	$ 31,080	$ 43,978	$ 42,220	$ 55,008	$ 63,980	**$ 23,392**
Total	**47,081**	**18,260**	**33,059**	**15,443**	**13,185**	**11,200**	**6,366**	**3,535**	**1,858**	**149,987**
Avg. Earnings	**$ 27,700**	**$ 41,899**	**$ 49,596**	**$ 54,086**	**$ 59,342**	**$ 64,439**	**$ 68,884**	**$ 75,752**	**$ 75,876**	**$ 45,974**

* *This exhibit does not reflect service earned in other PERA funds or service earned in a Combined Service Annuity arrangement. It should not be relied upon as an indicator of non-vested status.*

In each cell, the top number is the count of active participants for the age/service combination and the bottom number is average valuation earnings for the fiscal year ending on the valuation date.

Membership Data

Distribution of Active Members (Basic)

Age	Years of Service as of June 30, 2022 <3*	3 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35+	Total
< 25										
Avg. Earnings										
25 - 29										
Avg. Earnings										
30 - 34										
Avg. Earnings										
35 - 39										
Avg. Earnings										
40 - 44										
Avg. Earnings										
45 - 49										
Avg. Earnings										
50 - 54										
Avg. Earnings										
55 - 59										
Avg. Earnings										
60 - 64										
Avg. Earnings										
65 - 69										
Avg. Earnings										
70+									2	**2**
Avg. Earnings									$ 79,950	**$ 79,950**
Total									**2**	**2**
Avg. Earnings									**$ 79,950**	**$ 79,950**

* *This exhibit does not reflect service earned in other PERA funds or service earned in a Combined Service Annuity arrangement. It should not be relied upon as an indicator of non-vested status.*

In each cell, the top number is the count of active participants for the age/service combination and the bottom number is average valuation earnings for the fiscal year ending on the valuation date.

Membership Data

Distribution of Active Members (Coordinated)

	Years of Service as of June 30, 2022									
Age	**<3***	**3 - 4**	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25 - 29**	**30 - 34**	**35+**	**Total**
< 25	7,692	450	40							**8,182**
Avg. Earnings	$ 18,045	$ 30,406	$ 30,730							**$ 18,787**
25 - 29	7,724	2,446	1,394	12						**11,576**
Avg. Earnings	$ 29,059	$ 42,598	$ 45,456	$ 53,017						**$ 33,919**
30 - 34	6,454	2,833	4,654	584	16					**14,541**
Avg. Earnings	$ 32,796	$ 47,155	$ 54,540	$ 56,831	$ 55,549					**$ 43,543**
35 - 39	6,078	2,697	5,519	2,150	704	12				**17,160**
Avg. Earnings	$ 30,766	$ 45,874	$ 57,610	$ 66,006	$ 67,754	$ 57,411				**$ 47,725**
40 - 44	5,167	2,528	5,203	2,381	2,052	678	10			**18,019**
Avg. Earnings	$ 30,645	$ 43,358	$ 53,990	$ 66,524	$ 73,988	$ 73,088	$ 82,512			**$ 50,472**
45 - 49	3,645	1,980	4,437	2,148	1,928	1,898	379	5		**16,420**
Avg. Earnings	$ 30,893	$ 42,953	$ 48,861	$ 57,281	$ 72,256	$ 79,377	$ 76,410	$ 62,249		**$ 52,176**
50 - 54	3,234	1,666	4,049	2,635	2,332	2,191	1,546	425	16	**18,094**
Avg. Earnings	$ 31,762	$ 41,852	$ 46,891	$ 50,112	$ 61,838	$ 75,585	$ 79,812	$ 75,167	$ 85,476	**$ 53,104**
55 - 59	2,691	1,493	3,326	2,539	2,848	2,656	1,821	1,385	417	**19,176**
Avg. Earnings	$ 29,536	$ 40,548	$ 45,218	$ 46,730	$ 51,080	$ 60,785	$ 73,162	$ 80,538	$ 73,659	**$ 51,704**
60 - 64	2,320	1,221	2,628	2,006	2,445	2,826	1,939	1,309	979	**17,673**
Avg. Earnings	$ 24,640	$ 35,890	$ 41,938	$ 46,112	$ 47,586	$ 52,989	$ 61,064	$ 75,437	$ 77,738	**$ 48,834**
65 - 69	1,256	571	1,168	677	649	754	560	331	336	**6,302**
Avg. Earnings	$ 17,420	$ 26,794	$ 36,206	$ 40,872	$ 46,411	$ 47,582	$ 51,831	$ 62,937	$ 76,555	**$ 39,467**
70+	820	375	641	311	211	185	111	80	104	**2,838**
Avg. Earnings	$ 12,235	$ 15,606	$ 19,872	$ 23,169	$ 31,080	$ 43,978	$ 42,220	$ 55,008	$ 63,443	**$ 23,329**
Total	**47,081**	**18,260**	**33,059**	**15,443**	**13,185**	**11,200**	**6,366**	**3,535**	**1,852**	**149,981**
Avg. Earnings	**$ 27,700**	**$ 41,899**	**$ 49,596**	**$ 54,086**	**$ 59,342**	**$ 64,439**	**$ 68,884**	**$ 75,752**	**$ 75,868**	**$ 45,973**

* *This exhibit does not reflect service earned in other PERA funds or service earned in a Combined Service Annuity arrangement. It should not be relied upon as an indicator of non-vested status.*

In each cell, the top number is the count of active participants for the age/service combination and the bottom number is average valuation earnings for the fiscal year ending on the valuation date.

Membership Data

Distribution of Active Members (MERF)

Age	Years of Service as of June 30, 2022									
	<3*	**3 - 4**	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25 - 29**	**30 - 34**	**35+**	**Total**
< 25										
Avg. Earnings										
25 - 29										
Avg. Earnings										
30 - 34										
Avg. Earnings										
35 - 39										
Avg. Earnings										
40 - 44										
Avg. Earnings										
45 - 49										
Avg. Earnings										
50 - 54										
Avg. Earnings										
55 - 59										
Avg. Earnings										
60 - 64										
Avg. Earnings										
65 - 69									3	**3**
Avg. Earnings									$ 73,899	**$ 73,899**
70+									1	**1**
Avg. Earnings									$ 87,880	**$ 87,880**
Total									**4**	**4**
Avg. Earnings									**$ 77,394**	**$ 77,394**

* *This exhibit does not reflect service earned in other PERA funds or service earned in a Combined Service Annuity arrangement. It should not be relied upon as an indicator of non-vested status.*

In each cell, the top number is the count of active participants for the age/service combination and the bottom number is average valuation earnings for the fiscal year ending on the valuation date.

Membership Data

Distribution of Service Retirements (Total)

	Years Retired as of June 30, 2022							
Age	**<1**	**1 - 4**	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25+**	**Total**
<50		1						**1**
Avg. Benefit		$ 8,422						**$ 8,422**
50 - 54	4	5						**9**
Avg. Benefit	$ 26,820	$ 9,924						**$ 17,433**
55 - 59	589	1,011	24	1				**1,625**
Avg. Benefit	$ 14,256	$ 12,886	$ 12,931	$ 9,939				**$ 13,381**
60 - 64	1,945	4,903	2,077	46	3			**8,974**
Avg. Benefit	$ 16,668	$ 17,359	$ 14,431	$ 13,555	$ 36,885			**$ 16,519**
65 - 69	3,124	12,242	7,737	2,295	152	17		**25,567**
Avg. Benefit	$ 15,194	$ 15,558	$ 16,794	$ 13,979	$ 33,260	$ 42,122		**$ 15,869**
70 - 74	440	4,815	12,322	6,586	2,608	169	9	**26,949**
Avg. Benefit	$ 12,044	$ 13,928	$ 15,510	$ 15,967	$ 14,891	$ 39,432	$ 40,258	**$ 15,381**
75 - 79	117	705	3,358	7,162	4,723	2,101	44	**18,210**
Avg. Benefit	$ 10,150	$ 10,774	$ 13,586	$ 13,968	$ 15,055	$ 16,054	$ 51,686	**$ 14,363**
80 - 84	25	220	637	1,653	4,089	3,681	1,077	**11,382**
Avg. Benefit	$ 7,404	$ 6,623	$ 8,222	$ 11,511	$ 12,121	$ 14,781	$ 18,993	**$ 13,208**
85 - 89	4	63	194	346	783	2,781	2,361	**6,532**
Avg. Benefit	$ 3,887	$ 9,048	$ 7,147	$ 7,219	$ 9,900	$ 12,650	$ 19,985	**$ 14,481**
90+		11	34	96	175	476	3,080	**3,872**
Avg. Benefit		$ 14,358	$ 6,997	$ 6,942	$ 6,777	$ 11,030	$ 19,448	**$ 17,406**
Total	**6,248**	**23,976**	**26,383**	**18,185**	**12,533**	**9,225**	**6,571**	**103,121**
Avg. Benefit	**$ 15,217**	**$ 15,245**	**$ 15,306**	**$ 14,303**	**$ 13,852**	**$ 14,737**	**$ 19,811**	**$ 15,169**

In each cell, the top number is the count of retired participants for the age/years retired combination and the bottom number is the average annual benefit amount as of the valuation date.

Membership Data

Distribution of Service Retirements (Basic)

	Years Retired as of June 30, 2022							
Age	**<1**	**1 - 4**	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25+**	**Total**
<50								
Avg. Benefit								
50 - 54								
Avg. Benefit								
55 - 59								
Avg. Benefit								
60 - 64								
Avg. Benefit								
65 - 69								
Avg. Benefit								
70 - 74			1	3	30	2		**36**
Avg. Benefit			$ 34,770	$ 36,964	$ 46,967	$ 28,626		**$ 44,775**
75 - 79	1	1	6	29	77	205	6	**325**
Avg. Benefit	$ 106,872	$ 116,440	$ 43,707	$ 28,772	$ 41,449	$ 45,144	$ 32,699	**$ 42,961**
80 - 84			1	15	60	315	195	**586**
Avg. Benefit			$ 3,202	$ 33,216	$ 33,140	$ 43,849	$ 51,879	**$ 45,084**
85 - 89				3	15	153	479	**650**
Avg. Benefit				$ 69,196	$ 40,075	$ 33,121	$ 47,545	**$ 44,077**
90+		1			3	24	669	**697**
Avg. Benefit		$ 58,029			$ 31,210	$ 33,327	$ 39,422	**$ 39,203**
Total	**1**	**2**	**8**	**50**	**185**	**699**	**1,349**	**2,294**
Avg. Benefit	**$ 106,872**	**$ 87,235**	**$ 37,527**	**$ 33,023**	**$ 39,372**	**$ 41,476**	**$ 44,077**	**$ 42,706**

In each cell, the top number is the count of retired participants for the age/years retired combination and the bottom number is the average annual benefit amount as of the valuation date.

Membership Data

Distribution of Service Retirements (Coordinated)

	Years Retired as of June 30, 2022							
Age	**<1**	**1 - 4**	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25+**	**Total**
<50		1						**1**
Avg. Benefit		$ 8,422						**$ 8,422**
50 - 54	4	5						**9**
Avg. Benefit	$ 26,820	$ 9,924						**$ 17,433**
55 - 59	589	1,011	24	1				**1,625**
Avg. Benefit	$ 14,256	$ 12,886	$ 12,931	$ 9,939				**$ 13,381**
60 - 64	1,945	4,902	2,071	43				**8,961**
Avg. Benefit	$ 16,668	$ 17,361	$ 14,349	$ 10,556				**$ 16,482**
65 - 69	3,121	12,233	7,705	2,255	48			**25,362**
Avg. Benefit	$ 15,185	$ 15,541	$ 16,672	$ 13,442	$ 11,513			**$ 15,646**
70 - 74	439	4,811	12,279	6,469	2,399	31		**26,428**
Avg. Benefit	$ 11,855	$ 13,936	$ 15,480	$ 15,628	$ 12,435	$ 11,675		**$ 14,894**
75 - 79	116	701	3,332	7,083	4,489	1,720	4	**17,445**
Avg. Benefit	$ 9,316	$ 10,466	$ 13,389	$ 13,768	$ 13,771	$ 9,132	$ 14,075	**$ 13,077**
80 - 84	25	220	629	1,625	3,978	3,215	811	**10,503**
Avg. Benefit	$ 7,404	$ 6,623	$ 7,576	$ 11,189	$ 11,620	$ 10,844	$ 7,971	**$ 10,677**
85 - 89	4	63	193	341	750	2,556	1,761	**5,668**
Avg. Benefit	$ 3,887	$ 9,048	$ 7,053	$ 6,620	$ 8,813	$ 11,011	$ 10,987	**$ 10,287**
90+		10	34	96	167	435	2,210	**2,952**
Avg. Benefit		$ 9,990	$ 6,997	$ 6,942	$ 5,564	$ 9,077	$ 11,800	**$ 10,827**
Total	**6,243**	**23,957**	**26,267**	**17,913**	**11,831**	**7,957**	**4,786**	**98,954**
Avg. Benefit	**$ 15,185**	**$ 15,228**	**$ 15,211**	**$ 13,984**	**$ 12,337**	**$ 10,434**	**$ 10,854**	**$ 14,053**

In each cell, the top number is the count of retired participants for the age/years retired combination and the bottom number is the average annual benefit amount as of the valuation date.

Membership Data

Distribution of Service Retirements (MERF)

	Years Retired as of June 30, 2022							
Age	**<1**	**1 - 4**	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25+**	**Total**
<50								
Avg. Benefit								
50 - 54								
Avg. Benefit								
55 - 59								
Avg. Benefit								
60 - 64		1	6	3	3			**13**
Avg. Benefit		$ 8,122	$ 42,945	$ 56,538	$ 36,885			**$ 42,005**
65 - 69	3	9	32	40	104	17		**205**
Avg. Benefit	$ 23,725	$ 39,884	$ 46,112	$ 44,198	$ 43,298	$ 42,122		**$ 43,379**
70 - 74	1	4	42	114	179	136	9	**485**
Avg. Benefit	$ 95,133	$ 4,358	$ 23,866	$ 34,661	$ 42,436	$ 45,917	$ 40,258	**$ 39,731**
75 - 79		3	20	50	157	176	34	**440**
Avg. Benefit		$ 47,550	$ 37,211	$ 33,682	$ 38,824	$ 49,813	$ 59,461	**$ 44,216**
80 - 84			7	13	51	151	71	**293**
Avg. Benefit			$ 67,003	$ 26,780	$ 26,540	$ 37,970	$ 54,563	**$ 40,198**
85 - 89			1	2	18	72	121	**214**
Avg. Benefit			$ 25,437	$ 16,323	$ 30,048	$ 27,331	$ 41,852	**$ 35,658**
90+					5	17	201	**223**
Avg. Benefit					$ 32,606	$ 29,531	$ 37,054	**$ 36,380**
Total	**4**	**17**	**108**	**222**	**517**	**569**	**436**	**1,873**
Avg. Benefit	**$ 41,577**	**$ 31,010**	**$ 36,799**	**$ 35,828**	**$ 39,386**	**$ 42,058**	**$ 43,050**	**$ 40,409**

In each cell, the top number is the count of retired participants for the age/years retired combination and the bottom number is the average annual benefit amount as of the valuation date.

Membership Data

Distribution of Survivors (Total)

Age					Years Since Death as of June 30, 2022				
	<1	1 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25+		Total
<45	10	77	65	20	10	10	4		**196**
Avg. Benefit	$ 5,184	$ 5,697	$ 6,024	$ 4,063	$ 5,224	$ 7,024	$ 15,355		**$ 5,853**
45 - 49	7	27	19	18	5	3	3		**82**
Avg. Benefit	$ 5,318	$ 9,506	$ 8,328	$ 8,570	$ 2,521	$ 9,927	$ 12,724		**$ 8,377**
50 - 54	16	56	36	28	8	5	13		**162**
Avg. Benefit	$ 9,397	$ 10,886	$ 7,318	$ 6,210	$ 4,637	$ 7,071	$ 11,452		**$ 8,757**
55 - 59	32	100	85	21	17	8	11		**274**
Avg. Benefit	$ 13,640	$ 11,614	$ 8,028	$ 6,289	$ 9,380	$ 10,170	$ 8,629		**$ 10,029**
60 - 64	71	230	180	67	28	17	18		**611**
Avg. Benefit	$ 13,754	$ 13,648	$ 11,566	$ 9,899	$ 9,662	$ 9,171	$ 14,568		**$ 12,355**
65 - 69	118	372	268	174	84	39	35		**1,090**
Avg. Benefit	$ 14,891	$ 13,935	$ 13,002	$ 10,348	$ 12,860	$ 11,645	$ 17,977		**$ 13,202**
70 - 74	153	438	414	197	123	66	63		**1,454**
Avg. Benefit	$ 13,108	$ 13,610	$ 12,649	$ 13,139	$ 13,096	$ 18,087	$ 22,002		**$ 13,743**
75 - 79	122	432	355	217	137	68	92		**1,423**
Avg. Benefit	$ 15,325	$ 14,578	$ 14,044	$ 12,991	$ 13,446	$ 17,374	$ 21,109		**$ 14,714**
80 - 84	115	378	340	202	145	109	153		**1,442**
Avg. Benefit	$ 16,601	$ 13,918	$ 15,607	$ 14,539	$ 15,453	$ 14,534	$ 23,714		**$ 15,858**
85 - 89	65	315	278	201	130	115	207		**1,311**
Avg. Benefit	$ 14,480	$ 16,225	$ 18,037	$ 17,410	$ 19,054	$ 18,258	$ 25,923		**$ 18,695**
90+	50	199	265	224	147	124	316		**1,325**
Avg. Benefit	$ 21,974	$ 22,380	$ 23,982	$ 19,116	$ 20,471	$ 22,598	$ 24,219		**$ 22,381**
Total	**759**	**2,624**	**2,305**	**1,369**	**834**	**564**	**915**		9,370
Avg. Benefit	**$ 14,801**	**$ 14,434**	**$ 14,733**	**$ 13,974**	**$ 15,338**	**$ 17,177**	**$ 23,181**		$ 15,570

In each cell, the top number is the count of survivors for the age/years since death combination and the bottom number is the average annual benefit amount as of the valuation date.

Membership Data

Distribution of Survivors (Basic)

	Years Since Death as of June 30, 2022							
Age	**<1**	**1 - 4**	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25+**	**Total**
<45		1						**1**
Avg. Benefit		$ 1,042						**$ 1,042**
45 - 49								
Avg. Benefit								
50 - 54			1				4	**5**
Avg. Benefit			$ 55,236				$ 21,812	**$ 28,497**
55 - 59		1	1			1		**3**
Avg. Benefit		$ 18,380	$ 31,805			$ 5,082		**$ 18,423**
60 - 64		4	1		1	1	2	**9**
Avg. Benefit		$ 30,593	$ 20,374		$ 15,169	$ 2,528	$ 24,741	**$ 23,325**
65 - 69		4	2	6	3	3	4	**22**
Avg. Benefit		$ 32,242	$ 11,843	$ 11,412	$ 15,343	$ 10,698	$ 34,056	**$ 19,794**
70 - 74	2	9	10	6	2	5	12	**46**
Avg. Benefit	$ 21,690	$ 19,270	$ 21,608	$ 21,740	$ 12,275	$ 17,181	$ 34,150	**$ 23,556**
75 - 79	8	34	27	15	19	8	29	**140**
Avg. Benefit	$ 40,108	$ 29,739	$ 29,829	$ 24,189	$ 30,575	$ 37,392	$ 33,775	**$ 31,141**
80 - 84	23	54	61	36	32	23	54	**283**
Avg. Benefit	$ 27,565	$ 26,908	$ 32,562	$ 28,457	$ 35,594	$ 33,762	$ 31,140	**$ 30,724**
85 - 89	20	56	61	57	44	35	62	**335**
Avg. Benefit	$ 22,837	$ 32,414	$ 36,512	$ 32,510	$ 32,502	$ 36,695	$ 36,596	**$ 33,837**
90+	17	60	114	79	58	55	130	**513**
Avg. Benefit	$ 36,198	$ 39,621	$ 34,845	$ 33,876	$ 36,359	$ 36,706	$ 30,207	**$ 34,495**
Total	**70**	**223**	**278**	**199**	**159**	**131**	**297**	**1,357**
Avg. Benefit	**$ 29,576**	**$ 31,842**	**$ 33,592**	**$ 30,731**	**$ 33,614**	**$ 34,385**	**$ 32,120**	**$ 32,434**

In each cell, the top number is the count of survivors for the age/years since death combination and the bottom number is the average annual benefit amount as of the valuation date.

Membership Data

Distribution of Survivors (Coordinated)

	Years Since Death as of June 30, 2022							
Age	**<1**	**1 - 4**	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25+**	**Total**
<45	10	75	65	20	10	10	4	**194**
Avg. Benefit	$ 5,184	$ 5,584	$ 6,024	$ 4,063	$ 5,224	$ 7,024	$ 15,355	**$ 5,811**
45 - 49	7	26	19	18	5	3	3	**81**
Avg. Benefit	5,318	$ 8,615	$ 8,328	$ 8,570	$ 2,521	$ 9,927	$ 12,724	**$ 8,077**
50 - 54	16	56	35	26	8	5	9	**155**
Avg. Benefit	$ 9,397	$ 10,886	$ 5,948	$ 4,483	$ 4,637	$ 7,071	$ 6,848	**$ 7,863**
55 - 59	32	98	84	21	17	7	11	**270**
Avg. Benefit	$ 13,640	$ 11,254	$ 7,745	$ 6,289	$ 9,380	$ 10,897	$ 8,629	**$ 9,825**
60 - 64	70	222	177	67	25	15	15	**591**
Avg. Benefit	$ 13,408	$ 13,203	$ 11,348	$ 9,899	$ 7,026	$ 7,939	$ 11,965	**$ 11,871**
65 - 69	116	360	257	165	78	32	24	**1,032**
Avg. Benefit	$ 14,594	$ 13,360	$ 12,524	$ 9,779	$ 11,351	$ 9,753	$ 11,206	**$ 12,404**
70 - 74	143	402	387	186	114	50	33	**1,315**
Avg. Benefit	$ 12,001	$ 12,360	$ 11,306	$ 11,956	$ 11,759	$ 14,469	$ 12,238	**$ 11,979**
75 - 79	108	365	307	198	118	54	47	**1,197**
Avg. Benefit	$ 11,892	$ 11,521	$ 10,697	$ 11,792	$ 10,688	$ 11,088	$ 11,966	**$ 11,304**
80 - 84	83	301	262	160	111	82	65	**1,064**
Avg. Benefit	$ 9,932	$ 9,446	$ 10,268	$ 10,287	$ 9,586	$ 8,736	$ 10,246	**$ 9,822**
85 - 89	41	235	206	141	84	78	94	**879**
Avg. Benefit	$ 6,373	$ 9,195	$ 11,081	$ 10,153	$ 11,492	$ 9,340	$ 11,148	**$ 10,100**
90+	31	122	121	141	89	68	115	**687**
Avg. Benefit	$ 11,538	$ 10,887	$ 9,609	$ 9,905	$ 10,117	$ 11,367	$ 11,820	**$ 10,594**
Total	**657**	**2,262**	**1,920**	**1,143**	**659**	**404**	**420**	**7,465**
Avg. Benefit	**$ 11,798**	**$ 11,318**	**$ 10,641**	**$ 10,318**	**$ 10,400**	**$ 10,354**	**$ 11,295**	**$ 10,899**

In each cell, the top number is the count of survivors for the age/years since death combination and the bottom number is the average annual benefit amount as of the valuation date.

Membership Data

Distribution of Survivors (MERF)

	Years Since Death as of June 30, 2022							
Age	**<1**	**1 - 4**	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25+**	**Total**
<45		1						**1**
Avg. Benefit		$ 18,783						**$ 18,783**
45 - 49		1						**1**
Avg. Benefit		$ 32,688						**$ 32,688**
50 - 54				2				**2**
Avg. Benefit				$ 28,668				**$ 28,668**
55 - 59		1						**1**
Avg. Benefit		$ 40,164						**$ 40,164**
60 - 64	1	4	2		2	1	1	**11**
Avg. Benefit	$ 37,949	$ 21,349	$ 26,392		$ 39,851	$ 34,306	$ 33,266	**$ 29,400**
65 - 69	2	8	9	3	3	4	7	**36**
Avg. Benefit	$ 32,117	$ 30,676	$ 26,928	$ 39,516	$ 49,623	$ 27,491	$ 32,006	**$ 32,039**
70 - 74	8	27	17	5	7	11	18	**93**
Avg. Benefit	$ 30,757	$ 30,342	$ 37,932	$ 46,809	$ 35,110	$ 34,947	$ 31,803	**$ 33,837**
75 - 79	6	33	21	4		6	16	**86**
Avg. Benefit	$ 44,064	$ 32,773	$ 42,671	$ 30,370		$ 47,258	$ 25,007	**$ 35,432**
80 - 84	9	23	17	6	2	4	34	**95**
Avg. Benefit	$ 50,093	$ 41,942	$ 37,047	$ 44,398	$ 18,833	$ 22,829	$ 37,669	**$ 39,173**
85 - 89	4	24	11	3	2	2	51	**97**
Avg. Benefit	$ 55,797	$ 47,293	$ 45,865	$ 71,551	$ 40,786	$ 43,396	$ 40,181	**$ 44,278**
90+	2	17	30	4		1	71	**125**
Avg. Benefit	$ 62,835	$ 44,014	$ 40,675	$ 52,305		$ 10,312	$ 33,340	**$ 37,447**
Total	**32**	**139**	**107**	**27**	**16**	**29**	**198**	**548**
Avg. Benefit	**$ 44,135**	**$ 37,202**	**$ 39,165**	**$ 45,247**	**$ 37,099**	**$ 34,505**	**$ 34,985**	**$ 37,440**

In each cell, the top number is the count of survivors for the age/years since death combination and the bottom number is the average annual benefit amount as of the valuation date.

Membership Data

Distribution of Disability Retirements (Total)

	Years Disabled* as of June 30, 2022							
Age	**<1**	**1 - 4**	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25+**	**Total**
< 45	2	8	3	2	1			**16**
Avg. Benefit	$ 10,491	$ 7,441	$ 7,569	$ 6,356	$ 2,407			**$ 7,396**
45 - 49	3	15	11	5	1	1		**36**
Avg. Benefit	$ 4,019	$ 10,807	$ 8,339	$ 6,676	$ 2,093	$ 1,956		**$ 8,425**
50 - 54	7	32	28	16	6	1		**90**
Avg. Benefit	$ 14,093	$ 14,633	$ 10,482	$ 7,633	$ 6,657	$ 2,966		**$ 11,393**
55 - 59	17	104	72	38	23	11	2	**267**
Avg. Benefit	$ 21,821	$ 17,920	$ 12,944	$ 8,561	$ 6,490	$ 6,335	$ 4,549	**$ 13,932**
60 - 64	20	184	181	100	80	29	22	**616**
Avg. Benefit	$ 25,026	$ 15,946	$ 16,128	$ 12,973	$ 9,297	$ 6,306	$ 7,225	**$ 14,183**
65 - 69	126	494	64	42	15	13	2	**756**
Avg. Benefit	$ 14,653	$ 16,159	$ 15,764	$ 11,132	$ 8,812	$ 5,419	$ 11,634	**$ 15,253**
70 - 74		130	605	7	1		11	**754**
Avg. Benefit		$ 11,711	$ 14,314	$ 12,333	$ 3,100		$ 32,455	**$ 14,097**
75+		1	100	441	240	100	72	**954**
Avg. Benefit		$ 22,854	$ 12,317	$ 14,392	$ 15,134	$ 18,017	$ 23,750	**$ 15,456**
Total	**175**	**968**	**1,064**	**651**	**367**	**155**	**109**	**3,489**
Avg. Benefit	**$ 16,283**	**$ 15,512**	**$ 14,248**	**$ 13,351**	**$ 12,820**	**$ 13,739**	**$ 20,719**	**$ 14,563**

** Based on effective date as provided by PERA; "Years Disabled" may reflect years since age 65 for members over age 65.*

In each cell, the top number is the count of disabled participants for the age/years disabled combination and the bottom number is the average annual benefit amount as of the valuation date.

Membership Data

Distribution of Disability Retirements (Basic)

	Years Disabled* as of June 30, 2022							
Age	**<1**	**1 - 4**	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25+**	**Total**
< 45								
Avg. Benefit								
45 - 49								
Avg. Benefit								
50 - 54								
Avg. Benefit								
55 - 59								
Avg. Benefit								
60 - 64								
Avg. Benefit								
65 - 69								
Avg. Benefit								
70 - 74								
Avg. Benefit								
75+			3	10	15	11	10	**49**
Avg. Benefit			$ 46,188	$ 48,405	$ 39,147	$ 44,881	$ 37,112	**$ 42,339**
Total			**3**	**10**	**15**	**11**	**10**	**49**
Avg. Benefit			**$ 46,188**	**$ 48,405**	**$ 39,147**	**$ 44,881**	**$ 37,112**	**$ 42,339**

** Based on effective date as provided by PERA; “Years Disabled” may reflect years since age 65 for members over age 65.*

In each cell, the top number is the count of disabled participants for the age/years disabled combination and the bottom number is the average annual benefit amount as of the valuation date.

Membership Data

Distribution of Disability Retirements (Coordinated)

Age	Years Disabled* as of June 30, 2022							
	<1	1 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25+	Total
< 45	2	8	3	2	1			**16**
Avg. Benefit	$ 10,491	$ 7,441	$ 7,569	$ 6,356	$ 2,407			**$ 7,396**
45 - 49	3	15	11	5	1	1		**36**
Avg. Benefit	$ 4,019	$ 10,807	$ 8,339	$ 6,676	$ 2,093	$ 1,956		**$ 8,425**
50 - 54	7	32	28	16	6	1		**90**
Avg. Benefit	$ 14,093	$ 14,633	$ 10,482	$ 7,633	$ 6,657	$ 2,966		**$ 11,393**
55 - 59	17	104	72	38	23	11	2	**267**
Avg. Benefit	$ 21,821	$ 17,920	$ 12,944	$ 8,561	$ 6,490	$ 6,335	$ 4,549	**$ 13,932**
60 - 64	20	184	181	100	80	29	22	**616**
Avg. Benefit	$ 25,026	$ 15,946	$ 16,128	$ 12,973	$ 9,297	$ 6,306	$ 7,225	**$ 14,183**
65 - 69	126	494	58	42	15	13	2	**750**
Avg. Benefit	$ 14,653	$ 16,159	$ 15,456	$ 11,132	$ 8,812	$ 5,419	$ 11,634	**$ 15,225**
70 - 74		130	603	7	1			**741**
Avg. Benefit		$ 11,711	$ 14,243	$ 12,333	$ 3,100			**$ 13,766**
75+		1	97	431	225	80	34	**868**
Avg. Benefit		$ 22,854	$ 11,270	$ 13,602	$ 13,533	$ 13,381	$ 12,695	**$ 13,278**
Total	**175**	**968**	**1,053**	**641**	**352**	**135**	**60**	**3,384**
Avg. Benefit	**$ 16,283**	**$ 15,512**	**$ 14,090**	**$ 12,804**	**$ 11,698**	**$ 10,358**	**$ 10,382**	**$ 13,903**

** Based on effective date as provided by PERA; "Years Disabled" may reflect years since age 65 for members over age 65.*

In each cell, the top number is the count of disabled participants for the age/years disabled combination and the bottom number is the average annual benefit amount as of the valuation date.

Membership Data

Distribution of Disability Retirements (MERF)

	Years Disabled* as of June 30, 2022							
Age	**<1**	**1 - 4**	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25+**	**Total**
< 45								
Avg. Benefit								
45 - 49								
Avg. Benefit								
50 - 54								
Avg. Benefit								
55 - 59								
Avg. Benefit								
60 - 64								
Avg. Benefit								
65 - 69			6					**6**
Avg. Benefit			$ 18,739					**$ 18,739**
70 - 74			2				11	**13**
Avg. Benefit			$ 35,913				$ 32,455	**$ 32,987**
75+						9	28	**37**
Avg. Benefit						$ 26,395	$ 32,403	**$ 30,942**
Total			**8**			**9**	**39**	**56**
Avg. Benefit			**$ 23,032**			**$ 26,395**	**$ 32,418**	**$ 30,109**

** Based on effective date as provided by PERA; "Years Disabled" may reflect years since age 65 for members over age 65.*

In each cell, the top number is the count of disabled participants for the age/years disabled combination and the bottom number is the average annual benefit amount as of the valuation date.

Membership Data

Reconciliation of Members

		Terminated		Recipients			
	Actives	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	Total
GERP Members on 7/1/2021	**149,281**	**66,048**	**81,052**	**99,441**	**3,577**	**9,214**	**408,613**
New members	21,451	0	0	0	0	0	**21,451**
Return to active	3,128	(1,135)	(1,993)	0	0	0	**0**
Terminated non-vested	(9,253)	0	9,253	0	0	0	**0**
Service retirements	(3,293)	(3,271)	0	6,564	0	0	**0**
Terminated deferred	(7,187)	7,187	0	0	0	0	**0**
Terminated refund/transfer	(3,853)	(1,032)	(5,403)	0	0	0	**(10,288)**
Deaths	(226)	(188)	(219)	(2,944)	(188)	(621)	**(4,386)**
New beneficiary	0	0	0	0	0	796	**796**
Disabled	(61)	0	0	0	61	0	**0**
Data adjustments	0	1,027	1,985	60	39	(19)	**3,092**
Net change	706	2,588	3,623	3,680	(88)	156	**10,665**
GERP Members on 6/30/2022	**149,987**	**68,636**	**84,675**	**103,121**	**3,489**	**9,370**	**419,278**

Summary of Membership

Active Member Statistics	**Basic Members**	**Coordinated Members**	**MERF Members**	**Total**
Number	2	149,981	4	149,987
Average age	74.1	45.9	69.0	45.9
Average service	54.8	9.3	47.0	9.3
Average salary	$ 79,950	$ 45,973	$ 77,394	$ 45,974

Deferred Retirement Terminated Member Statistics	**Basic Members**	**Coordinated Members**	**MERF Members**	**Total**
Number	11	68,620	5	68,636
Average age	75.8	50.7	67.0	50.7
Average service	2.6	6.8	11.8	6.8
Average annual benefit, with augmentation to December 31, 2018 and 15% CSA load	$ 7,321	$ 5,486	$ 26,038	$ 5,488
Average refund value, with 15% CSA load	$ 76	$ 13,160	$ 23,679	$ 13,158

Membership Data

Summary of Membership

Service Retiree Member Statistics	Basic Members	Coordinated Members	MERF Members	Total
Number	2,294	98,954	1,873	103,121
Average age	86.2	73.0	78.4	73.4
Average annual benefit	$ 42,706	$ 14,053	$ 40,409	$ 15,169

Disabled Retiree Member Statistics	Basic Members	Coordinated Members	MERF Members	Total
Number	49	3,384	56	3,489
Average age	84.4	69.0	77.1	69.3
Average annual benefit	$ 42,339	$ 13,903	$ 30,109	$ 14,563

Survivor Member Statistics	Basic Members	Coordinated Members	MERF Members	Total
Number	1,357	7,465	548	9,370
Average age	86.3	74.2	81.4	76.3
Average annual benefit	$ 32,434	$ 10,899	$ 37,440	$ 15,570

Development of Costs

Actuarial Valuation Balance Sheet *(Dollars in Thousands)*

The actuarial balance sheet is based on the principle that the long-term projected benefit obligations of the plan should be ideally equal to the long-term resources available to fund those obligations. A Projected Benefit Funding Ratio less than 100% indicates that contributions are insufficient. The resources available to meet projected obligations for current members consist of current fund assets plus the present value of anticipated future contributions intended to fund benefits for current members. In the exhibit below, B.2 is the estimated present value of contributions to fund the normal cost rate for current members until their respective termination dates. Item B.1 is the present value of the total 14.51% statutory contribution net of normal cost and anticipated plan expenses during the period from the valuation date to the statutory amortization date. Item D. Current Benefit Obligation, is the liability based on current service and projected compensation (the Entry Age Normal cost method is used to determine liabilities and contributions elsewhere in the report).

The contributions made in excess of amounts required for current benefit payments are accumulated as a reserve to help meet benefit payments in later years. It is this reserve system which permits the establishment of a level rate of contribution each year.

	Non-Vested	Vested	June 30, 2022
A. Actuarial Value of Assets			$ 26,397,045
B. Expected Future Assets			
1. Present value of expected future statutory supplemental contributions*			$ 7,417,385
2. Present value of future normal cost contributions			$ 4,074,369
3. Total expected future assets: *(1.) + (2.)*			$ 11,491,754
C. Total Current and Expected Future Assets *(A.+ B.3)*			$ 37,888,799
D. Current Benefit Obligations**			
1. Benefit recipients	**Non-Vested**	**Vested**	**Total**
a. Service retirements	$ -	$ 16,155,394	$ 16,155,394
b. Disability retirements	$ -	$ 489,352	$ 489,352
c. Survivors	$ -	$ 1,126,811	$ 1,126,811
2. Deferred retirements with augmentation	$ -	$ 2,213,404	$ 2,213,404
3. Former members without vested rights	$ 34,898	$ -	$ 34,898
4. Active members	$ 326,670	$ 8,420,297	$ 8,746,967
5. Total Current Benefit Obligations	$ 361,568	$ 28,405,258	$ 28,766,826
E. Expected Future Benefit Obligations			$ 5,497,192
F. Total Current and Expected Future Benefit Obligations***			$ 34,264,018
G. Unfunded Current Benefit Obligations: *(D.5.) - (A.)*			$ 2,369,781
H. Unfunded Current and Future Benefit Obligations: *(F.) - (C.)*			$ (3,624,781)
I. Accrued Benefit Funding Ratio: *(A.)/(D.)*			91.76%
J. Projected Benefit Funding Ratio: *(C.)/(F.)*			110.58%

* *Per the LCPR Standards for Actuarial Work, calculated assuming the current contribution toward the unfunded liability continues for the entire amortization period.*

** *Present value of credited projected benefits (projected compensation, current service).*

*** *Present value of projected benefits (projected compensation, projected service).*

Development of Costs

Determination of Unfunded Actuarial Accrued Liability and Supplemental Contribution Rate (*Dollars in Thousands)*

	Actuarial Present Value of Projected Benefits	Actuarial Present Value of Future Normal Costs	Actuarial Accrued Liability
A. Determination of Actuarial Accrued Liability (AAL)			
1. Active members			
a. Retirement annuities	$ 12,781,820	$ 2,736,523	$ 10,045,297
b. Disability benefits	$ 320,143	$ 113,271	$ 206,872
c. Survivor's benefits	$ 167,003	$ 47,572	$ 119,431
d. Deferred retirements	$ 880,681	$ 876,818	$ 3,863
e. Refunds*	$ 94,512	$ 300,185	$ (205,673)
f. Total	$ 14,244,159	$ 4,074,369	$ 10,169,790
2. Deferred retirements with future augmentation	$ 2,213,404	$ -	$ 2,213,404
3. Former members without vested rights	$ 34,898	$ -	$ 34,898
4. Annuitants	$ 17,771,557	$ -	$ 17,771,557
5. Total	$ 34,264,018	$ 4,074,369	$ 30,189,649
B. Determination of Unfunded Actuarial Accrued Liability (UAAL)			
1. Actuarial accrued liability			$ 30,189,649
2. Current assets (AVA)			$ 26,397,045
3. Unfunded actuarial accrued liability			$ 3,792,604
C. Determination of Supplemental Contribution Rate**			
1. Present value of future payrolls through the amortization date of June 30, 2048			$ 111,205,170
2. Supplemental contribution rate: *(B.3.) / (C.1.)*			3.41 % ***

* *Includes non-vested refunds and non-married survivor benefits only.*

** *The amortization of the Unfunded Actuarial Accrued Liability (UAAL) using the current amortization method results in initial payments less than the "interest only" payment on the UAAL. Payments less than the interest only amount will result in the UAAL increasing for an initial period of time.*

*** *The amortization factor as of June 30, 2022 is 15.421163.*

Development of Costs

Changes in Unfunded Actuarial Accrued Liability (UAAL) *(Dollars in Thousands)*

	Year Ending June 30, 2022		
	Actuarial Accrued Liability	Current Assets	Unfunded Actuarial Accrued Liability
A. Values at beginning of year	$ 29,215,560	$ 24,909,060	$ 4,306,500
B. Changes due to interest requirements and current rate of funding			
1. Normal cost, including expenses	$ 541,428	$ -	$ 541,428
2. Benefit payments	$ (1,811,057)	$ (1,811,057)	$ -
3. Contributions	$ -	$ 1,020,031	$ (1,020,031)
4. Interest on A., B.1., B.2., and B.3.	$ 2,143,556	$ 1,838,516	$ 305,040
5. Total *(B.1. + B.2. + B.3. + B.4.)*	$ 873,927	$ 1,047,490	$ (173,563)
C. Expected values at end of year *(A. + B.5.)*	$ 30,089,487	$ 25,956,550	$ 4,132,937
D. Increase (decrease) due to actuarial losses (gains) because of experience deviations from expected			
1. Age and service retirements			$ 21,418
2. Disability retirements			$ (1,842)
3. Death-in-service benefits			$ (965)
4. Withdrawals			$ (73,179)
5. Salary increases			$ 111,005
6. Investment income			$ (440,495)
7. Mortality of annuitants			$ (44,951)
8. January 1, 2022 COLA (gain)/loss*			$ 40,357
9. Other items			$ (11,101)
10.Total			$ (399,753)
E. Unfunded actuarial accrued liability at end of year before plan amendments and changes in actuarial assumptions *(C. + D.9.)*			$ 3,733,184
F. Change in unfunded actuarial accrued liability due to changes in plan provisions			$ -
G. Change in unfunded actuarial accrued liability due to changes in actuarial assumptions			$ 59,420
H. Change in unfunded actuarial accrued liability due to changes in methodology			$ -
I. Unfunded actuarial accrued liability at end of year *(E. + F. + G. + H.)***			$ 3,792,604

* *January 1, 2022. Benefits increased 1.50% and were expected to increase 1.25%.*

** *The unfunded actuarial accrued liability on a market value of assets basis is $4,155,464.*

Development of Costs

Determination of Contribution Sufficiency/(Deficiency) – Total *(Dollars in Thousands)*

The required contribution is defined in Minnesota statutes as the sum of normal cost, a supplemental contribution to amortize the UAAL, and an allowance for expenses. The dollar amounts shown are for illustration purposes and equal percent-of-payroll multiplied by projected annual payroll. The exhibit below is a compilation of the results for Basic, Coordinated and MERF members, presented on subsequent pages.

	Percent-of-Payroll	Dollar Amount
A. Statutory Contributions - Chapter 353		
1. Employee contributions	6.50%	$ 468,743
2. Employer contributions	7.50%	$ 540,854
3. Employer supplemental contributions	0.29%	$ 21,000
4. State contributions	0.22%	$ 16,000
5. Total	14.51%	$ 1,046,597
B. Required Contributions - Chapter 356		
1. Normal cost		
a. Retirement benefits	5.38%	$ 387,962
b. Disability benefits	0.19%	$ 13,709
c. Survivors	0.09%	$ 6,491
d. Deferred retirement benefits	1.46%	$ 105,289
e. Refunds*	0.53%	$ 38,221
f. Total	7.65%	$ 551,672
2. Supplemental Contribution Amortization of Unfunded Actuarial Accrued Liability by June 30, 2048	3.41%	$ 245,902
3. Allowance for Expenses	0.19%	$ 13,701
4. Total	11.25% **	$ 811,275
C. Contribution Sufficiency/(Deficiency) *(A.5. - B.4.)*	3.26 %	$ 235,322

* *Includes non-vested refunds and non-married survivor benefits only.*

** *The required contribution on a market value of assets basis is 11.58% of payroll.*

Note: Projected annual payroll for fiscal year beginning on the valuation date: $7,211,205 (determined by increasing reported pay for each member by one full year's assumed pay increase according to the actuarial salary scale, as prescribed by the LCPR Standards for Actuarial Work).

Development of Costs

Determination of Normal Cost – Basic *(Dollars in Thousands)*

This exhibit compares statutory contributions to normal cost for the group of Basic Plan active members. This closed plan includes members not covered under the Social Security Act.

	Percent-of-Payroll	Dollar Amount
A. Statutory contributions - Chapter 353		
1. Employee contributions	9.10%	$ 15
2. Employer contributions	11.78%	$ 19
3. Total	20.88%	$ 34
B. Required contributions - Chapter 356		
1. Normal cost		
a. Retirement benefits	2.51%	$ 5
b. Disability benefits	0.15%	$ -
c. Survivors	0.05%	$ -
d. Deferred retirement benefits	3.09%	$ 5
e. Refunds*	0.57%	$ 1
f. Total	6.37%	$ 11

** Includes non-vested refunds and non-married survivor benefits only.*

Note: Projected annual payroll for fiscal year beginning on the valuation date: $165.

Development of Costs

Determination of Normal Cost – Coordinated *(Dollars in Thousands)*

This exhibit compares statutory contributions to normal cost for the group of Coordinated Plan active members.

	Percent-of-Payroll		Dollar Amount
A. Statutory contributions - Chapter 353			
1. Employee contributions	6.50%	$	468,697
2. Employer contributions	7.50%	$	540,804
3. Total	14.00%	$	1,009,501
B. Required contributions - Chapter 356			
1. Normal cost			
a. Retirement benefits	5.38%	$	387,937
b. Disability benefits	0.19%	$	13,700
c. Survivors	0.09%	$	6,490
d. Deferred retirement benefits	1.46%	$	105,276
e. Refunds*	0.53%	$	38,217
f. Total	7.65%	$	551,620

** Includes non-vested refunds and non-married survivor benefits only.*

Note: Projected annual payroll for fiscal year beginning on the valuation date: $7,210,719.

Development of Costs

Determination of Normal Cost – MERF *(Dollars in Thousands)*

This exhibit compares statutory contributions to normal cost for the MERF Plan active members.

	Percent-of-Payroll	Dollar Amount
A. Statutory contributions - Chapter 353		
1. Employee contributions	9.75%	$ 31
2. Employer contributions	9.75%	$ 31
3. Employer supplemental contributions	6,542.06%	$ 21,000
4. State contributions	4,984.42%	$ 16,000
5. Total	11,545.98%	$ 37,062
B. Required contributions - Chapter 356		
1. Normal cost		
a. Retirement benefits	6.23%	$ 20
b. Disability benefits	2.78%	$ 9
c. Survivors	0.22%	$ 1
d. Deferred retirement benefits	2.61%	$ 8
e. Refunds*	0.82%	$ 3
f. Total	12.66%	$ 41

** Includes non-vested refunds and non-married survivor benefits only.*

Note: Projected annual payroll for fiscal year beginning on the valuation date: $321.

Actuarial Basis

Actuarial Methods

All actuarial methods are prescribed by Minnesota Statutes, the Legislative Commission on Pensions and Retirement, or the Board of Trustees. Different methodologies may also be reasonable and results based on other methodologies would be different.

Actuarial Cost Method

Actuarial Accrued Liability and required contributions in this report are computed using the Entry Age Normal Cost Method. This method is prescribed by Minnesota Statute. Under this method, a normal cost is developed by amortizing the actuarial value of benefits expected to be received by each active participant (as a level percentage-of-pay) over the total working lifetime of that participant, from hire to termination. Age as of the valuation date was calculated based on the dates of birth provided by the Fund. Entry age for valuation purposes was calculated as the age on the valuation date minus the provided years of service on the valuation date.

To the extent that current assets and future normal costs do not support participants' expected future benefits, an Unfunded Actuarial Accrued Liability ("UAAL") develops. The UAAL is amortized over the statutory amortization period using level percent-of-payroll. The total contribution developed under this method is the sum of normal cost, expenses, and the payment toward the UAAL.

Valuation of Future Post-Retirement Benefit Increases

Benefit increases after retirement will equal 50% of the Social Security Cost-of-Living Adjustment, not less than 1.0% and not more than 1.5%, beginning January 1, 2019. Stochastic modeling was used to determine the assumption that benefit increases will equal 1.25% per year. This is only an assumption; actual increases will depend on actual experience.

Funding Objective

The fundamental financing objective of the fund is to establish contribution rates which, when expressed as a percentage of active member payroll, will remain approximately level from generation to generation and meet the required deadline for full funding.

Actuarial Basis

Actuarial Methods (Concluded)

Asset Valuation Method
The assets are valued based on a five-year moving average of expected and market values (five-year average actuarial value) and determined as follows:

- At the end of each plan year, an average asset value is calculated as the average of the market asset value at the beginning and end of the fiscal year net of investment income for the fiscal year;
- The investment gain or (loss) is taken as the excess of actual investment income over the expected investment income based on the average asset value as calculated above;
- The investment gain or (loss) so determined is recognized over five years at 20% per year; and
- The asset value is the sum of the market asset value plus the scheduled recognition of investment gains or (losses) during the current and the preceding four fiscal years.

Payment on the Unfunded Actuarial Accrued Liability
Payment equals a level percentage-of-payroll each year to the statutory amortization date of June 30, 2048 assuming payroll increases of 3.00% per annum. If there is a negative Unfunded Actuarial Accrued Liability, the surplus amount is amortized over 30 years as a level percentage-of-payroll. If the unfunded liability increases due to changes in benefits, assumptions, or methods, the statutory amortization date may be extended.

As required by the Standards for Actuarial Work, projected payroll is 1) determined by increasing reported payroll for each member by one full year's assumed pay increase according to the actuarial salary scale and 2) multiplied by 0.962 in the determination of the present value of future payroll to account for timing differences. This statutory method produces a required contribution that is similar to, but slightly below, the contribution that would be produced by more common actuarial methods.

Changes in Methods since Prior Valuation
There were no changes in actuarial methods since the prior valuation.

Actuarial Basis

Summary of Actuarial Assumptions – Basic and Coordinated

The following assumptions were used in valuing the liabilities and benefits under the plan. All actuarial assumptions are prescribed by Minnesota Statutes, the Legislative Commission on Pensions and Retirement (LCPR), or the Board of Trustees. These parties are responsible for selecting the assumptions used for this valuation. Unless noted otherwise, the assumptions prescribed are based on the last experience study dated June 27, 2019. The Allowance for Combined Service Annuity assumptions are based on an analysis completed by the LCPR actuary and documented in a report dated October 2016.

Investment return	7.50% per annum (prescribed by Minnesota Statutes).
Benefit increases after retirement	1.25% per annum.
Salary increases	Reported salary at valuation date increased according to the rate table, to current fiscal year and annually for each future year. Prior fiscal year salary is annualized for members with less than one year of service earned during the year.
Inflation	2.25% per year.
Payroll growth	3.00% per year.
Mortality rates	
Healthy pre-retirement	Pub-2010 General Employee Mortality Table adjusted for mortality improvements using projection scale MP-2021. Rates are multiplied by a factor of 1.07 for males and 0.98 for females.
Healthy post-retirement	Pub-2010 Healthy Retired General Mortality Table adjusted for mortality improvements using projection scale MP-2021. Male rates are multiplied by a factor of 1.02 and female rates are multiplied by a factor of 0.90.
Disabled retirees	Pub-2010 General/Teacher Disabled Retiree Mortality Table, adjusted for mortality improvements using projection scale MP-2021. Rates are set forward two years for males and set forward four years for females.
Notes	The Pub-2010 Employee Mortality Table as published by the Society of Actuaries (SOA) contains mortality rates for ages 18 to 80 and the annuitant mortality table contains mortality rates for ages 50 to 120. We have extended the annuitant mortality table as needed for members and beneficiaries younger than age 50 who are receiving a benefit by deriving rates based on the employee table and the juvenile table. Similarly, we have extended the employee table as needed for members older than age 80 by deriving rates based on the annuitant table.
Retirement	Members retiring from active status are assumed to retire according to the age-related rates shown in the tables. Members who have attained the highest assumed retirement age are assumed to retire in one year. Note that significant plan changes reflected in this report may result in behavior changes that are not anticipated in the current retirement rates.

Actuarial Basis

Summary of Actuarial Assumptions – Basic and Coordinated (Continued)

Withdrawal	Service-related rates based on experience; see table of sample rates.
Disability	Age-related rates based on experience; see table of sample rates.
Allowance for combined service annuity	Liabilities for former members are increased by 15.0% for vested members and 3.0% for non-vested members to account for the effect of some participants having eligibility for a Combined Service Annuity.
Administrative expenses	Prior year administrative expenses expressed as a percentage of prior year projected payroll.
Refund of contributions	For non-vested members, account balances accumulate interest until the assumed commencement date and are discounted back to the valuation date. Active members decrementing after becoming eligible for a deferred benefit are assumed to take the contributions accumulated with interest if larger than the value of the benefit.
Commencement of deferred benefits	Members receiving deferred annuities (including current terminated deferred members) are assumed to begin receiving benefits at Normal Retirement.
Percentage married	80% of male and 70% of female active members are assumed to be married. Actual marital status is used for members in payment status.
Age of spouse	Males are assumed to have a beneficiary three years younger, while females are assumed to have a beneficiary one year older. For members in payment status, actual spouse date of birth is used, if provided.
Eligible children	Retiring members are assumed to have no dependent children.
Form of payment	Married members retiring from active status are assumed to elect subsidized joint and survivor form of annuity as follows: Males: 10% elect 25% Joint & Survivor option 15% elect 50% Joint & Survivor option 10% elect 75% Joint & Survivor option 45% elect 100% Joint & Survivor option Females: 10% elect 25% Joint & Survivor option 10% elect 50% Joint & Survivor option 5% elect 75% Joint & Survivor option 30% elect 100% Joint & Survivor option Remaining married members and unmarried members are assumed to elect the Straight Life option. Members receiving deferred annuities (including current terminated deferred members) are assumed to elect a straight life annuity.
Eligibility testing	Eligibility for benefits is determined based upon the age nearest birthday and service on the date the decrement is assumed to occur.
Decrement operation	Withdrawal decrements do not operate during retirement eligibility. Decrements are assumed to occur mid-fiscal year.
Service credit accruals	It is assumed that members accrue one year of service credit per year.

Actuarial Basis

Summary of Actuarial Assumptions – Basic and Coordinated (Continued)

Benefit service	Exact fractional service is used to determine the amount of benefit payable.
Pay increases	Pay increases are assumed to happen at the beginning of the fiscal year. This is equivalent to assuming that reported earnings are pensionable earnings for the year ending on the valuation date.
Final average salary	For present value of future benefit purposes, final average salary was calculated in accordance with pay increase assumptions, but was not permitted to fall below the average salary reported in the data.
Unknown data for certain members	To prepare this report, GRS has used and relied on participant data supplied by the Fund. Although GRS has reviewed the data in accordance with Actuarial Standards of Practice No. 23, GRS has not verified or audited any of the data or information provided. In cases where submitted data was missing or incomplete, the following assumptions, based on average results for applicable members at the time of the last experience study, were applied: <u>Data for active members:</u> There were 4,207 members reported with a salary less than or equal to $100 (after annualization). We used prior year salary (2,125 members), if available; otherwise high five salary with a 10% load to account for salary increases (1,197 members). If neither prior year salary or high five salary was available, we assumed a value of $30,000. There were 3,813 members reported without a gender and 417 members reported with an invalid date of birth. We assumed a date of birth based on an entry age of 36 and female gender. <u>Data for terminated members:</u> We calculated benefits for these members using the reported Average Salary and credited service. If Average Salary was not reported (97 members), we assumed a value of $24,000. If credited service was not reported (170 members), we assumed credited service was elapsed time from hire to termination date (165 members); if elapsed time was not available, we assumed six years. If termination date was invalid or not reported (171 members), we assumed the termination date was equal to hire date plus credited service; otherwise the valuation date unless they are noted as a pre-July 1, 1989 hire, then June 30, 1989. If reported termination date occurs prior to reported hire date, the two dates were swapped. There were 668 members reported without a gender. We assume female gender. There were 87 members reported without a date of birth, we assumed a birth date of July 1, 1970. <u>Data for retired members:</u> There were 224 members reported without a gender. We assumed retirees are female and beneficiaries are male. There were no members reported with an invalid date of birth.

Actuarial Basis

Summary of Actuarial Assumptions – Basic and Coordinated (Continued)

Unknown data for certain members (Concluded)	Data for retired members (Concluded): Because PERA reclassifies disabled members as retirees once the member reaches Normal Retirement Age, we compare the members that PERA reports as retirees to our disabled group from the last valuation. If a member was disabled in the prior valuation, we reclassify that member as a disabled retiree in this year's valuation. We reclassified 2,244 retirees as disabled retirees in this valuation.
Changes in actuarial assumptions since the prior valuation	The mortality improvement scale was changed from Scale MP-2020 to Scale MP-2021.

Actuarial Basis

Summary of Actuarial Assumptions – Basic and Coordinated (Continued)

	Percentage of Members Dying Each Year*					
	Healthy Post-Retirement Mortality**		Healthy Pre-Retirement Mortality**		Disability Mortality**	
Age in 2022	Male	Female	Male	Female	Male	Female
20	0.04%	0.01%	0.04%	0.01%	0.36%	0.18%
25	0.03	0.01	0.04	0.01	0.31	0.29
30	0.05	0.02	0.05	0.02	0.55	0.51
35	0.07	0.03	0.08	0.03	0.78	0.80
40	0.09	0.04	0.09	0.04	1.02	1.06
45	0.12	0.06	0.11	0.05	1.31	1.33
50	0.29	0.18	0.15	0.07	1.71	1.55
55	0.42	0.26	0.22	0.12	2.18	1.90
60	0.65	0.36	0.35	0.19	2.76	2.27
65	0.94	0.53	0.51	0.28	3.38	2.58
70	1.44	0.84	0.70	0.42	4.02	3.26
75	2.42	1.50	1.04	0.70	5.27	4.87
80	4.37	2.77	1.66	1.19	7.69	7.83
85	8.06	5.27	7.11	4.93	11.59	12.04
90	14.03	9.88	14.72	10.76	17.94	17.16

* *Generally, mortality rates are expected to increase as age increases (with the exception of young ages, where expected mortality may decrease as age increases). In cases where the application of the projection scale would reverse the nature of this trend, standard mortality rates have been adjusted slightly. This adjustment has no material effect on results.*

** *Rates are adjusted for mortality improvements using Scale MP-2021, from a base year of 2010.*

	Rates of Disability Retirement	
Age	Male	Female
20	0.01%	0.01%
25	0.01	0.01
30	0.01	0.01
35	0.02	0.02
40	0.04	0.04
45	0.06	0.05
50	0.11	0.10
55	0.26	0.14
60	0.53	0.21
65	0.00	0.00
70	0.00	0.00

Actuarial Basis

Summary of Actuarial Assumptions – Basic and Coordinated (Continued)

	Rates of Service Retirement		
Age	**Rule of 90 Eligible**	**Tier 1**	**Tier 2**
55	20.0%	4.0%	4.0%
56	15.0%	4.0%	4.0%
57	15.0%	5.0%	4.0%
58	15.0%	5.0%	5.0%
59	15.0%	6.0%	5.0%
60	15.0%	8.0%	6.0%
61	15.0%	10.0%	8.0%
62	30.0%	20.0%	15.0%
63	25.0%	20.0%	15.0%
64	25.0%	20.0%	15.0%
65	40.0%	40.0%	25.0%
66	35.0%	35.0%	35.0%
67	25.0%	25.0%	25.0%
68	25.0%	25.0%	25.0%
69	25.0%	25.0%	25.0%
70	25.0%	25.0%	25.0%
71+	100.0%	100.0%	100.0%

Actuarial Basis

Summary of Actuarial Assumptions – Basic and Coordinated (Concluded)

Salary Scale			Rates of Termination	
Year	Increase	Year	Male	Female
1	10.25%	1	21.50%	21.50%
2	7.25	2	16.25	17.25
3	6.00	3	11.00	13.00
4	5.50	4	9.00	11.00
5	5.00	5	8.00	9.00
6	4.70	6	7.00	8.50
7	4.50	7	6.25	8.00
8	4.40	8	5.50	7.50
9	4.30	9	5.00	7.00
10	4.20	10	4.50	6.00
11	4.00	11	4.25	5.50
12	3.90	12	4.00	5.25
13	3.80	13	3.75	5.00
14	3.70	14	3.50	4.75
15	3.65	15	3.00	4.25
16	3.60	16	2.75	3.75
17	3.50	17	2.50	3.50
18	3.40	18	2.25	3.00
19	3.40	19	2.00	2.80
20	3.40	20	1.90	2.70
21	3.30	21	1.85	2.60
22	3.30	22	1.80	2.50
23	3.30	23	1.75	2.40
24	3.20	24	1.70	2.30
25	3.20	25	1.65	2.20
26	3.10	26	1.60	2.10
27	3.00	27	1.55	2.00
28	3.00	28	1.50	1.50
29	3.00	29	1.00	1.50
30+	3.00	30	1.00	1.50

Actuarial Basis

Summary of Actuarial Assumptions – MERF

The following assumptions were used in valuing the liabilities and benefits under the plan for MERF members only. Assumptions regarding investment return, mortality, benefit increases, and Combined Service Annuity (CSA) are the same as shown in the Basic and Coordinated Plan assumption summary.

Salary increases	Total reported pay for prior calendar year increased 1.86% (half year of 3.75%, compounded) to prior fiscal year and 3.75% annually for each future year.
Retirement	Active members are assumed to retire at age 61, or immediately if currently age 61 or older.
Withdrawal	Rates are shown in rate table.
Disability	Age-related rates based on experience; see table of sample rates.
Commencement of deferred benefits	Members receiving deferred annuities (including current terminated deferred members) are assumed to begin receiving benefits at age 60.
Percentage married	66.67% of active members are assumed to be married. Actual marital status is used for members in payment status.
Age of spouse	Females are assumed to be three years younger than their male spouses. For members in payment status, actual spouse date of birth is used, if provided.
Eligible children	Retiring members are assumed to have no dependent children.
Form of payment	Members are assumed to elect a life annuity.
Unknown data for certain members	To prepare this report, GRS has used and relied on participant data supplied by the Fund. Although GRS has reviewed the data in accordance with Actuarial Standards of Practice No. 23, GRS has not verified or audited any of the data or information provided. In cases where submitted data was missing or incomplete, the following assumptions were applied: There were no members with missing or invalid dates of birth. <u>Data for active members:</u> There were no active members with missing salary or service. <u>Data for terminated members:</u> Benefits were provided by PERA for all members. <u>Data for retired members:</u> There were 3 members reported without a gender. We assumed male gender. Because PERA reclassifies disabled members as retirees once the member reaches Normal Retirement Age, we compare the members that PERA reports as retirees to our disabled group from the last valuation. If a member was disabled in the prior valuation, we reclassify that member as a disabled retiree in this year's valuation. We reclassified 56 retirees as disabled retirees in this valuation.

Actuarial Basis

Summary of Actuarial Assumptions – MERF (Concluded)

	Rates of Termination		Rates of Disability Retirement	
Age	Male	Female	Male	Female
20	21.00%	21.00%	0.21%	0.21%
25	11.00	11.00	0.21	0.21
30	5.00	5.00	0.23	0.23
35	1.50	1.50	0.30	0.30
40	1.00	1.00	0.41	0.41
45	1.00	1.00	0.61	0.61
50	1.00	1.00	0.93	0.93
55	1.00	1.00	1.60	1.60
60	1.00	1.00	0.00	0.00
65	0.00	0.00	0.00	0.00
70	0.00	0.00	0.00	0.00

Actuarial Basis

Summary of Plan Provisions – Basic

Following is a summary of the major plan provisions used in the valuation of this report. PERA is solely responsible for the validity, accuracy and comprehensiveness of this information. If any of the plan provisions shown below are not accurate and complete, the valuation results may differ significantly from those shown in this report and may require a revision of this report. Many of the plan provisions described below are no longer relevant due to the age and/or service of remaining Basic active members.

Plan year	July 1 through June 30
Eligibility	A public employee who is not covered under the Social Security Act. General exceptions are employees covered by other public funds, certain part-time employees and full-time students under age 23.
Contributions	Shown as a percent of salary: <u>Member</u> 9.10% of salary <u>Employer</u> 11.78% of salary Member contributions are “picked up” according to the provisions of Internal Revenue Code 414(h).
Allowable service	Service during which member contributions were made. May also include certain leaves of absence and military service.
Salary	Includes amounts deducted for deferred compensation or supplemental retirement plans, net income from fees and sick leave payments funded by the employer. Excludes unused annual leaves and sick leave payments, severance payments, Workers’ Compensation benefits and employer-paid flexible spending accounts and employer-paid deferred compensation deposits, cafeteria plans, healthcare expense accounts, day-care expenses, fringe benefits and the cost of insurance coverage.
Average salary	Average of the five highest successive years of annual salary. Average salary is based on all Allowable Service if less than five years.
Vesting	Hired before July 1, 2010: 100% vested after 3 years of Allowable Service. Hired after June 30, 2010: 100% vested after 5 years of Allowable Service. (Not applicable since all Basic members were hired before 1968.)

Retirement

<u>Normal retirement benefit</u>

Age/service requirement	Age 65 and vested. Proportionate retirement annuity is available at age 65 and one year of Allowable Service.
Amount	2.70% of Average Salary for each year of Allowable Service.

<u>Early retirement benefit</u>

Age/service requirement	(a.) Age 55 and vested. (b.) Any age with 30 years of Allowable Service. (c.) Rule of 90: Age plus Allowable Service totals 90.

Retirement (Continued)

Early retirement benefit (Continued)

Amount	The greater of (a) and (b): (a.) 2.20% of Average Salary for each of the first ten years of Allowable Service and 2.70% of Average Salary for each subsequent year with reduction of 0.25% for each month if the Member is under age 65 at time of retirement and has less than 30 years of Allowable Service or if the Member is under age 62 and has 30 or more years of Allowable Service. No reduction if age plus years of Allowable Service totals 90. (b.) 2.70% of Average Salary for each year of Allowable Service assuming augmentation to age 65 at 3.00% per year and actuarial reduction for each month the Member is under age 65. Augmentation adjustment is phased out over a five-year period starting July 1, 2019, resulting in no augmentation adjustment after June 30, 2024.
Form of payment	Life annuity with return on death of any balance of contributions over aggregate monthly payments. Actuarially equivalent options are: 25%, 50%, 75% or 100% Joint and Survivor. If a Joint and Survivor benefit is elected and the beneficiary predeceases the annuitant, the annuitant's benefit increases to the Life Annuity amount. This "bounce back" is subsidized by the plan.
Benefit increases	Benefit recipients will receive increases each year in January based upon 50% of the current Social Security increase, not less than 1.0% and not more than 1.5%, beginning January 1, 2019. For retirements on or after January 1, 2024, the first benefit increase is delayed until the retiree reaches Normal Retirement Age (not applicable to Rule of 90 retirees, disability benefit recipients, or survivors). A benefit recipient who has been receiving a benefit for at least 12 full months as of June 30 will receive a full increase. Members receiving benefits for at least one month but less than 12 full months as of June 30 will receive a pro rata increase. Members retired under laws in effect before July 1, 1973 receive an additional lump sum payment each year. In 1989, this lump sum payment is the greater of $25 times each full year of Allowable Service or the difference between $400 times each full year of Allowable Service and the sum of benefits paid from any Minnesota public pension plan plus cash payments from the Social Security Administration for the preceding fiscal year July 1, 1988 through June 30, 1989. In each following year, the lump sum payment will increase by the same percentage increase that is applied to regular annuities paid from the fund. Effective January 1, 2002, annual lump sum payment is divided by 12 and paid as a monthly life annuity in the annuity form elected.

Summary of Plan Provisions – Basic (Continued)

Disability	
Disability benefit	
Age/service requirement	Total and permanent disability before normal retirement age if vested. Since all remaining active Basic members are over normal retirement age, none are eligible for disability benefits.
Amount	Normal Retirement benefit based on Allowable Service and Average Salary at disability without reduction for commencement before Normal Retirement Age. Supplemental benefit of $25 per month payable to the later of the normal retirement age or the five-year anniversary of commencement of disability. The disability benefit is reduced to that amount which, when added to Workers' Compensation, does not exceed the salary the disabled Member received as of the date of the disability or the salary currently payable for the same employment position substantially similar to the one the person held as of the date of the disability, whichever is greater. If a member became disabled prior to July 1, 1997 but did not commence his or her benefit before July 1, 1997, the benefit payable is calculated under the laws in effect at the time the Member became disabled and an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%. Payments stop earlier if disability ceases. If death occurs prior to age 65, or within five years of disability, the surviving spouse can receive a refund or a survivor benefit. Dependent children are entitled to dependent child benefits subject to the 70.00% family maximum. Payments revert to a retirement annuity at normal retirement age. Benefits may be reduced on resumption of partial employment.
Form of payment	Same as for retirement.
Benefit increases	Same as for retirement, except benefit increases are paid prior to Normal Retirement.

Actuarial Basis

Summary of Plan Provisions – Basic (Continued)

Disability (Concluded)

<u>Retirement after disability</u>

Age/service requirement	Normal retirement age.
Amount	Any optional annuity continues. Otherwise, the larger of the disability benefit paid before normal retirement age or the normal retirement benefit available at normal retirement age, or an actuarially equivalent optional annuity.
Benefit increases	Same as for retirement, except benefit increases are paid prior to Normal Retirement.

Death

<u>Surviving spouse benefit</u>

Age/service requirement	Active Member with 18 months of Allowable Service or while Member is receiving a disability benefit.
Amount	50.00% of salary averaged over last six months. Family benefit is maximum of 70.00% and minimum of 50.00% of average salary. Benefit paid until spouse's death but no payments while spouse is remarried prior to July 1, 1991. If a member died prior to July 1, 1997 and the beneficiary was not eligible to commence their survivor benefit as of July 1, 1997, the benefit payable is calculated under the laws in effect before July 1, 1997, and an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%. Surviving spouse optional annuity may be elected in lieu of this benefit.
Benefit increases	Same as for retirement, except benefit increases are paid prior to Normal Retirement.

<u>Surviving dependent children's benefit</u>

Age/service requirement	Active Member with 18 months of Allowable Service or while Member is receiving a disability benefit.
Amount	10.00% of salary averaged over last six months for each child. Family benefit minimum (including spouse's benefit) of 50.00% of salary and maximum of 70.00% of average salary. Benefits paid until child marries, dies, or attains age 18 (age 22 if full-time student).

Death (Concluded)	
Surviving dependent children's benefit (Concluded)	
Amount (Concluded)	If a member died prior to July 1, 1997 and the beneficiary was not eligible to commence their survivor benefit before July 1, 1997, the benefit payable is calculated under the laws in effect before July 1, 1997, and an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.
Benefit increases	Same as for retirement, except benefit increases are paid prior to Normal Retirement.
Surviving spouse optional annuity	
Age/service requirement	Member or former Member who dies before retirement benefits commence and other survivor annuity is waived by spouse.
Amount	Survivor's payment of the 100% joint and survivor benefit the Member could have elected if terminated or an actuarial equivalent term certain annuity. If commencement is prior to age 65 (age 62 if 30 years of service), the benefit is reduced the same as early retirement with half the applicable reduction factor used from age 55 to the actual commencement age. If no surviving spouse, then an actuarial equivalent dependent child benefit is paid to age 20 or for five years if longer. If a member died prior to July 1, 1997 and the beneficiary was not eligible to commence their survivor benefit as of July 1, 1997, the benefit payable is calculated under the laws in effect before July 1, 1997, and an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.
Benefit increases	Same as for retirement, except benefit increases are paid prior to Normal Retirement.
Refund of contributions with interest	
Age/service requirement	Member dies before receiving any retirement benefits and survivor benefits are not payable.
Amount	The excess of the Member's contributions with 6.00% interest until June 30, 2011; 4.00% through June 30, 2018; 3.00% thereafter over any disability or survivor benefits paid.

Summary of Plan Provisions – Basic (Continued)

Termination	
Refund of contributions	
Age/service requirement	Termination of public service.
Amount	Member's contributions with 6.00% interest through June 30, 2011. Beginning July 1, 2011, a member's contributions increase at 4.00% interest. Beginning July 1, 2018, a member's contributions increase at 3.00% interest. If a member is vested, a deferred annuity may be elected in lieu of a refund.
Deferred benefit	
Age/service requirement	Fully vested.
Amount	Benefit computed under law in effect at termination and increased by the following "augmentation" percentage compounded annually for terminations prior to 2012: (a.) 0.00% before July 1, 1971; (b.) 5.00% from July 1, 1971 to January 1, 1981; (c.) 3.00% thereafter until the earlier of January 1 of the year following attainment of age 55 and January 1, 2012; (d.) 5.00% thereafter until the earlier of the date the annuity begins and January 1, 2012; (e.) 1.00% from January 1, 2012 through December 31, 2018; and (f.) 0.00% from January 1, 2019, thereafter. Members who terminate after 2011 will receive no future augmentation. Members active with a public employer the day prior to the privatization of the employer become vested immediately. Members who are privatized after June 30, 2020 will receive no future augmentation.

Summary of Plan Provisions – Basic (Continued)

Termination (Concluded)

Deferred benefit (Concluded)

Amount (Concluded)

Members who are privatized before July 1, 2020 receive enhanced augmentation (unless the enhancement results in a net loss to the Plan). Amount is payable at normal or early retirement. Augmentation is compounded annually through benefit commencement, equal to:

Date of Privatization	Augmentation prior to July 1, 2020	July 1, 2020 through December 31, 2023	After December 31, 2023
Prior to January 1, 2007 (or January 1, 2008 for Hutchinson Area Health Care)	5.5% prior to age 55, 7.5% after	2.0%	0.0%
After December 31, 2006 (2007 for Hutchinson Area Health Care) and prior to January 1, 2011	4.0% prior to age 55, 6.0% after	2.0%	0.0%
After December 31, 2010 and prior to July 1, 2020	2.0%*	2.0%*	0.0%

** Reduced to 1% if 2% augmentation resulted in a net loss to the Plan.*

If a member terminated employment prior to July 1, 1997 but was not eligible to commence their pension before July 1, 1997, the benefit payable is calculated under the laws in effect before July 1, 1997 and an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.

Form of payment

Same as for retirement.

Actuarial equivalent factors

Effective July 1, 2019, actuarially equivalent factors based on the RP-2014 mortality table for healthy annuitants for a member turning age 62 in 2021, reflecting projected mortality improvements using Scale MP-2017, white collar adjustment, male rates set forward two years, female rates multiplied by 0.90, blended 40% males, 6.17% post-retirement interest, and 7.50% pre-retirement interest. Reflecting statutory requirements, joint and survivor factors are based on an interest assumption of 6.50%.

Actuarial Basis

Summary of Plan Provisions – Basic (Concluded)

Combined service annuity	Members are eligible for combined service benefits if they: (a.) Meet minimum retirement age for each plan participated in and total public service meets the vesting requirements of each plan; or (b.) Have three or more years of service under PERA and the covered fund(s) (if hired prior to July 1, 2010). Other requirements for combined service include: (a.) Member must have at least six months of allowable service credit in each plan worked under; and (b.) Member may not be in receipt of a benefit from another plan. Members who meet the above requirements must have their benefits based on the following: (a.) Allowable service in all covered plans is combined in order to determine eligibility for early retirement. (b.) Average salary is based on the high five consecutive years during their entire service in all covered plans.
Changes in plan provisions	There were no changes in plan provisions since the previous valuation.

Actuarial Basis

Summary of Plan Provisions – Coordinated

Following is a summary of the major plan provisions used in the valuation of this report. PERA is solely responsible for the validity, accuracy and comprehensiveness of this information. If any of the plan provisions shown below are not accurate and complete, the valuation results may differ significantly from those shown in this report and may require a revision of this report.

Plan year	July 1 through June 30		
Eligibility	A public employee who is covered under the Social Security Act. General exceptions are employees covered by other public funds, certain part-time employees and full-time students under age 23. City managers and persons holding certain elective office positions may choose to become Members.		
Contributions	Shown as a percent of salary:		
Effective date	**Member**	**Employer**	**Additional Employer**
January 1, 2015	6.50%	6.50%	1.00%
	Additional Employer Contribution remains in effect until the plan is 100% funded on an actuarial value of assets basis (contribution is repealed the following March 31). Member contributions are “picked up” according to the provisions of Internal Revenue Code 414(h).		
Allowable service	Service during which member contributions are deducted. May also include certain leaves of absence and military service.		
Salary	Includes amounts deducted for deferred compensation or supplemental retirement plans, net income from fees and sick leave payments funded by the employer. Excludes unused annual leave and sick leave payments, severance payments, Workers’ Compensation benefits and employer-paid flexible spending accounts and employer-paid deferred compensation deposits, cafeteria plans, healthcare expense accounts, day-care expenses, fringe benefits and the cost of insurance coverage.		
Average salary	Average of the five highest successive years of annual salary. Average salary is based on all Allowable Service if less than five years.		
Vesting	Hired before July 1, 2010: 100% vested after three years of Allowable Service. Hired after June 30, 2010: 100% vested after five years of Allowable Service.		
Retirement Normal retirement benefit Age/service requirement	First hired before July 1, 1989: (a.) Age 65 and vested. (b.) Proportionate retirement annuity is available at age 65 and one year of Allowable Service.		
Amount	1.70% of Average Salary for each year of Allowable Service.		

Summary of Plan Provisions – Coordinated (Continued)

Retirement (Continued)

Normal retirement benefit (Continued)

Age/service requirement	First hired after June 30, 1989: (a.) The greater of age 65 or the age eligible for full Social Security retirement benefits but no later than age 66 and vested. (b.) Proportionate Retirement Annuity is available at normal retirement age and one year of Allowable Service.
Amount	1.70% of Average Salary for each year of Allowable Service.

Early retirement benefit

Age/service requirement	First hired before July 1, 1989: (a.) Age 55 and vested. (b.) Any age with 30 years of Allowable Service. (c.) Rule of 90: Age plus Allowable Service totals 90. First hired after June 30, 1989: (a.) Age 55 and vested.
Amount	First hired before July 1, 1989: The greater of (a) or (b): (a.) 1.20% of Average Salary for each of the first ten years of Allowable Service and 1.70% of Average Salary for each subsequent year with reduction of 0.25% for each month the Member is under age 65 at time of retirement or under age 62 if 30 years of Allowable Service. No reduction if age plus years of Allowable Service totals 90. (b.) 1.70% of Average Salary for each year of Allowable Service assuming augmentation to age 65 at 3.00% per year and actuarial reduction for each month the Member is under age 65. Augmentation adjustment is phased out over a five-year period starting July 1, 2019, resulting in no augmentation adjustment after June 30, 2024. First hired after June 30, 1989: (a.) 1.70% of Average Salary for each year of Allowable Service assuming augmentation to the age eligible for full Social Security retirement benefit (but not higher than age 66) at 3.00% (2.50% if hired after June 30, 2006) per year and actuarial reduction for each month the member is under the normal retirement age. Augmentation adjustment is phased out over a five-year period starting July 1, 2019, resulting in no augmentation adjustment after June 30, 2024.

Summary of Plan Provisions – Coordinated (Continued)

Retirement (Concluded)	
Form of payment	Life annuity with return on death of any balance of contributions over aggregate monthly payments. Actuarially equivalent options are: 25%, 50%, 75% or 100% Joint and Survivor. If a Joint and Survivor benefit is elected and the beneficiary predeceases the annuitant, the annuitant's benefit increases to the Life Annuity amount. This "bounce back" is subsidized by the plan.
Benefit increases	Benefit recipients receive increases each year in January based upon 50% of the current Social Security increase, not less than 1.0% and not more than 1.5%, beginning January 1, 2019. For retirements on or after January 1, 2024, the first benefit increase is delayed until the retiree reaches Normal Retirement Age (not applicable to Rule of 90 retirees, disability benefit recipients, or survivors). A benefit recipient who has been receiving a benefit for at least 12 full months as of June 30 will receive a full increase. Members receiving benefits for at least one month but less than 12 full months as of June 30 will receive a pro rata increase. Members retired under laws in effect before July 1, 1973 will receive an additional lump sum payment each year. In 1989, this lump sum payment is $25 times each full year of Allowable Service. In each following year, the lump sum payment will increase by the same percentage increase that is applied to regular annuities paid from the fund.
Disability	
Disability benefit	
Age/service requirement	Total and permanent disability before normal retirement age if vested.
Amount	Normal Retirement benefit based on Allowable Service and Average Salary at disability without reduction for commencement before normal retirement age. The disability benefit is reduced to that amount which, when added to Workers' Compensation, does not exceed the salary the disabled Member received as of the date of the disability or the salary currently payable for the same employment position substantially similar to the one the person held as of the date of the disability, whichever is greater. If a Member became disabled prior to July 1, 1997 but did not commence his or her benefit before July 1, 1997, the benefit payable is calculated under the laws in effect before July 1, 1997, and an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.

Summary of Plan Provisions – Coordinated (Continued)

Disability (Concluded)	
Disability benefit (Concluded)	
Amount (Concluded)	Payments stop if disability ceases or death occurs. Payments change to a retirement annuity at normal retirement age. Benefits may be reduced on resumption of partial employment.
Form of payment	Same as for retirement.
Benefit increases	Same as for retirement, except benefit increases are paid prior to Normal Retirement.
Retirement after disability	
Age/service requirement	Normal retirement age.
Amount	Any optional annuity continues. Otherwise, the larger of the disability benefit paid before normal retirement age or the normal retirement benefit available at normal retirement age, or an actuarially equivalent optional annuity.
Benefit increases	Same as for retirement, except benefit increases are paid prior to Normal Retirement.
Death	
Surviving spouse optional annuity	
Age/service requirement	Member or former Member who dies before retirement or disability benefits commence.
Amount	Survivor's payment of the 100% joint and survivor benefit the Member could have elected if terminated or an actuarial equivalent term certain annuity. If commencement is prior to age 65 (age 62 if 30 years of service), the benefit is reduced the same as early retirement with half the applicable reduction factor used from age 55 to the actual commencement age. If no surviving spouse, then an actuarial equivalent dependent child benefit is paid to age 20 or for five years if longer. If a member died prior to July 1, 1997 and the beneficiary was not eligible to commence their survivor benefit before July 1, 1997, the benefit payable is calculated under the laws in effect before July 1, 1997, and an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.
Benefit increases	Same as for retirement, except benefit increases are paid prior to Normal Retirement.

Summary of Plan Provisions – Coordinated (Continued)

Death (Concluded)	
Refund of contributions	
Age/service requirement	Member dies before receiving any retirement benefits and survivor benefits are not payable.
Amount	The excess of the Member's contributions with 6.00% interest until June 30, 2011; 4.00% through June 30, 2018; 3.00% thereafter over any disability or survivor benefits paid.
Termination	
Refund of contributions	
Age/service requirement	Termination of public service.
Amount	Member's contributions with 6.00% interest through June 30, 2011. Beginning July 1, 2011, a member's contributions increase at 4.00% interest. Beginning July 1, 2018, a member's contributions increase at 3.00% interest. If a member is vested, a deferred annuity may be elected in lieu of a refund.
Deferred benefit	
Age/service requirement	Fully vested.
Amount	Benefit computed under law in effect at termination and increased by the following percentage (augmentation) compounded annually for terminations prior to 2012: (a.) 0.00% before July 1, 1971; (b.) 5.00% from July 1, 1971 to January 1, 1981; (c.) 3.00% (2.50% if hired after June 30, 2006) thereafter until the earlier of January 1 of the year following attainment of age 55 and January 1, 2012; (d.) 5.00% (2.50% if hired after June 30, 2006) thereafter until the earlier of the date the annuity begins and January 1, 2012; or (e.) 1.00% from January 1, 2012 through December 31, 2018; and (f.) 0.00% from January 1, 2019, thereafter. Members who terminate after 2011 will receive no future augmentation. Members active with a public employer the day prior to the privatization of the employer become vested immediately. Members who are privatized after June 30, 2020 will receive no future augmentation.

Actuarial Basis

Summary of Plan Provisions – Coordinated (Continued)

Termination (Concluded)

Deferred benefit (Concluded)

Amount (Concluded)

Members who are privatized before July 1, 2020 receive enhanced augmentation (unless the enhancement results in a net loss to the Plan). Amount is payable at normal or early retirement. Augmentation is compounded annually through benefit commencement, equal to:

Date of Privatization	Augmentation prior to July 1, 2020	July 1, 2020 through December 31, 2023	After December 31, 2023
Prior to January 1, 2007 (or January 1, 2008 for Hutchinson Area Health Care)	5.5% prior to age 55, 7.5% after	2.0%	0.0%
After December 31, 2006 (2007 for Hutchinson Area Health Care) and prior to January 1, 2011	4.0% prior to age 55, 6.0% after	2.0%	0.0%
After December 31, 2010 and prior to July 1, 2020	2.0%*	2.0%*	0.0%

** Reduced to 1% if 2% augmentation resulted in a net loss to the Plan.*

If a member terminated employment prior to July 1, 1997 but was not eligible to commence their pension before July 1, 1997, the benefit payable is calculated under the laws in effect before July 1, 1997 and an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.

Form of payment — Same as for retirement.

Actuarial equivalent factors

Effective July 1, 2019, actuarially equivalent factors based on the RP-2014 mortality table for healthy annuitants for a member turning age 62 in 2021, reflecting projected mortality improvements using Scale MP-2017, white collar adjustment, male rates set forward two years, female rates multiplied by 0.90, blended 40% males, 6.17% post-retirement interest, and 7.50% pre-retirement interest. Reflecting statutory requirements, joint and survivor factors are based on an interest assumption of 6.50%.

Actuarial Basis

Summary of Plan Provisions – Coordinated (Concluded)

Combined service annuity	Members are eligible for combined service benefits if they: (a.) Meet minimum retirement age for each plan participated in and total public service meets the vesting requirements of each plan; or (b.) Have three or more years of service under PERA and the covered fund(s) (if hired prior to July 1, 2010). Other requirements for combined service include: (a.) Member must have at least six months of allowable service credit in each plan worked under; and (b.) Member may not be in receipt of a benefit from another plan. Members who meet the above requirements must have their benefit based on the following: (a.) Allowable service in all covered plans is combined in order to determine eligibility for early retirement. (b.) Average salary is based on the high five consecutive years during their entire service in all covered plans.
Changes in plan provisions	There were no changes in plan provisions since the previous valuation.

Actuarial Basis

Summary of Plan Provisions of Minneapolis Employees Retirement Fund (MERF)

Following is a summary of the major plan provisions used in the valuation of this report. PERA is solely responsible for the validity, accuracy and comprehensiveness of this information. If any of the plan provisions shown below are not accurate and complete, the valuation results may differ significantly from those shown in this report and may require a revision of this report.

Plan year

July 1 through June 30

Eligibility/employee rule

An employee of the City of Minneapolis, the Metropolitan Airports Commission, the Met Council/Environmental Services, the Municipal Employees Retirement Fund, and Special School District No. 1 if covered prior to July 1, 1978. Employees covered July 1, 1978 or later are covered by the Public Employees Retirement Association (PERA) Plan.

Effective July 1, 1992, licensed peace officers and firefighters who are employed by the Metropolitan Airports Commission and covered by the Minneapolis Employees Retirement Fund will receive the greater of retirement, disability, or survivor benefits under:

a) The Minneapolis Employees Retirement Fund; or
b) The Public Employees Retirement Association (PERA) Police & Fire Plan.

Full consolidation

The MERF Division fully merged with PERA's General Employees Retirement Plan, effective January 1, 2015. Upon consolidation, state and employer contributions were revised as shown herein.

Contributions

Member: 9.75% of salary

Employer: 9.75% of salary (Employer Regular Contributions)

Employer Regular and Additional Contributions will be paid as long as there are active members.

Employer Supplemental Contributions equal $21,000,000 per year through September 2031.

Contribution allocation

Employer Supplemental Contributions are allocated to the employers in proportion to their share of the actuarial accrued liability of MERF on July 1, 2009, as follows:

Employer	Allocation
City of Minneapolis	54.78%
Minneapolis Park Board	10.33%
Met Council	1.74%
Metropolitan Airport Commission	5.76%
Municipal Building Commission	1.08%
Minneapolis School District No. 1	23.04%
Hennepin County	3.17%
MnSCU	0.10%
Total	100.00%

Actuarial Basis

Summary of Plan Provisions of Minneapolis Employees Retirement Fund (MERF) (Continued)

State contributions	The State's contributions equal $16,000,000 and are payable by September 30 each year through September 15, 2031.
Allowable service	Service during which member contributions were made. Allowable Service may also include certain leaves of absence, military service and service prior to becoming a member. Allowable service also includes time on duty disability provided that the member returns to active service if the disability ceases.
Salary	All amounts of salary, wages or compensation.
Average salary	Average of the five highest calendar years of salary out of the last ten calendar years.
Retirement	
Normal retirement benefit	
Age/service requirement	Age 60 and 10 years of employment. Any age with 30 years of employment. Proportionate retirement annuity is available at age 65 and one year allowable service.
Amount	2.00% of average salary for the first 10 years of allowable service plus 2.50% of average salary for each subsequent year of allowable service.

Summary of Plan Provisions of Minneapolis Employees Retirement Fund (MERF) (Continued)

Disability

Disability benefit

Age/service requirement	Total and permanent disability before age 60 with five years of allowable service, or no allowable service if a work-related disability.
Amount	2.00% of average salary for the first 10 years of disability service plus 2.50% of average salary for each subsequent year of disability service. Disability service is the greater of (a) or (b) where: (a.) equals allowable service plus service projected to age 60, subject to a maximum of 22 years, and (b.) equals allowable service. Benefit is reduced by Workers' Compensation benefits. Payments stop at age 60 or earlier if disability ceases or death occurs. Benefits may be reduced on resumption of partial employment.

Disability after separation

Age/service requirement	Total and permanent disability after electing to receive a retirement benefit but before age 60.
Amount	Actuarial equivalent of total credit to member's account.

Retirement after disability

Age/service requirement	Total and permanent disability after electing to receive a retirement benefit but before age 60. Employee is still disabled after age 60.
Amount	Benefit continues according to the option selected.

Summary of Plan Provisions of Minneapolis Employees Retirement Fund (MERF) (Continued)

Death	
Pre-retirement survivor's spouse benefit	
Age/service requirement	Active member with 18 months of allowable service.
Amount	30% of salary averaged over the last six months to the surviving spouse plus 10% of salary averaged over the last six months to each surviving child. Maximum benefit is $900 per month.
Pre-retirement survivor's spouse annuity	
Age/service requirement	Active member or former member who dies before retirement with 20 years of allowable service.
Amount	Actuarial equivalent of a single life annuity which would have been paid as a retirement benefit on the date of death without regard to eligibility age for retirement benefit. If there is no surviving spouse, the designated beneficiary may be a dependent child or dependent parent.
Refund of accumulated city contributions	
Age/service requirement	Active member or former member dies after 10 years of allowable service and prior to retirement.
Amount	Present value of the City's annual installments of $60 or, in the case of a former member, the net accumulation of city deposits. This benefit is not payable if survivor's benefits are paid.
Lump sum	
Age/service requirement	Death prior to service or disability retirement without an eligible surviving beneficiary.
Amount	$750 with less than 10 years allowable service, or $1,500 with 10 or more years of allowable service.
Refund of member contributions at death	
Age/service requirement	Active member or former member dies before retirement.
Amount	The excess of the member's contributions (exclusive of the contributions to the survivor's account) plus interest to the date of death.

Actuarial Basis

Summary of Plan Provisions of Minneapolis Employees Retirement Fund (MERF) (Concluded)

Termination	
<u>Deferred benefit</u>	
Age/service requirement	Three years of allowable service.
Amount	Benefit computed under law in effect at termination and increased by the following percentage (augmentation), compounded annually: (a.) 0.00% prior to July 1, 1971, (b.) 5.00% from July 1, 1971 to January 1, 1981, and (c.) 3.00% thereafter until the annuity begins. Amount is payable at or after age 60.
<u>Refund of member contributions upon termination</u>	
Age/service requirement	Termination of public service.
Amount	Member's contributions with interest. A deferred annuity may be elected in lieu of a refund if vested.
Form of payment	▪ Life annuity. ▪ Life annuity with 3, 5, 10 or 15 years guaranteed. ▪ Life annuity with lump sum death benefit. ▪ Joint & Survivor (with or without bounce back feature).
Optional form conversion factors	1986 PET mortality table with a one-year setback, blended 50% male and 50% female, and 5% interest.
Two dollar bill and annuity	Optional Two Dollar Bill money purchase annuity available at age 55 with 20 years of service if member had service prior to June 28, 1973. According to PERA, this option is rarely utilized. We have assumed that remaining active members will not elect this optional benefit.
Benefit increases	Benefit recipients receive increases each year in January based upon 50% of the current Social Security increase, not less than 1.0% and not more than 1.5%, beginning January 1, 2019. For retirements on or after January 1, 2024, the first benefit increase is delayed until the retiree reaches Normal Retirement Age (not applicable to Rule of 90 retirees, disability benefit recipients, or survivors).
Changes in plan provisions	There were no changes in plan provisions since the previous valuation.

Additional Schedules

Schedule of Funding Progress[1] *(Dollars in Thousands)*

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded (Overfunded) AAL (UAAL) (b) - (a)	Funded Ratio (a)/(b)	Actual Covered Payroll (Previous FY) (c)	UAAL as a Percentage of Covered Payroll [(b)-(a)]/(c)
7-1-1998	$ 7,636,668	$ 8,769,303	$ 1,132,635	87.08 %	$ 3,271,737	34.62 %
7-1-1999	$ 8,489,177	$ 9,443,678	$ 954,501	89.89	$ 3,302,808	28.90
7-1-2000	$ 9,609,367	$ 11,133,682	$ 1,524,315	86.31	$ 3,437,954	44.34
7-1-2001	$ 10,527,270	$ 12,105,337	$ 1,578,067	86.96	$ 3,466,587	45.52
7-1-2002	$ 11,017,414	$ 12,958,105	$ 1,940,691	85.02	$ 3,809,864	50.94
7-1-2003	$ 11,195,902	$ 13,776,198	$ 2,580,296	81.27	$ 4,387,649	58.81
7-1-2004	$ 11,477,961	$ 14,959,465	$ 3,481,504	76.73	$ 3,968,034	87.74
7-1-2005	$ 11,843,936	$ 15,892,555	$ 4,048,619	74.53	$ 4,096,138	98.84
7-1-2006	$ 12,495,207	$ 16,737,757	$ 4,242,550	74.65	$ 4,247,109	99.89
7-1-2007	$ 12,985,324	$ 17,705,627	$ 4,720,303	73.34	$ 4,448,954	106.10
7-1-2008	$ 13,048,970	$ 17,729,847	$ 4,680,877	73.60	$ 4,722,432	99.12
7-1-2009	$ 13,158,490	$ 18,799,416	$ 5,640,926	69.99	$ 4,778,708	118.04
7-1-2010	$ 13,126,993	$ 17,180,956	$ 4,053,963	76.40	$ 4,804,627	84.38
7-1-2011	$ 13,455,753	$ 17,898,849	$ 4,443,096	75.18	$ 5,079,429 [2]	87.47
7-1-2012	$ 13,661,682	$ 18,598,897	$ 4,937,215	73.45	$ 5,142,592 [3]	96.01
7-1-2013	$ 14,113,295	$ 19,379,769	$ 5,266,474	72.82	$ 5,246,928 [3]	100.37
7-1-2014	$ 15,644,540	$ 21,282,504	$ 5,637,964	73.51	$ 5,351,920 [3]	105.34
7-1-2015	$ 17,974,439	$ 23,560,951	$ 5,586,512	76.29	$ 5,549,255 [4]	100.67
7-1-2016	$ 18,765,863	$ 24,848,409	$ 6,082,546	75.52	$ 5,773,708 [5]	105.35
7-1-2017	$ 19,916,322	$ 25,615,722	$ 5,699,400	77.75	$ 6,156,985 [5]	92.57
7-1-2018	$ 21,129,746	$ 27,101,067	$ 5,971,321	77.97	$ 6,298,815 [5]	94.80
7-1-2019	$ 21,979,022	$ 27,969,744	$ 5,990,722	78.58	$ 6,523,754 [5]	91.83
7-1-2020	$ 22,792,333	$ 28,626,916	$ 5,834,583	79.62	$ 6,698,754 [5]	87.10
7-1-2021	$ 24,909,060	$ 29,215,560	$ 4,306,500	85.26	$ 6,761,354 [5]	63.69
7-1-2022	$ 26,397,045	$ 30,189,649	$ 3,792,604	87.44	$ 7,042,154 [5]	53.86

[1] Information prior to 2012 provided by prior actuaries. See prior reports for additional detail.
[2] Assumed equal to actual member contributions divided by 6.125%.
[3] Assumed equal to actual member contributions divided by 6.250%.
[4] Assumed equal to actual member contributions divided by 6.375%.
[5] Assumed equal to actual member contributions divided by 6.500%.

Additional Schedules

Schedule of Contributions from the Employer and Other Contributing Entities[1]
(Dollars in Thousands)

Plan Year Ended June 30	Actuarially Required Contribution Rate (a)	Actual Covered Payroll (b)	Actual Member Contributions (c)	Annual Required Contributions [(a)x(b)] - (c) = (d)	Actual Employer Contributions[2] (e)	Percentage Contributed (e)/(d)
1998	9.62 %	$ 3,271,737	$ 140,385	$ 174,356	$ 151,499	86.89%
1999	9.63	$ 3,302,808	$ 158,475	$ 159,585	$ 173,370	108.64
2000	9.22	$ 3,437,954	$ 171,073	$ 145,906	$ 186,637	127.92
2001	11.84	$ 3,466,587	$ 173,380	$ 237,064	$ 188,208	79.39
2002	11.85	$ 3,809,864	$ 191,422	$ 260,047	$ 206,982	79.59
2003	11.52	$ 4,387,649	$ 205,963	$ 299,494	$ 221,689	74.02
2004	12.25	$ 3,968,034	$ 215,697	$ 270,387	$ 225,745	83.49
2005	12.72	$ 4,096,138	$ 216,701	$ 304,328	$ 232,963	76.55
2006	13.26	$ 4,247,109	$ 235,901	$ 327,266	$ 255,531	78.08
2007	13.41	$ 4,448,954	$ 260,907	$ 335,698	$ 283,419	84.43
2008	13.86	$ 4,722,432	$ 280,007	$ 374,522	$ 303,304	80.98
2009	14.22	$ 4,778,708	$ 298,381	$ 381,151	$ 328,603	86.21
2010	15.55	$ 4,804,627	$ 303,571	$ 443,548	$ 342,678	77.26
2011	12.46	$ 5,079,429 [3]	$ 311,115	$ 321,782	$ 357,596	111.13
2012	13.47	$ 5,142,592 [4]	$ 321,412	$ 371,295	$ 368,037	99.12
2013	14.46	$ 5,246,928 [4]	$ 327,933	$ 430,773	$ 372,652	86.51
2014	15.15	$ 5,351,920 [4]	$ 334,495	$ 476,321	$ 382,251	80.25
2015	15.80	$ 5,549,255 [5]	$ 353,765	$ 523,017	$ 435,115	83.19
2016	15.89	$ 5,773,708 [6]	$ 375,291	$ 542,151	$ 465,978	85.95
2017	16.49	$ 6,156,985 [6]	$ 400,204	$ 615,083	$ 483,888	78.67
2018	16.18	$ 6,298,815 [6]	$ 409,423	$ 609,725	$ 504,819	82.79
2019	13.45	$ 6,523,754 [6]	$ 424,044	$ 453,401	$ 531,444	117.21
2020	13.30	$ 6,698,754 [6]	$ 435,419	$ 455,515	$ 525,821	115.43
2021	13.13	$ 6,761,354 [6]	$ 439,488	$ 448,278	$ 540,685	120.61
2022	11.73	$ 7,042,154 [6]	$ 457,740	$ 368,305	$ 562,291	152.67
2023	11.25					

[1] *Information prior to 2012 provided by prior actuary. See prior reports for additional detail.*
[2] *Includes contributions from other sources (if applicable).*
[3] *Assumed equal to actual member contributions divided by 6.125%.*
[4] *Assumed equal to actual member contributions divided by 6.25%.*
[5] *Assumed equal to actual member contributions divided by 6.375%.*
[6] *Assumed equal to actual member contributions divided by 6.500%.*

Glossary of Terms

Actual Covered Payroll (GASB)	The payroll of covered employees, which is typically only the pensionable pay (meets the statutory salary definition) and does not include pay above any pay cap.
Actuarial Accrued Liability (AAL)	The difference between the Actuarial Present Value of Future Benefits, and the Actuarial Present Value of Future Normal Costs.
Accrued Benefit Funding Ratio	The ratio of assets to Current Benefit Obligations.
Accrued Liability Funding Ratio	The ratio of assets to Actuarial Accrued Liability.
Actuarial Assumptions	Assumptions about future plan experience that affect costs or liabilities, such as: mortality, withdrawal, disablement, and retirement; future increases in salary; future rates of investment earnings; future investment and administrative expenses; characteristics of members not specified in the data, such as marital status; characteristics of future members; future elections made by members; and other items.
Actuarial Cost Method	A procedure for allocating the Actuarial Present Value of Future Benefits between the Actuarial Present Value of future Normal Costs and the Actuarial Accrued Liability.
Actuarial Equivalent	Of equal Actuarial Present Value, determined as of a given date and based on a given set of Actuarial Assumptions.
Actuarial Present Value (APV)	The amount of funds required to provide a payment or series of payments in the future. It is determined by discounting the future payments with an assumed interest rate and with the assumed probability each payment will be made.
Actuarial Present Value of Projected Benefits	The Actuarial Present Value of amounts which are expected to be paid at various future times to active members, retired members, beneficiaries receiving benefits, and inactive, non-retired members entitled to either a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.
Actuarial Valuation	The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial Valuation for a governmental retirement system typically also includes calculations of items needed for developing and monitoring a retirement system's funding policy, such as the Funded Ratio and the Annual Required Contribution (ARC).
Actuarial Value of Assets	The value of the assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets or a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the Funded Ratio and the Annual Required Contribution (ARC).

Glossary of Terms (Continued)

Amortization Method	A method for determining the Amortization Payment. Under the Level Percentage of Pay method, the Amortization payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. The stream of payments increases at the rate at which total covered payroll of all active members is assumed to increase.
Amortization Payment	That portion of the plan contribution or ARC which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.
Amortization Period	The period used in calculating the Amortization Payment.
Annual Required Contribution (ARC)	The employer's periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation. The ARC consists of the Employer Normal Cost and Amortization Payment.
Annual Valuation Earnings	Reported salary at valuation date. annualized for members with less than one year of service earned during the year.
Augmentation	Annual increases to deferred benefits.
Closed Amortization Period	A specific number of years that is reduced by one each year, and declines to zero with the passage of time. For example, if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc.
Current Benefit Obligations	The present value of benefits earned to the valuation date, based on current service and including future salary increases to retirement (comparable to a Projected Unit Credit measurement).
Employer Normal Cost	The portion of the Normal Cost to be paid by the employer. This is equal to the Normal Cost less expected member contributions.
Expected Assets	The present value of anticipated future contributions intended to fund benefits for current members.
Experience Gain/Loss	A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two actuarial valuations. To the extent that actual experience differs from that assumed, Unfunded Actuarial Accrued Liabilities emerge which may be larger or smaller than projected. Gains are due to favorable experience; e.g., the assets earn more than projected, salaries do not increase as fast as assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, losses are the result of unfavorable experience; i.e., actual results that produce Unfunded Actuarial Accrued Liabilities which are larger than projected.
GASB	Governmental Accounting Standards Board.

Glossary of Terms (Concluded)

GASB Statements No. 25 and No. 27 — These are the governmental accounting standards that previously set the accounting and financial reporting rules for public retirement systems and the employers that sponsor or contribute to them. Statement No. 27 sets the accounting and financial reporting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 25 sets the rules for the systems themselves. These statements remain in effect only for pension plans that are not administered as trusts or equivalent arrangements. Please refer to the definition of GASB Statements No. 67 and No. 68 on the following page.

GASB Statement No. 50 — The accounting standard governing a state or local governmental employer's accounting for pensions. This statement remains in effect only for pension plans that are not administered as trusts. Please refer to the definition of GASB Statements No. 67 and No. 68.

GASB Statements No. 67 and No. 68 — Statements No. 67 and No. 68, issued in June 2012, replace the requirements of Statements No. 25, No. 27 and No. 50, respectively, for pension plans administered as trusts. Statement No. 68, effective for the fiscal year beginning July 1, 2014, sets the accounting and financial reporting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 67, effective for the fiscal year beginning July 1, 2013, sets the rules for the systems themselves. Accounting and financial reporting information prepared according to Statements No. 67 and No. 68 is provided in a separate report beginning with the June 30, 2014 actuarial valuation.

GASB Statement No. 82 — Statement No. 82, issued in March 2016, is an amendment to Statements No. 67, No. 68, and No. 73, and is intended to improve consistency in the application of the accounting statements.

Normal Cost — The annual cost assigned, under the Actuarial Cost Method, to the current plan year.

Projected Annual Earnings — Projected annual payroll for fiscal year beginning on the valuation date, determined by increasing reported pay for each member by one full year's assumed pay increase according to the actuarial salary scale, as prescribed by the LCPR Standards for Actuarial Work.

Projected Benefit Funding Ratio — The ratio of the sum of Actuarial Value of Assets and Expected Assets to the Actuarial Present Value of Projected Benefits. A ratio less than 100% indicates that contributions are insufficient.

Unfunded Actuarial Accrued Liability — The difference between the Actuarial Accrued Liability and Actuarial Value of Assets.

Valuation Date — The date as of which the Actuarial Present Value of Future Benefits are determined. The benefits expected to be paid in the future are discounted to this date.

Public Employees Retirement Association of Minnesota

Local Government Correctional Service Retirement Plan
Actuarial Valuation Report as of July 1, 2022

November 8, 2022

Public Employees Retirement Association of Minnesota
Trustees of the Local Government Correctional Service Retirement Plan
St. Paul, Minnesota

Dear Trustees of the Local Government Correctional Service Retirement Plan:

The results of the July 1, 2022 annual actuarial valuation of the Local Government Correctional Service Retirement Plan are presented in this report. This report was prepared at the request of the Board and is intended for use by the Board and staff and those designated or approved by the Board. This report may be provided to parties other than the Board and staff only in its entirety and only with permission of the Board. GRS is not responsible for unauthorized use of this report.

The purpose of the valuation is to measure the Plan's funding progress and to determine the required contribution rate for the fiscal year beginning July 1, 2022 according to the prescribed assumptions. Note that the impact of GASB Statements No. 67 and No. 68 is provided in a separate report.

Actuarial assumptions, including discount rates, mortality tables and others identified in this report, are prescribed by Minnesota Statutes Section 356.215, the Legislative Commission on Pensions and Retirement (LCPR), and the Trustees. These parties are responsible for selecting the plan's funding policy, actuarial valuation methods, asset valuation methods, and assumptions. The policies, methods and assumptions used in this valuation are those that have been so prescribed and are described in the Actuarial Basis section of this report. PERA is solely responsible for communicating to GRS any changes required thereto.

In our professional judgment, the statutory investment return assumption of 7.5% used in the report deviates materially from the guidance set forth in Actuarial Standards of Practice No. 27 (ASOP No. 27). In a 2022 analysis of long-term rate of investment return and inflation assumptions, GRS suggested that an investment return assumption in the range of 5.64% to 6.84% would be reasonable for this valuation. Please see our letter dated July 12, 2022 for additional information. For informational purposes, note that results based on a 6.50% investment return assumption are shown on page 6.

The contribution rate in this report is determined using the actuarial assumptions and methods disclosed in the Actuarial Basis section of this report. This report includes risk metrics on pages 7 through 10, but does not include a more robust assessment of the risks of future experience differing materially from the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment.

The valuation assumed the continuing ability of the plan sponsor to make the contributions necessary to fund this plan. A determination regarding whether or not the plan sponsor is actually able to do so is outside our scope of expertise and was not performed.

The findings in this report are based on data and other information through June 30, 2022. The valuation was based upon information furnished by the Public Employees Retirement Association of Minnesota (PERA), concerning benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by PERA.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of such future measurements.

This report reflects the impact of COVID-19 through June 30, 2022. It does not reflect the ongoing impact of COVID-19, which is likely to influence demographic and investment experience, at least in the short term. We will continue to monitor these developments and their impact on the plan.

This report was prepared using our proprietary valuation model and related software which, in our professional judgment, has the capability to provide results that are consistent with the purposes of the valuation and has no material limitations or known weaknesses. We performed tests to ensure that the model reasonably represents that which is intended to be modeled.

This report should not be relied on for any purpose other than the purpose described herein. Determinations of the financial results associated with the benefits described in this report in a manner other than the intended purpose may produce significantly different results.

The signing actuaries are independent of the plan sponsor. We are not aware of any relationship that would impair the objectivity of our work.

Brian B. Murphy, Bonita J. Wurst, and Sheryl L. Christensen are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. In addition, GRS meets the requirements of "approved actuary" under Minnesota Statutes Section 356.215, Subdivision 1, Paragraph (c).

This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. To the best of our knowledge and belief, the information contained in this report is accurate and fairly presents the actuarial position of the Local Government Correctional Service Retirement Plan as of the valuation date and was performed in accordance with the requirements of Minnesota Statutes Section 356.215, and the requirements of the Standards for Actuarial Work established by the LCPR. All calculations have been made in conformity with generally accepted actuarial principles and practices, with the Actuarial Standards of Practice issued by the Actuarial Standards Board, and with applicable statutes.

We are available to answer any questions or provide further details.

Respectfully submitted,
Gabriel, Roeder, Smith & Company

Brian B Murphy

Brian B. Murphy, FSA, EA, FCA, MAAA, PhD

Bonita J. Wurst

Bonita J. Wurst, ASA, EA, FCA, MAAA

Sheryl Christensen

Sheryl L. Christensen, FSA, EA, FCA, MAAA

BBM/BJW:sc

Other Observations

General Implications of Contribution Allocation Procedure or Funding Policy on Future Expected Plan Contributions and Funded Status

Given the plan's contribution allocation procedure, if there are no changes in benefits, Chapter 356 required contributions are made, and all actuarial assumptions are met (including the assumption of the plan earning 7.50% on an actuarial value of assets, as prescribed by statutes), it is expected that:

(1) The normal cost of the plan is expected to remain approximately level as a percent of pay, and
(2) The plan is expected to remain fully funded.

Limitations of Funded Status Measurements

Unless otherwise indicated, a funded status measurement presented in this report is based upon the actuarial accrued liability and the actuarial value of assets. Unless otherwise indicated, with regard to any funded status measurements presented in this report:

(1) The measurement is inappropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations, in other words, of transferring the obligations to an unrelated third party in an arm's length market value type transaction.
(2) The measurement is dependent upon the actuarial cost method which, in combination with the plan's amortization policy, affects the timing and amounts of future contributions. The amounts of future contributions will most certainly differ from those assumed in this report due to future actual experience differing from assumed experience based upon the actuarial assumptions. A funded status measurement in this report of 100% is not synonymous with no required future contributions. If the funded status were 100%, the plan would still require future normal cost contributions (i.e., contributions to cover the cost of the active membership accruing an additional year of service credit).
(3) The measurement would produce a different result if the market value of assets were used instead of the actuarial value of assets.

Limitations of Project Scope

Actuarial standards do not require the actuary to evaluate the ability of the plan sponsor or other contributing entity to make required contributions to the plan when due. Such an evaluation was not within the scope of this project and is not within the actuary's domain of expertise. Consequently, the actuary performed no such evaluation.

Contents

Summary of Valuation Results

Contributions

The following table summarizes important contribution information as described in the Development of Costs section.

Contributions	Actuarial Valuation as of July 1, 2022	Actuarial Valuation as of July 1, 2021
Statutory Contributions - Chapter 353E (% of Payroll)	14.58%	14.58%
Required Contributions - Chapter 356 (% of Payroll)	11.39%	11.76%
Sufficiency / (Deficiency)	3.19%	2.82%

Statutory contributions represent the amount actually contributed to the fund and include fixed percentage of payroll contributions plus any supplemental contributions. Required contributions are defined in statutes and the LCPR Standards for Actuarial Work, and represent the amount needed to fully fund the plan within the statutory amortization period. When member contributions of 5.83% of pay are reflected, the remaining employer statutory contribution is 8.75% of pay, and the remaining employer required contribution is 5.56% of pay.

The contribution sufficiency improved from 2.82% of payroll to 3.19% of payroll. The improvement is primarily due to the recognition of deferred asset gains in the actuarial value of assets.

These results are based on the statutory return assumption of 7.50%, which in our professional judgment, deviates significantly from guidance in ASOP No. 27. If an investment return assumption within the reasonable range were used in this valuation instead of 7.50%, liabilities and required contributions would be higher than shown, and the contribution sufficiency would be lower than shown and possibly even become a deficiency (see 6.5% interest results on page 6).

The Plan Assets section provides detail on the Plan Assets used for the valuation including a development of the Actuarial Value of Assets (AVA). The Market Value of Assets (MVA) earned approximately -6.4% for the plan year ending June 30, 2022. The AVA earned approximately 9.1% for the plan year ending June 30, 2022 compared to the assumed rate of 7.50%.

Participant reconciliation and statistics are detailed in the Membership Data section. The Actuarial Basis section includes a summary of plan provisions and actuarial methods and assumptions used for the calculations in this report.

During the past year, there were significantly more terminations and retirements than in recent prior years and fewer new hires to replace these members. As a result, the number of active members and total payroll decreased. We will continue to monitor these developments and their impact on the plan.

Accounting information prepared according to GASB Statements No. 67 and No. 68 will be provided in a separate report.

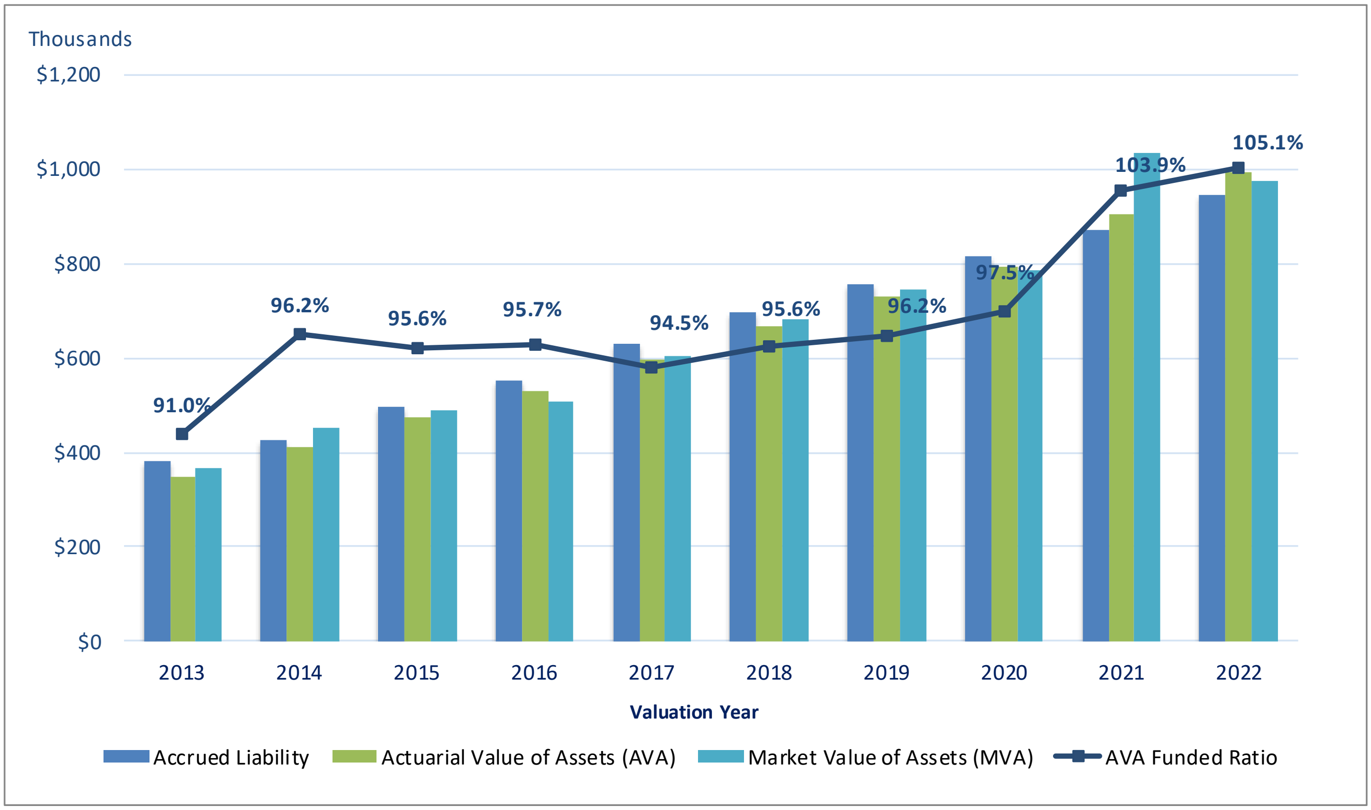
Summary of Valuation Results

A summary of principal valuation results from the current valuation and the prior valuation follows. Any changes in plan provisions, actuarial assumptions or valuation methods and procedures between the two valuations are described after the summary.

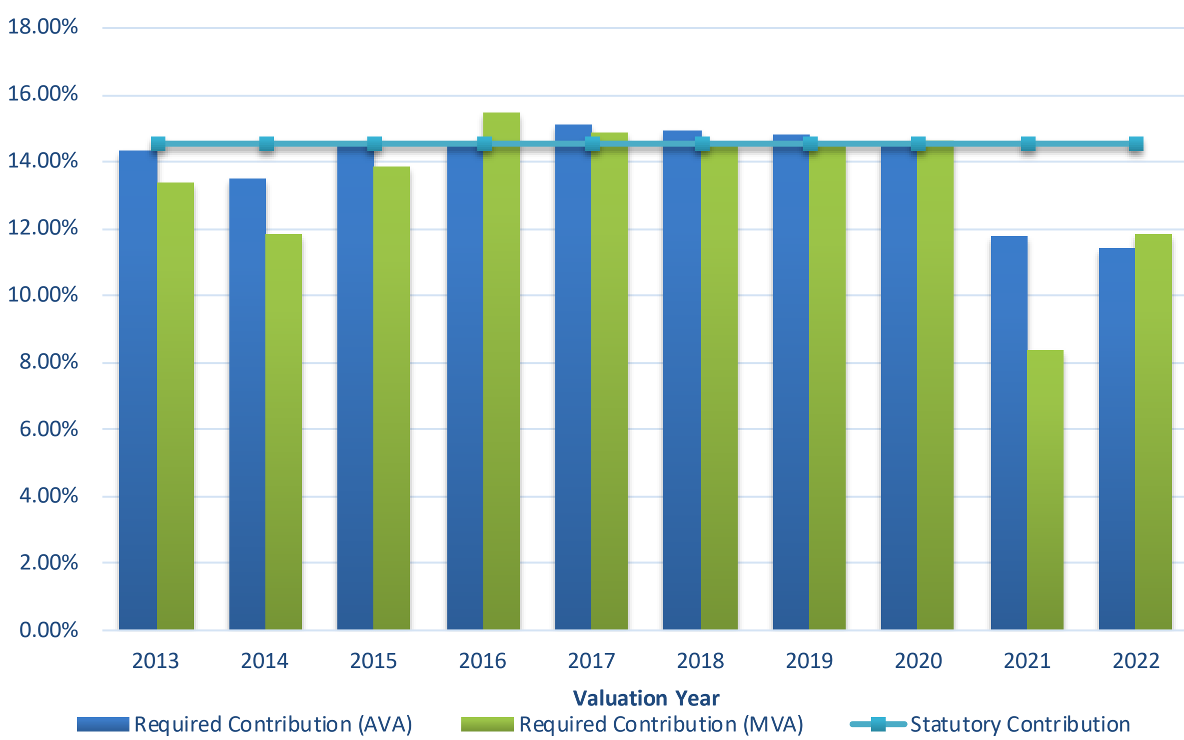
	Actuarial Valuation as of July 1, 2022	Actuarial Valuation as of July 1, 2021
Contributions (*% of Payroll*)		
Statutory - Chapter 353E	14.58%	14.58%
Required - Chapter 356	11.39%	11.76%
Sufficiency / (Deficiency)	3.19%	2.82%
Funding Ratios (*dollars in thousands*)		
Assets		
- Current assets (AVA)	$ 992,811	$ 904,434
- Current assets (MVA)	$ 975,315	$ 1,035,716
Accrued Benefit Funding Ratio		
- Current benefit obligations	$ 889,399	$ 813,622
- Funding ratio (AVA)	111.63%	111.16%
- Funding ratio (MVA)	109.66%	127.30%
Accrued Liability Funding Ratio		
- Actuarial accrued liability	$ 944,741	$ 870,567
- Funding ratio (AVA)	105.09%	103.89%
- Funding ratio (MVA)	103.24%	118.97%
Projected Benefit Funding Ratio		
- Current and expected future assets	$ 1,266,245	$ 1,186,109
- Current and expected future benefit obligations	$ 1,145,322	$ 1,076,165
- Projected benefit funding ratio (AVA)	110.56%	110.22%
Participant Data		
Active members		
- Number	3,564	3,788
- Actual covered payroll (GASB) *(000s)*	$ 220,292	$ 222,093
- Annual valuation earnings *(000s)*	$ 217,490	$ 223,628
- Average annual valuation earnings	$ 61,024	$ 59,036
- Projected annual earnings *(000s)*	$ 228,446	$ 234,885
- Average projected annual earnings	$ 64,098	$ 62,008
- Average age	38.7	38.9
- Average service	7.6	7.8
Service retirements	1,407	1,277
Survivors	87	79
Disability retirements	223	216
Deferred retirements	4,129	3,832
Non-vested terminations eligible for refund only	2,480	2,200
Total	**11,890**	**11,392**

Summary of Valuation Results

Funded Ratio History



Contribution Rate History (% of Pay)



Summary of Valuation Results

Effects of Changes

The following change in actuarial assumptions was recognized as of July 1, 2022:

- The mortality projection scale was updated from MP-2020 to MP-2021.

The impact of this change was to increase the unfunded actuarial accrued liability by $1.3 million and increase the required contribution by 0.04% of pay, as follows:

	Before Changes	Reflecting Assumption Changes
Normal Cost Rate, % of Pay	12.49%	12.50%
Amortization of Unfunded Accrued Liability, Level % of Pay to 2048*	-1.30%	-1.27%
Expenses (% of Pay)	0.16%	0.16%
Total Required Contribution, % of Pay	11.35%	11.39%
Accrued Liability Funding Ratio	105.2%	105.1%
Projected Benefit Funding Ratio	110.7%	110.6%
Unfunded Accrued Liability (in millions)	($49.2)	($48.1)

** Per Minnesota Statute 356.215 Subdivision 11, the amortization period is 30 years when the plan is fully funded.*

Summary of Valuation Results

Valuation of Future Post-Retirement Benefit Increases

The 2018 Omnibus Pension Bill, which was passed during the 2018 legislative session, revised the post-retirement benefit increases payable to retirees in the Local Government Correctional Service Retirement Plan (LGCSRP). Effective January 1, 2019, benefit recipients receive a future annual post-retirement benefit increase equal to 100% of the Social Security Cost-of-Living Adjustment, not less than 1.0% and not more than 2.5%. If the funding status declines to 85% for two consecutive years or 80% for one year, the maximum increase will be lowered to 1.5%.

For valuation purposes, we must make an assumption about future post-retirement benefit increases. We completed analysis initially after the plan change was adopted and updated the analysis recently for the change in the inflation assumption as recommended in the 2019 experience study (dated July 10, 2020).

We examined the capital market inflation assumptions for 14 investment consulting firms based on the GRS Capital Market Assumption Modeler (CMAM). Because GRS is a benefits consulting firm and does not develop or maintain its own capital market expectations, we request and monitor forward-looking expectations developed by several major investment consulting firms. We update our CMAM on an annual basis. The capital market assumptions in the 2019 CMAM are from the following investment consultants (in alphabetical order): Aon, Blackrock, BNY Mellon, Callan, Cambridge, JPMorgan, Marquette, Meketa, Mercer, NEPC, RVK, Verus, Voya, and Wilshire.

The average assumption for inflation was 2.24%, with a range of 1.70% to 3.00%, and the standard deviation was 1.79% (note that not every investment firm provided a standard deviation).

We normalized these parameters slightly so that they would correspond to an inflation assumption of 2.25% (proposed in the 2019 experience study report dated July 10, 2020). Then, based on a Monte Carlo simulation (1,000 simulations) of the post-retirement benefit increases as described above, we determined that an annual COLA assumption of 2.00% would be appropriate to model the effect of the post-retirement benefit increases. This is only an assumption; actual increases will depend on actual experience.

Note the result of the simulation was 1.91%; our recommended actuarial assumption of 2.0% reflects a margin for adverse deviation and minor rounding. The assumptions will be quite sensitive to the inflation assumption, and to its assumed standard deviation.

Actual benefit increases since this plan provision was enacted are summarized in the table below:

Effective Date	Benefit Increase
January 1, 2019	2.5%
January 1, 2020	1.6%
January 1, 2021	1.3%
January 1, 2022	2.5%

The January 1, 2023 benefit increase of 2.5% will first be reflected in the valuation as of July 1, 2023.

Summary of Valuation Results

Sensitivity Tests

During the 2017 legislative session, the Legislative Commission on Pensions and Retirement (LCPR) enacted a new sensitivity disclosure requirement for PERA's valuations. Per the LCPR's requirement, we have calculated the liabilities associated with the following scenarios:

1) 6.50% interest rate assumption
2) 8.50% interest rate assumption

We also included two alternate post-retirement benefit increase scenarios for informational purposes. The maximum benefit increase paid under current plan provisions is 2.5% per year. If the funding status declines to a specified level, the maximum benefit increase will be lowered to 1.5% per year. The financial impact of a 1.5% or 2.5% post-retirement benefit increase compared to the baseline assumption of 2.0% is shown below.

In each case, all other assumptions were unchanged from those used to develop the final valuation results in this report. Note that we believe the 8.50% and 7.50% interest rate assumptions do not comply with Actuarial Standards of Practice.

$ in millions	Final Valuation Assumptions (7.5% Interest)	Final Valuation Assumptions with 6.5% Interest	Final Valuation Assumptions with 8.5% Interest	Final Valuation Assumptions with 2.5% COLA for All Future Years	Final Valuation Assumptions with 1.5% COLA for All Future Years
Normal Cost Rate, % of Pay	12.50%	15.73%	10.17%	13.17%	11.89%
Amortization of Unfunded Accrued Liability, Level % of Pay to 2048*	(1.27%)	2.84%	(5.15%)	0.14%	(2.55%)
Expenses (% of Pay)	0.16%	0.16%	0.16%	0.16%	0.16%
Total Required Contribution, % of Pay	11.39%	18.73%	5.18%	13.47%	9.50%
Contribution Sufficiency/(Deficiency)	3.19%	(4.15%)	9.40%	1.11%	5.08%
Accrued Liability Funding Ratio	105.1%	90.0%	121.4%	99.5%	110.8%
Present Value of Projected Benefits	$1,145.3	$1,375.2	$ 970.0	$1,209.0	$1,087.0
Present Value of Future Normal Costs	200.6	271.8	152.5	211.3	190.9
Actuarial Accrued Liability	$ 944.7	$1,103.4	$ 817.5	$ 997.7	$ 896.1
Unfunded Accrued Liability	$ (48.1)	$ 110.6	$(175.3)	$ 4.9	$ (96.7)

** Per Minnesota Statute 356.215 Subdivision 11, the amortization period is 30 years when the plan is fully funded.*

Summary of Valuation Results

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

The determination of the accrued liability and the actuarially determined contribution requires the use of assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the actuarially determined contribution that result from the differences between actual experience and the actuarial assumptions.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions due to changing conditions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the Plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the plan's future financial condition include:

1. **Investment Risk** – actual investment returns may differ from the expected returns;
2. **Asset/Liability Mismatch** – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
3. **Contribution Risk** – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. **Salary and Payroll Risk** – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. **Longevity Risk** – members may live longer or shorter than expected and receive pensions for a period of time other than assumed; and
6. **Other Demographic Risks** – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example, if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise, if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

Summary of Valuation Results

The Required Contribution rate shown on page 1 may be considered as a minimum contribution rate that complies with Minnesota Statutes and the requirements of the Standards for Actuarial Work published by the LCPR. The timely receipt of the actuarially determined contributions is critical to support the financial health of the plan. Users of this report should be aware that contributions made at the actuarially determined rate do not necessarily guarantee benefit security.

PLAN MATURITY MEASURES

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Generally accepted plan maturity measures include the following. Additional maturity measures are shown on the following page.

	2022	2021
Ratio of market value of assets to total payroll	4.43	4.66
Ratio of actuarial accrued liability to total payroll	4.29	3.92
Ratio of actives to retirees and beneficiaries	2.08	2.41
Ratio of net cash flow to market value of assets	0.6%	0.9%
Approximate modified duration* of:		
▪ Total projected benefits:	17.69	18.14
▪ Actuarial accrued liability:	15.13	15.38
▪ Retiree liability:	9.83	9.79

* *Based on 7.50% interest.*

RATIO OF MARKET VALUE OF ASSETS TO PAYROLL

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 5.0 times the payroll, a return on assets 5% different than assumed would equal 25% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.

RATIO OF ACTUARIAL ACCRUED LIABILITY TO PAYROLL

The relationship between actuarial accrued liability and payroll is a useful indicator of the potential volatility of contributions for a fully funded plan. A funding policy that targets a funded ratio of 100% is expected to result in the ratio of assets to payroll and the ratio of liability to payroll converging over time. The ratio of liability to payroll may also be used as a measure of sensitivity of contribution rates to liability gains and losses. For example, if the actuarial accrued liability is 5.0 times the payroll, a change in liability 2% other than assumed would equal 10% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

Summary of Valuation Results

RATIO OF ACTIVES TO RETIREES AND BENEFICIARIES

A young plan with many active members and few retirees will have a high ratio of actives to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

RATIO OF NET CASH FLOW TO MARKET VALUE OF ASSETS

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means benefits and expenses exceed contributions, and existing funds may be used to make payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

DURATION OF ACTUARIAL LIABILITIES

The modified duration (as opposed to the Macaulay duration) may be used to approximate the sensitivity of the liability to a small change in the assumed rate of return. For example, a modified duration of 10 indicates that the liability would change by approximately 10% if the assumed rate of return were changed by 1% (i.e., from 7.5% to 6.5%).

ADDITIONAL RISK ASSESSMENT

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability. We would be please to perform such assessments upon request.

Summary of Valuation Results

Risk Measures Summary *(Dollars in Thousands)*

Valuation Date (6/30)	(1) Accrued Liabilities (AAL)	(2) Market Value of Assets	(3) Market Value Unfunded AAL	(4) Actual Covered Payroll	(5) Market Value Funded Ratio (2)/(1)	(6) Retiree Liabilities	(7) Ret Liab/ AAL (6)/(1)	(8) AAL/ Payroll (1)/(4)	(9) Assets/ Payroll (2)/(4)
2013	$381,179	$366,750	$14,429	$164,820	96.2%	$ 74,683	19.6%	231.3%	222.5%
2014	426,508	453,232	(26,724)	172,041	106.3%	85,638	20.1%	247.9%	263.4%
2015	498,052	490,731	7,321	179,623	98.5%	106,898	21.5%	277.3%	273.2%
2016	553,840	507,783	46,057	188,816	91.7%	126,066	22.8%	293.3%	268.9%
2017	629,870	602,460	27,410	200,103	95.6%	162,539	25.8%	314.8%	301.1%
2018	696,842	680,395	16,447	205,077	97.6%	189,738	27.2%	339.8%	331.8%
2019	758,268	744,423	13,845	214,151	98.2%	218,046	28.8%	354.1%	347.6%
2020	814,456	787,322	27,134	217,702	96.7%	247,929	30.4%	374.1%	361.7%
2021	870,567	1,035,716	(165,149)	222,093	119.0%	280,208	32.2%	392.0%	466.3%
2022	944,741	975,315	(30,574)	220,292	103.2%	328,697	34.8%	428.9%	442.7%

Valuation Date (6/30)	(10) Portfolio Std Dev	(11) Std Dev % of Pay (9) x (10)	(12) Unfunded/ Payroll (3)/(4)	(13) Non-Investment Cash Flow (NICF)	(14) NICF/ Assets (13)/(2)	(15) SBI Market Rate of Return	(16) SBI 5-Year Average	(17) SBI 10-Year Average
2013			8.8%	16,964	4.6%	14.2%	6.2%	N/A
2014	14.1%	37.1%	-15.5%	17,031	3.8%	18.6%	14.5%	N/A
2015	14.1%	38.5%	4.1%	17,127	3.5%	4.4%	12.3%	N/A
2016	14.1%	37.9%	24.4%	16,845	3.3%	-0.1%	7.7%	N/A
2017	14.1%	42.5%	13.7%	16,314	2.7%	15.1%	10.2%	6.2%
2018	14.1%	46.8%	8.0%	14,972	2.2%	10.3%	9.4%	7.8%
2019	14.3%	49.7%	6.5%	13,175	1.8%	7.3%	7.3%	10.8%
2020	14.3%	51.7%	12.5%	11,125	1.4%	4.2%	7.2%	9.7%
2021	13.9%	64.8%	-74.4%	9,727	0.9%	30.3%	13.1%	10.3%
2022	14.0%	61.9%	-13.9%	5,614	0.6%	-6.4%	8.5%	9.4%

(5) The Funded ratio is the most widely known measure of a plan's financial strength, but the trend in the funded ratio is much more important than the absolute ratio. The funded ratio should trend to 100%. As it approaches 100%, it is important to re-evaluate the level of investment risk in the portfolio and potentially to re-evaluate the assumed rate of return.

(6) and (7) The ratio of Retiree liabilities to total accrued liabilities gives an indication of the maturity of the system. As the ratio increases, cash flow needs increase, and the liquidity needs of the portfolio change. A ratio on the order of 50% indicates a maturing system.

(8) and (9) The ratios of liabilities and assets to payroll gives an indication of both maturity and volatility. Many systems have ratios between 500% and 700%. Ratios significantly above that range may indicate difficulty in supporting the benefit level as a level % of payroll.

(10) and (11) The portfolio standard deviation measures the volatility of investment return. When multiplied by the ratio of assets to payroll it gives the effect of a one standard deviation asset move as a percent of payroll. This figure helps users understand the difficulty of dealing with investment volatility and the challenges volatility brings to sustainability.

(12) The ratio of unfunded liability to payroll gives an indication of the plan sponsor's ability to actually pay off the unfunded liability. A ratio above approximately 300% or 400% may indicate difficulty in discharging the unfunded liability within a reasonable time frame.

(13) and (14) The ratio of Non-Investment Cash Flow to assets is an important measure of sustainability. Negative ratios are common and expected for a maturing system. In the longer term, this ratio should be on the order of approximately -4%. A ratio that is significantly more negative than that for an extended period could be a leading indicator of potential exhaustion of assets.

(15) (16) and (17) Investment return is probably the largest single risk that most systems face. The year by year return and the 5-year and 10-year geometric average give an indicator of past performance. Of course, past performance is not a guarantee of future results, may not even be reflective of potential future results, and historical averages are very sensitive to the time period chosen. The performance data for the Combined Funds (pooled investments of major Minnesota Public Retirement Systems) is presented in these columns. The source of this data is the Minnesota State Board of Investment.

Supplemental Information

The remainder of the report includes information supporting the results presented in the previous sections.

- **Plan assets** presents information about the Plan's assets as reported by the Public Employees Retirement Association of Minnesota. The assets represent the portion of total fund liabilities that has been funded.

- **Membership data** presents and describes the membership data used in the valuation.

- **Development of costs** shows the liabilities for plan benefits and the derivation of the contribution amount.

- **Actuarial basis** describes the Plan provisions, as well as the methods and assumptions used to value the Plan. The valuation is based on the premise that the Plan is ongoing.

- **Additional schedules** shows the Schedule of Funding Progress and Schedule of Contributions.

- **Glossary** defines the terms used in this report.

Plan Assets

Statement of Fiduciary Net Position *(Dollars in Thousands)*

	Market Value			
Assets in Trust	**June 30, 2022**		**June 30, 2021**	
Cash, equivalents, short term securities	$	16,177	$	16,480
Fixed income	$	222,439	$	234,762
Equity	$	489,555	$	604,051
Private Markets	$	247,026	$	180,490
Other	$	-	$	-
Total Assets in Trust	**$**	**975,197**	**$**	**1,035,783**
Assets Receivable	$	743	$	555
Amounts Payable	$	(625)	$	(622)
Net Assets Held in Trust for Pension Benefits	**$**	**975,315**	**$**	**1,035,716**

Plan Assets

Reconciliation of Plan Assets *(Dollars in Thousands)*

The following exhibit shows the revenue, expenses and resulting assets of the Fund as reported by the Public Employees Retirement Association for the Plan's prior two fiscal years.

Change in Assets	**Market Value**	
Year Ending	**June 30, 2022**	**June 30, 2021**
1. Fund balance at market value at end of prior year	$ 1,035,716	$ 787,322
2. Contributions		
a. Member	$ 12,843	$ 12,948
b. Employer	$ 19,227	$ 19,351
c. Other sources	$ -	$ -
d. Total contributions	$ 32,070	$ 32,299
3. Investment income		
a. Investment income/(loss)	$ (62,508)	$ 239,635
b. Investment expenses	$ (3,507)	$ (969)
c. Net subtotal	$ (66,015)	$ 238,666
4. Other	$ -	$ 1
5. Total income: *(2.d.) + (3.c.) + (4.)*	**$ (33,945)**	**$ 270,966**
6. Benefits Paid		
a. Annuity benefits	$ (23,372)	$ (20,088)
b. Refunds	$ (2,713)	$ (2,140)
c. Total benefits paid	$ (26,085)	$ (22,228)
7. Expenses		
a. Other	$ -	$ -
b. Administrative	$ (371)	$ (344)
c. Total expenses	$ (371)	$ (344)
8. Total disbursements: *(6.c.) + (7.c.)*	**$ (26,456)**	**$ (22,572)**
9. Fund balance at market value at end of year	**$ 975,315**	**$ 1,035,716**
10. Approximate return on market value of assets	-6.4%	30.2%

Plan Assets

Actuarial Asset Value *(Dollars in Thousands)*

			June 30, 2022	June 30, 2021
1. Market value of assets available for benefits			$ 975,315	$ 1,035,716
2. Determination of average balance				
a. Total assets available at beginning of year			$ 1,035,716	$ 787,322
b. Total assets available at end of year			$ 975,315	$ 1,035,716
c. Net investment income for fiscal year			$ (66,015)	$ 238,666
d. Average balance *[a. + b. - c.] / 2*			$ 1,038,523	$ 792,186
3. Expected return *[7.5% x 2.d.]*			$ 77,889	$ 59,414
4. Actual return			$ (66,015)	$ 238,666
5. Current year asset gain/(loss) *[4. - 3.]*			$ (143,904)	$ 179,252
6. Unrecognized asset returns				
		Original Amount	**Unrecognized Amount**	
a. Year ended June 30, 2022		$ (143,904)	$ (115,123)	N/A
b. Year ended June 30, 2021		$ 179,252	$ 107,551	$ 143,402
c. Year ended June 30, 2020		$ (24,475)	$ (9,790)	$ (14,685)
d. Year ended June 30, 2019		$ (671)	$ (134)	$ (268)
e. Year ended June 30, 2018		$ 14,166	N/A	$ 2,833
f. Unrecognized return adjustment			$ (17,496)	$ 131,282
7. **Actuarial value at end of year** *(1. - 6.f.)*			**$ 992,811**	**$ 904,434**
8. Approximate return on actuarial value of assets during fiscal year			9.1%	12.5%
9. Ratio of actuarial value of assets to market value of assets			1.02	0.87

Plan Assets

10-Year History of AVA and MVA Asset Returns

Membership Data

Distribution of Active Members

	Years of Service as of June 30, 2022									
Age	**<3***	**3 - 4**	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25 - 29**	**30 - 34**	**35+**	**Total**
< 25	349	22								**371**
Avg. Earnings	$ 33,271	$ 55,917								**$ 34,614**
25 - 29	371	127	57							**555**
Avg. Earnings	$ 45,007	$ 57,740	$ 59,307							**$ 49,389**
30 - 34	233	112	220	11						**576**
Avg. Earnings	$ 47,606	$ 62,551	$ 66,092	$ 71,567						**$ 58,030**
35 - 39	147	70	142	91	29					**479**
Avg. Earnings	$ 45,780	$ 58,199	$ 65,251	$ 74,544	$ 79,963					**$ 60,901**
40 - 44	100	49	104	72	101	23				**449**
Avg. Earnings	$ 47,280	$ 61,103	$ 65,093	$ 74,550	$ 83,115	$ 78,451				**$ 66,945**
45 - 49	53	32	66	45	77	98				**371**
Avg. Earnings	$ 47,094	$ 67,895	$ 66,346	$ 77,345	$ 81,236	$ 83,757				**$ 72,753**
50 - 54	49	26	44	47	67	146				**379**
Avg. Earnings	$ 76,700	$ 71,021	$ 65,496	$ 71,700	$ 81,156	$ 85,902				**$ 78,722**
55 - 59	25	15	27	23	48	80				**218**
Avg. Earnings	$ 36,376	$ 53,470	$ 58,168	$ 70,197	$ 81,705	$ 89,819				**$ 73,412**
60 - 64	17	7	13	20	30	47				**134**
Avg. Earnings	$ 35,660	$ 70,613	$ 63,373	$ 63,359	$ 83,741	$ 84,026				**$ 72,037**
65 - 69	4	1	6	3	5	9				**28**
Avg. Earnings	$ 79,471	$ 23,933	$ 28,755	$ 69,261	$ 92,234	$ 80,873				**$ 68,256**
70+	1		1	1		1				**4**
Avg. Earnings	$ 59,778		$ 1,874	$ 45,876		$ 77,663				**$ 46,298**
Total	**1,349**	**461**	**680**	**313**	**357**	**404**				**3,564**
Avg. Earnings	**$ 43,741**	**$ 60,686**	**$ 64,390**	**$ 73,240**	**$ 82,077**	**$ 85,382**				**$ 61,024**

* *This exhibit does not reflect service earned in other PERA funds or service earned in a Combined Service Annuity arrangement. It should not be relied upon as an indicator of non-vested status.*

In each cell, the top number is the count of active participants for the age/service combination and the bottom number is average valuation earnings for the fiscal year ending on the valuation date.

Membership Data

Distribution of Service Retirements

	Years Retired as of June 30, 2022							
Age	**<1**	**1 - 4**	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25+**	**Total**
<50								
Avg. Benefit								
50 - 54	9	20						**29**
Avg. Benefit	$ 8,236	$ 11,370						**$ 10,397**
55 - 59	56	135	41					**232**
Avg. Benefit	$ 22,230	$ 16,307	$ 11,769					**$ 16,935**
60 - 64	41	162	100	13				**316**
Avg. Benefit	$ 22,419	$ 16,984	$ 12,816	$ 7,314				**$ 15,972**
65 - 69	34	127	145	62	3			**371**
Avg. Benefit	$ 17,885	$ 16,755	$ 15,041	$ 9,915	$ 3,614			**$ 14,940**
70 - 74	3	27	118	90	26			**264**
Avg. Benefit	$ 23,799	$ 15,522	$ 13,610	$ 10,569	$ 6,472			**$ 12,182**
75 - 79		3	16	59	46	6		**130**
Avg. Benefit		$ 10,423	$ 13,491	$ 9,271	$ 5,464	$ 2,222		**$ 8,145**
80 - 84		2		9	31	14		**56**
Avg. Benefit		$ 13,413		$ 7,713	$ 5,282	$ 1,269		**$ 4,960**
85 - 89					2	5		**7**
Avg. Benefit					$ 3,572	$ 999		**$ 1,734**
90+						2		**2**
Avg. Benefit						$ 1,361		**$ 1,361**
Total	**143**	**476**	**420**	**233**	**108**	**27**		**1,407**
Avg. Benefit	**$ 20,404**	**$ 16,356**	**$ 13,731**	**$ 9,774**	**$ 5,568**	**$ 1,438**		**$ 13,779**

In each cell, the top number is the count of retired participants for the age/years retired combination and the bottom number is the average annual benefit amount as of the valuation date.

Membership Data

Distribution of Survivors

Age	Years Since Death as of June 30, 2022							
	<1	**1 - 4**	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25+**	**Total**
<45		2	4	1				**7**
Avg. Benefit		$ 5,841	$ 7,876	$ 4,540				**$ 6,818**
45 - 49		2	3					**5**
Avg. Benefit		$ 7,309	$ 12,716					**$ 10,553**
50 - 54		2	1	2				**5**
Avg. Benefit		$ 23,487	$ 7,062	$ 10,410				**$ 14,971**
55 - 59	1	3	4	2				**10**
Avg. Benefit	$ 1,805	$ 23,839	$ 9,594	$ 11,907				**$ 13,551**
60 - 64	1	4	6		1	1		**13**
Avg. Benefit	$ 27,362	$ 12,232	$ 20,550		$ 2,729	$ 1,210		**$ 15,656**
65 - 69	2	8	8	3	1			**22**
Avg. Benefit	$ 19,152	$ 9,957	$ 8,135	$ 6,986	$ 1,453			**$ 9,339**
70 - 74	3	1	4	3	1			**12**
Avg. Benefit	$ 1,261	$ 20,926	$ 9,795	$ 9,007	$ 25,002			**$ 9,659**
75 - 79	2	3	3		2			**10**
Avg. Benefit	$ 11,491	$ 6,588	$ 4,362		$ 9,198			**$ 7,423**
80 - 84		2	1					**3**
Avg. Benefit		$ 13,015	$ 1,165					**$ 9,065**
85 - 89								
Avg. Benefit								
90+								
Avg. Benefit								
Total	**9**	**27**	**34**	**11**	**5**	**1**		**87**
Avg. Benefit	**$ 10,471**	**$ 12,596**	**$ 10,497**	**$ 8,832**	**$ 9,516**	**$ 1,210**		**$ 10,772**

In each cell, the top number is the count of survivors for the age/years since death combination and the bottom number is the average annual benefit amount as of the valuation date.

Membership Data

Distribution of Disability Retirements

Age	<1	1 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25+	Total
	Years Disabled as of June 30, 2022 *							
< 45	3	12	5	3	1			**24**
Avg. Benefit	$ 27,727	$ 24,614	$ 19,797	$ 12,849	$ 13,874			**$ 22,082**
45 - 49	1	3	3	6	1			**14**
Avg. Benefit	$ 34,952	$ 17,011	$ 12,452	$ 17,031	$ 9,219			**$ 16,768**
50 - 54	3	9	8	2	3			**25**
Avg. Benefit	$ 21,451	$ 23,550	$ 24,166	$ 20,665	$ 22,566			**$ 23,146**
55 - 59	5	12	6	13	3	2		**41**
Avg. Benefit	$ 26,107	$ 22,889	$ 18,475	$ 16,598	$ 17,756	$ 28,554		**$ 20,542**
60 - 64	4	8	8	9	5	2		**36**
Avg. Benefit	$ 23,507	$ 22,783	$ 17,407	$ 18,087	$ 26,773	$ 29,560		**$ 21,425**
65 - 69	6	23	1	1	2			**33**
Avg. Benefit	$ 24,385	$ 18,254	$ 19,700	$ 10,453	$ 29,740			**$ 19,872**
70 - 74		3	31					**34**
Avg. Benefit		$ 15,418	$ 21,315					**$ 20,795**
75+			3	10	3			**16**
Avg. Benefit			$ 24,092	$ 21,179	$ 10,830			**$ 19,785**
Total	**22**	**70**	**65**	**44**	**18**	**4**		**223**
Avg. Benefit	**$ 25,153**	**$ 21,162**	**$ 20,500**	**$ 17,792**	**$ 20,550**	**$ 29,057**		**$ 20,790**

** Based on effective date as provided by PERA, "Years Disabled" may reflect years since age 65 for members over age 65.*

In each cell, the top number is the count of disabled participants for the age/years disabled combination and the bottom number is the average annual benefit amount as of the valuation date.

Membership Data

Reconciliation of Members

		Terminated		Recipients			
	Actives	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	Total
Members on 7/1/2021	**3,788**	**3,832**	**2,200**	**1,277**	**216**	**79**	**11,392**
New members	697	-	-	-	-	-	**697**
Return to active	43	(15)	(28)	-	-	-	**-**
Terminated non-vested	(448)	-	448	-	-	-	**-**
Service retirements	(97)	(53)	-	150	-	-	**-**
Terminated deferred	(266)	266	-	-	-	-	**-**
Terminated refund/transfer	(136)	(45)	(178)	-	-	-	**(359)**
Deaths	(7)	(10)	(3)	(20)	(4)	(1)	**(45)**
New beneficiary	-	-	-	-	-	9	**9**
Disabled	(10)	-	-	-	10	-	**-**
Data correction	-	154	41	-	1	-	**196**
Net change	(224)	297	280	130	7	8	**498**
Members on 6/30/2022	**3,564**	**4,129**	**2,480**	**1,407**	**223**	**87**	**11,890**

Summary of Membership

Active Member Statistics	**Total**
Number	3,564
Average age	38.7
Average service	7.6
Average salary	$ 61,024

Terminated Member Statistics	**Deferred Retirement**	**Other Non-Vested**	**Total**
Number	4,129	2,480	6,609
Average age	43.1	36.0	40.4
Average service	4.0	1.0	2.9
Average annual benefit, with augmentation to December 31, 2018 and 35% Combined Service Annuity (CSA) load	$ 6,941	N/A	$ 6,941
Average refund value, with 35% CSA load (1% CSA load for Non-Vested)	$ 13,494	$ 2,122	$ 9,227

Retiree & Survivor Member Statistics	**Service Retirees**	**Disabled Retirees**	**Survivors**	**Total**
Number	1,407	223	87	1,717
Average age	66.5	60.0	63.6	65.5
Average annual benefit	$ 13,779	$ 20,790	$ 10,772	$ 14,537

Development of Costs

Actuarial Valuation Balance Sheet *(Dollars in Thousands)*

The actuarial balance sheet is based on the principle that the long-term projected benefit obligations of the Plan should be ideally equal to the long-term resources available to fund those obligations. **A Projected Benefit Funding Ratio less than 100% indicates that contributions are insufficient.** The resources available to meet projected obligations for current members consist of current fund assets plus the present value of anticipated future contributions intended to fund benefits for current members. In the exhibit below, B.2 is the estimated present value of contributions to fund the normal cost rate for current members until their respective termination dates. Item B.1 is the present value of the total 14.58% statutory contribution net of normal cost and anticipated Plan expenses during the period from the valuation date to the statutory amortization date. Item D. Current Benefit Obligation, is the liability based on current service and projected compensation (the Entry Age Normal cost method is used to determine liabilities and contributions elsewhere in the report).

The contributions made in excess of amounts required for current benefit payments are accumulated as a reserve to help meet benefit payments in later years. It is this reserve system which permits the establishment of a level rate of contribution each year.

			June 30, 2022
A. Actuarial Value of Assets			$ 992,811
B. Expected Future Assets			
1. Present value of expected future statutory supplemental contributions*			$ 72,853
2. Present value of future normal cost contributions			$ 200,581
3. Total expected future assets: *(1.) + (2.)*			$ 273,434
C. Total Current and Expected Future Assets: *(A.+ B.3)*			$ 1,266,245
D. Current Benefit Obligations**			
1. Benefit recipients	**Non-Vested**	**Vested**	**Total**
a. Service retirements	$ -	$ 254,907	$ 254,907
b. Disability retirements	$ -	$ 63,848	$ 63,848
c. Survivors	$ -	$ 9,942	$ 9,942
2. Deferred retirements with augmentation	$ -	$ 229,150	$ 229,150
3. Former members without vested rights	$ 2,151	$ -	$ 2,151
4. Active members	$ 29,768	$ 299,633	$ 329,401
5. Total Current Benefit Obligations	$ 31,919	$ 857,480	$ 889,399
E. Expected Future Benefit Obligations			$ 255,923
F. Total Current and Expected Future Benefit Obligations***			$ 1,145,322
G. Unfunded Current Benefit Obligations: *(D.5.) - (A.)*			$ (103,412)
H. Unfunded Current and Future Benefit Obligations: *(F.) - (C.)*			$ (120,923)
I. Accrued Benefit Funding Ratio: *(A.)/(D.)*			111.63%
J. Projected Benefit Funding Ratio: *(C.)/(F.)*			110.56%

* *Per the LCPR Standards for Actuarial Work, calculated assuming the current contribution toward the unfunded liability continues for the entire amortization period.*

** *Present value of credited projected benefits (projected compensation, current service).*

*** *Present value of projected benefits (projected compensation, projected service).*

Development of Costs

Determination of Unfunded Actuarial Accrued Liability and Supplemental Contribution Rate (Dollars in Thousands)

	Actuarial Present Value of Projected Benefits	Actuarial Present Value of Future Normal Costs	Actuarial Accrued Liability
A. Determination of Actuarial Accrued Liability (AAL)			
1. Active members			
a. Retirement annuities	$ 462,335	$ 115,351	$ 346,984
b. Disability benefits	$ 56,736	$ 32,285	$ 24,451
c. Survivor's benefits	$ 5,149	$ 1,580	$ 3,569
d. Deferred retirements	$ 57,641	$ 39,805	$ 17,836
e. Refunds*	$ 3,463	$ 11,560	$ (8,097)
f. Total	$ 585,324	$ 200,581	$ 384,743
2. Deferred retirements with future augmentation	$ 229,150	$ -	$ 229,150
3. Former members without vested rights	$ 2,151	$ -	$ 2,151
4. Annuitants	$ 328,697	$ -	$ 328,697
5. Total	$ 1,145,322	$ 200,581	$ 944,741
B. Determination of Unfunded Actuarial Accrued Liability (UAAL)			
1. Actuarial accrued liability			$ 944,741
2. Current assets (AVA)			$ 992,811
3. Unfunded actuarial accrued liability			$ (48,070)
C. Determination of Supplemental Contribution Rate			
1. Present value of future payrolls through the amortization date of June 30, 2048			$ 3,794,426
2. Supplemental contribution rate: *(B.3.) / (C.1.)*			-1.27% **

* *Includes non-vested refunds and non-married survivor benefits only.*

** *The amortization factor as of June 30, 2022 is 16.609726. Per Minnesota Statute 356.215 Subdivision 11, the amortization period is 30 years when the plan is fully funded.*

Development of Costs

Changes in Unfunded Actuarial Accrued Liability (UAAL) *(Dollars in Thousands)*

	Year Ending June 30, 2022		
	Actuarial Accrued Liability	Current Assets	Unfunded Actuarial Accrued Liability
A. Values at beginning of year	$ 870,567	$ 904,434	$ (33,867)
B. Changes due to interest requirements and current rate of funding			
1. Normal cost, including expenses	$ 29,684	$ -	$ 29,684
2. Benefit payments	$ (26,085)	$ (26,085)	$ -
3. Contributions	$ -	$ 32,070	$ (32,070)
4. Interest on A., B.1., B.2. and B.3.	$ 65,427	$ 68,057	$ (2,630)
5. Total *(B.1. + B.2. + B.3. + B.4.)*	$ 69,026	$ 74,042	$ (5,016)
C. Expected values at end of year *(A. + B.5.)*	$ 939,593	$ 978,476	$ (38,883)
D. Increase (decrease) due to actuarial losses (gains) because of experience deviations from expected			
1. Age and Service Retirements			$ 1,707
2. Disability Retirements			$ (3,081)
3. Death-in-Service Benefits			$ (54)
4. Withdrawals			$ (7,365)
5. Salary increases			$ 5,618
6. Investment income			$ (14,335)
7. Mortality of annuitants			$ (730)
8. January 1, 2022 COLA (gain)/loss*			$ 1,358
9. Other items			$ 6,434
10.Total			$ (10,448)
E. Unfunded actuarial accrued liability at end of year before Plan amendments and changes in actuarial assumptions *(C. + D.9.)*			$ (49,331)
F. Change in unfunded actuarial accrued liability due to changes in Plan provisions			$ -
G. Change in unfunded actuarial accrued liability due to changes in actuarial assumptions			$ 1,261
H. Change in unfunded actuarial accrued liability due to changes in methodology			$ -
I. Unfunded actuarial accrued liability at end of year *(E. + F. + G. + H.)***			$ (48,070)

* *January 1, 2022 benefits increased 2.5% and were expected to increase 2.0%.*

** *On a market value of assets basis, assets exceed liabilities by $30,574.*

Development of Costs

Determination of Contribution Sufficiency/(Deficiency) *(Dollars in Thousands)*

The required contribution is defined in Minnesota statutes as the sum of normal cost, a supplemental contribution to amortize the UAAL, and an allowance for expenses. The dollar amounts shown are for illustration purposes and equal percent of payroll multiplied by projected annual payroll.

	Percent of Payroll		Dollar Amount
A. Statutory contributions - Chapter 353E			
1. Employee contributions	5.83%	$	13,318
2. Employer contributions	8.75%	$	19,989
3. Total	14.58%	$	33,307
B. Required contributions - Chapter 356			
1. Normal cost			
a. Retirement benefits	7.34%	$	16,768
b. Disability benefits	2.12%	$	4,843
c. Survivors	0.10%	$	228
d. Deferred retirement benefits	2.26%	$	5,163
e. Refunds*	0.68%	$	1,553
f. Total	12.50%	$	28,555
2. Supplemental contribution amortization of Unfunded Actuarial Accrued Liability by June 30, 2048**	-1.27%	$	(2,901)
3. Allowance for expenses	0.16%	$	366
4. Total	11.39% ***	$	26,020
C. Contribution Sufficiency/(Deficiency) *(A.3. - B.4.)*	3.19%	$	7,287

Note: Projected annual payroll for fiscal year beginning on the valuation date: $228,446 (determined by increasing reported pay for each member by one full year's assumed pay increase according to the actuarial salary scale, as prescribed by the LCPR Standards for Actuarial Work).

* *Includes non-vested refunds and non-married survivor benefits only.*

** *Per Minnesota Statute 356.215 Subdivision 11, the amortization period is 30 years when the plan is fully funded.*

*** *The required contribution on a market value of assets basis is 11.85% of payroll.*

Actuarial Basis

Actuarial Methods

All actuarial methods are prescribed by Minnesota Statutes, the Legislative Commission on Pensions and Retirement, or the Board of Trustees. Different methodologies may also be reasonable and results based on other methodologies would be different.

Actuarial Cost Method

Actuarial Accrued Liability and required contributions in this report are computed using the Entry Age Normal Cost Method. This method is prescribed by Minnesota Statute. Under this method, a normal cost is developed by amortizing the actuarial value of benefits expected to be received by each active participant (as a level percentage of pay) over the total working lifetime of that participant, from hire to termination. Age as of the valuation date was calculated based on the dates of birth provided by the Fund. Entry age for valuation purposes was calculated as the age on the valuation date minus the provided years of service on the valuation date.

To the extent that current assets and future normal costs do not support participants' expected future benefits, an Unfunded Actuarial Accrued Liability ("UAAL") develops. The UAAL is amortized over the statutory amortization period using level percent of payroll. The total contribution developed under this method is the sum of normal cost, expenses, and the payment toward the UAAL.

Valuation of Future Post-Retirement Benefit Increases

Benefit increases after retirement will equal 100% of the Social Security Cost-of-Living Adjustment, not less than 1.0% and not more than 2.5%, beginning January 1, 2019. If the funding status declines to 85% for two consecutive years or 80% for one year, the maximum increase will be lowered to 1.5%. Stochastic modeling was used to determine the assumption that benefit increases will equal 2.00% per year. This is only an assumption; actual increases will depend on actual experience.

Funding Objective

The fundamental financing objective of the Fund is to establish contribution rates which, when expressed as a percentage of active member payroll, will remain approximately level from generation to generation and meet the required deadline for full funding.

Actuarial Basis

Actuarial Methods (Concluded)

Asset Valuation Method

The assets are valued based on a five-year moving average of expected and market values (five-year average actuarial value) and determined as follows:

- At the end of each plan year, an average asset value is calculated as the average of the market asset value at the beginning and end of the fiscal year net of investment income for the fiscal year;
- The investment gain or (loss) is taken as the excess of actual investment income over the expected investment income based on the average asset value as calculated above;
- The investment gain or (loss) so determined is recognized over five years at 20% per year; and
- The asset value is the sum of the market asset value plus the scheduled recognition of investment gains or (losses) during the current and the preceding four fiscal years.

Payment on the Unfunded Actuarial Accrued Liability

Payment equals a level percentage of payroll each year to the statutory amortization date of June 30, 2048 assuming payroll increases of 3.00% per annum. If there is a negative Unfunded Actuarial Accrued Liability, the surplus amount is amortized over 30 years as a level percentage of payroll. If the unfunded liability increases due to changes in benefits, assumptions, or methods, the statutory amortization date may be extended.

As required by the Standards for Actuarial Work, projected payroll is 1) determined by increasing reported payroll for each member by one full year's assumed pay increase according to the actuarial salary scale and 2) multiplied by 0.962 in the determination of the present value of future payroll to account for timing differences. This statutory method produces a required contribution that is similar to, but slightly below, the contribution that would be produced by more common actuarial methods.

Changes in Methods since Prior Valuation

There have been no changes in actuarial methods since the prior valuation.

Actuarial Basis

Summary of Actuarial Assumptions

The following assumptions were used in valuing the liabilities and benefits under the Plan. All actuarial assumptions are prescribed by Minnesota Statutes, the Legislative Commission on Pensions and Retirement (LCPR), or the Board of Trustees. These parties are responsible for selecting the assumptions used for this valuation. Unless noted otherwise, the assumptions prescribed are based on the last experience study, dated July 10, 2020. The Allowance for Combined Service Annuity assumptions are based on an analysis completed by the LCPR actuary and documented in a report dated October 2016.

Investment return	7.50% per annum (prescribed by Minnesota Statutes).
Benefit increases after retirement	2.00% per annum.
Salary increases	Reported salary at valuation date increased according to the rate table, to current fiscal year and annually for each future year. Prior fiscal year salary is annualized for members with less than one year of service earned during the year.
Inflation	2.25% per year.
Payroll growth	3.00% per year.
Mortality rates	
Healthy pre-retirement	Pub-2010 Public Safety Mortality Table adjusted for mortality improvements using projection scale MP-2021.
Healthy post-retirement	Pub-2010 Healthy Retired Public Safety Mortality Table adjusted for mortality improvements using projection scale MP-2021. Male rates are adjusted by a factor of 0.98.
Disabled	Pub-2010 Public Safety Disabled Retiree Mortality Table, adjusted for mortality improvements using projection scale MP-2021. Male rates are adjusted by a factor of 1.05.
Notes	The Pub-2010 employee mortality table as published by the Society of Actuaries (SOA) contains mortality rates for ages 18 to 80 and the annuitant mortality table contains mortality rates for ages 50 to 120. We have extended the annuitant mortality table as needed for members and beneficiaries younger than age 50 who are receiving a benefit by deriving rates based on the employee table and the juvenile table. Similarly, we have extended the employee table as needed for members older than age 80 by deriving rates based on the annuitant table.
Retirement	Members retiring from active status are assumed to retire according to the age related rates shown in the rate table. Members who have attained the highest assumed retirement age are assumed to retire in one year. Note that plan changes reflected in this report may ultimately result in behavior changes that are not anticipated in the current retirement rates.
Withdrawal	Select and Ultimate rates based on actual experience. Ultimate rates after the third year are shown in the rate table. Select rates in the first three years are:

Year	Select Withdrawal Rates
1	27%
2	23%
3	17%

Actuarial Basis

Summary of Actuarial Assumptions (Continued)

Disability	Age-related rates based on experience; see table of sample rates. All incidences are assumed to be duty-related.
Allowance for combined service annuity	Liabilities for former members are increased by 35.0% for vested members and 1.0% for non-vested members to account for the effect of some participants having eligibility for a Combined Service Annuity.
Administrative expenses	Prior year administrative expenses expressed as a percentage of prior year projected payroll.
Refund of contributions	For non-vested members, account balances accumulate interest until the assumed commencement date and are discounted back to the valuation date. Active members decrementing after becoming eligible for a benefit are assumed to take the contributions accumulated with interest if larger than the value of the benefit.
Commencement of deferred benefits	Members receiving deferred annuities (including current terminated deferred members) are assumed to begin receiving benefits at age 55.
Percentage married	75% of active members are assumed to be married. Actual marital status is used for members in payment status.
Age of spouse	Females are assumed to be three years younger than their male spouses. For members in payment status, actual spouse date of birth is used, if provided.
Eligible children	Retiring members are assumed to have no dependent children.
Form of payment	Married members retiring from active status are assumed to elect subsidized joint and survivor form of annuity as follows: Males: 10% elect 25% Joint & Survivor option 15% elect 50% Joint & Survivor option 5% elect 75% Joint & Survivor option 50% elect 100% Joint & Survivor option Females: 10% elect 25% Joint & Survivor option 10% elect 50% Joint & Survivor option 5% elect 75% Joint & Survivor option 25% elect 100% Joint & Survivor option Remaining married members and unmarried members are assumed to elect the Straight Life option. Members receiving deferred annuities (including current terminated deferred members) are assumed to elect a straight life annuity.
Eligibility testing	Eligibility for benefits is determined based upon the age nearest birthday and service on the date the decrement is assumed to occur.
Decrement operation	Withdrawal decrements do not operate during retirement eligibility. Decrements are assumed to occur mid-fiscal year.
Service credit accruals	It is assumed that members accrue one year of service credit per year.
Benefit service	Exact fractional service is used to determine the amount of benefit payable.
Pay increases	Pay increases are assumed to happen at the beginning of the fiscal year. This is equivalent to assuming that reported earnings are pensionable earnings for the year ending on the valuation date.

Summary of Actuarial Assumptions (Continued)

Final average salary	For present value of future benefit purposes, final average salary was calculated in accordance with pay increase assumptions, but was not permitted to fall below the final average salary reported in the data.
Unknown data for certain members	To prepare this report, GRS has used and relied on participant data supplied by the Fund. Although GRS has reviewed the data in accordance with Actuarial Standards of Practice No. 23, GRS has not verified or audited any of the data or information provided. In cases where submitted data was missing or incomplete, the following assumptions, based on average results for applicable members, were applied: <u>Data for active members:</u> There were 88 members reported with a salary less than or equal to $100 (after annualization). We used prior year salary (37 members), if available; otherwise high five salary with a 10% load to account for salary increases (47 members). If neither prior year salary or high five salary was available, we assumed a value of $43,000. There were three members reported without a date of birth; we assumed the members were hired at age 30. There were 114 members reported without a gender; male was assumed. <u>Data for terminated members:</u> We calculated benefits for these members using the reported Average Salary and credited service. There were no members reported without Average Salary. If credited service was not reported (37 members), we used elapsed time from hire date to termination date (19 members), otherwise we assumed nine years of service. If termination date was not reported (21 members), we assumed the termination date was equal to the hire date plus credited service, otherwise the valuation date. If the reported termination date occurs prior to the reported hire date, the two dates were swapped. There were no members reported without a date of birth. There were nine members reported without a gender; male was assumed. <u>Data for retired members:</u> There were three members reported without a gender; male was assumed. There were no members reported without a date of birth or benefit. Because PERA reclassifies disabled members as retirees once the member reaches Normal Retirement Age, we compare the members that PERA reports as retirees to our disabled group from the last valuation. If a member was disabled in the prior valuation, we reclassify that member as a disabled retiree in this year's valuation. We reclassified 92 retirees as disabled retirees in this valuation.
Changes in actuarial assumptions since the prior valuation	The mortality improvement scale was changed from MP-2020 to MP-2021.

Actuarial Basis

Summary of Actuarial Assumptions (Continued)

	Percentage of Members Dying Each Year*					
	Healthy Post-Retirement Mortality**		Healthy Pre-Retirement Mortality**		Disability Mortality**	
Age in 2022	Male	Female	Male	Female	Male	Female
20	0.04%	0.02%	0.04%	0.02%	0.13%	0.06%
25	0.04	0.02	0.04	0.02	0.13	0.08
30	0.06	0.04	0.06	0.04	0.18	0.12
35	0.07	0.05	0.07	0.05	0.22	0.17
40	0.08	0.06	0.08	0.06	0.24	0.19
45	0.13	0.08	0.09	0.07	0.27	0.22
50	0.18	0.14	0.11	0.08	0.35	0.28
55	0.29	0.26	0.17	0.12	0.48	0.46
60	0.51	0.46	0.27	0.18	0.80	0.73
65	0.87	0.74	0.41	0.22	1.26	1.01
70	1.42	1.17	0.71	0.40	1.86	1.41
75	2.46	2.02	1.27	0.80	3.03	2.16
80	4.49	3.63	2.40	1.65	5.28	3.63
85	8.23	6.46	7.52	5.66	8.90	6.46
90	14.58	11.29	14.87	11.29	15.62	11.29

* *Generally, mortality rates are expected to increase as age increases (with the exception of young ages, where expected mortality may decrease as age increases). In cases where the application of the projection scale would reverse the nature of this trend, standard mortality rates have been adjusted slightly. The adjustment has no material effect on these results.*

** *Rates are adjusted for mortality improvement using Scale MP-2021, from a base year of 2010.*

	Withdrawal Rates After Third Year		Rates of Disability Retirement	
Age	Male	Female	Male	Female
20	17.00%	17.00%	0.04%	0.04%
25	17.00%	17.00%	0.06%	0.06%
30	11.00%	13.00%	0.10%	0.08%
35	7.50%	9.00%	0.18%	0.17%
40	5.50%	6.50%	0.21%	0.18%
45	3.50%	4.75%	0.31%	0.39%
50	3.00%	3.00%	0.55%	0.70%
55	0.00%	0.00%	0.78%	0.93%
60	0.00%	0.00%	0.92%	1.30%
65	0.00%	0.00%	1.00%	1.30%

Actuarial Basis

Summary of Actuarial Assumptions (Concluded)

Age	Retirement Rate
50	5%
51	5
52	5
53	5
54	7
55	15
56	10
57	11
58	11
59	11
60	15
61	15
62	25
63	25
64	30
65	40
66	50
67	40
68	30
69	40
70+	100

Salary Scale	
Age	Increase
20	11.00%
25	7.75
30	6.00
35	5.50
40	4.75
45	4.00
50	3.75
55	3.50
60	3.00
65	3.00
70+	3.00

Actuarial Basis

Summary of Plan Provisions

Following is a summary of the major plan provisions used in the valuation of this report. PERA is solely responsible for the validity, accuracy and comprehensiveness of this information. If any of the plan provisions shown below are not accurate and complete, the valuation results may differ significantly from those shown in this report and may require a revision of this report.

Plan year	July 1 through June 30.
Eligibility	Local government employees in covered correctional service for a county administered jail or correctional facility or in a regional correctional facility administered by multiple counties, who are directly responsible for security, custody and control of persons confined in jail or facility, who are expected to respond to incidents within the jail or facility, and who are not members of the Public Employees Police and Fire Fund.
Contributions	Shown as a percent of salary: <u>Member</u> 5.83% <u>Employer</u> 8.75% Member contributions are "picked up" according to the provisions of Internal Revenue Code 414(h).
Allowable service	Local Government Correctional Service during which member contributions were made (effective July 1, 1999). May also include certain leaves of absence, military service and periods while temporary Worker's Compensation is paid.
Salary	Includes amounts deducted for deferred compensation or supplemental retirement plans, net income from fees and sick leave payments funded by the employer. Excludes unused annual leaves and sick leave payments, severance payments, Workers' Compensation benefits and employer-paid flexible spending accounts, cafeteria plans, healthcare expense accounts, day-care expenses, fringe benefits and the cost of insurance coverage.
Average salary	Average of the five highest successive years of salary. Average Salary is based on all Allowable Service if less than five years.
Vesting	Hired before July 1, 2010: 100% vested after 3 years of Allowable Service. Hired after June 30, 2010: 50% vested after 5 years of Allowable Service; 60% vested after 6 years of Allowable Service; 70% vested after 7 years of Allowable Service; 80% vested after 8 years of Allowable Service; 90% vested after 9 years of Allowable Service; and 100% vested after 10 years of Allowable Service.
Retirement <u>Normal retirement benefit</u>	
Age/service requirement	Age 55 and vested. Proportionate Retirement Annuity is available at age 65 and one year of Allowable Service.
Amount	1.9% of Average Salary for each year of Allowable Service, pro rata for completed months, adjusted for partial vesting if applicable.

Retirement (Concluded)	
Early Retirement	
Age/service requirement	Age 50 and vested.
Amount	Normal Retirement Benefit based on Allowable Service and Average Salary at retirement date with actuarial reduction to commencement age assuming 3% augmentation to age 55 (2.50% if hired after June 30, 2006). Augmentation adjustment is phased out over a five-year period starting July 1, 2019, resulting in no augmentation adjustment after June 30, 2024.
Form of payment	Life annuity. Actuarially equivalent options are: 25%, 50%, 75% or 100% Joint and Survivor. If a Joint and Survivor benefit is elected and the beneficiary predeceases the annuitant, the annuitant's benefit increases to the Life Annuity amount. This "bounce back" is subsidized by the plan.
Benefit increases	Benefit recipients receive increases each year in January based upon 100% of the current Social Security increase, not less than 1.0% and not more than 2.5%, beginning January 1, 2019. If the funding status declines to 85% for two consecutive years or 80% for one year, the maximum increase will be lowered to 1.5%. A benefit recipient who has been receiving a benefit for at least 12 full months as of June 30 will receive a full increase. Members receiving benefits for at least one month but less than 12 full months as of June 30 will receive a pro rata increase.
Disability	
Duty Disability	
Age/service requirement	Member who cannot perform duties as a direct result of a disability relating to an act of duty specific to protecting the property and personal safety of others.
Amount	47.50% of Average Salary plus 1.90% of Average Salary for each year in excess of 25 years of Allowable Service (pro rata for completed months). Payment begins at disability and ends at age 65 or earlier if disability ceases or death occurs. Benefits may be paid upon re-employment but salary plus benefit cannot exceed current salary of position held at time of disability.
Regular Disability Age/service requirement	At least one year of Allowable Service and a disability preventing member from performing normal duties that arise out of activities not related to covered employment or while at work; activities related to duties that do not present inherent dangers specific to occupation.

Summary of Plan Provisions (Continued)

Disability (Concluded)

Amount	Normal Retirement Benefit based on Allowable Service (minimum of 10 years) and Average Salary at disability. Payment begins at disability and ends at age 65 or earlier if disability ceases or death occurs. Benefits may be paid upon re-employment but salary plus benefit cannot exceed current salary of position held at time of disability.
Retirement benefit	
Age/service requirement	Age 65 with continued disability.
Amount	Any optional annuity continues. Otherwise, the larger of the disability benefit paid before age 65 or the normal retirement benefit available at age 65, or an actuarially equivalent optional annuity.
Form of payment	Same as for retirement.
Benefit increases	Same as for retirement.

Death

Surviving spouse benefit	
Age/service requirement	Vested active member at any age or vested former member age 50 or older who dies before retirement or disability benefit commences. If an active member dies, benefits may commence immediately, regardless of age.
Amount	Surviving spouse receives the 100% joint and survivor benefit using the Normal Retirement formula above. If commencement is prior to age 55, the appropriate early retirement formula described above applies except that one-half the monthly reduction factor is used from age 50 to the commencement age. In lieu of this benefit, the surviving spouse may elect a refund of contributions with interest or an actuarially equivalent term certain annuity (lump sum payable to estate at death).
Benefit increases	Same as for retirement.
Surviving dependent children's benefit	
Age/service requirement	If no surviving spouse, all dependent children (biological or adopted) below age 20 who are dependent for more than half of their support on deceased member.
Amount	Actuarially equivalent to surviving spouse 100% joint and survivor annuity payable to the later of age 20 or five years. The amount is to be proportionally divided among surviving children.

Summary of Plan Provisions (Continued)

Death (Concluded)	
Refund of contributions	
Age/service requirement	Active employee dies and survivor benefits paid are less than member's contributions or a former employee dies before annuity begins.
Amount	If no survivor benefits are paid, the member's contributions with 6.00% interest until June 30, 2011; 4.00% to June 30, 2018; 3.00% thereafter. If survivor benefits are paid and accumulated contributions exceed total payments to the surviving spouse and children, then the remaining contributions are paid out.
Termination	
Refund of contributions	
Age/service requirement	Termination of local government service.
Amount	Member's contributions with 6.00% interest through June 30, 2011. Beginning July 1, 2011, a member's contributions increase at 4.00% interest. Beginning July 1, 2018, a member's contributions increase at 3.00% interest. If a member is vested, a deferred annuity may be elected in lieu of a refund.
Deferred benefit	
Age/service requirement	Partially or fully vested.
Amount	Benefit computed under law in effect at termination and increased by the following percentage (augmentation), compounded annually, if termination of employment is prior to January 1, 2012: (a.) 3.00% (2.50% if hired after June 30, 2006) until the earlier of January 1 of the year following attainment of age 55 and January 1, 2012; (b.) 5.00% (2.50% if hired after June 30, 2006) thereafter until the earlier of the date the annuity begins and January 1, 2012; (c.) 1.00% from January 1, 2012 through December 31, 2018; and (d.) 0.00% thereafter. If a member terminates employment after 2011, they are not eligible for augmentation.
Form of payment	Same as for retirement.
Actuarial equivalent factors	Effective July 1, 2019, actuarially equivalent factors based on the RP-2014 mortality table for healthy annuitants for a member turning age 55 in 2021, reflecting projected mortality improvements using Scale MP-2017, male rates multiplied by 0.96, blended 65% males, 4.88% post-retirement interest, and 7.5% pre-retirement interest. Reflecting statutory requirements, joint and survivor factors are based on an interest assumption of 6.50%.

Actuarial Basis

Summary of Plan Provisions (Concluded)

Combined service annuity	Members are eligible for combined service benefits if they: (a.) Meet minimum retirement age for each plan participated in and total public service meets the vesting requirements of each plan; or (b.) Have three or more years of service under PERA and the covered fund(s) (if hired prior to July 1, 2010). Other requirements for combined service include: (a.) Member must have at least six months of allowable service credit in each plan worked under; and (b.) Member may not be in receipt of a benefit from another plan. Members who meet the above requirements must have their benefit based on the following: (a.) Allowable service in all covered plans is combined in order to determine eligibility for early retirement. (b.) Average salary is based on the high five consecutive years during their entire service in all covered plans.
Changes in plan provisions	There were no changes in plan provisions since the prior valuation.

Additional Schedules

Schedule of Funding Progress[1] *(Dollars in Thousands)*

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded (Overfunded) AAL (UAAL) (b) - (a)	Funded Ratio (a)/(b)	Actual Covered Payroll (Previous FY) (c)	UAAL as a Percentage of Covered Payroll [(b)-(a)]/(c)
7-1-2006	$ 125,776	$ 133,306	$ 7,530	94.35	$ 125,189	6.01 %
7-1-2007	159,548	162,169	2,621	98.38	134,117	1.95
7-1-2008	192,937	192,572	(365)	100.19	154,202	(0.24)
7-1-2009	217,577	229,383	11,806	94.85	154,650	7.63
7-1-2010	242,019	248,867	6,848	97.25	154,777	4.42
7-1-2011	274,704	284,593	9,889	96.53	165,077 [2]	5.99
7-1-2012	306,454	343,199	36,745	89.29	164,340 [2]	22.36
7-1-2013	346,778	381,179	34,401	90.98	164,820 [2]	20.87
7-1-2014	410,489	426,508	16,019	96.24	172,041 [2]	9.31
7-1-2015	475,963	498,052	22,089	95.56	179,623 [2]	12.30
7-1-2016	529,879	553,840	23,961	95.67	188,816 [2]	12.69
7-1-2017	595,366	629,870	34,504	94.52	200,103 [2]	17.24
7-1-2018	666,012	696,842	30,830	95.58	205,077 [2]	15.03
7-1-2019	729,570	758,268	28,698	96.22	214,151 [2]	13.40
7-1-2020	794,221	814,456	20,235	97.52	217,702 [2]	9.29
7-1-2021	904,434	870,567	(33,867)	103.89	222,093 [2]	(15.25)
7-1-2022	992,811	944,741	(48,070)	105.09	220,292 [2]	(21.82)

[1] *Information prior to 2012 provided by prior actuaries. See prior reports for additional detail.*
[2] *Assumed equal to actual member contributions divided by 5.83%.*

Additional Schedules

Schedule of Contributions from the Employer and Other Contributing Entities[1]

(Dollars in Thousands)

Plan Year Ended June 30	Actuarially Required Contribution Rate (a)	Actual Covered Payroll (b)	Actual Member Contributions (c)	Annual Required Contributions [(a)x(b)] - (c) = (d)	Actual Employer Contributions[2] (e)	Percentage Contributed (e)/(d)
2006	13.09	$ 125,189	$ 7,881	$ 8,507	$ 11,826	139.02 %
2007	12.71	134,117	8,335	8,712	12,499	143.48
2008	12.37	154,202	8,922	10,153	13,388	131.87
2009	13.50	154,650	9,409	11,469	14,124	123.15
2010	14.03	154,777	9,442	12,273	14,170	115.46
2011	13.21	165,077 [3]	9,624	12,183	14,289	117.29
2012	13.42	164,340 [3]	9,581	12,473	14,320	114.80
2013	14.45	164,820 [3]	9,609	14,207	14,498	102.04
2014	14.32	172,041 [3]	10,030	14,606	15,054	103.07
2015	13.49	179,623 [3]	10,472	13,759	15,736	114.37
2016	14.54	188,816 [3]	11,008	16,446	16,490	100.27
2017	14.46	200,103 [3]	11,666	17,269	17,489	101.27
2018	15.11	205,077 [3]	11,956	19,031	17,871	93.90
2019	14.92	214,151 [3]	12,485	19,466	18,676	95.94
2020	14.83	217,702 [3]	12,692	19,593	19,043	97.19
2021	14.46	222,093 [3]	12,948	19,167	19,351	100.96
2022	11.76	220,292 [3]	12,843	13,063	19,227	147.18
2023	11.39					

[1] *Information prior to 2012 provided by prior actuary. See prior reports for additional detail.*
[2] *Includes contributions from other sources (if applicable).*
[3] *Assumed equal to actual member contributions divided by 5.83%.*

Glossary of Terms

Actual Covered Payroll (GASB)	The payroll of covered employees, which is typically only the pensionable pay (meets the statutory salary definition) and does not include pay above any pay cap.
Actuarial Accrued Liability (AAL)	The difference between the Actuarial Present Value of Future Benefits, and the Actuarial Present Value of Future Normal Costs.
Accrued Benefit Funding Ratio	The ratio of assets to Current Benefit Obligations.
Accrued Liability Funding Ratio	The ratio of assets to Actuarial Accrued Liability.
Actuarial Assumptions	Assumptions about future plan experience that affect costs or liabilities, such as: mortality, withdrawal, disablement, and retirement; future increases in salary; future rates of investment earnings; future investment and administrative expenses; characteristics of members not specified in the data, such as marital status; characteristics of future members; future elections made by members; and other items.
Actuarial Cost Method	A procedure for allocating the Actuarial Present Value of Future Benefits between the Actuarial Present Value of future Normal Costs and the Actuarial Accrued Liability.
Actuarial Equivalent	Of equal Actuarial Present Value, determined as of a given date and based on a given set of Actuarial Assumptions.
Actuarial Present Value (APV)	The amount of funds required to provide a payment or series of payments in the future. It is determined by discounting the future payments with an assumed interest rate and with the assumed probability each payment will be made.
Actuarial Present Value of Projected Benefits	The Actuarial Present Value of amounts which are expected to be paid at various future times to active members, retired members, beneficiaries receiving benefits, and inactive, non-retired members entitled to either a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.
Actuarial Valuation	The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial Valuation for a governmental retirement system typically also includes calculations of items needed for developing and monitoring a retirement system's funding policy, such as the Funded Ratio and the Annual Required Contribution (ARC).
Actuarial Value of Assets	The value of the assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets or a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the Funded Ratio and the Annual Required Contribution (ARC).

Glossary of Terms (Continued)

Amortization Method	A method for determining the Amortization Payment. Under the Level Percentage of Pay method, the Amortization payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. The stream of payments increases at the rate at which total covered payroll of all active members is assumed to increase.
Amortization Payment	That portion of the plan contribution or ARC which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.
Amortization Period	The period used in calculating the Amortization Payment.
Annual Required Contribution (ARC)	The employer's periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation. The ARC consists of the Employer Normal Cost and Amortization Payment.
Annual Valuation Earnings	Reported salary at valuation date. annualized for members with less than one year of service earned during the year.
Augmentation	Annual increases to deferred benefits.
Closed Amortization Period	A specific number of years that is reduced by one each year, and declines to zero with the passage of time. For example, if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc.
Current Benefit Obligations	The present value of benefits earned to the valuation date, based on current service and including future salary increases to retirement (comparable to a Projected Unit Credit measurement).
Employer Normal Cost	The portion of the Normal Cost to be paid by the employer. This is equal to the Normal Cost less expected member contributions.
Expected Assets	The present value of anticipated future contributions intended to fund benefits for current members.
Experience Gain/Loss	A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two actuarial valuations. To the extent that actual experience differs from that assumed, Unfunded Actuarial Accrued Liabilities emerge which may be larger or smaller than projected. Gains are due to favorable experience; e.g., the assets earn more than projected, salaries do not increase as fast as assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, losses are the result of unfavorable experience; i.e., actual results that produce Unfunded Actuarial Accrued Liabilities which are larger than projected.
GASB	Governmental Accounting Standards Board.

Glossary of Terms (Concluded)

GASB Statements No. 25 and No. 27	These are the governmental accounting standards that previously set the accounting and financial reporting rules for public retirement systems and the employers that sponsor or contribute to them. Statement No. 27 sets the accounting and financial reporting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 25 sets the rules for the systems themselves. These statements remain in effect only for pension plans that are not administered as trusts or equivalent arrangements. Please refer to the definition of GASB Statements No. 67 and No. 68 on the following page.
GASB Statement No. 50	The accounting standard governing a state or local governmental employer's accounting for pensions. This statement remains in effect only for pension plans that are not administered as trusts. Please refer to the definition of GASB Statements No. 67 and No. 68.
GASB Statements No. 67 and No. 68	Statements No. 67 and No. 68, issued in June 2012, replace the requirements of Statements No. 25, No. 27 and No. 50, respectively, for pension plans administered as trusts. Statement No. 68, effective for the fiscal year beginning July 1, 2014, sets the accounting and financial reporting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 67, effective for the fiscal year beginning July 1, 2013, sets the rules for the systems themselves. Accounting and financial reporting information prepared according to Statements No. 67 and No. 68 is provided in a separate report beginning with the June 30, 2014 actuarial valuation.
GASB Statement No. 82	Statement No. 82, issued in March 2016, is an amendment to Statements No. 67, No. 68, and No. 73, and is intended to improve consistency in the application of the accounting statements.
Normal Cost	The annual cost assigned, under the Actuarial Cost Method, to the current plan year.
Projected Annual Earnings	Projected annual payroll for fiscal year beginning on the valuation date, determined by increasing reported pay for each member by one full year's assumed pay increase according to the actuarial salary scale, as prescribed by the LCPR Standards for Actuarial Work.
Projected Benefit Funding Ratio	The ratio of the sum of Actuarial Value of Assets and Expected Assets to the Actuarial Present Value of Projected Benefits. A ratio less than 100% indicates that contributions are insufficient.
Unfunded Actuarial Accrued Liability	The difference between the Actuarial Accrued Liability and Actuarial Value of Assets.
Valuation Date	The date as of which the Actuarial Present Value of Future Benefits are determined. The benefits expected to be paid in the future are discounted to this date.

Public Employees Retirement Association of Minnesota

Public Employees Police and Fire Plan
Actuarial Valuation Report as of July 1, 2022

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November 8, 2022

Public Employees Retirement Association of Minnesota
Trustees of the Public Employees Police and Fire Plan
St. Paul, Minnesota

Dear Trustees of the Public Employees Police and Fire Plan:

The results of the July 1, 2022 annual actuarial valuation of the Public Employees Police and Fire Plan are presented in this report. This report was prepared at the request of the Board and is intended for use by the Board and staff and those designated or approved by the Board. This report may be provided to parties other than the Board and staff only in its entirety and only with permission of the Board. GRS is not responsible for unauthorized use of this report.

The purpose of the valuation is to measure the Plan's funding progress and to determine the required contribution rate for the fiscal year beginning July 1, 2022 according to the prescribed assumptions. Note that the impact of GASB Statements No. 67 and No. 68 is provided in a separate report.

Actuarial assumptions, including discount rates, mortality tables and others identified in this report, are prescribed by Minnesota Statutes Section 356.215, the Legislative Commission on Pensions and Retirement (LCPR), and the Trustees. These parties are responsible for selecting the plan's funding policy, actuarial valuation methods, asset valuation methods and assumptions. The policies, methods and assumptions used in this valuation are those that have been so prescribed and are described in the Actuarial Basis section of this report. PERA is solely responsible for communicating to GRS any changes required thereto.

In our professional judgment, the statutory investment return assumption of 7.5% used in the report deviates materially from the guidance set forth in Actuarial Standards of Practice No. 27 (ASOP No. 27). In a 2022 analysis of long-term rate of investment return and inflation assumptions, GRS suggested that an investment return assumption in the range of 5.64% to 6.84% would be reasonable for this valuation. Please see our letter dated July 12, 2022 for additional information. For informational purposes, note that results based on a 6.50% investment return assumption are shown on page 5.

The contribution rate in this report is determined using the actuarial assumptions and methods disclosed in the Actuarial Basis section of this report. This report includes risk metrics on pages 6 through 9, but does not include a more robust assessment of the risks of future experience differing materially from the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment.

The valuation assumed the continuing ability of the plan sponsor to make the contributions necessary to fund this plan. A determination regarding whether or not the plan sponsor is actually able to do so is outside our scope of expertise and was not performed.

The findings in this report are based on data and other information through June 30, 2022. The valuation was based upon information furnished by the Public Employees Retirement Association of Minnesota (PERA), concerning benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by PERA.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the

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natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of such future measurements.

This report reflects the impact of COVID-19 through June 30, 2022. It does not reflect the ongoing impact of COVID-19, which is likely to influence demographic and investment experience, at least in the short term. We will continue to monitor these developments and their impact on the plan.

This report was prepared using our proprietary valuation model and related software which, in our professional judgment, has the capability to provide results that are consistent with the purposes of the valuation and has no material limitations or known weaknesses. We performed tests to ensure that the model reasonably represents that which is intended to be modeled.

This report should not be relied on for any purpose other than the purpose described herein. Determinations of the financial results associated with the benefits described in this report in a manner other than the intended purpose may produce significantly different results.

The signing actuaries are independent of the plan sponsor. We are not aware of any relationship that would impair the objectivity of our work.

Brian B. Murphy, Bonita J. Wurst and Sheryl L. Christensen are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. In addition, GRS meets the requirements of "approved actuary" under Minnesota Statutes Section 356.215, Subdivision 1, Paragraph (c).

This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. To the best of our knowledge and belief the information contained in this report is accurate and fairly presents the actuarial position of the Public Employees Police and Fire Plan as of the valuation date and was performed in accordance with the requirements of Minnesota Statutes Section 356.215, and the requirements of the Standards for Actuarial Work established by the LCPR. All calculations have been made in conformity with generally accepted actuarial principles and practices, with the Actuarial Standards of Practice issued by the Actuarial Standards Board, and with applicable statutes.

We are available to answer any questions or provide further details.

Respectfully submitted,
Gabriel, Roeder, Smith & Company

Brian B. Murphy

Brian B. Murphy, FSA, EA, FCA, MAAA, PhD

Bonita J. Wurst

Bonita J. Wurst, ASA, EA, FCA, MAAA

Sheryl Christensen

Sheryl L. Christensen, FSA, EA, FCA, MAAA

BBM/BJW:sc

Other Observations

General Implications of Contribution Allocation Procedure or Funding Policy on Future Expected Plan Contributions and Funded Status

Given the plan's contribution allocation procedure, if there are no changes in benefits, Chapter 356 required contributions are made, and all actuarial assumptions are met (including the assumption of the plan earning 7.50% on the actuarial value of assets, as prescribed by statutes), it is expected that:

(1) The normal cost of the plan is expected to remain approximately level as a percent of pay;
(2) The funded status of the plan is expected to gradually improve and is expected to be 100% funded within the next 26 years; and
(3) The unfunded liability is expected to grow initially as a dollar amount before beginning to decline.

Limitations of Funded Status Measurements

Unless otherwise indicated, a funded status measurement presented in this report is based upon the actuarial accrued liability and the actuarial value of assets. Unless otherwise indicated, with regard to any funded status measurements presented in this report:

(1) The measurement is inappropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations, in other words, of transferring the obligations to an unrelated third party in an arm's length market value type transaction.
(2) The measurement is dependent upon the actuarial cost method which, in combination with the plan's amortization policy, affects the timing and amounts of future contributions. The amounts of future contributions will most certainly differ from those assumed in this report due to future actual experience differing from assumed experience based upon the actuarial assumptions. A funded status measurement in this report of 100% is not synonymous with no required future contributions. If the funded status were 100%, the plan would still require future normal cost contributions (i.e., contributions to cover the cost of the active membership accruing an additional year of service credit).
(3) The measurement would produce a different result if the market value of assets were used instead of the actuarial value of assets.

Limitations of Project Scope

Actuarial standards do not require the actuary to evaluate the ability of the plan sponsor or other contributing entity to make required contributions to the plan when due. Such an evaluation was not within the scope of this project and is not within the actuary's domain of expertise. Consequently, the actuary performed no such evaluation.

Contents

Summary of Valuation Results

Contributions

The following table summarizes important contribution information as described in the Development of Costs section.

Contributions	Actuarial Valuation as of July 1, 2022	Actuarial Valuation as of July 1, 2021
Statutory Contributions - Chapter 353 (% of Payroll)	31.77%	31.84%
Required Contributions - Chapter 356 (% of Payroll)	25.01%	25.44%
Sufficiency / (Deficiency)	6.76%	6.40%

Statutory contributions represent the amount actually contributed to the fund and include fixed percentage of payroll contributions plus any supplemental contributions. Required contributions are defined in statutes and the LCPR Standards for Actuarial Work, and represent the amount needed to fully fund the plan within 26 years (normal cost, expenses and a payment to amortize the unfunded liability). When member contributions of 11.80% of pay are reflected, the remaining employer statutory contribution is 19.97% of pay, and the remaining employer required contribution is 13.21% of pay.

The statutory contribution sufficiency increased from 6.40% of payroll to 6.76% of payroll. The increase is primarily due to the recognition of deferred investment gains in the actuarial value of assets.

Based on the actuarial value of assets, scheduled contribution rates and actuarial assumptions described in this report, statutory contributions are expected to bring the plan to full funding within the 26-year amortization period.

These results are based on the statutory return assumption of 7.50%, which in our professional judgment, deviates significantly from guidance in ASOP No. 27. If an investment return assumption within the reasonable range were used in this valuation instead of 7.50%, liabilities and required contributions would be higher than shown, and the contribution sufficiency would be lower than shown and possibly even become a deficiency (see 6.5% interest results on page 5).

The Plan Assets section provides detail on the plan assets used for the valuation including a development of the Actuarial Value of Assets (AVA). The Market Value of Assets (MVA) earned approximately -6.2% for the plan year ending June 30, 2022. The AVA earned approximately 9.3% for the plan year ending June 30, 2022 compared to the assumed rate of 7.50%.

Participant reconciliation and statistics are detailed in the Membership Data section. The Actuarial Basis section includes a summary of plan provisions and actuarial methods and assumptions used for the calculations in this report.

During the past year, there were more terminations, retirements and disabilities than in recent prior years, and less new hires to replace these members. As a result, active membership decreased for the second year in a row and liabilities were greater than expected. We will continue to monitor these developments and their impact on the plan.

Accounting information prepared according to the Governmental Accounting Standards Board (GASB) Statements No. 67 and No. 68 will be provided in a separate report.

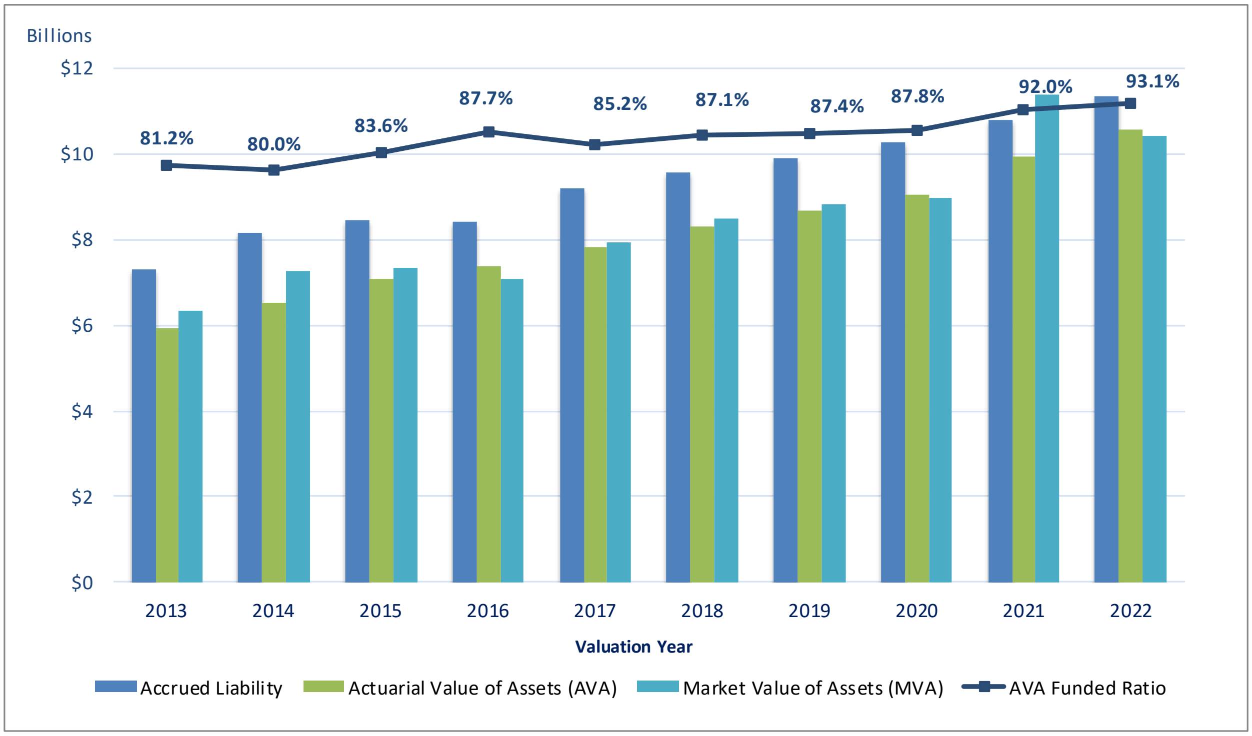
Summary of Valuation Results

A summary of principal valuation results from the current valuation and the prior valuation follows. Any changes in plan provisions, actuarial assumptions or valuation methods and procedures between the two valuations are described after the summary.

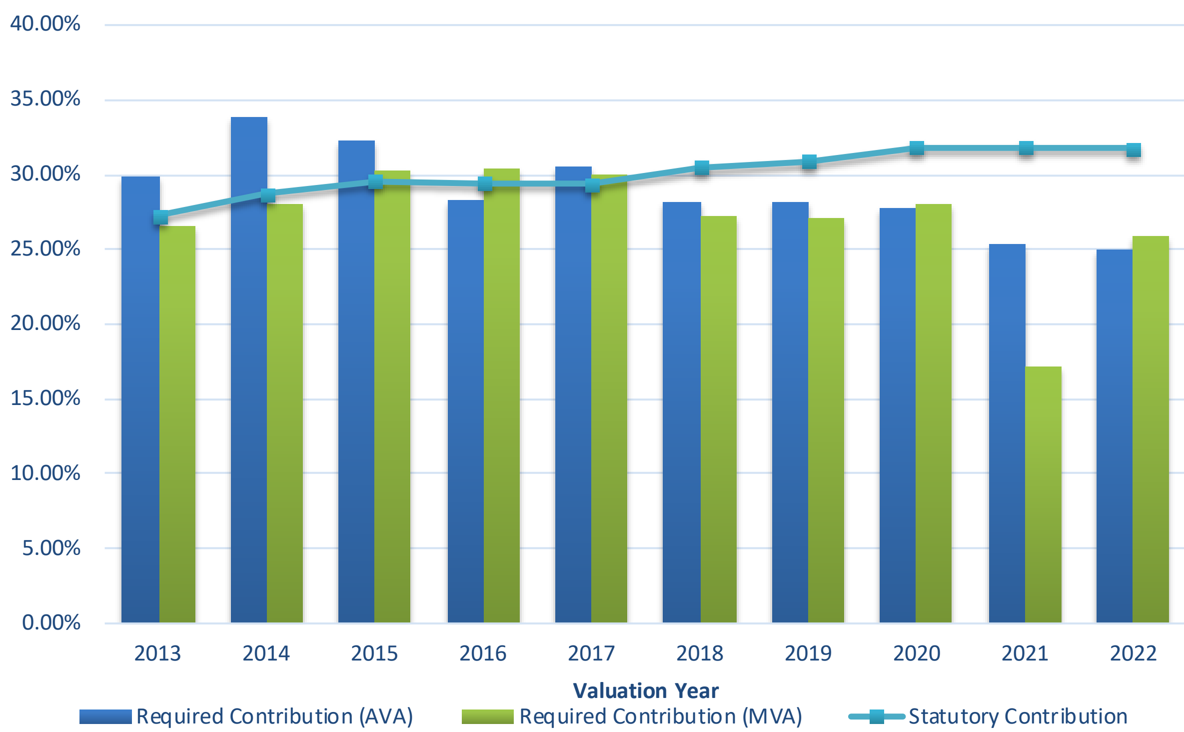
	Actuarial Valuation as of	
	July 1, 2022	July 1, 2021
Contributions (*% of Payroll*)		
Statutory - Chapter 353	31.77%	31.84%
Required - Chapter 356	25.01%	25.44%
Sufficiency / (Deficiency)	6.76%	6.40%
Funding Ratios (*dollars in thousands*)		
Assets		
- Current assets (AVA)	$ 10,563,877	$ 9,931,003
- Current assets (MVA)	$ 10,415,493	$ 11,398,101
Accrued Benefit Funding Ratio		
- Current benefit obligations	$ 11,029,888	$ 10,476,942
- Funding ratio (AVA)	95.78%	94.79%
- Funding ratio (MVA)	94.43%	108.79%
Accrued Liability Funding Ratio		
- Actuarial accrued liability	$ 11,351,467	$ 10,793,845
- Funding ratio (AVA)	93.06%	92.01%
- Funding ratio (MVA)	91.75%	105.60%
Projected Benefit Funding Ratio		
- Current and expected future assets	$ 14,591,239	$ 13,878,589
- Current and expected future benefit obligations	$ 13,410,366	$ 12,775,104
- Projected benefit funding ratio (AVA)	108.81%	108.64%
Participant Data		
Active members		
- Number	11,629	11,705
- Actual covered payroll (GASB) *(000s)*	$ 1,127,314	$ 1,096,195
- Annual valuation earnings *(000s)*	$ 1,083,253	$ 1,048,417
- Average annual valuation earnings	$ 93,151	$ 89,570
- Projected annual earnings *(000s)*	$ 1,132,625	$ 1,096,003
- Average projected annual earnings	$ 97,397	$ 93,635
- Average age	40.1	40.3
- Average service	12.0	12.3
Service retirements	8,236	8,021
Survivors	1,959	1,951
Disability retirements	1,912	1,684
Deferred retirements	1,864	1,813
Non-vested terminations eligible for refunds only	957	912
Total	**26,557**	**26,086**

Summary of Valuation Results

Funded Ratio History



Contribution Rate History (% of Pay)



Summary of Valuation Results

Effects of Changes

The following change in actuarial assumptions was recognized as of July 1, 2022:

- The mortality projection scale was updated from MP-2020 to MP-2021.

The assumption change increased the unfunded actuarial accrued liability by $14 million and increased the required contribution by 0.09% of pay, as follows:

	Before Changes	Reflecting Assumption Changes
Normal Cost Rate, % of Pay	20.34%	20.35%
Amortization of Unfunded Accrued Liability,		
Level % of pay to 2048	4.43%	4.51%
Expenses (% of Pay)	0.15%	0.15%
Total Required Contribution, % of Pay	24.92%	25.01%
Accrued Liability Funding Ratio	93.2%	93.1%
Projected Benefit Funding Ratio	108.9%	108.8%
Unfunded Accrued Liability (in billions)	$0.8	$0.8

Summary of Valuation Results

Sensitivity Tests

During the 2017 legislative session, the Legislative Commission on Pensions and Retirement (LCPR) enacted a new sensitivity disclosure requirement for PERA's valuations. Per the LCPR's requirement, we have calculated the liabilities associated with the following scenarios:

1) 6.50% interest rate assumption
2) 8.50% interest rate assumption

In each case, all other assumptions were unchanged from those used to develop the final valuation results in this report. Note that we believe the 8.50% and 7.50% interest rate assumptions do not comply with Actuarial Standards of Practice.

$ in billions	**Final Valuation Assumptions (7.5% Interest)**	**Final Valuation Assumptions with 6.5% Interest**	**Final Valuation Assumptions with 8.5% Interest**
Normal Cost Rate, % of Pay	20.35%	25.79%	16.29%
Amortization of Unfunded Accrued Liability, Level % of Pay to 2048	4.51%	11.57%	(2.42)%
Expenses (% of Pay)	0.15%	0.15%	0.15%
Total Required Contribution, % of Pay	25.01%	37.51%	14.02%
Contribution Sufficiency/(Deficiency), % of Pay	6.76%	(5.74)%	17.75 %
Accrued Liability Funding Ratio	93.1%	82.5%	104.0%
Present Value of Projected Benefits	$13.4	$15.6	$ 11.7
Present Value of Future Normal Costs	2.0	2.8	1.5
Actuarial Accrued Liability	$11.4	$12.8	$ 10.2
Unfunded Accrued Liability	$ 0.8	$ 2.2	$(0.4)

Summary of Valuation Results

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

The determination of the accrued liability and the actuarially determined contribution requires the use of assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the actuarially determined contribution that result from the differences between actual experience and the actuarial assumptions.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions due to changing conditions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the Plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the plan's future financial condition include:

1. **Investment Risk** – actual investment returns may differ from the expected returns;
2. **Asset/Liability Mismatch** – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
3. **Contribution Risk** – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. **Salary and Payroll Risk** – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. **Longevity Risk** – members may live longer or shorter than expected and receive pensions for a period of time other than assumed; and
6. **Other Demographic Risks** – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example, if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise, if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

Summary of Valuation Results

The Required Contribution rate shown on page 1 may be considered as a minimum contribution rate that complies with Minnesota Statutes and the requirements of the Standards for Actuarial Work published by the LCPR. The timely receipt of the actuarially determined contributions is critical to support the financial health of the plan. Users of this report should be aware that contributions made at the actuarially determined rate do not necessarily guarantee benefit security.

PLAN MATURITY MEASURES

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Generally accepted plan maturity measures include the following. Additional maturity measures are shown on the following page.

	2022	2021
Ratio of market value of assets to total payroll	9.24	10.40
Ratio of actuarial accrued liability to total payroll	10.07	9.85
Ratio of actives to retirees and beneficiaries	0.96	1.00
Ratio of net cash flow to market value of assets	-2.7%	-2.2%
Approximate modified duration* of:		
▪ Total projected benefits:	14.66	14.68
▪ Actuarial accrued liability:	11.65	11.65
▪ Retiree liability:	8.81	8.69

** Based on 7.50% interest.*

RATIO OF MARKET VALUE OF ASSETS TO PAYROLL

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 5.0 times the payroll, a return on assets 5% different than assumed would equal 25% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.

RATIO OF ACTUARIAL ACCRUED LIABILITY TO PAYROLL

The relationship between actuarial accrued liability and payroll is a useful indicator of the potential volatility of contributions for a fully funded plan. A funding policy that targets a funded ratio of 100% is expected to result in the ratio of assets to payroll and the ratio of liability to payroll converging over time.

The ratio of liability to payroll may also be used as a measure of sensitivity of contribution rates to liability gains and losses. For example, if the actuarial accrued liability is 5.0 times the payroll, a change in liability 2% other than assumed would equal 10% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

Summary of Valuation Results

RATIO OF ACTIVES TO RETIREES AND BENEFICIARIES

A young plan with many active members and few retirees will have a high ratio of actives to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

RATIO OF NET CASH FLOW TO MARKET VALUE OF ASSETS

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means benefits and expenses exceed contributions and existing funds may be used to make payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

DURATION OF LIABILITIES

The modified duration (as opposed to the Macaulay duration) may be used to approximate the sensitivity of the Liability to a small change in the assumed rate of return. For example, a modified duration of 10 indicates that the liability would change by approximately 10% if the assumed rate of return were changed by 1% (i.e., from 7.5% to 6.5%).

ADDITIONAL RISK ASSESSMENT

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability. We would be please to perform such assessments upon request.

Summary of Valuation Results

Risk Measures Summary *(Dollars in Thousands)*

Valuation Date (6/30)	(1) Accrued Liabilities (AAL)	(2) Market Value of Assets	(3) Market Value Unfunded AAL	(4) Actual Covered Payroll	(5) Market Value Funded Ratio (2)/(1)	(6) Retiree Liabilities	(7) RetLiab/ AAL (6)/(1)	(8) AAL/ Payroll (1)/(4)	(9) Assets/ Payroll (2)/(4)
2013	$ 7,304,032	$ 6,346,741	$ 957,291	$ 796,188	86.9%	$ 4,333,475	59.3%	917.4%	797.1%
2014	8,151,328	7,273,100	878,228	820,333	89.2%	4,888,411	60.0%	993.7%	886.6%
2015	8,460,477	7,348,704	1,111,773	845,076	86.9%	5,000,871	59.1%	1001.1%	869.6%
2016	8,417,621	7,098,090	1,319,531	881,222	84.3%	5,066,605	60.2%	955.2%	805.5%
2017	9,199,208	7,918,879	1,280,329	944,296	86.1%	5,532,560	60.1%	974.2%	838.6%
2018	9,552,804	8,486,907	1,065,897	976,657	88.8%	5,780,590	60.5%	978.1%	869.0%
2019	9,909,153	8,844,552	1,064,601	1,011,421	89.3%	6,022,997	60.8%	979.7%	874.5%
2020	10,291,567	8,973,460	1,318,107	1,069,481	87.2%	6,164,792	59.9%	962.3%	839.0%
2021	10,793,845	11,398,101	(604,256)	1,096,195	105.6%	6,603,316	61.2%	984.7%	1039.8%
2022	11,351,467	10,415,493	935,974	1,127,314	91.8%	7,055,903	62.2%	1006.9%	923.9%

Valuation Date (6/30)	(10) Portfolio StdDev	(11) Std Dev % of Pay (9) x (10)	(12) Unfunded AAL/ Payroll (3)/(4)	(13) Non-Investment Cash Flow (NICF)	(14) NICF/ Assets (13)/(2)	(15) SBI Market Rate of Return	(16) SBI 5-Year Average	(17) SBI 10-Year Average
2013			120.2%	$(230,072)	(3.6%)	14.2%	6.2%	N/A
2014			107.1%	(232,048)	(3.2%)	18.6%	14.5%	N/A
2015	14.1%	122.6%	131.6%	(242,036)	(3.3%)	4.4%	12.3%	N/A
2016	14.1%	113.6%	149.7%	(241,668)	(3.4%)	-0.1%	7.7%	N/A
2017	14.1%	118.2%	135.6%	(238,177)	(3.0%)	15.1%	10.2%	6.2%
2018	14.1%	122.5%	109.1%	(245,996)	(2.9%)	10.3%	9.4%	7.8%
2019	14.3%	125.0%	105.3%	(251,921)	(2.8%)	7.3%	7.3%	10.8%
2020	14.3%	120.0%	123.2%	(240,301)	(2.7%)	4.2%	7.2%	9.7%
2021	13.9%	144.5%	-55.1%	(248,208)	(2.2%)	30.3%	13.1%	10.3%
2022	14.0%	129.3%	83.0%	(281,646)	(2.7%)	-6.4%	8.5%	9.4%

(5) The Funded ratio is the most widely known measure of a plan's financial strength, but the trend in the funded ratio is much more important than the absolute ratio. The funded ratio should trend to 100%. As it approaches 100%, it is important to re-evaluate the level of investment risk in the portfolio and potentially to re-evaluate the assumed rate of return.

(6) and (7) The ratio of Retiree liabilities to total accrued liabilities gives an indication of the maturity of the system. As the ratio increases, cash flow needs increase, and the liquidity needs of the portfolio change. A ratio on the order of 50% indicates a maturing system.

(8) and (9) The ratios of liabilities and assets to payroll gives an indication of both maturity and volatility. Many systems have ratios between 500% and 700%. Ratios significantly above that range may indicate difficulty in supporting the benefit level as a level % of payroll.

(10) and (11) The portfolio standard deviation measures the volatility of investment return. When multiplied by the ratio of assets to payroll it gives the effect of a one standard deviation asset move as a percent of payroll. This figure helps users understand the difficulty of dealing with investment volatility and the challenges volatility brings to sustainability.

(12) The ratio of unfunded liability to payroll gives an indication of the plan sponsor's ability to actually pay off the unfunded liability. A ratio above approximately 300% or 400% may indicate difficulty in discharging the unfunded liability within a reasonable time frame.

(13) and (14) The ratio of Non-Investment Cash Flow to assets is an important measure of sustainability. Negative ratios are common and expected for a maturing system. In the longer term, this ratio should be on the order of approximately -4%. A ratio that is significantly more negative than that for an extended period could be a leading indicator of potential exhaustion of assets.

(15) (16) and (17) Investment return is probably the largest single risk that most systems face. The year by year return and the 5-year and 10-year geometric average give an indicator of past performance. Of course, past performance is not a guarantee of future results, may not even be reflective of potential future results, and historical averages are very sensitive to the time period chosen. The performance data for the Combined Funds (pooled investments of major Minnesota Public Retirement Systems) is presented in these columns. The source of this data is the Minnesota State Board of Investment.

Supplemental Information

The remainder of the report includes information supporting the results presented in the previous sections.

- **Plan assets** presents information about the plan's assets as reported by the Public Employees Retirement Association of Minnesota. The assets represent the portion of total fund liabilities that have been funded.

- **Membership data** presents and describes the membership data used in the valuation.

- **Development of costs** shows the liabilities for plan benefits and the derivation of the contribution amount.

- **Actuarial basis** describes the plan provisions, as well as the methods and assumptions used to value the plan. The valuation is based on the premise that the plan is ongoing.

- **Additional schedules** shows the Schedule of Funding Progress and Schedule of Contributions.

- **Glossary** defines the terms used in this report.

Plan Assets

Statement of Fiduciary Net Position *(Dollars in Thousands)*

	Market Value	
Assets in Trust	**June 30, 2022**	**June 30, 2021**
Cash, equivalents, short term securities	$ 198,592	$ 181,935
Fixed income	$ 2,385,899	$ 2,585,324
Equity	$ 5,210,590	$ 6,647,336
Private Markets	$ 2,621,319	$ 1,978,079
Other	$ -	$ -
Total Assets in Trust	**$ 10,416,400**	**$ 11,392,674**
Assets receivable	$ 5,652	$ 12,147 *
Amounts payable	$ (6,559)	$ (6,720)
Net Assets Held in Trust for Pension Benefits	**$ 10,415,493**	**$ 11,398,101**

* *Includes $7.679 million contribution receivable from Minneapolis to be paid by July 15, 2021.*

Plan Assets

Reconciliation of Plan Assets *(Dollars in Thousands)*

The following exhibit shows the revenue, expenses and resulting assets of the Fund as reported by the Public Employees Retirement Association for the prior two fiscal years.

Change in Assets		**Market Value**				
Year Ending			**June 30, 2022**		**June 30, 2021**	
1.	Fund balance at market value at beginning of year	**$**	**11,398,101**	**$**	**8,973,460**	
2.	Contributions					
	a. Member	$	133,023	$	129,351	
	b. Employer	$	206,416	$	201,129	*
	c. Other sources (State contribution)	$	18,000	$	18,000	
	d. Total contributions	$	357,439	$	348,480	
3.	Investment income					
	a. Investment income/(loss)	$	(688,884)	$	2,683,628	
	b. Investment expenses	$	(12,058)	$	(10,802)	
	c. Net subtotal	$	(700,942)	$	2,672,826	
4.	Other	$	(20)	$	23	
5.	**Total income:** *(2.d.) + (3.c.) + (4.)*	**$**	**(343,523)**	**$**	**3,021,329**	
6.	Benefits Paid					
	a. Annuity benefits	$	(633,255)	$	(592,687)	
	b. Refunds	$	(4,196)	$	(3,060)	
	c. Total benefits paid	$	(637,451)	$	(595,747)	
7.	Expenses					
	a. Other	$	-	$	-	
	b. Administrative	$	(1,634)	$	(941)	
	c. Total expenses	$	(1,634)	$	(941)	
8.	**Total disbursements:** *(6.c.) + (7.c.)*	**$**	**(639,085)**	**$**	**(596,688)**	
9.	**Fund balance at market value at end of year**	**$**	**10,415,493**	**$**	**11,398,101**	
10.	Approximate return on market value of assets		-6.2%		30.3%	

* *Includes $7.679 million contribution receivable from Minneapolis to be paid by July 15, 2021.*

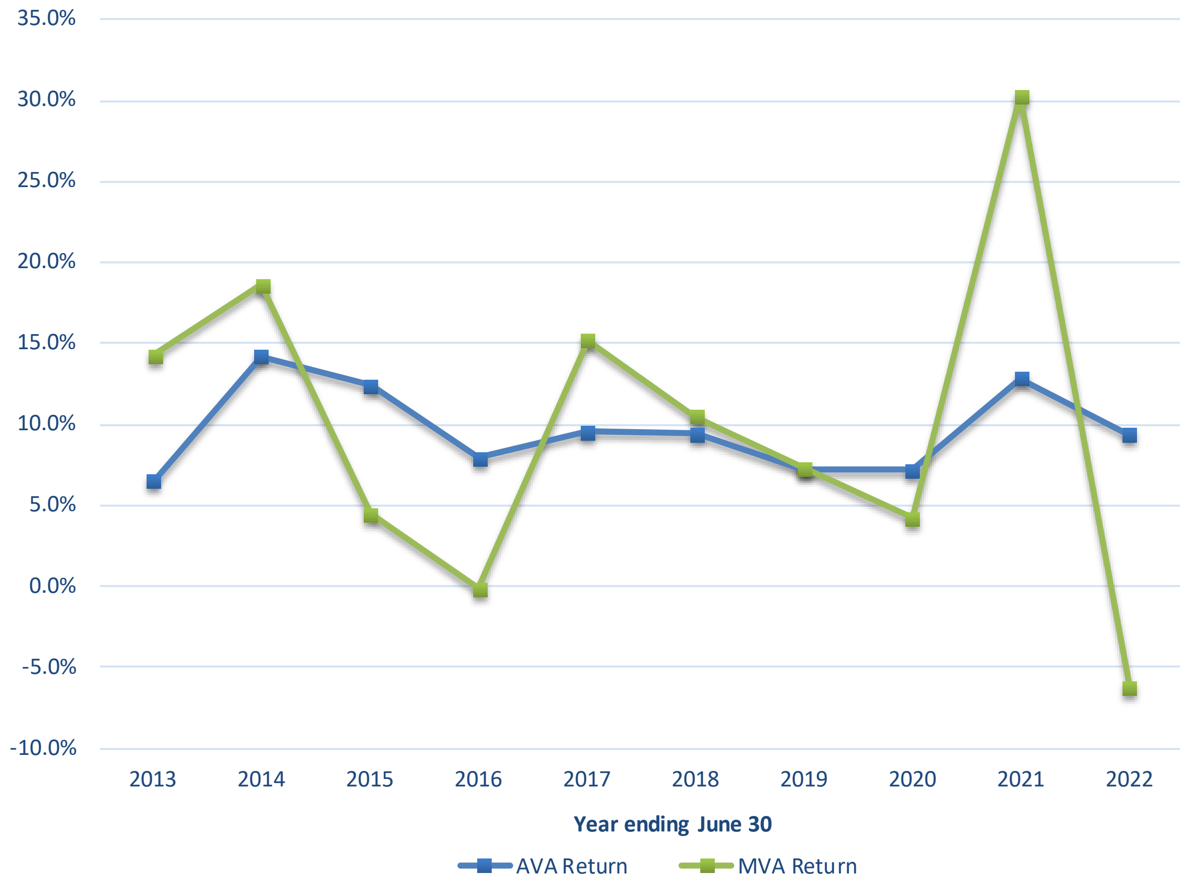
Plan Assets

Actuarial Asset Value *(Dollars in Thousands)*

		June 30, 2022	June 30, 2021
1. Market value of assets available for benefits		**$ 10,415,493**	**$ 11,398,101**
2. Determination of average balance			
a. Total assets available at beginning of year		$ 11,398,101	$ 8,973,460
b. Total assets available at end of year		$ 10,415,493	$ 11,398,101
c. Net investment income for fiscal year		$ (700,942)	$ 2,672,826
d. Average balance *[a. + b. - c.] / 2*		$ 11,257,268	$ 8,849,368
3. Expected return *[7.5% x 2.d.]*		$ 844,295	$ 663,703
4. Actual return		$ (700,942)	$ 2,672,826
5. Current year asset gain/(loss) *[4. - 3.]*		$ (1,545,237)	$ 2,009,123
6. Unrecognized asset returns			
	Original Amount	**Unrecognized Amount**	
a. Year ended June 30, 2022	$ (1,545,237)	$ (1,236,190)	N/A
b. Year ended June 30, 2021	$ 2,009,123	$ 1,205,474	$ 1,607,298
c. Year ended June 30, 2020	$ (285,391)	$ (114,156)	$ (171,235)
d. Year ended June 30, 2019	$ (17,561)	$ (3,512)	$ (7,024)
e. Year ended June 30, 2018	$ (587,179)	N/A	$ 38,059
f. Unrecognized return adjustment		$ (148,384)	$ 1,467,098
7. **Actuarial value at end of year** *(1. - 6.f.)*		**$ 10,563,877**	**$ 9,931,003**
8. Approximate return on actuarial value of assets during fiscal year		9.3%	12.8%
9. Ratio of actuarial value of assets to market value of assets		1.01	0.87

Plan Assets

10-Year History of AVA and MVA Asset Returns



Membership Data

Distribution of Active Members

	Years of Service as of June 30, 2022									
Age	**<3***	**3 - 4**	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25 - 29**	**30 - 34**	**35+**	**Total**
< 25	407	26	1							**434**
Avg. Earnings	$ 53,767	$ 75,552	$ 87,750							**$ 55,150**
25 - 29	706	452	274							**1,432**
Avg. Earnings	$ 61,673	$ 83,918	$ 88,013							**$ 73,734**
30 - 34	424	369	900	106						**1,799**
Avg. Earnings	$ 61,386	$ 83,161	$ 91,670	$ 92,317						**$ 82,825**
35 - 39	242	209	700	627	243					**2,021**
Avg. Earnings	$ 63,971	$ 79,714	$ 90,680	$ 99,070	$ 101,089					**$ 90,202**
40 - 44	144	102	372	373	733	177				**1,901**
Avg. Earnings	$ 64,534	$ 76,840	$ 90,392	$ 101,669	$ 103,977	$ 108,064				**$ 96,802**
45 - 49	61	35	145	176	448	738	123	1		**1,727**
Avg. Earnings	$ 64,797	$ 80,144	$ 90,559	$ 95,313	$ 104,571	$ 111,457	$ 111,555	$ 90,576		**$ 103,983**
50 - 54	28	15	87	110	233	542	591	73		**1,679**
Avg. Earnings	$ 62,710	$ 86,080	$ 92,941	$ 92,768	$ 104,755	$ 113,062	$ 122,191	$ 127,734		**$ 112,308**
55 - 59	12	8	35	38	57	144	119	65	9	**487**
Avg. Earnings	$ 61,795	$ 66,326	$ 95,488	$ 90,819	$ 103,415	$ 114,546	$ 123,703	$ 127,982	$ 112,958	**$ 111,932**
60 - 64	6	2	13	6	23	29	25	15	8	**127**
Avg. Earnings	$ 55,600	$ 36,152	$ 80,103	$ 115,647	$ 111,272	$ 107,710	$ 116,607	$ 118,430	$ 135,582	**$ 107,089**
65 - 69	1	2	1	2	1	5	4		4	**20**
Avg. Earnings	$ 60,547	$ 53,187	$ 17,997	$ 64,154	$ 25,104	$ 123,238	$ 126,085		$ 149,854	**$ 102,914**
70+				1			1			**2**
Avg. Earnings				$ 39,125			$ 58,877			**$ 49,001**
Total	**2,031**	**1,220**	**2,528**	**1,439**	**1,738**	**1,635**	**863**	**154**	**21**	**11,629**
Avg. Earnings	**$ 60,596**	**$ 81,873**	**$ 90,754**	**$ 98,066**	**$ 103,863**	**$ 111,863**	**$ 120,667**	**$ 126,691**	**$ 128,604**	**$ 93,151**

* *This exhibit does not reflect service earned in other PERA funds or service earned in a Combined Service Annuity arrangement. It should not be relied upon as an indicator of non-vested status.*

In each cell, the top number is the count of active participants for the age/service combination and the bottom number is average valuation earnings for the fiscal year ending on the valuation date.

Membership Data

Distribution of Service Retirements

	Years Retired as of June 30, 2022							
Age	**<1**	**1 - 4**	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25+**	**Total**
<50								
Avg. Benefit								
50 - 54	114	160						**274**
Avg. Benefit	$ 55,295	$ 39,479						**$ 46,059**
55 - 59	233	714	397					**1,344**
Avg. Benefit	$ 75,597	$ 68,439	$ 49,537					**$ 64,096**
60 - 64	44	362	764	369				**1,539**
Avg. Benefit	$ 64,825	$ 66,190	$ 61,772	$ 52,764				**$ 60,739**
65 - 69	17	98	353	598	402	5		**1,473**
Avg. Benefit	$ 41,079	$ 53,828	$ 62,524	$ 60,777	$ 51,898	$ 65,553		**$ 58,099**
70 - 74	1	23	136	238	561	440	4	**1,403**
Avg. Benefit	$ 4,045	$ 51,198	$ 51,022	$ 54,560	$ 56,993	$ 52,947	$ 62,708	**$ 54,616**
75 - 79	1	3	13	92	158	682	102	**1,051**
Avg. Benefit	$ 627	$ 9,811	$ 48,273	$ 42,235	$ 49,939	$ 59,345	$ 48,628	**$ 55,059**
80 - 84			3	9	35	287	328	**662**
Avg. Benefit			$ 42,130	$ 27,161	$ 37,457	$ 61,004	$ 65,055	**$ 61,221**
85 - 89				3	2	94	231	**330**
Avg. Benefit				$ 30,042	$ 32,366	$ 55,805	$ 61,278	**$ 59,260**
90+			1	1		14	144	**160**
Avg. Benefit			$ 22,121	$ 24,150		$ 61,987	$ 61,801	**$ 61,334**
Total	**410**	**1,360**	**1,667**	**1,310**	**1,158**	**1,522**	**809**	**8,236**
Avg. Benefit	**$ 67,007**	**$ 62,959**	**$ 57,976**	**$ 55,759**	**$ 53,629**	**$ 57,634**	**$ 61,314**	**$ 58,549**

In each cell, the top number is the count of retired participants for the age/years retired combination and the bottom number is the average annual benefit amount as of the valuation date.

Membership Data

Distribution of Survivors

	Years Since Death as of June 30, 2022							
Age	**<1**	**1 - 4**	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25+**	**Total**
<45	14	43	35	34	13	1		**140**
Avg. Benefit	$ 14,637	$ 18,319	$ 14,383	$ 16,212	$ 15,857	$ 31,703		**$ 16,322**
45 - 49	2	5	7	8	5	1		**28**
Avg. Benefit	$ 27,459	$ 33,236	$ 33,990	$ 34,708	$ 30,269	$ 27,507		**$ 32,698**
50 - 54	4	14	5	9	4	2	1	**39**
Avg. Benefit	$ 23,353	$ 39,283	$ 41,056	$ 29,700	$ 43,574	$ 35,589	$ 33,082	**$ 35,757**
55 - 59	6	14	9	10	7	3	5	**54**
Avg. Benefit	$ 39,325	$ 46,596	$ 54,540	$ 40,066	$ 32,062	$ 44,995	$ 39,482	**$ 43,271**
60 - 64	11	34	15	18	9	3	8	**98**
Avg. Benefit	$ 39,747	$ 41,239	$ 32,129	$ 41,391	$ 37,785	$ 28,279	$ 37,146	**$ 38,657**
65 - 69	12	48	43	25	26	11	15	**180**
Avg. Benefit	$ 36,429	$ 37,238	$ 32,748	$ 34,573	$ 35,532	$ 36,459	$ 42,904	**$ 35,919**
70 - 74	24	74	57	29	26	25	28	**263**
Avg. Benefit	$ 31,812	$ 32,866	$ 35,344	$ 35,682	$ 31,509	$ 34,543	$ 42,556	**$ 34,674**
75 - 79	24	74	68	48	30	51	45	**340**
Avg. Benefit	$ 33,952	$ 33,929	$ 36,169	$ 32,052	$ 36,265	$ 34,694	$ 36,865	**$ 34,823**
80 - 84	17	78	61	41	23	40	37	**297**
Avg. Benefit	$ 32,684	$ 35,151	$ 33,332	$ 34,349	$ 35,797	$ 36,569	$ 39,568	**$ 35,317**
85 - 89	9	41	60	32	29	33	45	**249**
Avg. Benefit	$ 36,282	$ 36,631	$ 35,736	$ 27,976	$ 39,934	$ 31,592	$ 34,697	**$ 34,658**
90+	8	36	34	31	35	53	74	**271**
Avg. Benefit	$ 41,402	$ 40,963	$ 34,763	$ 29,500	$ 32,533	$ 32,866	$ 29,973	**$ 33,214**
Total	**131**	**461**	**394**	**285**	**207**	**223**	**258**	**1,959**
Avg. Benefit	**$ 32,483**	**$ 34,722**	**$ 33,404**	**$ 31,219**	**$ 34,045**	**$ 34,222**	**$ 35,911**	**$ 33,826**

In each cell, the top number is the count of survivors for the age/years since death combination and the bottom number is the average annual benefit amount as of the valuation date.

Membership Data

Distribution of Disability Retirements

Age	Years Disabled* as of June 30, 2022 <1	1 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25+	Total
< 45	86	200	41	13	5			**345**
Avg. Benefit	$ 50,531	$ 47,475	$ 40,694	$ 30,591	$ 32,486			**$ 46,577**
45 - 49	40	120	54	11	5			**230**
Avg. Benefit	$ 53,169	$ 50,841	$ 42,019	$ 37,479	$ 32,251			**$ 48,132**
50 - 54	45	152	65	22	23	4	2	**313**
Avg. Benefit	$ 60,608	$ 60,000	$ 47,717	$ 37,171	$ 35,585	$ 32,781	$ 28,663	**$ 53,590**
55 - 59	27	94	30	10	26	17	4	**208**
Avg. Benefit	$ 60,176	$ 56,720	$ 50,042	$ 45,248	$ 39,929	$ 36,034	$ 35,761	**$ 51,461**
60 - 64	5	42	30	10	42	37	8	**174**
Avg. Benefit	$ 44,110	$ 49,562	$ 41,041	$ 44,886	$ 43,305	$ 40,031	$ 44,585	**$ 43,902**
65 - 69	3	14	17	21	70	52	8	**185**
Avg. Benefit	$ 33,334	$ 40,133	$ 57,023	$ 52,932	$ 48,711	$ 43,871	$ 47,856	**$ 47,658**
70 - 74	1	2	11	2	72	115	21	**224**
Avg. Benefit	$ 49,345	$ 41,992	$ 45,330	$ 59,894	$ 49,896	$ 54,438	$ 52,215	**$ 52,237**
75+			2	5	26	116	84	**233**
Avg. Benefit			$ 72,405	$ 61,564	$ 51,948	$ 55,282	$ 59,213	**$ 56,609**
Total	**207**	**624**	**250**	**94**	**269**	**341**	**127**	**1,912**
Avg. Benefit	**$ 54,079**	**$ 52,524**	**$ 45,537**	**$ 43,279**	**$ 45,918**	**$ 50,379**	**$ 55,199**	**$ 50,190**

** Based on effective date as provided by PERA; "Years Disabled" may reflect years since age 65 for members over age 65.*

In each cell, the top number is the count of disabled participants for the age/years disabled combination and the bottom number is the average annual benefit amount as of the valuation date.

Membership Data

Reconciliation of Members

		Terminated		Recipients			
	Actives	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	Total
Members on 7/1/2021	**11,705**	**1,813**	**912**	**8,021**	**1,684**	**1,951**	**26,086**
New members	822						822
Return to active	63	(28)	(35)	0	0	0	0
Terminated non-vested	(129)	0	129	0	0	0	0
Service retirements	(279)	(137)	0	416	0	0	0
Terminated deferred	(269)	269	0	0	0	0	0
Terminated refund/transfer	(60)	(27)	(83)	0	0	0	(170)
Deaths	(10)	(7)	(3)	(220)	(42)	(119)	(401)
New beneficiary	0	0	0	0	0	127	127
Disabled	(214)	0	0	0	214	0	0
Data adjustments	0	(19)	37	19	56	0	93
Net change	(76)	51	45	215	228	8	471
Members on 6/30/2022	**11,629**	**1,864**	**957**	**8,236**	**1,912**	**1,959**	**26,557**

Summary of Membership

Active Member Statistics	Total
Number	11,629
Average age	40.1
Average service	12.0
Average salary	$ 93,151

Terminated Member Statistics	Deferred Retirement	Other Non-Vested	Total
Number	1,864	957	2,821
Average age	45.7	43.9	45.1
Average service	8.4	0.9	5.8
Average annual benefit, with augmentation to December 31, 2018 and 33% Combined Service Annuity (CSA) load	$25,777	N/A	$25,777
Average refund value, with 33% CSA load (2% CSA load for Non-Vested)	$59,416	$4,989	$40,952

Retiree & Survivor Member Statistics	Service Retirees	Disabled Retirees	Survivors	Total
Number	8,236	1,912	1,959	12,107
Average age	68.6	57.7	73.5	67.6
Average annual benefit	$ 58,549	$ 50,190	$ 33,826	$ 53,229

Development of Costs

Actuarial Valuation Balance Sheet *(Dollars in Thousands)*

The actuarial balance sheet is based on the principle that the long-term projected benefit obligations of the plan should be ideally equal to the long-term resources available to fund those obligations. **A Projected Benefit Funding Ratio less than 100% indicates that contributions are insufficient.** The resources available to meet projected obligations for current members consist of current Fund assets plus the present value of anticipated future contributions intended to fund benefits for current members. In the exhibit below, B.2 is the estimated present value of contributions to fund the normal cost rate for current members until their respective termination dates. Item B.1 is the present value of the total 31.77% statutory contribution net of normal cost and anticipated plan expenses during the period from the valuation date to the statutory amortization date. Item D. Current Benefit Obligation, is the liability based on current service and projected compensation (the Entry Age Normal cost method is used to determine liabilities and contributions elsewhere in the report).

The contributions made in excess of amounts required for current benefit payments are accumulated as a reserve to help meet benefit payments in later years. It is this reserve system which permits the establishment of a level rate of contribution each year.

							June 30, 2022
A. Actuarial Value of Assets						$	10,563,877
B. Expected Future Assets							
1. Present value of expected future statutory supplemental contributions*						$	1,968,463
2. Present value of future normal cost contributions						$	2,058,899
3. Total expected future assets: *(1.) + (2.)*						$	4,027,362
C. Total Current and Expected Future Assets *(A.+ B.3)*						$	14,591,239
D. Current Benefit Obligations**							
1. Benefit recipients	Non-Vested		Vested		Total		
a. Service retirements	$	-	$	5,304,388	$	5,304,388	
b. Disability retirements	$	-	$	1,215,997	$	1,215,997	
c. Survivors	$	-	$	535,518	$	535,518	
2. Deferred retirements with augmentation	$	-	$	395,476	$	395,476	
3. Former members without vested rights	$	2,057	$	-	$	2,057	
4. Active members	$	291,733	$	3,284,719	$	3,576,452	
5. Total current benefit obligations	$	293,790	$	10,736,098	$	11,029,888	
E. Expected Future Benefit Obligations						$	2,380,478
F. Total Current and Expected Future Benefit Obligations***						$	13,410,366
G. Unfunded Current Benefit Obligations: *(D.5.) - (A.)*						$	466,011
H. Unfunded Current and Future Benefit Obligations: *(F.) - (C.)*						$	(1,180,873)
I. Accrued Benefit Funding Ratio: *(A.)/(D.5.)*							95.78%
J. Projected Benefit Funding Ratio: *(C.)/(F.)*							108.81%

* *Per the LCPR Standards for Actuarial Work, calculated assuming the current contribution toward the unfunded liability continues for the entire amortization period.*

** *Present value of credited projected benefits (projected compensation, current service).*

*** *Present value of projected benefits (projected compensation, projected service).*

Development of Costs

Determination of Unfunded Actuarial Accrued Liability and Supplemental Contribution Rate *(Dollars in Thousands)*

	Actuarial Present Value of Projected Benefits	Actuarial Present Value of Future Normal Costs	Actuarial Accrued Liability
A. Determination of Actuarial Accrued Liability (AAL)			
1. Active members			
a. Retirement annuities	$ 5,092,547	$ 1,420,077	$ 3,672,470
b. Disability benefits	$ 583,628	$ 406,139	$ 177,489
c. Survivor's benefits	$ 83,391	$ 55,878	$ 27,513
d. Deferred retirements	$ 170,567	$ 140,639	$ 29,928
e. Refunds*	$ 26,797	$ 36,166	$ (9,369)
f. Total	$ 5,956,930	$ 2,058,899	$ 3,898,031
2. Deferred retirements with future augmentation	$ 395,476	$ -	$ 395,476
3. Former members without vested rights	$ 2,057	$ -	$ 2,057
4. Annuitants	$ 7,055,903	$ -	$ 7,055,903
5. Total	$ 13,410,366	$ 2,058,899	$ 11,351,467

B. Determination of Unfunded Actuarial Accrued Liability (UAAL)	
1. Actuarial accrued liability	$ 11,351,467
2. Current assets (AVA)	$ 10,563,877
3. Unfunded actuarial accrued liability	$ 787,590
C. Determination of Supplemental Contribution Rate**	
1. Present value of future payrolls through the amortization date of June 30, 2048	$ 17,466,395
2. Supplemental contribution rate: *(B.3.) / (C.1.)*	4.51% ***

* *Includes non-vested refunds and non-married survivor benefits only.*

** *The amortization of the Unfunded Actuarial Accrued Liability (UAAL) using the current amortization method results in initial payments less than the "interest only" payment on the UAAL. Payments less than the interest only amount will result in the UAAL increasing for an initial period of time.*

*** *The amortization factor as of July 1, 2022 is 15.421163.*

Development of Costs

Changes in Unfunded Actuarial Accrued Liability (UAAL) *(Dollars in Thousands)*

	Year Ending June 30, 2022		
	Actuarial Accrued Liability	Current Assets	Unfunded Actuarial Accrued Liability
A. Values at beginning of year	$ 10,793,845	$ 9,931,003	$ 862,842
B. Changes due to interest requirements and current rate of funding			
1. Normal cost, including expenses	$ 224,670	$ -	$ 224,670
2. Benefit payments	$ (637,451)	$ (637,451)	$ -
3. Contributions	$ -	$ 357,439	$ (357,439)
4. Interest on A., B.1., B.2. and B.3.	$ 794,059	$ 734,325	$ 59,734
5. Total *(B.1. + B.2. + B.3. + B.4.)*	$ 381,278	$ 454,313	$ (73,035)
C. Expected values at end of year *(A. + B.5.)*	$ 11,175,123	$ 10,385,316	$ 789,807
D. Increase (decrease) due to actuarial losses (gains) because of experience deviations from expected			
1. Age and service retirements			$ 7,823
2. Disability retirements			$ 73,062
3. Death-in-service benefits			$ 150
4. Withdrawals			$ (3,843)
5. Salary increases			$ 81,582
6. Investment income			$ (178,561)
7. Mortality of annuitants			$ (24,996)
8. Other items			$ 28,197
9. Total			$ (16,586)
E. Unfunded actuarial accrued liability at end of year before plan amendments and changes in actuarial assumptions *(C. + D.9.)*			$ 773,221
F. Change in unfunded actuarial accrued liability due to changes in plan provisions			$ -
G. Change in unfunded actuarial accrued liability due to changes in actuarial assumptions			$ 14,369
H. Change in unfunded actuarial accrued liability due to changes in methodology			$ -
I. Unfunded actuarial accrued liability at end of year *(E. + F. + G. + H.)**			$ 787,590

* *The unfunded actuarial accrued liability on a market value of assets basis is $935,974.*

Development of Costs

Determination of Contribution Sufficiency/(Deficiency) *(Dollars in Thousands)*

The required contribution is defined in Minnesota statutes as the sum of normal cost, a supplemental contribution to amortize the UAAL, and an allowance for expenses. The dollar amounts shown are for illustration purposes and equal percent of pay multiplied by projected annual payroll.

	Percent of Payroll		Dollar Amount
A. Statutory contributions - Chapter 353			
1. Employee contributions	11.80%	$	133,650
2. Employer contributions	17.70%	$	200,475
3. Minneapolis Police contributions	0.40%	$	4,490
4. Minneapolis Fire contributions	0.28%	$	3,189
5. State contributions***	1.59%	$	18,000
6. Total	31.77%	$	359,804
B. Required contributions - Chapter 356			
1. Normal cost			
a. Retirement benefits	14.05%	$	159,134
b. Disability benefits	4.06%	$	45,985
c. Survivors	0.55%	$	6,229
d. Deferred retirement benefits	1.40%	$	15,857
e. Refunds*	0.29%	$	3,285
f. Total	20.35%	$	230,490
2. Supplemental contribution amortization of Unfunded Actuarial Accrued Liability by June 30, 2048	4.51%	$	51,081
3. Allowance for expenses	0.15%	$	1,699
4. Total	25.01% **	$	283,270
C. Contribution Sufficiency/(Deficiency) *(A.6. - B.4.)*	6.76%	$	76,534

Note: Projected annual payroll for fiscal year beginning on the valuation date: $1,132,625 (determined by increasing reported pay for each member by one full year's assumed pay increase according to the actuarial salary scale, as prescribed by the LCPR Standards for Actuarial Work).

* *Includes non-vested refunds and non-married survivor benefits only.*

** *The required contribution on a market value of assets basis is 25.86% of payroll.*

*** *$9.0 million contributions paid until both PERA P&F and MSRS State Patrol reach 90% funding (on an Actuarial Value of Assets basis), or July 1, 2048, if earlier. In addition, $9.0 million starting in fiscal year 2021, paid each year until the plan reaches 100% funding (on an Actuarial Value of Assets basis), or July 1, 2048, if earlier.*

Development of Costs

Consolidated Groups *(Dollars in Thousands)*

The Minneapolis Police Relief Association (MPRA) and Minneapolis Firefighters' Relief Association (MFRA) were consolidated with the P&F Plan on December 30, 2011, per 2011 legislation. Until July 15, 2018, each employer contributed annually an amount to amortize the unfunded liability by December 31, 2031. Beginning July 15, 2019, the employer will contribute $4,489,837 for MPRA and $3,188,735 for MFRA, each July 15th through 2031.

	As of June 30, 2022					
	MPRA			MFRA		
Group	Number	Annual Benefits	Average Age	Number	Annual Benefits	Average Age
Active Members	0	N/A	N/A	0	N/A	N/A
Service Retirements	312	$ 20,624	79.0	200	$ 13,601	78.5
Disability Retirements	13	$ 782	76.5	30	$ 1,963	77.9
Survivors	194	$ 7,126	80.3	134	$ 4,982	81.8
Total	**519**	**$ 28,532**	**79.4**	**364**	**$ 20,546**	**79.7**

Actuarial Basis

Actuarial Methods

All actuarial methods are prescribed by Minnesota Statutes, the Legislative Commission on Pensions and Retirement, or the Board of Trustees. Different methodologies may also be reasonable and results based on other methodologies would produce different results.

Actuarial Cost Method

Actuarial Accrued Liability and required contributions in this report are computed using the Entry Age Normal Cost Method. This method is prescribed by Minnesota Statute. Under this method, a normal cost is developed by amortizing the actuarial value of benefits expected to be received by each active participant (as a level percentage of pay) over the total working lifetime of that participant, from hire to termination. Age as of the valuation date was calculated based on the dates of birth provided by the Fund. Entry age for valuation purposes was calculated as the age on the valuation date minus the provided years of service on the valuation date.

To the extent that current assets and future normal costs do not support participants' expected future benefits, an Unfunded Actuarial Accrued Liability ("UAAL") develops. The UAAL is amortized over the statutory amortization period using level percent-of-payroll. The total contribution developed under this method is the sum of normal cost, expenses, and the payment toward the UAAL.

Funding Objective

The fundamental financing objective of the Plan is to establish contribution rates which, when expressed as a percentage of active member payroll, will remain approximately level from generation to generation and meet the required deadline for full funding.

Actuarial Methods (Concluded)

Asset Valuation Method

The assets are valued based on a five-year moving average of expected and market values (five-year average actuarial value) and determined as follows:

- At the end of each plan year, an average asset value is calculated as the average of the market asset value at the beginning and end of the fiscal year net of investment income for the fiscal year;
- The investment gain or (loss) is taken as the excess of actual investment income over the expected investment income based on the average asset value as calculated above;
- The investment gain or (loss) so determined is recognized over five years at 20% per year; and
- The asset value is the sum of the market asset value plus the scheduled recognition of investment gains or (losses) during the current and the preceding four fiscal years.

Payment on the Unfunded Actuarial Accrued Liability

Payment equals a level percentage of payroll each year to the statutory amortization date of June 30, 2048 assuming payroll increases of 3.00% per annum. If there is a negative Unfunded Actuarial Accrued Liability, the surplus amount is amortized over 30 years as a level percentage of payroll. If the unfunded liability increases due to changes in benefits, assumptions, or methods, the statutory amortization date may be extended.

As required by the Standards for Actuarial Work, projected payroll is 1) determined by increasing reported payroll for each member by one full year's assumed pay increase according to the actuarial salary scale and 2) multiplied by 0.962 in the determination of the present value of future payroll to account for timing differences. This statutory method produces a required contribution that is similar to, but slightly below, the contribution that would be produced by more common actuarial methods.

Changes in Methods Since Prior Valuation

There have been no changes in actuarial methods since the prior valuation.

Actuarial Basis

Summary of Actuarial Assumptions

The following assumptions were used in valuing the liabilities and benefits under the plan. All actuarial assumptions are prescribed by Minnesota Statutes, the Legislative Commission on Pensions and Retirement (LCPR), or the Board of Trustees. These parties are responsible for selecting the assumptions used for this valuation. Unless noted otherwise, the assumptions prescribed are based on the last experience study, dated July 14, 2020.The Allowance for Combined Service Annuity assumptions are based on an analysis completed by the LCPR actuary and documented in a report dated October 2016.

Investment return	7.50% per annum (prescribed by Minnesota Statutes).
Salary increases	Reported salary at valuation date increased according to the rate table, to current fiscal year and annually for each future year. Prior fiscal year salary is annualized for members with less than one year of service earned during the year.
Inflation	2.25% per year.
Payroll growth	3.00% per year.
Mortality rates	
Healthy pre-retirement	Pub-2010 Public Safety Employee Mortality Table adjusted for mortality improvements using projection scale MP-2021.
Healthy post-retirement	Pub-2010 Healthy Retired Public Safety Mortality Table adjusted for mortality improvements using projection scale MP-2021. Male rates are multiplied by a factor of 0.98.
Disabled	Pub-2010 Public Safety Disabled Retiree Mortality Table, adjusted for mortality improvements using projection scale MP-2021. Male rates are multiplied by a factor of 1.05.
Notes	The Pub-2010 employee mortality table as published by the Society of Actuaries (SOA) contains mortality rates for ages 18 to 80 and the annuitant mortality table contains mortality rates for ages 50 to 120. We have extended the annuitant mortality table as needed for members and beneficiaries younger than age 50 who are receiving a benefit by deriving rates based on the employee table and the juvenile table. Similarly, we have extended the employee table as needed for members older than age 80 by deriving rates based on the annuitant table.
Retirement	Members retiring from active status are assumed to retire according to the age-related rates shown in the rate table. Members who have attained the highest assumed retirement age are assumed to retire in one year. Note that plan changes reflected in this report may ultimately result in behavior changes that are not anticipated in the current retirement rates.
Withdrawal	Service-related rates based on actual experience; see table of sample rates

Actuarial Basis

Summary of Actuarial Assumptions (Continued)

Disability	Age-related rates based on experience; see table of sample rates. All incidences are assumed to be duty-related.
Allowance for combined service annuity	Liabilities for former members are increased by 33.0% for vested members and 2.0% for non-vested members to account for the effect of some participants having eligibility for a Combined Service Annuity.
Administrative expenses	Prior year administrative expenses expressed as a percentage of prior year projected payroll.
Refund of contributions	For non-vested members, account balances accumulate interest until the assumed commencement date and are discounted back to the valuation date. Active members decrementing after becoming eligible for a benefit are assumed to take the contributions accumulated with interest if larger than the value of the benefit.
Commencement of deferred benefits	Members receiving deferred annuities (including current terminated deferred members) are assumed to begin receiving benefits at age 55.
Percentage married	85% of male and 70% of female active members are assumed to be married. Actual marital status is used for members in payment status.
Age of spouse	Males are assumed to be two years older than females. For members in payment status, actual spouse date of birth is used, if provided.
Eligible children	Retiring members are assumed to have no dependent children.
Form of payment	Married members retiring from active status are assumed to elect subsidized joint and survivor form of annuity as follows: Males: 7.5% elect 25% Joint & Survivor option 15.0% elect 50% Joint & Survivor option 12.5% elect 75% Joint & Survivor option 55.0% elect 100% Joint & Survivor option Females: 15.0% elect 25% Joint & Survivor option 30.0% elect 50% Joint & Survivor option 5.0% elect 75% Joint & Survivor option 20.0% elect 100% Joint & Survivor option Remaining married members and unmarried members are assumed to elect the Straight Life option. Members receiving deferred annuities (including current terminated deferred members) are assumed to elect a straight life annuity.
Eligibility testing	Eligibility for benefits is determined based upon the age nearest birthday and service on the date the decrement is assumed to occur.
Decrement operation	Withdrawal decrements do not operate during retirement eligibility. Decrements are assumed to occur mid-fiscal year.
Service credit accruals	It is assumed that members accrue one year of service credit per year.
Benefit service	Exact fractional service is used to determine the amount of benefit payable.

Actuarial Basis

Summary of Actuarial Assumptions (Continued)

Pay Increases	Pay increases are assumed to happen at the beginning of the fiscal year. This is equivalent to assuming that reported earnings are pensionable earnings for the year ending on the valuation date.
Final average salary	For present value of future benefit purposes, final average salary was calculated in accordance with pay increase assumptions, but was not permitted to fall below the final average salary reported in the data.
Unknown data for certain members	To prepare this report, GRS has used and relied on participant data supplied by the Fund. Although GRS has reviewed the data in accordance with Actuarial Standards of Practice No. 23, GRS has not verified or audited any of the data or information provided. In cases where submitted data was missing or incomplete, the following assumptions, based on average results for applicable members at the time of the last experience study, were applied: <u>Data for active members:</u> There were 33 members reported with a salary less than $100 after annualization. We used prior year salary (22 members), if available; otherwise high five salary with a 10% load to account for salary increases (9 members). If neither prior year salary nor high five salary was available, we assumed a value of $60,000. There were also 209 members reported without a gender. We assumed male gender. There were 2 members reported without a date of birth. We assumed these members were hired at age 30. <u>Data for terminated members:</u> We calculated benefits for these members using the reported Average Salary and credited service. If Average Salary was not reported (no members), we assumed a value of $24,000. If credited service was not reported (15 members), we used elapsed time from hire date to termination date (15 members); if elapsed time was not available, we assumed nine years of service. If termination date was invalid or not reported (8 members), we assumed the termination date was equal to the hire date plus credited service, otherwise the valuation date. If the reported termination date occurs prior to the reported hire date, the two dates were swapped. There were 11 members reported without a gender; male was assumed. There were no members reported without a date of birth. <u>Data for retired members:</u> There were no members with missing or invalid dates of birth. There was 1 member reported with a $0 benefit amount. Due to the small number of members with missing benefits, we made no adjustment to the reported data. There were 28 members reported without a gender. We assumed retirees are male and beneficiaries are female.

Actuarial Basis

Summary of Actuarial Assumptions (Continued)

Unknown data for certain members (Concluded)	Data for retired members (Concluded): Because PERA reclassifies disabled members as retirees once the member reaches Normal Retirement Age, we compare the members that PERA reports as retirees to our disabled group from the last valuation. If a member was disabled in the prior valuation, we reclassify that member as a disabled retiree in this year's valuation. We reclassified 268 retirees as disabled retirees in this valuation.
Changes in actuarial assumptions since the prior valuation	The mortality improvement scale was changed from MP-2020 to MP-2021.

Actuarial Basis

Summary of Actuarial Assumptions (Continued)

	Percentage of Members Dying Each Year*					
	Healthy Post-Retirement Mortality**		Healthy Pre-Retirement Mortality**		Disability Mortality**	
Age in 2022	Males	Females	Males	Females	Males	Females
20	0.04%	0.02%	0.04%	0.02%	0.13%	0.06%
25	0.04	0.02	0.04	0.02	0.13	0.08
30	0.06	0.04	0.06	0.04	0.18	0.12
35	0.07	0.05	0.07	0.05	0.22	0.17
40	0.08	0.06	0.08	0.06	0.24	0.19
45	0.13	0.08	0.09	0.07	0.27	0.22
50	0.18	0.14	0.11	0.08	0.35	0.28
55	0.29	0.26	0.17	0.12	0.48	0.46
60	0.51	0.46	0.27	0.18	0.80	0.73
65	0.87	0.74	0.41	0.22	1.26	1.01
70	1.42	1.17	0.71	0.40	1.86	1.41
75	2.46	2.02	1.27	0.80	3.03	2.16
80	4.49	3.63	2.40	1.65	5.28	3.63
85	8.23	6.46	7.52	5.66	8.90	6.46
90	14.58	11.29	14.87	11.29	15.62	11.29

* *Generally, mortality rates are expected to increase as age increases (with the exception of young ages, where expected mortality may decrease as age increases). In cases where the application of the projection scale would reverse the nature of this trend, standard mortality rates have been adjusted slightly. The adjustment has no material effect on these results.*

** *Rates are adjusted for mortality improvement using Scale MP-2021, from a base year of 2010.*

	Rates of Disability Retirement	
Age	Males	Females
20	0.11%	0.11%
25	0.14	0.14
30	0.21	0.21
35	0.34	0.34
40	0.54	0.54
45	0.62	0.62
50	0.95	0.95
55	1.30	1.30
60	1.30	1.30

Actuarial Basis

Summary of Actuarial Assumptions (Concluded)

Age	Rates of Service Retirement	Year	Withdrawal Rates	Year	Salary Scale Increase
50	7.50%	1	6.00%	1	11.75%
51	5.00	2	4.00	2	9.25
52	5.00	3	2.75	3	8.00
53	7.50	4	2.50	4	7.00
54	10.00	5	2.50	5	5.50
55	30.00	6	2.25	6	4.80
56	20.00	7	2.25	7	4.60
57	22.50	8	2.00	8	4.30
58	25.00	9	2.00	9	4.10
59	25.00	10	2.00	10	4.00
60	20.00	11	1.75	11	3.90
61	25.00	12	1.50	12	3.80
62	30.00	13	1.50	13	3.70
63	27.50	14	1.50	14	3.60
64	27.50	15	1.50	15	3.50
65	50.00	16	1.50	16	3.50
66	40.00	17	1.50	17	3.50
67	50.00	18	1.25	18	3.50
68	50.00	19	1.25	19	3.40
69	50.00	20	1.25	20	3.40
70+	100.00	21+	1.00	21	3.40
				22	3.30
				23	3.15
				24+	3.00

Actuarial Basis

Summary of Plan Provisions – Police and Fire Plan

Following is a summary of the major plan provisions used in the valuation of this report. PERA is solely responsible for the validity, accuracy and comprehensiveness of this information. If any of the plan provisions shown below are not accurate and complete, the valuation results may differ significantly from those shown in this report and may require a revision of this report.

Plan year	July 1 through June 30.
Eligibility	All full-time and certain part-time police officers and fire fighters, and certain paramedics, who are not contributing to any other local retirement fund.
Contributions	**Effective as of** / **Member** / **Employer** / **Total** January 1, 2020 and later / 11.80% / 17.70% / 29.50% Member contributions are "picked up" according to the provisions of Internal Revenue Code 414(h).
State contributions	$9 million paid annually on October 1 until both PERA P&F and MSRS State Patrol become 90% funded (on an actuarial value of assets basis), or July 1, 2048, if earlier. In addition, $4.5 million in fiscal years 2019 and 2020, and $9.0 million thereafter, until the plan reaches 100% funding on an actuarial value of assets basis, or July 1, 2048, if earlier.
Allowable service	Police and Fire service during which member contributions were made. May also include certain leaves of absence and military service.
Salary	Includes amounts deducted for deferred compensation or supplemental retirement plans, net income from fees and sick leave payments funded by the employer. Excludes unused annual leaves and sick leave payments, severance payments, Workers' Compensation benefits and employer-paid flexible spending accounts, cafeteria plans, healthcare expense accounts, day-care expenses, fringe benefits and the cost of insurance coverage.
Average salary	Average of the five highest successive years of salary. Average Salary is based on all Allowable Service if less than five years.

Summary of Plan Provisions – Police and Fire Plan (Continued)

Vesting

	Vesting Percent if First Hired		
Years of Service	**Before 7/1/2010**	**After 6/30/2010 & Before 7/1/2014**	**After 6/30/2014**
<3	0%	0%	0%
3 – 4	100	0	0
5	100	50	0
6	100	60	0
7	100	70	0
8	100	80	0
9	100	90	0
10	100	100	50
11	100	100	55
12	100	100	60
13	100	100	65
14	100	100	70
15	100	100	75
16	100	100	80
17	100	100	85
18	100	100	90
19	100	100	95
20+	100	100	100

Summary of Plan Provisions – Police and Fire Plan (Continued)

Retirement	
Normal retirement benefit	
Age/service requirement	Age 55 and at least partially vested. Proportionate Retirement Annuity is available at age 65 and one year of Allowable Service.
Amount	3.00% of Average Salary for each year of Allowable Service (up to 33 years if hired after June 30, 2014), pro-rata for completed months, adjusted for partial vesting if applicable. A pro-rata share of member contributions will be refunded at retirement for excess service.
Early retirement	
Age/service requirement	Age 50 and at least partially vested.
Amount	Normal Retirement Benefit based on Allowable Service and Average Salary at retirement date and 0.10% (0.20% for members enrolled in the plan after June 30, 2007) reduction for each month the member is under age 55. If the effective date of retirement is after June 30, 2019, the reduction is 5/12% for each month that the member is under age 55 at the time of retirement.
Form of payment	Life annuity with return on death of any balance of contributions over aggregate monthly payments. Actuarially equivalent options are: 25%, 50%, 75% or 100% Joint and Survivor with bounce back feature. The Joint and Survivor options are determined on an actuarially equivalent basis, but with no actuarial reduction for the bounce back feature.
Benefit Increases	Benefit recipients receive 1.00% increases each year in January. A benefit recipient who has been receiving a benefit for at least 12 full months as of June 30 will receive a full increase. Members receiving benefits for at least one month but less than 12 full months as of June 30 will receive a pro rata increase. For retirements after May 31, 2014, the first increase will be delayed two years. Members retired under laws in effect before July 1, 1973 receive an additional lump sum payment each year. In 1989, this lump sum payment is the greater of \$25 times each full year of Allowable Service or the difference between \$400 times each full year of Allowable Service and the sum of benefits paid from any Minnesota public pension plan plus cash payments from the Social Security Administration for the preceding fiscal year July 1, 1988 through June 30, 1989. In each following year, the lump sum payment will increase by the same percentage increase that is applied to regular annuities paid from the Fund. Effective January 1, 2002, annual lump sum payment is divided by 12 and paid as a monthly life annuity in the annuity form elected.

Summary of Plan Provisions – Police and Fire Plan (Continued)

Disability	
Duty disability benefit	
Age/service requirement	Physically or mentally unable to perform normal duties as a police officer or fire fighter as a direct result of an act of duty specific to protecting property and personal safety of others. Members age 55 or older with 20 or more years of Allowable Service are not eligible to apply for duty disability benefits.
Amount	60.0%, plus an additional 3.00% for each year of service in excess of 20 years, of Average Salary paid until Normal Retirement Age, or for 60 months, whichever is later. The retirement benefit is then recalculated but is never lower than the disability benefit. If a member became disabled prior to July 1, 1997 but did not commence their benefit before July 1, 1997, the benefit is calculated under the laws in effect before July 1, 1997, and an actuarial increase shall be made for the change in post-retirement interest rates from 5.00% to 6.00%.
Regular disability benefit	
Age/service requirement	Physically or mentally unable to perform normal duties as a police officer or fire fighter with one year of Allowable Service. Members age 55 or older with 15 or more years of Allowable Service are not eligible to apply for regular disability benefits.
Amount	45.00% of Average Salary, paid until Normal Retirement Age, or for 60 months, whichever is later. The retirement benefit is then recalculated but is never lower than the disability benefit. Benefits for total and permanent regular disability are calculated as 3.00% of Average Salary for each year of Allowable Service, with a minimum of 45.00% of Average Salary. If a member became disabled prior to July 1, 1997 but did not commence his or her benefit before July 1, 1997, the benefit payable is calculated under the laws in effect before July 1, 1997, and an actuarial increase shall be made for the change in post-retirement interest rates from 5.00% to 6.00%.
Benefit increases	Same as for retirement.
Retirement benefit	
Age/service requirement	Upon cessation of disability benefits.
Amount	Any optional annuity continues. Otherwise, the larger of the disability benefit paid before age 55 or the normal retirement benefit available at age 55, or an actuarially equivalent optional annuity.
Form of payment	Same as for retirement.
Benefit increases	Same as for retirement.

Summary of Plan Provisions – Police and Fire Plan (Continued)

Death	
Surviving spouse benefit	
Age/service requirement	Death of active member or regular disabled member with surviving spouse whose disability benefit accrued before July 1, 2007, who is vested at death (service requirement is waived if death occurs in the line of duty).
Amount	50.00% of salary (60.00% if death occurs in the line of duty after June 30, 2007) averaged over last six months. Benefit paid until spouse's death but no payments while spouse is remarried prior to July 1, 1991. If a member died prior to July 1, 1997 and the beneficiary was not eligible to commence their survivor benefits before July 1, 1997, the benefit payable is calculated under the laws in effect before July 1, 1997, and an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.
Benefit increases	Same as for retirement.
Surviving dependent children's benefit	
Age/service requirement	Non-duty related death of active member or regular disabled member with eligible dependent child.
Amount	10.00% of salary averaged over last six months for each child. Family benefit minimum (including spouse's benefit) of 50.00% of salary and maximum of 70.00% of salary. Benefits paid until child marries, dies, or attains age 18 (age 23 if full-time student).
Duty disability surviving spouse benefit	
Age/service requirement	Member who is totally and permanently disabled who dies before age 55 or within five years of the effective date of the disability benefit, whichever is later.
Amount	60.00% of salary averaged over last six months. Benefits paid until spouse's death but no payments while spouse is remarried prior to July 1, 1991.
Benefit increases	Same as for retirement.

Summary of Plan Provisions – Police and Fire Plan (Continued)

Death (Concluded)

Duty disability surviving dependent children's benefit

Age/service requirement	Death of a member with an eligible dependent child who was disabled in the line of duty and died as a direct result of the disability.
Amount	10.00% of salary averaged over last six months for each child. Family benefit minimum (including spouse's benefit) of 60.00% of salary and maximum of 80.00% of salary. Benefits paid until child marries, dies, or attains age 18 (age 23 if full-time student). If a member died prior to July 1, 1997 and the beneficiary was not eligible to commence their survivor benefits before July 1, 1997, the benefit payable is calculated under the laws in effect before July 1, 1997, and an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.

Surviving spouse optional annuity

Age/service requirement	Active member dies before age 55. Benefits commence when member would have been age 55 or as early as age 50 if qualified for early retirement, benefits commence immediately if member had 30 years of service.
Amount	Survivor's payment of the 100% joint and survivor benefit the member could have elected if terminated. Alternatively, spouse may elect refund of deceased's contributions with interest if there are no dependent children. If a member died prior to July 1, 1997 and the beneficiary was not eligible to commence their survivor benefits before July 1, 1997, the benefit payable is calculated under the laws in effect before July 1, 1997, and an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.
Benefit increases	Same as for retirement.

Summary of Plan Provisions – Police and Fire Plan (Continued)

Termination	
Refund of contributions	
Age/service requirement	Termination of public service.
Amount	Member's contributions with 6.00% interest through June 30, 2011. Beginning July 1, 2011, a member's contributions increase at 4.00% interest. Beginning July 1, 2018, a member's contributions increase at 3.00% interest. If a member is vested, a deferred annuity may be elected in lieu of a refund.
Deferred benefit	
Age/service requirement	Partially or fully vested.
Amount	Benefit computed under law in effect at termination and increased by the following percentage (augmentation) compounded annually for terminations prior to 2012: (a.) 0.00% before July 1, 1971; (b.) 5.00% from July 1, 1971 to January 1, 1981; (c.) 3.00% (2.50% if hired after June 30, 2006) thereafter until the earlier of January 1 of the year following attainment of age 55 and January 1, 2012; (d.) 5.00% (2.50% if hired after June 30, 2006) thereafter until the earlier of the date the annuity begins and January 1, 2012; (e.) 1.00% from January 1, 2012 through December 31, 2018; and (f.) 0.00% from January 1, 2019, thereafter. Members who terminate after 2011 will receive no future augmentation. If a member terminated employment prior to July 1, 1997 but was not eligible to commence their pension before July 1, 1997, the benefit payable is calculated under the laws in effect before July 1, 1997 and an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.
Form of payment	Same as for retirement.
Actuarial equivalent factors	Effective July 1, 2019, actuarially equivalent factors based on the RP-2014 mortality table for healthy annuitants for a member turning age 55 in 2021, reflecting projected mortality improvements using Scale MP-2017, male rates multiplied by 0.96, blended 90% males, and 6.50% interest.

Actuarial Basis

Summary of Plan Provisions – Police and Fire Plan (Concluded)

Combined service annuity	Members are eligible for combined service benefits if they: (a.) Meet minimum retirement age for each plan participated in and total public service meets the vesting requirements of each plan; or (b.) Have three or more years of service under PERA and the covered fund(s) (if hired prior to July 1, 2010). Other requirements for combined service include: (a.) Member must have at least six months of allowable service credit in each plan worked under; and (b.) Member may not be in receipt of a benefit from another plan. Members who meet the above requirements must have their benefits based on the following: (a.) Allowable service in all covered plans is combined in order to determine eligibility for early retirement. (b.) Average salary is based on the high five consecutive years during their entire service in all covered plans.
Changes in plan provisions	There have been no changes in plan provisions since the prior valuation.

Actuarial Basis

Summary of Plan Provisions – Minneapolis Police Relief Association

Normal retirement benefit	Monthly benefits are equal to the number of units multiplied by the unit values described herein. Units are based on service, as follows: **Service** / **Units** 20 / 35.0 units 21 / 36.6 units 22 / 38.2 units 23 / 39.8 units 24 / 41.4 units 25 or more / 43.0 units Members must be at least age 50 with 5 years of service to receive this benefit.
Unit values	**Calendar Year** / **Unit Value** 2012 / $ 104.651 2013 / 109.011 2014 / 114.825 2015 / 124.031 Unit values after 2015 are assumed to increase the same percentage as the post-retirement benefit increase.
Surviving spouse's benefit	Annual benefit based on 23 units for the surviving spouse of an active or retired member. Upon retirement, members may choose an alternative form of payment that provides 50%, 75%, or 100% of their benefit to their spouse after their death. The units are adjusted if one of these alternate forms is selected.
Surviving children's benefit	Annual benefit based on 8 units for each surviving child of an active or retired member. Benefits continue to age 18 or if the child is a full-time student, to age 22. The total benefit for surviving children and spouse combined is limited to 41 units.
Contributions	Member and employer contributions equal to 8.00% of the monthly unit value multiplied by 80 are required for each member. After 25 years of service, member contributions are paid to a separate health insurance account. Until July 15, 2018, the employer contributed annually an amount to amortize the unfunded liability by December 31, 2031. Beginning July 15, 2019, the employer will contribute $4,489,837 each July 15 through 2031.
Benefit increases	Benefit recipients receive 1.00% increases each year in January.

Actuarial Basis

Summary of Plan Provisions – Minneapolis Firefighters' Relief Association

Normal retirement benefit	Monthly benefits are equal to the number of units multiplied by the unit values described herein. Units are based on service, as follows: Service / Units 15 — 25.0 units 16 — 26.6 units 17 — 28.2 units 18 — 29.8 units 19 — 31.4 units 20 — 35.0 units 21 — 36.6 units 22 — 38.2 units 23 — 39.8 units 24 — 41.4 units 25 or more — 43.0 units Members must be at least age 50 with 5 years of service to receive this benefit. Members may choose among alternative survivor payment forms which modify the number of units payable to the member and their spouse. A member who is single at the time of retirement and who has at least 25 years of service may choose to receive 43.3 units on the condition of a reduced survivor payment to any future spouse.
Unit values	Calendar Year / Unit Value 2013 — $100.775 2014 — 104.264 2015 — 124.031 Unit values after 2015 are assumed to increase the same percentage as the post-retirement benefit increase.
Disability benefit	Annual benefit based on 41 units for the disabled member.
Surviving spouse's benefit	Annual benefit based on 23 units for the surviving spouse of an active or retired member and 22 units for the surviving spouse of a disabled member. Upon retirement, members may choose an alternative form of payment that provides 50%, 75% or 100% of their benefit to their spouse after their death. The units are adjusted if one of these alternate forms is selected.
Surviving children's benefit	Annual benefit based on 8 units for each surviving child of an active or retired member. Benefits continue to age 18 or if the child is a full-time student, to age 22. The total benefit for surviving children and spouse combined is limited to 43 units.
Contributions	Member and employer contributions equal to 8.00% of the monthly unit value multiplied by 80 are required for each member. After 25 years of service, member contributions are paid to a separate health insurance account. Until July 15, 2018, the employer contributed annually an amount to amortize the unfunded liability by December 31, 2031. Beginning July 15, 2019, the employer will contribute $3,188,735 each July 15 through 2031.
Benefit increases	Benefit recipients receive 1.00% increases each year in January.

Additional Schedules

Schedule of Funding Progress[1] *(Dollars in Thousands)*

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded (Overfunded) AAL (UAAL) (b) - (a)	Funded Ratio (a)/(b)	Actual Covered Payroll (Previous FY) (c)		UAAL as a Percentage of Covered Payroll [(b)-(a)]/(c)
7-1-1999	$ 3,679,551	$ 3,004,637	$ (674,914)	122.46	$ 352,066		(191.70) %
7-1-2000	4,145,351	3,383,187	(762,164)	122.53	392,796		(194.04)
7-1-2001	4,472,041	3,712,360	(759,681)	120.46	500,839		(151.68)
7-1-2002	4,672,679	3,886,311	(786,368)	120.23	522,153		(150.60)
7-1-2003	4,683,115	4,390,953	(292,162)	106.65	560,503		(52.12)
7-1-2004	4,746,834	4,692,190	(54,644)	101.16	551,266		(9.91)
7-1-2005	4,814,961	4,956,340	141,379	97.15	580,723		24.35
7-1-2006	5,017,951	5,260,564	242,613	95.39	618,435		39.23
7-1-2007	5,198,922	5,669,347	470,425	91.70	648,342		72.56
7-1-2008	5,233,015	5,918,061	685,046	88.42	703,701		97.35
7-1-2009	5,239,855	6,296,274	1,056,419	83.22	733,164		144.09
7-1-2010	5,188,339	5,963,672	775,333	87.00	740,101		104.76
7-1-2011	5,274,602	6,363,546	1,088,944	82.89	775,806		140.36
7-1-2012	5,797,868	7,403,295	1,605,427	78.31	794,417	2	202.09
7-1-2013	5,932,945	7,304,032	1,371,087	81.23	796,188	2	172.21
7-1-2014	6,525,019	8,151,328	1,626,309	80.05	820,333	3	198.25
7-1-2015	7,076,271	8,460,477	1,384,206	83.64	845,076	4	163.80
7-1-2016	7,385,777	8,417,621	1,031,844	87.74	881,222	5	117.09
7-1-2017	7,840,549	9,199,208	1,358,659	85.23	944,296	5	143.88
7-1-2018	8,320,094	9,552,804	1,232,710	87.10	976,657	5	126.22
7-1-2019	8,661,613	9,909,153	1,247,540	87.41	1,011,421	6	123.35
7-1-2020	9,036,069	10,291,567	1,255,498	87.80	1,069,481	7	117.39
7-1-2021	9,931,003	10,793,845	862,842	92.01	1,096,195	8	78.71
7-1-2022	10,563,877	11,351,467	787,590	93.06	1,127,314	8	69.86

[1] Information prior to 2012 provided by prior actuary. See prior reports for additional detail.
[2] Assumed equal to actual member contributions divided by 9.60%.
[3] Assumed equal to actual member contributions divided by 9.90%.
[4] Assumed equal to actual member contributions divided by 10.50%.
[5] Assumed equal to actual member contributions divided by 10.80%.
[6] Assumed equal to actual member contributions divided by 11.05%.
[7] Assumed equal to actual member contributions divided by 11.55%.
[8] Assumed equal to actual member contributions divided by 11.80%.

Additional Schedules

Schedule of Contributions from the Employer and Other Contributing Entities[1]

(Dollars in Thousands)

Plan Year Ended June 30	Actuarially Required Contribution Rate (a)	Actual Covered Payroll (b)	Actual Member Contributions (c)	Annual Required Contributions [(a)x(b)] - (c) = (d)	Actual Employer Contributions[5] (e)	Percentage Contributed (e)/(d)
1999	12.32%	$ 352,066	$ 30,897	$ 12,478	$ 46,280	370.89%
2000	12.87	392,796	31,214	19,339	53,178	274.98
2001	12.21	500,839	31,341	29,811	52,960	177.65
2002	12.61	522,153	33,801	32,042	90,664	282.95
2003	15.52	560,503	34,751	35,424	50,917	143.74
2004	19.47	551,266	36,313	71,019	52,770	74.30
2005	21.99	580,723	37,873	89,828	55,802	62.12
2006	24.36	618,435	42,970	107,681	63,603	59.07
2007	25.76	648,342	50,688	116,325	74,707	64.22
2008	28.82	703,701	58,259	144,548	87,023	60.20
2009	28.41	733,164	67,701	140,591	101,548	72.23
2010	29.99	740,101	71,736	150,220	107,066	71.27
2011	25.52	775,806	73,702	124,284	109,604	88.19
2012	28.78	794,417 [2]	76,264	152,369	121,891	80.00
2013	33.37	796,188 [2]	76,434	189,254	125,995	66.57
2014	29.89	820,333 [3]	81,213	163,985	141,632	86.37
2015	33.85	845,076 [4]	88,733	197,325	153,317	77.70
2016	32.29	881,222 [6]	95,172	189,375	165,065	87.16
2017	28.30	944,296 [6]	101,984	165,252	175,329	106.10
2018	30.58	976,657 [6]	105,479	193,183	179,781	93.06
2019	28.2	1,011,421 [7]	111,762	173,459	188,317	108.57
2020	28.18	1,069,481 [8]	123,525	177,855	207,319	116.57
2021	27.71	1,096,195 [9]	129,351	174,405	219,129	125.64
2022	25.44	1,127,314 [9]	133,023	153,766	224,416	145.95
2023	25.01					

[1] *Information prior to 2012 provided by prior actuary. See prior reports for additional detail.*

[2] *Assumed equal to actual member contributions divided by 9.60%.*

[3] *Assumed equal to actual member contributions divided by 9.90%.*

[4] *Assumed equal to actual member contributions divided by 10.50%.*

[5] *Includes contributions from other sources (if applicable).*

[6] *Assumed equal to actual member contributions divided by 10.80%.*

[7] *Assumed equal to actual member contributions divided by 11.05%.*

[8] *Assumed equal to actual member contributions divided by 11.55%.*

[9] *Assumed equal to actual member contributions divided by 11.80%.*

Glossary of Terms

Actual Covered Payroll (GASB)	The payroll of covered employees, which is typically only the pensionable pay (meets the statutory salary definition) and does not include pay above any pay cap.
Actuarial Accrued Liability (AAL)	The difference between the Actuarial Present Value of Future Benefits, and the Actuarial Present Value of Future Normal Costs.
Accrued Benefit Funding Ratio	The ratio of assets to Current Benefit Obligations.
Accrued Liability Funding Ratio	The ratio of assets to Actuarial Accrued Liability.
Actuarial Assumptions	Assumptions about future plan experience that affect costs or liabilities, such as: mortality, withdrawal, disablement, and retirement; future increases in salary; future rates of investment earnings; future investment and administrative expenses; characteristics of members not specified in the data, such as marital status; characteristics of future members; future elections made by members; and other items.
Actuarial Cost Method	A procedure for allocating the Actuarial Present Value of Future Benefits between the Actuarial Present Value of future Normal Costs and the Actuarial Accrued Liability.
Actuarial Equivalent	Of equal Actuarial Present Value, determined as of a given date and based on a given set of Actuarial Assumptions.
Actuarial Present Value (APV)	The amount of funds required to provide a payment or series of payments in the future. It is determined by discounting the future payments with an assumed interest rate and with the assumed probability each payment will be made.
Actuarial Present Value of Projected Benefits	The Actuarial Present Value of amounts which are expected to be paid at various future times to active members, retired members, beneficiaries receiving benefits, and inactive, non-retired members entitled to either a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.
Actuarial Valuation	The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial Valuation for a governmental retirement system typically also includes calculations of items needed for developing and monitoring a retirement system's funding policy, such as the Funded Ratio and the Annual Required Contribution (ARC).
Actuarial Value of Assets	The value of the assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets or a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the Funded Ratio and the Annual Required Contribution (ARC).

Glossary of Terms (Continued)

Amortization Method	A method for determining the Amortization Payment. Under the Level Percentage of Pay method, the Amortization payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. The stream of payments increases at the rate at which total covered payroll of all active members is assumed to increase.
Amortization Payment	That portion of the plan contribution or ARC which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.
Amortization Period	The period used in calculating the Amortization Payment.
Annual Required Contribution (ARC)	The employer's periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation. The ARC consists of the Employer Normal Cost and Amortization Payment.
Annual Valuation Earnings	Reported salary at valuation date, annualized for members with less than one year of service earned during the year.
Augmentation	Annual increases to deferred benefits.
Closed Amortization Period	A specific number of years that is reduced by one each year, and declines to zero with the passage of time. For example, if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc.
Current Benefit Obligations	The present value of benefits earned to the valuation date, based on current service and including future salary increases to retirement (comparable to a Projected Unit Credit measurement).
Employer Normal Cost	The portion of the Normal Cost to be paid by the employer. This is equal to the Normal Cost less expected member contributions.
Expected Assets	The present value of anticipated future contributions intended to fund benefits for current members.
Experience Gain/Loss	A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two actuarial valuations. To the extent that actual experience differs from that assumed, Unfunded Actuarial Accrued Liabilities emerge which may be larger or smaller than projected. Gains are due to favorable experience; e.g., the assets earn more than projected, salaries do not increase as fast as assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, losses are the result of unfavorable experience; i.e., actual results that produce Unfunded Actuarial Accrued Liabilities which are larger than projected.
GASB	Governmental Accounting Standards Board.

Glossary of Terms (Concluded)

GASB Statements No. 25 and No. 27	These are the governmental accounting standards that previously set the accounting and financial reporting rules for public retirement systems and the employers that sponsor or contribute to them. Statement No. 27 sets the accounting and financial reporting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 25 sets the rules for the systems themselves. These statements remain in effect only for pension plans that are not administered as trusts or equivalent arrangements. Please refer to the definition of GASB Statements No. 67 and No. 68 on the following page.
GASB Statement No. 50	The accounting standard governing a state or local governmental employer's accounting for pensions. This statement remains in effect only for pension plans that are not administered as trusts. Please refer to the definition of GASB Statements No. 67 and No. 68.
GASB Statements No. 67 and No. 68	Statements No. 67 and No. 68, issued in June 2012, replace the requirements of Statements No. 25, No. 27 and No. 50, respectively, for pension plans administered as trusts. Statement No. 68, effective for the fiscal year beginning July 1, 2014, sets the accounting and financial reporting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 67, effective for the fiscal year beginning July 1, 2013, sets the rules for the systems themselves. Accounting and financial reporting information prepared according to Statements No. 67 and No. 68 is provided in a separate report beginning with the June 30, 2014 actuarial valuation.
GASB Statement No. 82	Statement No. 82, issued in March 2016, is an amendment to Statements No. 67, No. 68, and No. 73, and is intended to improve consistency in the application of the accounting statements.
Normal Cost	The annual cost assigned, under the Actuarial Cost Method, to the current plan year.
Projected Annual Earnings	Projected annual payroll for fiscal year beginning on the valuation date, determined by increasing reported pay for each member by one full year's assumed pay increase according to the actuarial salary scale, as prescribed by the LCPR Standards for Actuarial Work.
Projected Benefit Funding Ratio	The ratio of the sum of Actuarial Value of Assets and Expected Assets to the Actuarial Present Value of Projected Benefits. A ratio less than 100% indicates that contributions are insufficient.
Unfunded Actuarial Accrued Liability	The difference between the Actuarial Accrued Liability and Actuarial Value of Assets.
Valuation Date	The date as of which the Actuarial Present Value of Future Benefits are determined. The benefits expected to be paid in the future are discounted to this date.