Minnesota State Retirement System

State Patrol Retirement Fund

GASB Statement Nos. 67 and 68

Accounting and Financial Reporting for Pensions

June 30, 2022

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November 18, 2022

Minnesota State Retirement System
State Patrol Retirement Fund
St. Paul, Minnesota

Dear Board of Directors:

This report provides accounting and financial reporting information that is intended to comply with the Governmental Accounting Standards Board (GASB) Statements No. 67 and No. 68 for the State Patrol Retirement Fund, as amended by GASB Statement No. 82. These calculations have been made on a basis that is consistent with our understanding of these accounting standards.

GASB Statement No. 67 is the accounting standard that applies to the financial reports issued by retirement systems. GASB Statement No. 68 establishes accounting and financial reporting for state and local government employers who provide their employees (including former employees) pension benefits through a trust. GASB Statement No. 82 is an amendment to GASB Statements No. 67, No. 68, and No. 73, intended to improve consistency in the application of the accounting standards.

Our calculation of the liability associated with the benefits described in this report was performed for the purpose of providing financial reporting and disclosure information that satisfies the requirements of GASB Statements No. 67 and No. 68. The Net Pension Liability is not an appropriate measure for measuring the sufficiency of plan assets to cover the estimated cost of settling the employer's benefit obligation. The Net Pension Liability is not an appropriate measure for assessing the need for or amount of future employer contributions. The calculation of the plan's liability for this report may not be applicable for purposes of funding the plan. A calculation of the plan's liability for purposes other than satisfying the requirements of GASB Statements No. 67 and No. 68 may produce significantly different results. The information in this report is calculated on a total plan basis. Minnesota State Retirement System (MSRS) is responsible for preparing the Schedule of Employer Allocations and the Schedule of Pension Amounts by Employer, as applicable. This report may be provided to parties other than the MSRS only in its entirety and only with the permission of MSRS. GRS is not responsible for unauthorized use of this report.

This report is based upon information, furnished to us by MSRS, concerning retirement and ancillary benefits, active members, deferred vested members, retirees and beneficiaries, and financial data. If your understanding of this information is different, please let us know. This information was checked for internal consistency, but it was not audited.

This report complements the actuarial valuation report for funding purposes that was or will be provided to the System and should be considered in conjunction with that report. Please see the actuarial valuation report as of June 30, 2022 for additional discussion of the nature of actuarial calculations and more information related to participant data, economic and demographic assumptions, and benefit provisions.

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To the best of our knowledge, the information contained within this report is accurate and fairly represents the actuarial position of the State Patrol Retirement Fund as of the measurement date. All calculations have been made in conformity with generally accepted actuarial principles and practices as well as with the Actuarial Standards of Practice issued by the Actuarial Standards Board.

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.

Respectfully submitted,
Gabriel, Roeder, Smith & Company

Brian B. Murphy

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

Bonita J. Wurst

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BBM/BJW/SLC:ah

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SECTION A

EXECUTIVE SUMMARY

Executive Summary
as of June 30, 2022 (Dollars in Thousands)

	2022
Actuarial Valuation Date	June 30, 2022
Measurement Date of the Net Pension Liability	June 30, 2022
Membership	
Number of	
- Service Retirements	888
- Survivors	167
- Disability Retirements	85
- Deferred Retirements	78
- Terminated Other Non-Vested	41
- Active Members	937
- Total	2,196
Covered-employee Payroll [1]	$ 107,240
Net Pension Liability	
Total Pension Liability	$ 1,164,176
Plan Fiduciary Net Position	883,581
Net Pension Liability	$ 280,595
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	75.90%
Net Pension Liability as a Percentage of Covered-employee Payroll	261.65%
Development of the Single Discount Rate	
Single Discount Rate	6.75%
Long-Term Expected Rate of Investment Return	6.75%
Long-Term Municipal Bond Rate[2]	3.69%
Last year ending June 30 in the 2023 to 2122 projection period for which projected benefit payments are fully funded	2122
Total Pension Expense / (Income)	$ (11,463)

Deferred Outflows and Deferred Inflows of Resources by Source Arising from Current and Prior Periods to be Recognized in Future Pension Expenses

	Deferred Outflows of Resources	Deferred Inflows of Resources
Difference between expected and actual experience in the measurement of Total Pension Liability	$ 47,377	$ 1,662
Changes in assumptions	60,096	50,718
Net difference between projected and actual earnings on pension plan investments	107,042	101,012
Totals	$ 214,515	$ 153,392

(1) *Assumed equal to actual member contributions divided by employee contribution rate.*

(2) *Based on the 20-Year Municipal GO Index of mixed maturity general obligation municipal bonds as of the weekly rate closest to but not later than the Measurement Date.*

Discussion

Accounting Standard

For pension plans that are administered through trusts or equivalent arrangements, Governmental Accounting Standards Board (GASB) Statement No. 67, *Financial Reporting for Pension Plans*, establishes standards of financial reporting for separately issued financial reports and specifies the required approach for measuring the pension liability. Similarly, GASB Statement No. 68, *Accounting and Financial Reporting for Pensions*, establishes standards for state and local government employers (as well as non-employer contributing entities) to account for and disclose the net pension liability, pension expense, and other information associated with providing retirement benefits to their employees (and former employees) on their basic financial statements. GASB Statement No. 82, *Pension Issues*, is an amendment to GASB Statements No. 67, No. 68, and No. 73, intended to improve consistency in the application of the accounting standards.

The following discussion provides a summary of the information that is required to be disclosed under these accounting standards. A number of these disclosure items are provided in this report. However, certain information, such as notes regarding accounting policies and investments, is not included in this report and the retirement system and/or plan sponsor will be responsible for preparing and disclosing that information to comply with these accounting standards.

Financial Statements

GASB Statement No. 68 requires state and local governmental employers to recognize the net pension liability and the pension expense on their financial statements. The net pension liability is the difference between the total pension liability and the plan's fiduciary net position. In traditional actuarial terms, this is analogous to the accrued liability less the market value of assets (not the smoothed actuarial value of assets that is often encountered in actuarial valuations performed to determine the employer's contribution requirement).

Paragraph 57 of GASB Statement No. 68 states, "Contributions to the pension plan from the employer subsequent to the measurement date of the collective net pension liability and before the end of the employer's reporting period should be reported as a deferred outflow of resources related to pensions." The information contained in this report does not incorporate any contributions made to the State Patrol Retirement Fund subsequent to the measurement date of June 30, 2022.

The pension expense or income recognized each fiscal year is equal to the change in the net pension liability from the beginning of the year to the end of the year, adjusted for deferred recognition of the difference between expected and actual experience in the measurement of the total pension liability, assumption changes, and investment experience.

Pension plans that prepare their own, stand-alone financial statements are required to present two financial statements – a Statement of Fiduciary Net Position and a Statement of Changes in Fiduciary Net Position in accordance with GASB Statement No. 67. The *Statement of Fiduciary Net Position* presents the assets and liabilities of the pension plan at the end of the pension plan's reporting period. The *Statement of Changes in Fiduciary Net Position* presents the additions, such as contributions and investment income, and deductions, such as benefit payments and expenses, and net increase or decrease in the fiduciary net position.

Notes to Financial Statements

GASB Statement No. 68 requires the notes of the employer's financial statements to disclose the total pension expense, the pension plan's liabilities and assets, and deferred outflows and inflows of resources related to pensions.

GASB Statement Nos. 67 and 68 require the notes of the financial statements for the employers and pension plans to include certain descriptive information about the pension plans through which the pension benefits are provided. The list of disclosure items should include:

- A description of benefits provided by the plan;
- The classes of employees and number of members covered by the pension plan;
- A description of the plan's funding policy, which includes member and employer contribution requirements;
- The pension plan's investment policies;
- The pension plan's fiduciary net position, net pension liability, and the pension plan's fiduciary net position as a percentage of the total pension liability;
- The net pension liability using a discount rate that is 1% higher and 1% lower than the current discount rate used to calculate the total pension liability and net pension liability for financial reporting purposes;
- Significant assumptions and methods used to calculate the total pension liability;
- Inputs to the discount rates; and
- Certain information about mortality assumptions and the dates of experience studies.

Retirement systems that issue stand-alone financial statements are required to disclose additional information in accordance with GASB Statement No. 67. This information includes:

- The composition of the pension plan's Board and the authority under which benefit terms may be amended;
- A description of how fair value is determined;
- Information regarding certain reserves and investments, which include concentrations of investments greater than or equal to 5%, receivables, and insurance contracts excluded from plan assets; and
- Annual money-weighted rate of return.

MSRS' comprehensive annual financial report, which contains the basic financial statements and related note disclosures for the State Patrol Retirement Fund, can be found online at www.msrs.state.mn.us/annual-reports-fy-2022 or obtained from MSRS at 60 Empire Drive, Suite 300, St. Paul, Minnesota, 55103 or requested via email at info@msrs.us or telephone at 1.800.657.5757.

Required Supplementary Information

GASB Statement No. 67 requires a 10-year fiscal history of:

- Sources of changes in the net pension liability;
- Information about the components of the net pension liability and related ratios, including the pension plan's fiduciary net position as a percentage of the total pension liability, and the net pension liability as a percent of covered-employee payroll; and
- A comparison of the actual employer contributions to the actuarially determined contributions based on the plan's funding policy.

Measurement of the Net Pension Liability

The net pension liability is to be measured as the total pension liability, less the amount of the pension plan's fiduciary net position. In actuarial terms, this will be the accrued liability less the market value of assets (not the smoothed actuarial value of assets that is often encountered in actuarial valuations performed to determine the employer's contribution requirement).

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 basis, as prescribed by statutes), then the following outcomes are expected:

1. The employer normal cost is expected to remain approximately level as a percentage of payroll;
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 will grow initially as a dollar amount before beginning to decline.

The projections in this report are strictly for the purpose of determining the GASB single discount rate and are different from a funding projection for the ongoing plan.

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 market 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 actuarial value of assets were used instead of the market value of assets.

Limitation 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.

Timing of the Valuation

GASB Statement Nos. 67 and 68 require that an actuarial valuation to determine the total pension liability is required to be performed at least every two years. For employer reporting, the net pension liability and pension expense should be measured as of a date (measurement date) no earlier than the end of the employer's prior fiscal year, consistently applied from period to period. If the actuarial valuation used to determine the total pension liability is not calculated as of the measurement date, the total pension liability is required to be rolled forward from the actuarial valuation date to the measurement date.

The total pension liability shown in this report is based on an actuarial valuation performed as of June 30, 2022 and a measurement date of June 30, 2022.

Single Discount Rate

Projected benefit payments are required to be discounted to their actuarial present values using a Single Discount Rate that reflects (1) a long-term expected rate of return on pension plan investments (to the extent that the plan's fiduciary net position is projected to be sufficient to pay benefits) and (2) tax-exempt municipal bond rate based on an index of 20-year general obligation bonds with an average AA credit rating as of the measurement date (to the extent that the contributions for use with the long-term expected rate of return are not met).

For the purpose of this valuation, the expected rate of return on pension plan investments is 6.75%; the municipal bond rate is 3.69% (based on the weekly rate closest to but not later than the measurement date of the "20-Year Municipal GO AA Index" as published by Fidelity); and the resulting single discount rate is 6.75%. The MSRS Board selected the long-term expected rate of investment return of 6.75% based on input from GRS that the proposed selection would be reasonable for the purpose of the measurement.

SECTION B

FINANCIAL STATEMENTS

Statement of Pension Expense Under GASB Statement No. 68
Fiscal Year Ended June 30, 2022 (Dollars in Thousands)

A. Expense		
1. Service Cost	$	26,648
2. Interest on the Total Pension Liability		71,049
3. Current-Period Benefit Changes		-
4. Employee Contributions		(16,515)
5. Projected Earnings on Plan Investments		(61,776)
6. Pension Plan Administrative Expense		190
7. Other Changes in Plan Fiduciary Net Position		-
8. Recognition of Outflow (Inflow) of Resources due to differences between expected and actual experience in the measurement of the Total Pension Liability		
Arising from Current Reporting Period		9,079
9. Recognition of Outflow (Inflow) of Resources due to assumption changes		
Arising from Current Reporting Period		(5,914)
10. Recognition of Outflow (Inflow) of Resources due to the difference between projected (7.50%) and actual earnings on Pension Plan Investments		
Arising from Current Reporting Period		24,227
11. Increases/(Decreases) from Experience in the Current Reporting Period	**$**	**46,988**
12. Recognition of Outflow (Inflow) of Resources due to differences between expected and actual experience in the measurement of the Total Pension Liability		
Arising from Prior Reporting Periods	$	(1,162)
13. Recognition of Outflow (Inflow) of Resources due to assumption changes		
Arising from Prior Reporting Periods		(24,908)
14. Recognition of Outflow (Inflow) of Resources due to the difference between projected and actual earnings on Pension Plan Investments		
Arising from Prior Reporting Periods		(32,381)
15. Total Pension Expense / (Income)	**$**	**(11,463)**

Differences between expected and actual experience and changes in assumptions are recognized in pension expense using a systematic and rational method over a closed period equal to the average of the expected remaining service lives of all employees that are provided with pension through the pension plan (active employees and inactive employees) determined as of the beginning of the measurement period.

At the beginning of the current measurement period, the expected remaining service lives of all active employees in the plan was approximately 5,472 years. Additionally, the total plan membership (active employees and inactive employees) was 2,138. As a result, the average of the expected remaining service lives for purposes of recognizing the applicable deferred outflows and inflows of resources established in the current measurement period is 5.0000 years (rounded).

Additionally, differences between projected and actual earnings on plan investments should be recognized in pension expense using a systematic and rational method over a closed five-year period. For this purpose, the deferred outflows and inflows of resources are recognized in the pension expense as a level dollar amount over the closed period identified above.

Statement of Outflows and Inflows
Arising from Current Reporting Period
Fiscal Year Ended June 30, 2022 (Dollars in Thousands)

A. Outflows (Inflows) of Resources due to Liabilities		
1. Difference between expected and actual experience of the Total Pension Liability (gains) or losses	$	54,474
2. Assumption Changes (gains) or losses		(35,484)
3. Recognition period for Liabilities: Average of the expected remaining service lives of all employees {in years, rounded to the nearest whole number}		6
4. Outflow (Inflow) of Resources to be recognized in the current pension expense for the difference between expected and actual experience of the Total Pension Liability		9,079
5. Outflow (Inflow) of Resources to be recognized in the current pension expense for Assumption Changes		(5,914)
6. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Liabilities	$	3,165
7. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses for the difference between expected and actual experience of the Total Pension Liability	$	45,395
8. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses for Assumption Changes		(29,570)
9. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Liabilities	$	15,825
B. Outflows (Inflows) of Resources due to Assets		
1. Net difference between projected and actual earnings on pension plan investments (gains) or losses	$	121,136
2. Recognition period for Assets {in years}		5
3. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Assets		24,227
4. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Assets	$	96,909

Statement of Outflows and Inflows
Arising from Current and Prior Reporting Periods
Fiscal Year Ended June 30, 2022 (Dollars in Thousands)

A. Outflows and Inflows of Resources due to Liabilities and Assets to be Recognized in Current Pension Expense

	Outflows of Resources	Inflows of Resources	Net Outflows/(Inflows) of Resources
1. Due to Liabilities	$ 24,828	$ 47,733	$ (22,905)
2. Due to Assets	29,479	37,633	(8,154)
3. Total	$ 54,307	$ 85,366	$ (31,059)

B. Outflows and Inflows of Resources by Source to be Recognized in Current Pension Expense

	Outflows of Resources	Inflows of Resources	Net Outflows/(Inflows) of Resources
1. Differences between expected and actual experience	$ 9,804	$ 1,887	$ 7,917
2. Assumption Changes	15,024	45,846	(30,822)
3. Net Difference between projected and actual earnings on pension plan investments	29,479	37,633	(8,154)
4. Total	$ 54,307	$ 85,366	$ (31,059)

C. Deferred Outflows and Deferred Inflows of Resources by Source to be Recognized in Future Pension Expenses

	Deferred Outflows of Resources	Deferred Inflows of Resources	Net Deferred Outflows/ (Inflows) of Resources
1. Differences between expected and actual experience	$ 47,377	$ 1,662	$ 45,715
2. Assumption Changes	60,096	50,718	9,378
3. Net Difference between projected and actual earnings on pension plan investments*	107,042	101,012	6,030
4. Total	$ 214,515	$ 153,392	$ 61,123

D. Deferred Outflows and Deferred Inflows of Resources by Year to be Recognized in Future Pension Expenses

Year Ending June 30	Net Deferred Outflows/ (Inflows) of Resources
2023	$ (7,910)
2024	14,263
2025	8,922
2026	42,683
2027	3,165
Thereafter	-
Total	$ 61,123

** Paragraph 71(b) of GASB Statement No. 68 requires deferred outflows and inflows arising from differences between projected and actual earnings on pension plan investments to be aggregated and shown as a net amount. For purposes of this valuation, amounts are shown separately for calculation purposes.*

Recognition of Deferred Outflows and Inflows of Resources Fiscal Year Ended June 30, 2022 (Dollars in Thousands)

Year Established	Initial Amount	Initial Recognition Period	Current Year Recognition	Remaining Recognition	Remaining Recognition Period
Deferred Outflow (Inflow) Due to Differences Between Expected and Actual Experience on Liabilities					
2017	$ (2,418)	6.0000	$ (403)	$ 0	0.0000
2018	(8,369)	6.0000	(1,395)	(1,394)	1.0000
2019	2,757	6.0000	459	918	2.0000
2020	(535)	6.0000	(89)	(268)	3.0000
2021	1,596	6.0000	266	1,064	4.0000
2022	54,474	6.0000	9,079	45,395	5.0000
Total			**$ 7,917**	**$ 45,715**	
Deferred Outflow (Inflow) Due to Assumption Changes					
2017	$ (112,694)	6.0000	$ (18,784)	$ 0	0.0000
2018	(126,888)	6.0000	(21,148)	(21,148)	1.0000
2021	90,144	6.0000	15,024	60,096	4.0000
2022	(35,484)	6.0000	(5,914)	(29,570)	5.0000
Total			**$ (30,822)**	**$ 9,378**	
Deferred Outflow (Inflow) Due to Differences Between Projected and Actual Earnings on Plan Investments					
2018	$ (19,814)	5.0000	$ (3,962)	$ 0	0.0000
2019	1,844	5.0000	369	368	1.0000
2020	24,414	5.0000	4,883	9,765	2.0000
2021	(168,354)	5.0000	(33,671)	(101,012)	3.0000
2022	121,136	5.0000	24,227	96,909	4.0000
Total			**$ (8,154)**	**$ 6,030**	
Deferred Outflow (Inflow) Due to All Sources					
Total			**$ (31,059)**	**$ 61,123**	

Statement of Fiduciary Net Position as of June 30, 2022 (Dollars in Thousands)

Assets		June 30, 2022
Cash & Short-term Investments	$	17,382
Receivables		4,299
Investment Pools (at fair value)		862,525
Securities Lending Collateral		45,448
Capital Assets		-
Total Assets	**$**	**929,654**
Total Deferred Outflows of Resources	**$**	**-**
Total Liabilities	**$**	**(46,073)**
Total Deferred Inflows of Resources	**$**	**-**
Net Position Restricted for Pensions	**$**	**883,581**

Statement of Changes in Fiduciary Net Position for Year Ended June 30, 2022 (Dollars in Thousands)

1.	**Net Position at market value at beginning of year**	**$**	**957,864**
Additions			
2.	Contributions		
	a. Employee	$	16,515
	b. Employer		32,258
	c. Other sources - Supplemental State Aid		1,000
	d. Total contributions	$	49,773
3.	Investment income		
	a. Investment income/(loss)	$	(58,345)
	b. Investment expenses		(1,015)
	c. Net investment income/(loss)	$	(59,360)
4.	Other Additions	$	-
5.	**Total Additions** *(2.d.) + (3.c.) + (4.)*	**$**	**(9,587)**
Deductions			
6.	Benefits Paid		
	a. Annuity benefits	$	(64,332)
	b. Refunds		(174)
	c. Total benefits paid	$	(64,506)
7.	Expenses		
	a. Other deductions	$	-
	b. Administrative		(190)
	c. Total expenses	$	(190)
8.	**Total Deductions** *(6.c.) + (7.c.)*	**$**	**(64,696)**
9.	**Net increase/(decrease) in fiduciary net position** *(5.) + (8.)*	**$**	**(74,283)**
10.	**Net position at market value at end of year** *(1.) + (9.)*	**$**	**883,581**
11.	State Board of Investment calculated annual investment return for the State Patrol Retirement Fund*		-6.3%

** The fiscal year 2022 investment return for the Combined Funds is -6.4%.*

SECTION C

REQUIRED SUPPLEMENTARY INFORMATION

Schedule of Changes in Net Pension Liability and Related Ratios
Current Period
Fiscal Year Ended June 30, 2022 (Dollars in Thousands)

A. Total pension liability		
1. Service cost	$	26,648
2. Interest on the total pension liability		71,049
3. Changes of benefit terms		-
4. Difference between expected and actual experience of the total pension liability		54,474
5. Changes of assumptions		(35,484)
6. Benefit payments, including refunds of employee contributions		(64,506)
7. Net change in total pension liability	$	52,181
8. Total pension liability – beginning		1,111,995
9. Total pension liability – ending	**$**	**1,164,176**
B. Plan fiduciary net position		
1. Contributions – employer (1)	$	33,258
2. Contributions – employee		16,515
3. Net investment income		(59,360)
4. Benefit payments, including refunds of employee contributions		(64,506)
5. Pension plan administrative expense		(190)
6. Other changes		-
7. Net change in plan fiduciary net position	$	(74,283)
8. Plan fiduciary net position – beginning		957,864
9. Plan fiduciary net position – ending	**$**	**883,581**
C. Net pension liability, *A.9. - B.9.*	**$**	**280,595**
D. Plan fiduciary net position as a percentage of the total pension liability, *B.9. / A.9.*		**75.90%**
E. Covered-employee payroll (2)	**$**	**107,240**
F. Net pension liability as a percentage of covered-employee payroll, *C. / E.*		**261.65%**

(1) Includes $1 million supplemental state aid.
(2) Assumed equal to actual member contributions divided by employee contribution rate.

Schedule of Changes in Net Pension Liability and Related Ratios Multiyear (Dollars in Thousands)

Last 10 Fiscal Years (which will be built prospectively)

Fiscal year ending June 30,	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
Total Pension Liability										
Service Cost	$ 26,648	$ 21,795	$ 21,122	$ 19,375	$ 24,935	$ 29,758	$ 16,555	$ 16,144	$ 14,514	
Interest on the Total Pension Liability	71,049	72,625	70,465	68,227	65,110	58,865	64,592	63,753	60,183	
Benefit Changes	0	0	0	0	(2,604)	0	0	0	0	
Difference between Expected and Actual Experience	54,474	1,596	(535)	2,757	(8,369)	(2,418)	(22,222)	(12,855)	(5,771)	
Assumption Changes	(35,484)	90,144	0	0	(126,888)	(112,694)	283,584	0	30,058	
Benefit Payments	(64,332)	(63,094)	(61,859)	(60,375)	(59,653)	(58,560)	(57,695)	(55,465)	(53,697)	
Refunds	(174)	(116)	(112)	(428)	(39)	(5)	(79)	(15)	(25)	
Net Change in Total Pension Liability	$ 52,181	$ 122,950	$ 29,081	$ 29,556	$ (107,508)	$ (85,054)	$ 284,735	$ 11,562	$ 45,262	
Total Pension Liability - Beginning	1,111,995	989,045	959,964	930,408	1,037,916	1,122,970	838,235	826,673	781,411	
Total Pension Liability - Ending (a)	**$ 1,164,176**	**$ 1,111,995**	**$ 989,045**	**$ 959,964**	**$ 930,408**	**$1,037,916**	**$1,122,970**	**$ 838,235**	**$ 826,673**	
Plan Fiduciary Net Position										
Employer Contributions [(1)]	$ 33,258	$ 25,809	$ 22,975	$ 20,479	$ 16,952	$ 16,783	$ 14,938	$ 14,763	$ 12,894	
Employee Contributions	16,515	13,606	12,595	12,038	10,657	10,520	9,292	9,174	7,930	
Pension Plan Net Investment Income	(59,360)	224,273	31,073	51,823	70,474	93,077	(774)	28,903	107,187	
Benefit Payments	(64,332)	(63,094)	(61,859)	(60,375)	(59,653)	(58,560)	(57,695)	(55,465)	(53,697)	
Refunds	(174)	(116)	(112)	(428)	(39)	(5)	(79)	(15)	(25)	
Pension Plan Administrative Expense	(190)	(204)	(224)	(191)	(184)	(208)	(220)	(170)	(150)	
Other	0	0	(2)	(1)	(7)	0	0	0	0	
Net Change in Plan Fiduciary Net Position	**$ (74,283)**	**$ 200,274**	**$ 4,446**	**$ 23,345**	**$ 38,200**	**$ 61,607**	**$ (34,538)**	**$ (2,810)**	**$ 74,139**	
Plan Fiduciary Net Position - Beginning	**957,864**	**757,590**	**753,144**	**729,799**	**691,599**	**629,992**	**664,530**	**667,340**	**593,201**	
Plan Fiduciary Net Position - Ending (b)	**$ 883,581**	**$ 957,864**	**$ 757,590**	**$ 753,144**	**$ 729,799**	**$ 691,599**	**$ 629,992**	**$ 664,530**	**$ 667,340**	
Net Pension Liability - Ending (a) - (b)	**$ 280,595**	**$ 154,131**	**$ 231,455**	**$ 206,820**	**$ 200,609**	**$ 346,317**	**$ 492,978**	**$ 173,705**	**$ 159,333**	
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	**75.90 %**	**86.14 %**	**76.60 %**	**78.46 %**	**78.44 %**	**66.63 %**	**56.10 %**	**79.28 %**	**80.73 %**	
Covered-Employee Payroll [(2)]	**$ 107,240**	**$ 88,351**	**$ 84,530**	**$ 80,792**	**$ 74,007**	**$ 73,056**	**$ 69,343**	**$ 68,463**	**$ 63,952**	
Net Pension Liability as a Percentage of Covered-Employee Payroll	**261.65 %**	**174.45 %**	**273.81 %**	**255.99 %**	**271.07 %**	**474.04 %**	**710.93 %**	**253.72 %**	**249.15 %**	

Notes to Schedule:

(1) Includes $1 million supplemental state aid.
(2) Assumed equal to actual member contributions divided by employee contribution rate.

Schedule of Net Pension Liability Multiyear
(Dollars in Thousands)

Last 10 Fiscal Years (which will be built prospectively)

Fiscal Year Ending June 30,	Total Pension Liability	Plan Net Position	Net Pension Liability	Plan Net Position as a % of Total Pension Liability	Covered-Employee Payroll	Net Pension Liability as a % of Covered-Employee Payroll
	(a)	(b)	(a) - (b) = (c)	(b) / (c)	(d)	(c) / (d)
2013						
2014	$ 826,673	$ 667,340	$ 159,333	80.73%	$ 63,952	249.14%
2015	838,235	664,530	173,705	79.28	68,463	253.72
2016	1,122,970	629,992	492,978	56.10	69,343	710.93
2017	1,037,916	691,599	346,317	66.63	73,056	474.04
2018	930,408	729,799	200,609	78.44	74,007	271.07
2019	959,964	753,144	206,820	78.46	80,792	255.99
2020	989,045	757,590	231,455	76.60	84,530	273.81
2021	1,111,995	957,864	154,131	86.14	88,351	174.45
2022	1,164,176	883,581	280,595	75.90	107,240	261.65

Schedule of Contributions Multiyear (Dollars in Thousands)

Last 10 Fiscal Years

Fiscal Year Ending June 30,	Actuarially Determined Contribution [1]	Actual Contributions		Contribution Deficiency (Excess)	Covered-Employee Payroll [2]	Actual Contribution as a % of Covered-Employee Payroll
	(a)	(b)		(a) - (b) = (c)	(d)	(b) / (d)
2013	$ 18,711	$ 11,482		$ 7,229	$ 62,121	18.48%
2014	18,444	12,894	(3)	5,550	63,952	20.16
2015	20,648	14,763	(3)	5,885	68,463	21.56
2016	20,463	14,938	(3)	5,525	69,343	21.54
2017	19,031	16,783	(3)	2,248	73,056	22.97
2018	20,900	16,952	(3)	3,948	74,007	22.91
2019	21,281	20,479	(3)	802	80,792	25.35
2020	21,580	22,975	(3)	(1,395)	84,530	27.18
2021	22,203	25,809	(3)	(3,606)	88,351	29.21
2022	20,611	33,258	(3)	(12,647)	107,240	31.01

Notes to Schedule of Contributions

Methods and Assumptions Used to Determine Fiscal Year Ending June 30, 2022 Contribution Rates Reported in this Schedule:

Notes	(1) Actuarially determined contribution rates are calculated as of each June 30 and apply to the fiscal year beginning on the day after the measurement date. (2) Assumed equal to actual member contributions divided by employee contribution rate. (3) Includes supplemental state aid of $1 million
Valuation Date	June 30, 2021
Actuarial Cost Method	Entry Age Normal
Amortization Method	Level Percentage of Payroll, Closed
Remaining Amortization Period	27 years
Asset Valuation Method	5-Year smoothed market; no corridor
Inflation	2.25%
Payroll Growth	3.00%
Salary Increases	Service based tables ranging from 12.50% with one year of service to 3.00% with 25 or more years of service, including inflation
Investment Rate of Return	7.50%
Retirement Age	Experience-based table of rates that are specific to the type of eligibility condition. Last updated for the 2021 valuation pursuant to an experience study of the period 2015-2019.
Healthy Post-retirement Mortality	Pub-2010 General Retired Mortality Table adjusted for mortality improvements using mortality improvement Scale MP-2019.

Other Information:

Benefit Increases After Retirement	1.00% per annum

See separate funding actuarial valuation report as of July 1, 2021 for additional detail. To obtain this report, contact MSRS as noted on page 3. The report is also available online at https://www.msrs.state.mn.us/annual-reports-fy-2021

Schedule of Investment Returns Multiyear

Last 10 Fiscal Years

Fiscal Year Ending June 30,	Annual Return[1]
2013	
2014	18.7 %
2015	4.5
2016	(0.1)
2017	15.2
2018	10.5
2019	7.3
2020	4.2
2021	30.3
2022	(6.3)

[1] *Annual money-weighted rate of return, net of investment expenses.*

The Minnesota State Board of Investment (SBI) compiled this data and the related investment notes and provided it to MSRS for GASB compliance purposes. MSRS furnished this information to us for inclusion within this report. We did not audit this information. We are not responsible for its accuracy or completeness.

Rate of Return

For the fiscal year ended June 30, 2022, the annual money-weighted rate of return for the State Patrol Retirement Fund was -6.3%. The money-weighted rate of return is a method of calculating period-by-period returns on pension plan investments that adjusts for the changing amounts actually invested. For purposes of this schedule, the money-weighted rate of return is calculated as the internal rate of return on pension plan investments, net of pension plan investment expense.

Ten-Year Schedule of Money-Weighted Investment Return

Ten-year data is not available. Additional years will be provided when they become available.

To request additional information about the computation of the annual money-weighted rate of return and the investments for the Minnesota Retirement Systems (including the investments for MSRS' defined benefit retirement funds), contact SBI at 60 Empire Drive, Suite 355, St. Paul, Minnesota, 55103, via email at minn.sbi@state.mn.us or telephone at 651.296.3328.

SECTION D

ADDITIONAL FINANCIAL STATEMENT DISCLOSURES

Asset Allocation

Long-Term Expected Return on Plan Assets

The long-term expected rate of return on pension plan investments was determined using a building-block method. Estimates for expected future real rates of return (expected returns, net of inflation) were developed for each asset class using both long-term historical returns and long-term capital market expectation from a number of investment management and consulting organizations. The asset class estimates and the target allocations were then combined to produce a geometric, long-term expected rate of return for the portfolio. Inflation expectations were applied to derive the nominal rate of return for the portfolio. For each major asset class that is included in the pension fund's target asset allocation as of June 30, 2022, these estimates are summarized in the following table:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return (Geometric Mean)
Domestic Equity	33.5%	5.10%
International Equity	16.5%	5.30%
Private Markets	25.0%	5.90%
Fixed Income	25.0%	0.75%
Total	100.0%	

The Minnesota State Board of Investment (SBI) compiled this data and the related investment notes and provided it to MSRS for GASB compliance purposes. MSRS furnished this information to us for inclusion within this report. We did not audit this information. We are not responsible for its accuracy or completeness.

For purposes of this valuation, the long-term expected rate of return assumption is 6.75%. This assumption is based on a review of inflation and investment return assumptions in our report dated July 12, 2022.

Sensitivity of Net Pension Liability to the Single Discount Rate Assumption

Single Discount Rate

A Single Discount Rate of 6.75% was used to measure the total pension liability. This Single Discount Rate was based on the expected rate of return on pension plan investments of 6.75%. The projection of cash flows used to determine this Single Discount Rate assumed that member, employer, and state contributions will be made at the current statutory contribution rates. Based on these assumptions, the pension plan's fiduciary net position and future contributions were sufficient to finance all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

Regarding the sensitivity of the net pension liability to changes in the Single Discount Rate, the following presents the plan's net pension liability, calculated using a Single Discount Rate of 6.75%, as well as what the plan's net pension liability would be if it were calculated using a Single Discount Rate that is one percent lower (5.75%) or one percent higher (7.75%) than the current rate:

Sensitivity of Net Pension Liability to the Single Discount Rate Assumption

(Dollars in Thousands)

	1% Decrease 5.75%	Current Single Discount Rate Assumption 6.75%	1% Increase 7.75%
Total Pension Liability	$1,317,564	$1,164,176	$1,038,381
Net Position Restricted for Pensions	883,581	883,581	883,581
Net Pension Liability	**$ 433,983**	**$ 280,595**	**$ 154,800**

For more information on the calculation of the single discount rate, refer to Section G of this report.

Note that we believe the 7.75% interest rate assumption does not comply with Actuarial Standards of Practice.

GASB Statement No. 68 Reconciliation (Dollars in Thousands)

	Total Pension Liability (a)	Plan Fiduciary Net Position (b)	Net Pension Liability (a) - (b)	Deferred Outflows	Deferred Inflows	Total Pension Expense
Balance Beginning of Year	**$ 1,111,995**	**$ 957,864**	**$ 154,131**	**$ 93,212**	**$ 203,274**	
Changes for the Year:						
Service Cost	$ 26,648		$ 26,648			$ 26,648
Interest on Total Pension Liability	71,049		71,049			71,049
Interest on Fiduciary Net Position		$ 61,776 [1]	(61,776)			(61,776)
Changes in Benefit Terms	-		-			-
Liability Experience Gains and Losses	54,474		54,474	$ 45,395	$ -	9,079
Changes in Assumptions	(35,484)		(35,484)	-	29,570	(5,914)
Recognition of Deferred Outflows/(Inflows) of Resources Arising from Prior Reporting Periods						
Liability Experience Gains/(Losses)				(725)	(1,887)	(1,162)
Assumption Changes				(15,024)	(39,932)	(24,908)
Investment Gains/(Losses)				(5,252)	(37,633)	(32,381)
Contributions - Employer		33,258 [2]	(33,258)			
Contributions - Employees		16,515	(16,515)			(16,515)
Asset Gain/(Loss)		(121,136) [1]	121,136	96,909	-	24,227
Benefit Payments and Refunds	(64,506)	(64,506)	-			
Administrative Expenses		(190)	190			190
Other changes		-	-			-
Net Changes	**$ 52,181**	**$ (74,283)**	**$ 126,464**	**$ 121,303**	**$ (49,882)**	**$ (11,463)**
Balance End of Year	**$ 1,164,176**	**$ 883,581**	**$ 280,595**	**$ 214,515**	**$ 153,392**	

[1] *The sum of these items in column (b) equals the net investment income of -$59,360.*

[2] *Includes supplemental state aid of $1,000.*

Summary of Population Statistics

		Terminated		Recipients			
	Actives	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	Total
Members on 7/1/2021	**912**	**69**	**36**	**895**	**72**	**154**	**2,138**
New members	76						**76**
Return to active	0	0	0	0	0	0	**0**
Terminated non-vested	(5)	0	5	0	0	0	**0**
Service retirements	(15)	(2)	0	17	0	0	**0**
Terminated deferred	(11)	11	0	0	0	0	**0**
Terminated refund/transfer	(3)	(1)	(2)	0	0	0	**(6)**
Deaths	(2)	0	0	(26)	(2)	(11)	**(41)**
New beneficiary	0	0	0	0	0	24	**24**
Disabled	(15)	0	0	0	15	0	**0**
Unexpected status change	0	1	2	2	0	0	**5**
Net change	25	9	5	(7)	13	13	**58**
Members on 6/30/2022	**937**	**78**	**41**	**888**	**85**	**167**	**2,196**

SECTION E

SUMMARY OF BENEFITS

Summary of Plan Provisions

Following is a summary of the major plan provisions used in the valuation of this report. MSRS 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	State troopers, conservation officers, certain crime bureau and gambling enforcement officers, and certain other persons listed in Minnesota Statutes 352B.011 subdivision 10.
Contributions	Percent of Salary: (see table below) Supplemental employer contributions remain in effect until the plan is 100% funded on a market value of assets basis. Member contributions are “picked up” according to the provisions of Internal Revenue Code 414(h).
State contributions	$1 million paid annually on October 1 until the earlier of 1) both the Public Employees Retirement Association Police and Fire Plan and the State Patrol Retirement Fund attaining 90% funded status (on an actuarial value of assets basis), or 2) July 1, 2048.
Allowable service	Service during which member contributions were deducted. Includes period receiving temporary Worker's Compensation and reduced salary from employer. See Normal Retirement benefit definition below for information about service limits.
Salary	Salaries excluding lump sum payments at separation.
Average salary	Average of the five highest years of Salary. Average Salary is based on all Allowable Service if less than five years. Average Salary is based on all years without regard to any service limits.

Contributions — Percent of Salary:

Effective as of	Member	Regular Employer	Supplemental Employer	Total
July 1, 2021	15.40%	23.10%	7.00%	45.50%

Summary of Plan Provisions (Continued)

Retirement

Normal retirement benefit

Age/Service requirement	Age 55 and three years (ten years if first hired after June 30, 2013) of Allowable Service.
Amount	3.00% of Average Salary for each year of Allowable Service up to 33 years. Members with at least 28 years of service as of July 1, 2013, are not subject to this service limit. Member contributions made after the service cap will be refunded at retirement.

Early retirement benefit

Age/Service requirement	Age 50 and three years (ten years if first hired after June 30, 2013) of Allowable Service.
Amount	Normal Retirement Benefit based on Allowable Service and Average Salary at retirement reduced by 0.34% for each month that the member is under age 55. If the effective date of retirement is before July 1, 2015, the reduction is 1/10% for each month that the member is under age 55 at the time of retirement.
Form of payment	Life annuity. Actuarially equivalent options are: 50%, 75%, or 100% Joint and Survivor, or 15-year certain. 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	1.00% per year. A benefit recipient who has been receiving a benefit for at least 12 full months as of the June 30 of the calendar year immediately before the adjustment will receive a full increase. Members receiving benefits for at least one month but less than 12 full months as of the June 30 of the calendar year immediately before the adjustment will receive a pro rata increase.

Disability

Occupational disability benefit

Age/Service requirement	Member who cannot perform his duties as a direct result of a disability relating to an act of duty.

Summary of Plan Provisions (Continued)

Disability (Continued)

Occupational disability benefit (Continued)

Amount	60% of Average Salary plus 3.00% of Average Salary for each year in excess of 20 years of Allowable Service (pro rata for completed months). Payments cease at age 65 (age 55 if disabled after June 30, 2015) or the 5-year anniversary of the effective date of the disability benefit, whichever is later. Payments stop 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.

Non-duty disability benefit

Age/Service requirement	At least one year of Allowable Service and disability not related to covered employment.
Amount	Normal Retirement Benefit based on Allowable Service (minimum of 15 years) and Average Salary at disability without reduction for commencement before age 55. Payments cease at age 65 (age 55 if disabled after June 30, 2015) 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 after disability

Age/Service requirement	Age 65 (age 55 if disabled after June 30, 2015) with continued disability.
Amount	Optional annuity continues. Otherwise, normal retirement benefit equal to the disability benefit paid, or an actuarially equivalent option.
Form of payment	Same as for retirement.
Benefit increases	Same as for retirement.

Summary of Plan Provisions (Continued)

Death	
Surviving spouse benefit	
Age/Service requirement	Member who is active or receiving a disability benefit or former member.
Amount	50% of Average Salary if member was active or occupational disability and either had less than three years (five years if first hired after June 30, 2013) of Allowable Service or was under age 55. Annuity is paid for life. Surviving spouse receives the 100% joint and survivor benefit commencing on the member's 55th birthday if member was active or a disability with three years (five years if first hired after June 30, 2013) of Allowable Service. A spouse who had been receiving the 50% benefit shall be entitled to the greater benefit. The surviving spouse of a former member receives the 100% joint and survivor benefit commencing on the member's 55th birthday if former member had three years (five years if first hired after June 30, 2013) of Allowable Service.
Benefit increases	Same as for retirement.
Surviving dependent children's benefit	
Age/Service requirement	Member who is active or receiving a disability benefit. Child must be unmarried, under age 18 (or 23 if full-time student) and dependent upon the member.
Amount	10% of Average Salary for each child and $20 per month prorated among all dependent children. Benefit must not be less than 50% nor exceed 70% of Average Salary.
Benefit increases	Same as for retirement.
Refund of contributions	
Age/Service requirement	Member dies before receiving any retirement benefits and survivor benefits are not payable.
Amount	Member's contributions with 6.00% interest through June 30, 2011. Beginning July 1, 2011, a member's contributions increase with 4.00% interest. Beginning July 1, 2018, member contributions increase with 3.00% interest.
Termination	
Refund of contributions	
Age/service requirement	Termination of state service.
Amount	Member's contributions with 6.00% interest through June 30, 2011. Beginning July 1, 2011, a member's contributions increase with 4.00% interest. Beginning July 1, 2018, member contributions increase with 3.00% interest. If a member is vested, a deferred annuity may be elected in lieu of a refund.

Summary of Plan Provisions (Concluded)

Termination (Continued)	
<u>**Deferred benefit**</u>	
Age/service requirement	Three years (ten years if first hired after June 30, 2013) of Allowable Service.
Amount	Benefit is computed under law in effect at termination and increased by the following annual augmentation percentage: (a.) 0.00% before July 1, 1971; (b.) 5.00% from July 1, 1971, to January 1, 1981; (c.) 3.00% thereafter (2.50% if hired after June 30, 2006) until January 1, 2012; (d.) 2.00% after December 31, 2011, through December 31, 2018; and (e.) 0.00% thereafter. Amount is payable at normal or early retirement. If a member terminated employment prior to July 1, 1997, but was not eligible to commence their pension before July 1, 1997, an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.
Optional form conversion factors	Effective July 1, 2019 and phased in over a 24-month period, 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, white collar adjustment, blended 90% males, 6.44% 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%.
Combined service annuity	Members are eligible for combined service benefits if they: (a.) Have sufficient allowable service in total that equals or exceeds the applicable service credit vesting requirement of the retirement plan with the longest applicable service credit vesting requirement; (b.) Have at least six months of allowable service credit in each plan worked under; and (c.) Are not in receipt of a benefit from another plan, or have applied for benefits with an effective date within one year. Members who meet the above requirements must have their benefit based on the following: (a.) Allowable service in all covered plans are 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.

SECTION F

ACTUARIAL COST METHOD AND ACTUARIAL ASSUMPTIONS

Actuarial Methods Used for the Determination of Total Pension Liability and Related Values

Actuarial Cost Method

Normal cost and the allocation of benefit values between service rendered before and after the valuation date were determined using an **Individual Entry-Age Actuarial Cost Method** having the following characteristics:

(i) The annual normal cost for each individual active member, payable from the date of employment to the date of retirement, is sufficient to accumulate the value of the member's benefit at the time of retirement; and

(ii) Each annual normal cost is a constant percentage of the member's year by year projected covered pay.

Actuarial gains/(losses), as they occur, reduce (increase) the Total Pension Liability.

Asset Valuation Method

Fair value of assets.

Summary of Actuarial Assumptions Used for the Determination of Total Pension Liability and Related Values

The following assumptions were used in valuing the liabilities and benefits under the plan. The assumptions are based on the last experience study, dated June 30, 2020, and a review of inflation and investment return assumptions, dated July 12, 2022. The MSRS Board selected the long-term expected rate of investment return of 6.75% based on input from GRS that the proposed selection would be reasonable for the purpose of the measurement.

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	6.75% per annum.
Single discount rate	6.75% 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.
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 mortality improvement Scale MP-2019.
Healthy post-retirement	Pub-2010 General Retired Mortality Table adjusted for mortality improvements using mortality improvement Scale MP-2019.
Disabled	Pub-2010 General Disabled Mortality Table adjusted for mortality improvements using mortality improvement Scale MP-2019.
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 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 result in behavior changes that are not anticipated in the current retirement rates.
Withdrawal	Service-related rates based on experience; see table of sample rates.
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, vested members are increased by 13.00% to account for the effect of some participants having eligibility for a Combined Service Annuity.

Summary of Actuarial Assumptions (Continued)

Administrative expenses	In the valuation year, equal to prior year administrative expenses expressed as percentage of prior year projected payroll. In each subsequent year, equal to the initial administrative expense percentage applied to payroll for the closed group.
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 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 two years younger than their spouses, and males are assumed to be two years older than their spouses.
Eligible children	Each member may have two dependent children depending on member's age. Assumed first child is born at member's age 28 and second child at member's age 31.
Form of payment	Married members retiring from active status are assumed to elect subsidized Joint and Survivor form of annuity as follows: 12.5% elect 50% Joint & Survivor option 12.5% elect 75% Joint & Survivor option 70.0% elect 100% Joint & Survivor option Remaining married and unmarried members are assumed to elect the Straight Life option.
Eligibility testing	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year 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.
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)

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. There are no members reported with missing birth dates. In cases where submitted data was missing or incomplete, the following assumptions were applied: Data for active members: There were no members reported with missing salary or with missing service. There were no members reported with a missing or invalid date of birth or gender. Data for terminated members: There were 4 members reported without a benefit. We calculated benefits for these members using the reported Credited Service and Termination Date. Average Salary was not reported, so we assumed a value of $45,000. There were no members reported with a missing or invalid date of birth or gender. Data for members receiving benefits: There was one member reported with a missing gender. We assumed male gender for retirees and female gender for survivors. There were no members reported with a missing or invalid birth date. There were no members reported without a benefit. There were no survivors reported with an expired benefit. There were 8 retirees reported with a bounceback annuity and an unreasonable reduction factor. A factor of 0.80, 0.85 and 0.90 was assumed for the 100%, 75% and 50% joint and survivor annuity, respectively. There were 2 retirees reported with a survivor option and a survivor date of death. We assumed no benefit was payable to the survivor, and the member benefit already reflected the "pop-up", if any. For retirees who elected a survivor benefit option, we used the valuation assumptions if the survivor date of birth was missing or invalid (145 members) and/or the survivor gender was missing or invalid (158 members).
Changes in actuarial assumptions	The investment return and single discount rate were changed from 6.50% to 6.75%.

Summary of Actuarial Assumptions (Continued)

Age in 2022	Healthy Post-Retirement Mortality** Male	Healthy Post-Retirement Mortality** Female	Healthy Pre-Retirement Mortality** Male	Healthy Pre-Retirement Mortality** Female	Disability Mortality** Male	Disability Mortality** Female
	Percentage of Members Dying each Year*					
20	0.04%	0.01%	0.04%	0.01%	0.44%	0.26%
25	0.03	0.01	0.03	0.01	0.34	0.20
30	0.05	0.02	0.05	0.02	0.50	0.36
35	0.07	0.03	0.07	0.03	0.68	0.55
40	0.09	0.04	0.09	0.04	0.84	0.75
45	0.11	0.06	0.10	0.06	1.05	0.98
50	0.28	0.21	0.14	0.08	1.50	1.42
55	0.42	0.30	0.21	0.13	2.04	1.81
60	0.64	0.41	0.33	0.20	2.59	2.08
65	0.92	0.59	0.47	0.29	3.06	2.18
70	1.42	0.95	0.65	0.44	3.63	2.57
75	2.40	1.69	0.99	0.73	4.67	3.59
80	4.32	3.12	1.57	1.23	6.65	5.57
85	7.90	5.87	6.65	5.05	9.95	8.83
90	13.68	10.92	13.68	10.92	15.15	12.99

* *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 results.*

*** Rates are adjusted for mortality improvements using Scale MP-2019 from a base year of 2010.*

Age	Percent of Members Decrementing Each Year Due to Disability Retirement
20	0.030%
25	0.050
30	0.090
35	0.135
40	0.155
45	0.239
50	0.481
55	0.800
60+	0.000

Summary of Actuarial Assumptions (Concluded)

Age	Percent Retiring	Salary Scale Year	Salary Scale Increase	Year	Percent of Members Terminating (Withdrawing) Each Year
50	3 %	1	12.50%	1	5.00%
51	5	2	8.50	2	3.50
52	5	3	7.50	3	2.50
53	3	4	7.25	4	2.25
54	4	5	7.00	5	2.00
55	65	6	6.75	6	1.75
56	40	7	6.50	7	1.50
57	30	8	5.50	8	1.25
58	15	9	5.00	9	1.00
59	20	10	4.50	10	0.75
60+	100	11	4.25	11	0.75
		12	4.00	12	0.75
		13	4.00	13	0.75
		14	4.00	14	0.75
		15	4.00	15	0.50
		16	3.75	16	0.50
		17	3.50	17	0.50
		18	3.50	18	0.50
		19	3.50	19	0.50
		20	3.50	20	0.50
		21	3.40	21	0.50
		22	3.30	22+	0.00
		23	3.20		
		24	3.10		
		25+	3.00		

SECTION G

CALCULATION OF THE SINGLE DISCOUNT RATE

Calculation of the Single Discount Rate

GASB Statement No. 67 includes a specific requirement for the discount rate that is used for the purpose of the measurement of the Total Pension Liability. This rate considers the ability of the fund to meet benefit obligations in the future. To make this determination, employer contributions, employee contributions, benefit payments, expenses and investment returns are projected into the future. The Plan Fiduciary Net Position (assets) in future years can then be determined and compared to its obligation to make benefit payments in those years. As long as assets are projected to be on hand in a future year, the long-term expected rate of return is used as the discount rate. In years where assets are not projected to be sufficient to meet benefit payments, the use of a municipal rate is required, as described in the following paragraph.

The *Single Discount Rate* (SDR) is equivalent to applying these two rates to the benefits that are projected to be paid during the different time periods. The SDR reflects (1) the long-term expected rate of return on pension plan investments (during the period in which the plan fiduciary net position is projected to be sufficient to pay benefits) and (2) tax-exempt municipal bond rate based on an index of 20-year general obligation bonds with an average AA credit rating as of the measurement date (to the extent that the contributions for use with the long-term expected rate of return are not met).

For the purpose of this valuation, the expected rate of return on pension plan investments is 6.75%; the municipal bond rate is 3.69% (based on the weekly rate closest to but not later than the measurement date of the "20-Year Municipal GO Index" as published by Fidelity) and **the resulting single discount rate as of June 30, 2022 is 6.75%**. In describing this index, Fidelity notes that the municipal curves are constructed using option-adjusted analytics of a diverse population of over 10,000 tax-exempt securities.

The tables in this section provide background for the development of the single discount rate.

The **Projection of Contributions** table shows the development of expected contributions in future years. Normal Cost contributions for future hires are not included (nor are their liabilities).

The **Projection of Plan Fiduciary Net Position** table shows the development of expected asset levels in future years.

The **Present Values of Projected Benefit Payments** table shows the development of the Single Discount Rate. It breaks down the benefit payments into present values for funded and unfunded portions and shows the equivalent total at the SDR.

Single Discount Rate Development
Projection of Contributions (Dollars in Thousands)

	Projected Covered-Employee Payroll			Projected Contributions				
Fiscal Year Ending	Payroll for Current Employees	Payroll for New Employees	Total Employee Payroll	Contributions from Current Employees	Employer Contributions for Current Employees	Contributions on Future Payroll toward Current UAL*	Additional State Contributions**	Total Contributions
	(a)	(b)	(c) = (a) + (b)	(d) = (a) x 15.4%	(e) = (a) x 30.1%***	(f)	(g)	(h) = (d) + (e) + (f) + (g)
2022	$ 107,240		$ 107,240					
2023	104,415	$ 487	104,902	$ 16,080	$ 31,429	$ 84	$ 1,000	$ 48,593
2024	103,741	4,308	108,049	15,976	31,226	746	1,000	48,948
2025	102,362	8,929	111,291	15,764	30,811	1,547	1,000	49,122
2026	100,989	13,640	114,629	15,552	30,398	2,363	1,000	49,313
2027	99,642	18,426	118,068	15,345	29,992	3,191	1,000	49,528
2028	97,661	23,949	121,610	15,040	29,396	4,148	1,000	49,584
2029	95,203	30,055	125,258	14,661	28,656	5,206	1,000	49,523
2030	92,619	36,397	129,016	14,263	27,878	6,304	-	48,445
2031	89,652	43,235	132,887	13,806	26,985	7,488	-	48,279
2032	86,133	50,740	136,873	13,264	25,926	8,788	-	47,978
2033	82,542	58,438	140,980	12,711	24,845	10,121	-	47,677
2034	79,478	65,731	145,209	12,240	23,923	11,385	-	47,548
2035	76,631	72,934	149,565	11,801	23,066	12,632	-	47,499
2036	73,483	80,569	154,052	11,316	22,118	13,955	-	47,389
2037	70,140	88,534	158,674	10,802	21,112	15,334	-	47,248
2038	66,888	96,546	163,434	10,301	15,451	9,964	-	35,716
2039	63,473	104,864	168,337	9,775	14,662	10,822	-	35,259
2040	59,572	113,815	173,387	9,174	13,761	11,746	-	34,681
2041	55,482	123,107	178,589	8,544	12,816	12,705	-	34,065
2042	50,910	133,036	183,946	7,840	11,760	13,729	-	33,329
2043	46,193	143,272	189,465	7,114	10,671	14,786	-	32,571
2044	41,830	153,319	195,149	6,442	9,663	15,823	-	31,928
2045	37,298	163,705	201,003	5,744	8,616	16,894	-	31,254
2046	32,394	174,639	207,033	4,989	7,483	18,023	-	30,495
2047	27,712	185,532	213,244	4,268	6,401	19,147	-	29,816
2048	23,069	196,572	219,641	3,553	5,329	20,286	-	29,168
2049	18,672	207,559	226,231	2,875	4,313	21,420	-	28,608
2050	14,721	218,297	233,018	2,267	3,401	22,528	-	28,196
2051	11,074	228,934	240,008	1,705	2,558	23,626	-	27,889
2052	7,892	239,316	247,208	1,215	1,823	24,697	-	27,735
2053	5,040	249,585	254,625	776	1,164	25,757	-	27,697
2054	3,032	259,231	262,263	467	700	26,753	-	27,920
2055	1,738	268,393	270,131	268	401	27,698	-	28,367
2056	1,021	277,214	278,235	157	236	28,609	-	29,002
2057	577	286,005	286,582	89	133	29,516	-	29,738
2058	256	294,924	295,180	39	59	30,436	-	30,534
2059	89	303,946	304,035	14	21	31,367	-	31,402
2060	13	313,143	313,156	2	3	32,316	-	32,321
2061	-	322,551	322,551	-	-	33,287	-	33,287
2062	-	332,227	332,227	-	-	34,286	-	34,286
2063	-	342,194	342,194	-	-	35,314	-	35,314
2064	-	352,460	352,460	-	-	36,374	-	36,374
2065	-	363,034	363,034	-	-	37,465	-	37,465
2066	-	373,925	373,925	-	-	38,589	-	38,589
2067	-	385,143	385,143	-	-	39,747	-	39,747
2068	-	396,697	396,697	-	-	40,939	-	40,939
2069	-	408,598	408,598	-	-	42,167	-	42,167
2070	-	420,856	420,856	-	-	43,432	-	43,432
2071	-	433,481	433,481	-	-	44,735	-	44,735
2072	-	446,486	446,486	-	-	46,077	-	46,077

* *Equal to contributions (45.50% of payroll for 15 years and 38.50% of payroll thereafter for new employees) net of normal cost and expenses (28.18% of payroll).*

** *State contributions equal to $1.0 million are assumed to end after 7 years. Actual end dates will depend on the funding status of this plan and the PERA Police and Fire Plan.*

*** *Employer contributions are equal to 30.1% for fiscal year ending June 30, 2022; the supplemental employer contribution of 7% of payroll is assumed to stop after 15 years.*

Single Discount Rate Development
Projection of Contributions (Dollars in Thousands, Concluded)

	Projected Covered-Employee Payroll			Projected Contributions				
Fiscal Year Ending	Payroll for Current Employees	Payroll for New Employees	Total Employee Payroll	Contributions from Current Employees	Employer Contributions for Current Employees	Contributions on Future Payroll toward Current UAL*	Additional State Contributions	Total Contributions
	(a)	(b)	(c) = (a) + (b)	(d)	(e)	(f)	(g)	(h) = (d) + (e) + (f) + (g)
2073	$ -	$ 459,880	$ 459,880	$ -	$ -	$ 47,460	$ -	$ 47,460
2074	-	473,677	473,677	-	-	48,883	-	48,883
2075	-	487,887	487,887	-	-	50,350	-	50,350
2076	-	502,524	502,524	-	-	51,860	-	51,860
2077	-	517,600	517,600	-	-	53,416	-	53,416
2078	-	533,128	533,128	-	-	55,019	-	55,019
2079	-	549,121	549,121	-	-	56,669	-	56,669
2080	-	565,595	565,595	-	-	58,369	-	58,369
2081	-	582,563	582,563	-	-	60,120	-	60,120
2082	-	600,040	600,040	-	-	61,924	-	61,924
2083	-	618,041	618,041	-	-	63,782	-	63,782
2084	-	636,582	636,582	-	-	65,695	-	65,695
2085	-	655,680	655,680	-	-	67,666	-	67,666
2086	-	675,350	675,350	-	-	69,696	-	69,696
2087	-	695,610	695,610	-	-	71,787	-	71,787
2088	-	716,479	716,479	-	-	73,941	-	73,941
2089	-	737,973	737,973	-	-	76,159	-	76,159
2090	-	760,112	760,112	-	-	78,444	-	78,444
2091	-	782,916	782,916	-	-	80,797	-	80,797
2092	-	806,403	806,403	-	-	83,221	-	83,221
2093	-	830,595	830,595	-	-	85,717	-	85,717
2094	-	855,513	855,513	-	-	88,289	-	88,289
2095	-	881,179	881,179	-	-	90,938	-	90,938
2096	-	907,614	907,614	-	-	93,666	-	93,666
2097	-	934,842	934,842	-	-	96,476	-	96,476
2098	-	962,888	962,888	-	-	99,370	-	99,370
2099	-	991,774	991,774	-	-	102,351	-	102,351
2100	-	1,021,527	1,021,527	-	-	105,422	-	105,422
2101	-	1,052,173	1,052,173	-	-	108,584	-	108,584
2102	-	1,083,738	1,083,738	-	-	111,842	-	111,842
2103	-	1,116,251	1,116,251	-	-	115,197	-	115,197
2104	-	1,149,738	1,149,738	-	-	118,653	-	118,653
2105	-	1,184,230	1,184,230	-	-	122,213	-	122,213
2106	-	1,219,757	1,219,757	-	-	125,879	-	125,879
2107	-	1,256,350	1,256,350	-	-	129,655	-	129,655
2108	-	1,294,040	1,294,040	-	-	133,545	-	133,545
2109	-	1,332,862	1,332,862	-	-	137,551	-	137,551
2110	-	1,372,847	1,372,847	-	-	141,678	-	141,678
2111	-	1,414,033	1,414,033	-	-	145,928	-	145,928
2112	-	1,456,454	1,456,454	-	-	150,306	-	150,306
2113	-	1,500,147	1,500,147	-	-	154,815	-	154,815
2114	-	1,545,152	1,545,152	-	-	159,460	-	159,460
2115	-	1,591,506	1,591,506	-	-	164,243	-	164,243
2116	-	1,639,252	1,639,252	-	-	169,171	-	169,171
2117	-	1,688,429	1,688,429	-	-	174,246	-	174,246
2118	-	1,739,082	1,739,082	-	-	179,473	-	179,473
2119	-	1,791,255	1,791,255	-	-	184,857	-	184,857
2120	-	1,844,992	1,844,992	-	-	190,403	-	190,403
2121	-	1,900,342	1,900,342	-	-	196,115	-	196,115
2122	-	1,957,352	1,957,352	-	-	201,999	-	201,999

* *Equal to contributions (45.50% of payroll for 15 years and 38.50% of payroll thereafter for new employees) net of normal cost and expenses (28.18% of payroll).*

Single Discount Rate Development
Projection of Plan Fiduciary Net Position (Dollars in Thousands)

Fiscal Year Ending	Projected Beginning Plan Fiduciary Net Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expenses	Projected Investment Earnings at 6.75%	Projected Ending Plan Net Position
	(a)	(b)	(c)	(d)	(e)	(f)=(a)+(b)-(c)-(d)+(e)
2023	$ 883,581	$ 48,593	$ 66,365	$ 219	$ 59,044	$ 924,634
2024	924,634	48,948	68,271	218	61,764	966,857
2025	966,857	49,122	70,463	215	64,547	1,009,848
2026	1,009,848	49,313	72,688	212	67,382	1,053,643
2027	1,053,643	49,528	75,070	209	70,266	1,098,158
2028	1,098,158	49,584	77,622	205	73,188	1,143,103
2029	1,143,103	49,523	80,199	200	76,134	1,188,361
2030	1,188,361	48,445	82,854	195	79,066	1,232,823
2031	1,232,823	48,279	85,731	188	81,966	1,277,149
2032	1,277,149	47,978	88,919	181	84,842	1,320,869
2033	1,320,869	47,677	92,000	173	87,682	1,364,055
2034	1,364,055	47,548	94,624	167	90,505	1,407,317
2035	1,407,317	47,499	97,085	161	93,343	1,450,913
2036	1,450,913	47,389	99,686	154	96,196	1,494,658
2037	1,494,658	47,248	102,310	147	99,057	1,538,506
2038	1,538,506	35,716	104,839	140	101,550	1,570,793
2039	1,570,793	35,259	107,362	133	103,630	1,602,187
2040	1,602,187	34,681	110,146	125	105,638	1,632,235
2041	1,632,235	34,065	113,091	117	107,548	1,660,640
2042	1,660,640	33,329	116,399	107	109,332	1,686,795
2043	1,686,795	32,571	119,726	97	110,962	1,710,505
2044	1,710,505	31,928	122,743	88	112,441	1,732,043
2045	1,732,043	31,254	125,846	78	113,770	1,751,143
2046	1,751,143	30,495	129,246	68	114,921	1,767,245
2047	1,767,245	29,816	132,375	58	115,882	1,780,510
2048	1,780,510	29,168	135,444	48	116,655	1,790,841
2049	1,790,841	28,608	138,228	39	117,241	1,798,423
2050	1,798,423	28,196	140,681	31	117,658	1,803,565
2051	1,803,565	27,889	142,754	23	117,927	1,806,604
2052	1,806,604	27,735	144,357	17	118,074	1,808,039
2053	1,808,039	27,697	145,628	11	118,127	1,808,224
2054	1,808,224	27,920	145,863	6	118,140	1,808,415
2055	1,808,415	28,367	145,573	4	118,177	1,809,382
2056	1,809,382	29,002	144,513	2	118,299	1,812,168
2057	1,812,168	29,738	143,241	1	118,553	1,817,217
2058	1,817,217	30,534	141,619	1	118,974	1,825,105
2059	1,825,105	31,402	139,831	-	119,595	1,836,271
2060	1,836,271	32,321	137,836	-	120,445	1,851,201
2061	1,851,201	33,287	135,711	-	121,556	1,870,333
2062	1,870,333	34,286	133,475	-	122,955	1,894,099
2063	1,894,099	35,314	131,114	-	124,671	1,922,970
2064	1,922,970	36,374	128,624	-	126,738	1,957,458
2065	1,957,458	37,465	126,003	-	129,189	1,998,109
2066	1,998,109	38,589	123,247	-	132,062	2,045,513
2067	2,045,513	39,747	120,358	-	135,396	2,100,298
2068	2,100,298	40,939	117,335	-	139,234	2,163,136
2069	2,163,136	42,167	114,182	-	143,621	2,234,742
2070	2,234,742	43,432	110,903	-	148,605	2,315,876
2071	2,315,876	44,735	107,505	-	154,238	2,407,344
2072	2,407,344	46,077	103,994	-	160,573	2,510,000

For purposes of this projection, we assumed the 23.1% regular employer statutory contribution rate would continue after the plan becomes fully funded.

Single Discount Rate Development
Projection of Plan Fiduciary Net Position
(Dollars in Thousands, Concluded)

Fiscal Year Ending	Projected Beginning Plan Fiduciary Net Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expenses	Projected Investment Earnings at 6.75%	Projected Ending Plan Net Position
	(a)	(b)	(c)	(d)	(e)	(f)=(a)+(b)-(c)-(d)+(e)
2073	$ 2,510,000	$ 47,460	$ 100,378	$ -	$ 167,669	$ 2,624,751
2074	2,624,751	48,883	96,668	-	175,585	2,752,551
2075	2,752,551	50,350	92,871	-	184,386	2,894,416
2076	2,894,416	51,860	88,998	-	194,140	3,051,418
2077	3,051,418	53,416	85,056	-	204,921	3,224,699
2078	3,224,699	55,019	81,054	-	216,803	3,415,467
2079	3,415,467	56,669	76,999	-	229,869	3,625,006
2080	3,625,006	58,369	72,901	-	244,206	3,854,680
2081	3,854,680	60,120	68,766	-	259,904	4,105,938
2082	4,105,938	61,924	64,606	-	277,062	4,380,318
2083	4,380,318	63,782	60,429	-	295,783	4,679,454
2084	4,679,454	65,695	56,249	-	316,177	5,005,077
2085	5,005,077	67,666	52,078	-	338,361	5,359,026
2086	5,359,026	69,696	47,934	-	362,457	5,743,245
2087	5,743,245	71,787	43,837	-	388,598	6,159,793
2088	6,159,793	73,941	39,810	-	416,920	6,610,844
2089	6,610,844	76,159	35,878	-	447,570	7,098,695
2090	7,098,695	78,444	32,068	-	480,702	7,625,773
2091	7,625,773	80,797	28,406	-	516,479	8,194,643
2092	8,194,643	83,221	24,920	-	555,074	8,808,018
2093	8,808,018	85,717	21,634	-	596,669	9,468,770
2094	9,468,770	88,289	18,571	-	641,457	10,179,945
2095	10,179,945	90,938	15,748	-	689,643	10,944,778
2096	10,944,778	93,666	13,180	-	741,445	11,766,709
2097	11,766,709	96,476	10,877	-	797,095	12,649,403
2098	12,649,403	99,370	8,843	-	856,841	13,596,771
2099	13,596,771	102,351	7,076	-	920,946	14,612,992
2100	14,612,992	105,422	5,568	-	989,692	15,702,538
2101	15,702,538	108,584	4,305	-	1,063,384	16,870,201
2102	16,870,201	111,842	3,270	-	1,142,343	18,121,116
2103	18,121,116	115,197	2,438	-	1,226,919	19,460,794
2104	19,460,794	118,653	1,785	-	1,317,484	20,895,146
2105	20,895,146	122,213	1,285	-	1,414,438	22,430,512
2106	22,430,512	125,879	910	-	1,518,209	24,073,690
2107	24,073,690	129,655	637	-	1,629,258	25,831,966
2108	25,831,966	133,545	444	-	1,748,077	27,713,144
2109	27,713,144	137,551	309	-	1,875,194	29,725,580
2110	29,725,580	141,678	218	-	2,011,173	31,878,213
2111	31,878,213	145,928	158	-	2,156,619	34,180,602
2112	34,180,602	150,306	118	-	2,312,177	36,642,967
2113	36,642,967	154,815	92	-	2,478,537	39,276,227
2114	39,276,227	159,460	75	-	2,656,437	42,092,049
2115	42,092,049	164,243	62	-	2,846,664	45,102,894
2116	45,102,894	169,171	53	-	3,050,060	48,322,072
2117	48,322,072	174,246	45	-	3,267,524	51,763,797
2118	51,763,797	179,473	39	-	3,500,014	55,443,245
2119	55,443,245	184,857	33	-	3,748,555	59,376,624
2120	59,376,624	190,403	28	-	4,014,243	63,581,242
2121	63,581,242	196,115	23	-	4,298,244	68,075,578
2122	68,075,578	201,999	66	-	4,601,806	72,879,317

For purposes of this projection, we assumed the 23.1% statutory regular employer statutory contribution rate would continue after the plan becomes fully funded.

Single Discount Rate Development
Present Values of Projected Benefits (Dollars in Thousands)

Fiscal Year Ending	Projected Beginning Plan Fiduciary Net Position	Projected Benefit Payments	Funded Portion of Benefit Payments	Unfunded Portion of Benefit Payments	Present Value of Funded Benefit Payments using Expected Return Rate (v)	Present Value of Unfunded Benefit Payments using Municipal Bond Rate (vf)	Present Value of Benefit Payments using Single Discount Rate (sdr)
(a)	(b)	(c)	(d)	(e)	(f)=(d)*v^((a)-.5)	(g)=(e)*vf ^((a)-.5)	(h)=(c)/(1+sdr)^(a-.5)
2023	$ 883,581	$ 66,365	$ 66,365	$ 0	$ 64,233	$ 0	$ 64,233
2024	924,634	68,271	68,271	0	61,899	0	61,899
2025	966,857	70,463	70,463	0	59,847	0	59,847
2026	1,009,848	72,688	72,688	0	57,833	0	57,833
2027	1,053,643	75,070	75,070	0	55,951	0	55,951
2028	1,098,158	77,622	77,622	0	54,195	0	54,195
2029	1,143,103	80,199	80,199	0	52,454	0	52,454
2030	1,188,361	82,854	82,854	0	50,764	0	50,764
2031	1,232,823	85,731	85,731	0	49,205	0	49,205
2032	1,277,149	88,919	88,919	0	47,808	0	47,808
2033	1,320,869	92,000	92,000	0	46,336	0	46,336
2034	1,364,055	94,624	94,624	0	44,645	0	44,645
2035	1,407,317	97,085	97,085	0	42,909	0	42,909
2036	1,450,913	99,686	99,686	0	41,273	0	41,273
2037	1,494,658	102,310	102,310	0	39,681	0	39,681
2038	1,538,506	104,839	104,839	0	38,091	0	38,091
2039	1,570,793	107,362	107,362	0	36,541	0	36,541
2040	1,602,187	110,146	110,146	0	35,118	0	35,118
2041	1,632,235	113,091	113,091	0	33,777	0	33,777
2042	1,660,640	116,399	116,399	0	32,567	0	32,567
2043	1,686,795	119,726	119,726	0	31,380	0	31,380
2044	1,710,505	122,743	122,743	0	30,136	0	30,136
2045	1,732,043	125,846	125,846	0	28,944	0	28,944
2046	1,751,143	129,246	129,246	0	27,847	0	27,847
2047	1,767,245	132,375	132,375	0	26,717	0	26,717
2048	1,780,510	135,444	135,444	0	25,608	0	25,608
2049	1,790,841	138,228	138,228	0	24,482	0	24,482
2050	1,798,423	140,681	140,681	0	23,341	0	23,341
2051	1,803,565	142,754	142,754	0	22,187	0	22,187
2052	1,806,604	144,357	144,357	0	21,018	0	21,018
2053	1,808,039	145,628	145,628	0	19,862	0	19,862
2054	1,808,224	145,863	145,863	0	18,636	0	18,636
2055	1,808,415	145,573	145,573	0	17,423	0	17,423
2056	1,809,382	144,513	144,513	0	16,202	0	16,202
2057	1,812,168	143,241	143,241	0	15,044	0	15,044
2058	1,817,217	141,619	141,619	0	13,934	0	13,934
2059	1,825,105	139,831	139,831	0	12,888	0	12,888
2060	1,836,271	137,836	137,836	0	11,901	0	11,901
2061	1,851,201	135,711	135,711	0	10,976	0	10,976
2062	1,870,333	133,475	133,475	0	10,113	0	10,113
2063	1,894,099	131,114	131,114	0	9,306	0	9,306
2064	1,922,970	128,624	128,624	0	8,552	0	8,552
2065	1,957,458	126,003	126,003	0	7,848	0	7,848
2066	1,998,109	123,247	123,247	0	7,191	0	7,191
2067	2,045,513	120,358	120,358	0	6,578	0	6,578
2068	2,100,298	117,335	117,335	0	6,007	0	6,007
2069	2,163,136	114,182	114,182	0	5,476	0	5,476
2070	2,234,742	110,903	110,903	0	4,983	0	4,983
2071	2,315,876	107,505	107,505	0	4,525	0	4,525
2072	2,407,344	103,994	103,994	0	4,100	0	4,100

Single Discount Rate Development
Present Values of Projected Benefits
(Dollars in Thousands, Concluded)

Fiscal Year Ending	Projected Beginning Plan Fiduciary Net Position	Projected Benefit Payments	Funded Portion of Benefit Payments	Unfunded Portion of Benefit Payments	Present Value of Funded Benefit Payments using Expected Return Rate (v)	Present Value of Unfunded Benefit Payments using Municipal Bond Rate (vf)	Present Value of Benefit Payments using Single Discount Rate (sdr)
(a)	(b)	(c)	(d)	(e)	(f)=(d)*v^((a)-.5)	(g)=(e)*vf ^((a)-.5)	(h)=(c)/(1+sdr)^(a-.5)
2073	$ 2,510,000	$ 100,378	$ 100,378	$ -	$ 3,707	$ -	$ 3,707
2074	2,624,751	96,668	96,668	-	3,345	-	3,345
2075	2,752,551	92,871	92,871	-	3,010	-	3,010
2076	2,894,416	88,998	88,998	-	2,702	-	2,702
2077	3,051,418	85,056	85,056	-	2,419	-	2,419
2078	3,224,699	81,054	81,054	-	2,160	-	2,160
2079	3,415,467	76,999	76,999	-	1,922	-	1,922
2080	3,625,006	72,901	72,901	-	1,704	-	1,704
2081	3,854,680	68,766	68,766	-	1,506	-	1,506
2082	4,105,938	64,606	64,606	-	1,326	-	1,326
2083	4,380,318	60,429	60,429	-	1,161	-	1,161
2084	4,679,454	56,249	56,249	-	1,013	-	1,013
2085	5,005,077	52,078	52,078	-	878	-	878
2086	5,359,026	47,934	47,934	-	757	-	757
2087	5,743,245	43,837	43,837	-	649	-	649
2088	6,159,793	39,810	39,810	-	552	-	552
2089	6,610,844	35,878	35,878	-	466	-	466
2090	7,098,695	32,068	32,068	-	390	-	390
2091	7,625,773	28,406	28,406	-	324	-	324
2092	8,194,643	24,920	24,920	-	266	-	266
2093	8,808,018	21,634	21,634	-	216	-	216
2094	9,468,770	18,571	18,571	-	174	-	174
2095	10,179,945	15,748	15,748	-	138	-	138
2096	10,944,778	13,180	13,180	-	108	-	108
2097	11,766,709	10,877	10,877	-	84	-	84
2098	12,649,403	8,843	8,843	-	64	-	64
2099	13,596,771	7,076	7,076	-	48	-	48
2100	14,612,992	5,568	5,568	-	35	-	35
2101	15,702,538	4,305	4,305	-	26	-	26
2102	16,870,201	3,270	3,270	-	18	-	18
2103	18,121,116	2,438	2,438	-	13	-	13
2104	19,460,794	1,785	1,785	-	9	-	9
2105	20,895,146	1,285	1,285	-	6	-	6
2106	22,430,512	910	910	-	4	-	4
2107	24,073,690	637	637	-	3	-	3
2108	25,831,966	444	444	-	2	-	2
2109	27,713,144	309	309	-	1	-	1
2110	29,725,580	218	218	-	1	-	1
2111	31,878,213	158	158	-	-	-	-
2112	34,180,602	118	118	-	-	-	-
2113	36,642,967	92	92	-	-	-	-
2114	39,276,227	75	75	-	-	-	-
2115	42,092,049	62	62	-	-	-	-
2116	45,102,894	53	53	-	-	-	-
2117	48,322,072	45	45	-	-	-	-
2118	51,763,797	39	39	-	-	-	-
2119	55,443,245	33	33	-	-	-	-
2120	59,376,624	28	28	-	-	-	-
2121	63,581,242	23	23	-	-	-	-
2122	68,075,578	66	66	-	-	-	-
				Totals	$ 1,449,540	$ -	$ 1,449,540

SECTION H

GLOSSARY OF TERMS

Glossary of Terms

Accrued Service	Service credited under the system which was rendered before the date of the actuarial valuation.
Actuarial Accrued Liability (AAL)	The AAL is the difference between the actuarial present value of all benefits and the actuarial value of future normal costs. The definition comes from the fundamental equation of funding which states that the present value of all benefits is the sum of the Actuarial Accrued Liability and the present value of future normal costs. The AAL may also be referred to as "accrued liability" or "actuarial liability."
Actuarial Assumptions	These assumptions are estimates of future experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and compensation increases. Actuarial assumptions are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (compensation increases, payroll growth, inflation and investment return) consist of an underlying real rate of return plus an assumption for a long-term average rate of inflation.
Actuarial Cost Method	A mathematical budgeting procedure for allocating the dollar amount of the actuarial present value of the pension trust benefits between future normal cost and actuarial accrued liability. The actuarial cost method may also be referred to as the actuarial funding method.
Actuarial Equivalent	A single amount or series of amounts of equal actuarial value to another single amount or series of amounts, computed on the basis of appropriate actuarial assumptions.
Actuarial Gain (Loss)	The difference in liabilities between actual experience and expected experience during the period between two actuarial valuations is the gain (loss) on the accrued liabilities.
Actuarial Present Value (APV)	The amount of funds currently required to provide a payment or series of payments in the future. The present value is determined by discounting future benefit payments at predetermined rates of interest to reflect the expected effects of the time value (present value) of money and the probabilities of payment.
Actuarial Valuation	The actuarial valuation report determines, as of the actuarial valuation date, the service cost, total pension liability, and related actuarial present value of projected benefit payments for pensions performed in conformity with Actuarial Standards of Practice unless otherwise specified by the GASB.
Actuarial Valuation Date	The date as of which an actuarial valuation is performed.
Actuarially Determined Contribution (ADC)	A calculated contribution into a defined benefit pension plan for the reporting period, most often determined based on the funding policy of the plan. Typically, the Actuarially Determined Contribution has a normal cost payment and an amortization payment.

Glossary of Terms

Amortization Method	The method used to determine the periodic amortization payment may be a level dollar amount, or a level percent of pay amount. The period will typically be expressed in years, and the method will either be "open" (meaning, reset each year) or "closed" (the number of years remaining will decline each year).
Amortization Payment	The amortization payment is the periodic payment required to pay off an interest-discounted amount with payments of interest and principal.
Cost-of-Living Adjustments	Postemployment benefit changes intended to adjust benefit payments for the effects of inflation.
Cost-Sharing Multiple-Employer Defined Benefit Pension Plan (cost-sharing pension plan)	A multiple-employer defined benefit pension plan in which the pension obligations to the employees of more than one employer are pooled and pension plan assets can be used to pay the benefits of the employees of any employer that provides pensions through the pension plan.
Covered-Employee Payroll	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.
Deferred Inflows and Outflows of Resources	The deferred inflows and outflows of pension resources are amounts used under GASB Statement No. 68 in developing the annual pension expense. Deferred inflows and outflows arise with differences between expected and actual experiences; changes of assumptions. The portion of these amounts not included in pension expense should be included in the deferred inflows or outflows of resources.
Discount Rate or Single Discount Rate	For GASB purposes, the discount rate is the single rate of return that results in the present value of all projected benefit payments to be equal to the sum of the funded and unfunded projected benefit payments, specifically: 1. The benefit payments to be made while the pension plans' fiduciary net position is projected to be greater than the benefit payments that are projected to be made in the period; and 2. The present value of the benefit payments not in (1) above, discounted using the municipal bond rate.
Entry Age Actuarial Cost Method or Entry Age Normal (EAN)	The EAN is a funding method for allocating the costs of the plan between the normal cost and the accrued liability. The actuarial present value of the projected benefits of each individual included in an actuarial valuation is allocated on a level basis (either level dollar or level percent of pay) over the earnings or service of the individual between entry age and assumed exit age(s). The portion of the actuarial present value allocated to a valuation year is the normal cost. The portion of this actuarial present value not provided for at a valuation date by the actuarial present value of future normal costs is the actuarial accrued liability. The sum of the accrued liability plus the present value of all future normal costs is the present value of all benefits.

Glossary of Terms

Fiduciary Net Position	The fiduciary net position is the value of the net assets of the trust restricted for pension benefits.
GASB	The Governmental Accounting Standards Board is an organization that exists with authority to promulgate accounting standards for state and local governmental entities.
Long-Term Expected Rate of Return	The long-term rate of return is the expected return to be earned over the entire trust portfolio based on the asset allocation of the portfolio.
Money-Weighted Rate of Return	The money-weighted rate of return is a method of calculating the returns that adjusts for the changing amounts actually invested. For purposes of GASB Statement No. 67, money-weighted rate of return is calculated as the internal rate of return on pension plan investments, net of pension plan investment expense.
Multiple-Employer Defined Benefit Pension Plan	A multiple-employer plan is a defined benefit pension plan that is used to provide pensions to the employees of more than one employer.
Municipal Bond Rate	The Municipal Bond Rate is the discount rate to be used for those benefit payments that occur after the assets of the trust have been depleted.
Net Pension Liability (NPL)	The NPL is the liability of employers and non-employer contributing entities to plan members for benefits provided through a defined benefit pension plan.
Non-Employer Contributing Entities	Non-employer contributing entities are entities that make contributing to a pension plan that is used to provide pensions to the employees of other entities. For purposes of the GASB Accounting Statements No. 67 and No. 68 plan members are not considered non-employer contributing entities.
Normal Cost	The actuarial present value of the pension trust benefits allocated to the current year by the actuarial cost method.
Other Postemployment Benefits (OPEB)	All postemployment benefits other than retirement income (such as death benefits, life insurance, disability, and long-term care) that are provided separately from a pension plan, as well as postemployment healthcare benefits regardless of the manner in which they are provided. Other postemployment benefits do not include termination benefits.
Real Rate of Return	The real rate of return is the rate of return on an investment after adjustment to eliminate inflation.
Service Cost	The service cost is the portion of the actuarial present value of projected benefit payments that is attributed to a valuation year.

Glossary of Terms

Total Pension Expense The total pension expense is the sum of the following items that are recognized at the end of the employer's fiscal year:

1. Service Cost
2. Interest on the Total Pension Liability
3. Current-Period Changes in Benefit Terms
4. Employee Contributions
5. Projected Earnings on Plan Investments
6. Pension Plan Administrative Expense
7. Other Changes in Plan Fiduciary Net Position
8. Recognition of Outflow (Inflow) of Resources due to the difference between expected and actual in measurement of the Total Pension Liability
9. Recognition of Outflow (Inflow) of Resources due to Assumption Changes
10. Recognition of Outflow (Inflow) of Resources due to the difference between projected and actual earnings on pension plan investments

Total Pension Liability (TPL) The TPL is the portion of the actuarial present value of projected benefit payments that is attributed to past periods of member service.

Unfunded Actuarial Accrued Liability (UAAL) The UAAL is the difference between actuarial accrued liability and valuation assets.

Valuation Assets The valuation assets are the plan fiduciary net position used in determining the net position liability of the plan. For purposes of the GASB Statement No. 67, the asset valuation method is equal to the market value of assets.