Minnesota State Retirement System
Correctional Employees Retirement Fund

GASB Statement Nos. 67 and 68
Accounting and Financial Reporting for Pensions
June 30, 2022

GRS

November 18, 2022

Minnesota State Retirement System
Correctional Employees 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 Correctional Employees 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 statements.

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 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. The Minnesota State Retirement System (MSRS) is responsible for preparing the Schedule of Employer Allocations and the Schedule of Pension Amounts by Employer. This report may be provided to parties other than 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.

To the best of our knowledge, the information contained within this report is accurate and fairly represents the actuarial position of the Correctional Employees 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 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

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Bonita J. Wurst

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BBM/BJW:rmn

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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	3,294
- Survivors	290
- Disability Retirements	330
- Deferred Retirements	1,475
- Terminated Other Non-vested	1,169
- Active Members	4,420
- Total	10,978
Covered-Employee Payroll [1]	$ 294,479
Net Pension Liability	
Total Pension Liability	$ 2,073,612
Plan Fiduciary Net Position	1,473,921
Net Pension Liability	$ 599,691
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	71.08%
Net Pension Liability as a Percentage of Covered-Employee Payroll	203.64%
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)	$ (34,485)

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 the Total Pension Liability	$ 23,911	$ 2,842
Changes in assumptions	161,738	54,123
Net difference between projected and actual earnings on pension plan investments	177,301	164,954
Total	$ 362,950	$ 221,919

(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 Correctional Employees Retirement Fund subsequent to the measurement date of June 30, 2022.

The pension expense 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 Correctional Employees 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 percent of pay;
2. The funded status of the plan is expected to gradually improve and is expected to be 100% funded within the next 26 years; and
3. The unfunded liability 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

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 long-term expected rate of return on pension plan investments is 6.75%; the municipal bond rate is 6.75% (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	$	56,990
2. Interest on the Total Pension Liability		130,414
3. Current-Period Benefit Changes		-
4. Employee Contributions		(28,270)
5. Projected Earnings on Plan Investments		(102,506)
6. Pension Plan Administrative Expense		909
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		6,419
9. Recognition of Outflow (Inflow) of Resources due to assumption changes		
Arising from Current Reporting Period		(18,041)
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		40,332
11. **Increases/(Decreases) from Experience in the Current Reporting Period**	**$**	**86,247**
12. Recognition of Outflow (Inflow) of Resources due to differences between expected and actual experience in the measurement of the Total Pension Liability		
Arising from Prior Reporting Periods		1,499
13. Recognition of Outflow (Inflow) of Resources due to assumption changes		
Arising from Prior Reporting Periods		(69,655)
14. Recognition of Outflow (Inflow) of Resources due to the difference between projected and actual earnings on Pension Plan Investments		
Arising from Prior Reporting Periods		(52,576)
15. **Total Pension Expense / (Income)**	**$**	**(34,485)**

Recognition of Deferred Outflows and Inflows of Resources

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 45,081 years. Additionally, the total plan membership (active employees and inactive employees) was 10,728. 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 4.0000 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	$	25,674
2. Assumption Changes (gains) or losses		(72,164)
3. Recognition period for Liabilities: Average of the expected remaining service lives of all employees {in years}		4
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		6,419
5. Outflow (Inflow) of Resources to be recognized in the current pension expense for Assumption Changes		(18,041)
6. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Liabilities	$	(11,622)
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	$	19,255
8. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses for Assumption Changes		(54,123)
9. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Liabilities	$	(34,868)
B. Outflows (Inflows) of Resources due to Assets		
1. Net difference between projected and actual earnings on pension plan investments (gains) or losses	$	201,661
2. Recognition period for Assets {in years}		5
3. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Assets		40,332
4. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Assets	$	161,329

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	$ 63,478	$ 143,256	$ (79,778)
2. Due to Assets	48,541	60,785	(12,244)
3. Totals	$ 112,019	$ 204,041	$ (92,022)

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	$ 9,565	$ 1,647	$ 7,918
2. Assumption Changes	53,913	141,609	(87,696)
3. Net Difference between projected and actual earnings on pension plan investments	48,541	60,785	(12,244)
4. Totals	$ 112,019	$ 204,041	$ (92,022)

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	$ 23,911	$ 2,842	$ 21,069
2. Assumption Changes	161,738	54,123	107,615
3. Net Difference between projected and actual earnings on pension plan investments*	177,301	164,954	12,347
4. Total	$ 362,950	$ 221,919	$ 141,031

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	$ 38,047
2024	35,962
2025	26,689
2026	40,333
2027	-
Thereafter	-
Total	$ 141,031

** 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					
2018	$ (3,499)	5.0000	$ (699)	$ -	0.0000
2019	8,180	5.0000	1,636	1,636	1.0000
2020	7,550	5.0000	1,510	3,020	2.0000
2021	(4,738)	5.0000	(948)	(2,842)	3.0000
2022	25,674	4.0000	6,419	19,255	3.0000
Total			**$ 7,918**	**$ 21,069**	
Deferred Outflow (Inflow) due to Assumption Changes					
2018	$ (617,840)	5.0000	$ (123,568)	$ -	0.0000
2021	269,564	5.0000	53,913	161,738	3.0000
2022	(72,164)	4.0000	(18,041)	(54,123)	3.0000
Total			**$ (87,696)**	**$ 107,615**	
Deferred Outflow (Inflow) due to Differences Between Projected and Actual Earnings on Plan Investments					
2018	$ (29,009)	5.0000	$ (5,801)	$ -	0.0000
2019	2,231	5.0000	446	447	1.0000
2020	38,814	5.0000	7,763	15,525	2.0000
2021	(274,922)	5.0000	(54,984)	(164,954)	3.0000
2022	201,661	5.0000	40,332	161,329	4.0000
Total			**$ (12,244)**	**$ 12,347**	
Deferred Outflow (Inflow) due to All Sources					
Total			**$ (92,022)**	**$ 141,031**	

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

Assets		June 30, 2022
Cash & Short-term Investments	$	28,370
Receivables		5,768
Investment Pools (at fair value)		1,442,916
Securities Lending Collateral		75,986
Capital Assets		-
Total Assets	**$**	**1,553,040**
Total Deferred Outflows of Resources	**$**	**-**
Total Liabilities	**$**	**(79,119)**
Total Deferred Inflows of Resources	**$**	**-**
Net Position Restricted for Pensions	**$**	**1,473,921**

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	**$**	**1,580,953**
Additions		
2. Contributions		
a. Employee	$	28,270
b. Employer		55,104
c. Other sources		-
d. Total contributions	$	83,374
3. Investment income		
a. Investment income/(loss)	$	(97,471)
b. Investment expenses		(1,684)
c. Net investment income/(loss)	$	(99,155)
4. Other Additions		3
5. Total Additions *(2.d.) + (3.c.) + (4.)*	**$**	**(15,778)**
Deductions		
6. Benefits Paid		
a. Annuity benefits	$	(87,102)
b. Refunds		(3,240)
c. Total benefits paid	$	(90,342)
7. Expenses		
a. Other deductions	$	(3)
b. Administrative		(909)
c. Total expenses	$	(912)
8. Total deductions *(6.c.) + (7.c.)*	**$**	**(91,254)**
9. Net increase/(decrease) in fiduciary net position *(5.) + (8.)*	**$**	**(107,032)**
10. Net position at market value at end of year *(1.) + (9.)*	**$**	**1,473,921**
11. State Board of Investment calculated annual investment return for the Correctional Employees 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	$	56,990
2. Interest on the Total Pension Liability		130,414
3. Changes of benefit terms		-
4. Difference between expected and actual experience of the Total Pension Liability		25,674
5. Changes of assumptions		(72,164)
6. Benefit payments, including refunds of employee contributions		(90,342)
7. Net change in Total Pension Liability	$	50,572
8. Total Pension Liability – Beginning		2,023,040
9. Total Pension Liability – Ending	**$**	**2,073,612**
B. Plan Fiduciary Net Position		
1. Contributions – Employer	$	55,104
2. Contributions – Employee		28,270
3. Net investment income		(99,155)
4. Benefit payments, including refunds of employee contributions		(90,342)
5. Pension Plan Administrative Expense		(909)
6. Other changes		-
7. Net change in Plan Fiduciary Net Position	$	(107,032)
8. Plan Fiduciary Net Position – Beginning		1,580,953
9. Plan Fiduciary Net Position – Ending	**$**	**1,473,921**
C. Net Pension Liability, *A.9 - B.9.*	**$**	**599,691**
D. Plan Fiduciary Net Position as a percentage of the Total Pension Liability, *B.9 / A.9.*		**71.08%**
E. Covered-Employee payroll	**$**	**294,479** [1]
F. Net Pension Liability as a percentage of Covered-Employee payroll, *C. / E.*		**203.64%**

[1] *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	$ 56,990	$ 47,383	$ 46,258	$ 44,912	$ 85,364	$ 95,522	$ 56,718	$ 48,805	$ 54,443	
Interest on the Total Pension Liability	130,414	123,942	117,205	110,664	108,421	95,307	97,571	92,039	85,702	
Benefit Changes	-	-	-	-	(164,182)	-	-	-	-	
Difference between Expected and Actual Experience	25,674	(4,738)	7,550	8,180	(3,499)	6,566	(764)	7,115	4,103	
Assumption Changes	(72,164)	269,564	-	-	(617,840)	(213,159)	576,552	118,399	(147,067)	
Benefit Payments	(87,102)	(81,829)	(77,045)	(72,419)	(67,622)	(63,221)	(59,045)	(54,909)	(50,842)	
Refunds	(3,240)	(2,136)	(2,488)	(2,484)	(2,052)	(1,466)	(1,895)	(1,590)	(1,447)	
Net Change in Total Pension Liability	**$ 50,572**	**$ 352,186**	**$ 91,480**	**$ 88,853**	**$ (661,410)**	**$ (80,451)**	**$ 669,137**	**$ 209,859**	**$ (55,108)**	
Total Pension Liability - Beginning	**$ 2,023,040**	**$ 1,670,854**	**$ 1,579,374**	**$ 1,490,521**	**$ 2,151,931**	**$ 2,232,382**	**$ 1,563,245**	**$ 1,353,386**	**$ 1,408,494**	
Total Pension Liability - Ending (a)	**$ 2,073,612**	**$ 2,023,040**	**$ 1,670,854**	**$ 1,579,374**	**$ 1,490,521**	**$ 2,151,931**	**$ 2,232,382**	**$ 1,563,245**	**$ 1,353,386**	
Plan Fiduciary Net Position										
Employer Contributions	$ 55,104	$ 48,823	$ 43,658	$ 38,245	$ 32,893	$ 31,763	$ 30,678	$ 29,480	$ 26,468	
Employee Contributions	28,270	27,136	26,734	25,686	23,417	22,648	21,953	21,061	18,855	
Pension Plan Net Investment Income	(99,155)	366,352	49,608	80,942	105,263	135,359	(195)	38,624	137,523	
Benefit Payments	(87,102)	(81,829)	(77,045)	(72,419)	(67,622)	(63,221)	(59,045)	(54,909)	(50,842)	
Refunds	(3,240)	(2,136)	(2,488)	(2,484)	(2,052)	(1,466)	(1,895)	(1,590)	(1,447)	
Pension Plan Administrative Expense	(909)	(950)	(924)	(856)	(827)	(856)	(906)	(720)	(657)	
Other Changes	-	20	(1)	(6)	(2)	(2)	-	-	(1)	
Net Change in Plan Fiduciary Net Position	**$ (107,032)**	**$ 357,416**	**$ 39,542**	**$ 69,108**	**$ 91,070**	**$ 124,225**	**$ (9,410)**	**$ 31,946**	**$ 129,899**	
Plan Fiduciary Net Position - Beginning	**$ 1,580,953**	**$ 1,223,537**	**$ 1,183,995**	**$ 1,114,887**	**$ 1,023,817**	**$ 899,592**	**$ 909,002**	**$ 877,056**	**$ 747,157**	
Plan Fiduciary Net Position - Ending (b)	**$ 1,473,921**	**$ 1,580,953**	**$ 1,223,537**	**$ 1,183,995**	**$ 1,114,887**	**$ 1,023,817**	**$ 899,592**	**$ 909,002**	**$ 877,056**	
Net Pension Liability - Ending (a) - (b)	**$ 599,691**	**$ 442,087**	**$ 447,317**	**$ 395,379**	**$ 375,634**	**$ 1,128,114**	**$ 1,332,790**	**$ 654,243**	**$ 476,330**	
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	**71.08 %**	**78.15 %**	**73.23 %**	**74.97 %**	**74.80 %**	**47.58 %**	**40.30 %**	**58.15 %**	**64.80 %**	
Covered-Employee Payroll [(1)]	**$ 294,479**	**$ 282,667**	**$ 278,479**	**$ 267,563**	**$257,330**	**$248,879**	**$241,242**	**$231,440**	**$219,244**	
Net Pension Liability as a Percentage of Covered-Employee Payroll	**203.64 %**	**156.40 %**	**160.63 %**	**147.77 %**	**145.97 %**	**453.28 %**	**552.47 %**	**282.68 %**	**217.26 %**	

Notes to Schedule:

(1) Assumed equal to plan 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	$ 1,353,386	$ 877,056	$ 476,330	64.80%	$ 219,244	217.26%
2015	1,563,245	909,002	654,243	58.15	231,440	282.68
2016	2,232,382	899,592	1,332,790	40.30	241,242	552.47
2017	2,151,931	1,023,817	1,128,114	47.58	248,879	453.28
2018	1,490,521	1,114,887	375,634	74.80	257,330	145.97
2019	1,579,374	1,183,995	395,379	74.97	267,563	147.77
2020	1,670,854	1,223,537	447,317	73.23	278,479	160.63
2021	2,023,040	1,580,953	442,087	78.15	282,667	156.40
2022	2,073,612	1,473,921	599,691	71.08	294,479	203.64

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	$ 34,060	$ 24,632	$ 9,428	$ 204,198	12.06%
2014	38,390	26,468	11,922	219,244	12.07
2015	40,109	29,480	10,629	231,440	12.74
2016	44,171	30,678	13,493	241,242	12.72
2017	45,943	31,763	14,180	248,879	12.76
2018	49,665	32,893	16,772	257,330	12.78
2019	43,265	38,245	5,020	267,563	14.29
2020	45,726	43,658	2,068	278,479	15.68
2021	46,781	48,823	(2,042)	282,667	17.27
2022	44,614	55,104	(10,490)	294,479	18.71

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.
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 11.50% 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	1.5% 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. This 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]
2012	
2014	18.6 %
2015	4.4
2016	(0.0)
2017	15.2
2018	10.4
2019	7.3
2020	4.2
2021	30.2
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 Correctional Employees 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.

10-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 real 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 an 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 plan 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 was projected to be available to make 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 fund's net pension liability would be if it were calculated using a Single Discount Rate that is 1-percentage-point lower (5.75%) or 1-percentage-point 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	$ 2,386,870	$ 2,073,612	$ 1,819,824
Net Position Restricted for Pensions	1,473,921	1,473,921	1,473,921
Net Pension Liability	**$ 912,949**	**$ 599,691**	**$ 345,903**

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	**$ 2,023,040**	**$ 1,580,953**	**$ 442,087**	**$ 247,634**	**$ 353,796**	
Changes for the Year:						
Service Cost	$ 56,990		$ 56,990			$ 56,990
Interest on Total Pension Liability	130,414		130,414			130,414
Interest on Plan Fiduciary Net Position [1]		$ 102,506 [1]	(102,506)			(102,506)
Changes in Benefit Terms	-		-			-
Liability Experience Gains and Losses	25,674		25,674	$ 19,255	$ -	6,419
Changes in Assumptions	(72,164)		(72,164)	-	54,123	(18,041)
Recognition of Deferred Outflows/(Inflows) of Resources Arising from Prior Reporting Periods						
Liability Experience Gains/(Losses)				(3,146)	(1,647)	1,499
Assumption Changes				(53,913)	(123,568)	(69,655)
Investment Gains/(Losses)				(8,209)	(60,785)	(52,576)
Contributions - Employer		55,104	(55,104)			
Contributions - Employees		28,270	(28,270)			(28,270)
Asset Gain/(Loss) [1]		(201,661) [1]	201,661	161,329	-	40,332
Benefit Payment and Refunds	(90,342)	(90,342)				
Administrative Expenses		(909)	909			909
Other Changes		-	-			-
Net Changes	**$ 50,572**	**$ (107,032)**	**$ 157,604**	**$ 115,316**	**$ (131,877)**	**$ (34,485)**
Balance End of Year	**$ 2,073,612**	**$ 1,473,921**	**$ 599,691**	**$ 362,950**	**$ 221,919**	

[1] *The sum of these items in column (b) equals the net investment income of -$99,155.*

Summary of Population Statistics

		Terminated		Recipients			
	Actives	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	Total
Members on July 1, 2021	**4,504**	**1,428**	**1,068**	**3,127**	**325**	**276**	**10,728**
New members	477						**477**
Return to active	36	(26)	(10)	0	0	0	**0**
Terminated non-vested	(189)	0	189	0	0	0	**0**
Service retirements	(160)	(51)	0	211	0	0	**0**
Terminated deferred	(113)	113	0	0	0	0	**0**
Terminated refund/transfer	(121)	(10)	(129)	0	0	0	**(260)**
Deaths	(5)	(2)	(3)	(57)	(6)	(11)	**(84)**
New beneficiary	0	0	0	0	0	29	**29**
Disabled	(9)	0	0	0	9	0	**0**
Unexpected status change	0	23	54	13	2	(4)	**88**
Net change	(84)	47	101	167	5	14	**250**
Members on July 1, 2022	**4,420**	**1,475**	**1,169**	**3,294**	**330**	**290**	**10,978**

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 employees in covered correctional service. Certain state employees with 75 percent working time spent in direct contact with inmates or patients are also eligible.
Contributions	Shown as a percent of salary:

Effective as of	Member	Regular Employer	Supplemental Employer	Total
July 1, 2021	9.60%	14.40%	4.45%	28.45%

Supplemental employer contribution remains 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).

Allowable service	Service during which member contributions were made. May also include certain leave of absence, military service and periods while temporary Worker’s Compensation is paid.
Salary	Includes wages, allowances and fees. Excludes lump sum payments of separation and reduced salary while receiving Worker’s Compensation benefits.
Average salary	Average of the five highest successive years of Salary. Average Salary is based on all Allowable Service if less than five years.
Vesting	Hired before July 1, 2010: 100% vested after 3 years of Allowable Service. Hired after June 30, 2010: 50% vested after 5 years of Allowable Service; 60% vested after 6 years of Allowable Service; 70% vested after 7 years of Allowable Service; 80% vested after 8 years of Allowable Service; 90% vested after 9 years of Allowable Service; and 100% vested after 10 years of Allowable Service.

Summary of Plan Provisions (Continued)

Retirement

Normal retirement benefit

Age/Service requirement	Age 55 and vested. Proportionate Retirement Annuity is available at age 65 and one year of Allowable Service.
Amount	2.40% (2.20% if first hired after June 30, 2010) of Average Salary for each year of Allowable Service, pro-rata for completed months.

Early retirement

Age/Service requirement	Age 50 and vested.
Amount	Normal Retirement Benefit based on Allowable Service and Average Salary at retirement date reduced by 2/10% (5/12% if first hired after June 30, 2010, or if hired before July 1, 2010, and retire after June 30, 2015) per month for each month that the member is under age 55.

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 — 1.50% 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

Duty Disability

Age/Service requirement	Physically or mentally unable to perform normal job duties as a direct result of a disability relating to an incident while performing the duties of the job which present inherent dangers to the employee. Members who become disabled after June 30, 2009, will have disability benefits converted to retirement benefits at age 55 instead of age 65.
Amount	50.00% of Average Salary plus 2.40% (2.20% if first hired after June 30, 2010) of Average Salary for each year in excess of 20 years and 10 months of Allowable Service (pro rata for completed months).

Summary of Plan Provisions (Continued)

Disability (Continued)

Duty Disability (Continued)

Amount (Continued)	Payment begins at disability and ends at age 55 (age 65 if disabled prior to July 1, 2009) or the five-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. Member is reclassified from disabled to retired at age 55 (age 65 if disabled prior to July 1, 2009). Optional amount continues. Otherwise, normal retirement benefit equal to the disability benefit paid, or an actuarially equivalent option.

Regular Disability

Age/Service requirement	At least one year of covered Correctional service for employees hired before July 1, 2009, or a vested Correctional employee hired after June 30, 2009, and the employee is determined to have a regular disability not related to an incident while performing the duties of the job.
Amount	Normal retirement benefit based on covered Correctional Service (minimum of 15 years if hired prior to July 1, 2009) and Average Salary at disability. Payment begins at disability and ends at age 55 (age 65 if disabled prior to July 1, 2009) or the five-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. Member is reclassified from disabled to retired at age 55 (age 65 if disabled prior to July 1, 2009). Optional amount continues. Otherwise, normal retirement benefit equal to the disability benefit paid, or an actuarially equivalent option.
Benefit Increases	Same as for retirement.

Death

Surviving spouse benefit

Age/Service requirement	Member at any age or former member age 50 or older who dies before retirement or disability benefit commences and was vested. If a former member dies before age 55 and has less than 30 years of Allowable Service, benefits commence when the former member would have been age 55. If an active member dies, benefits may commence immediately, regardless of age.

Death (Continued)	
Surviving spouse benefit (Continued)	
Amount	Surviving spouse receives the 100% joint and survivor benefits using the Normal Retirement formula above. If commencement is prior to age 55, the appropriate early retirement formula described above applies except that one-half the monthly reduction factor is used from age 50 to the commencement age and the Rule of 90 does not apply. In lieu of this benefit, the surviving spouse may elect a refund of member contributions with interest or an actuarially equivalent term certain annuity (lump sum payable to estate at death).
Benefit increases	Same as for retirement.
Surviving dependent children's benefit	
Age/service requirement	If no surviving spouse, all children (biological or adopted) below age 20 who are dependent for more than half of their support on deceased member.
Amount	Actuarially equivalent to surviving spouse 100% joint and survivor annuity payable to the later of age 20 or five years. The amount is to be proportionally divided among surviving children.
Benefit increases	Same as for retirement.
Refund of contributions with interest	
Age/service requirement	Active employee dies and survivor benefits are not payable or a former employee dies before annuity begins. If accumulated member contributions with interest exceed total payments to the surviving spouse and children, then the remainder is paid out.
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)	
Deferred benefit	
Age/service requirement	Partially or fully vested.
Amount	Benefit 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 of the year following attainment of age 55 or January 1, 2012, whichever is earlier; (d.) 5.00% thereafter until the annuity begins (2.50% if hired after June 30, 2006), but before January 1, 2012; (e.) 2.00% from January 1, 2012 to December 31, 2018; and (f.) 0.00% thereafter. Amount is payable at normal or early retirement.
Optional form conversion factors	Effective July 1, 2019 and phased in over a 12-month period, actuarially equivalent factors based on the RP-2014 mortality table for healthy annuitants for a member turning age 56 in 2021, reflecting projected mortality improvements using Scale MP-2017, white collar adjustment, male rates set forward two years, female rates set forward one year, blended 70% males, 5.91% 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 were 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 in 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 assumptions dated July 12, 2022. 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. 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.

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.

Summary of Actuarial Assumptions (Continued)

Withdrawal	Service-related rates are 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 members are increased by 17.0% for vested members and 6.0% for non-vested members to account for the effect of some participants having eligibility for a Combined Service Annuity.
Administrative expenses	In the valuation year, equal to prior year administrative expenses expressed as a 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	75% of active male members are assumed to be married and 60% of active female 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 male spouses.
Form of payment	Married members retiring from active status are assumed to elect subsidized Joint and Survivor form of annuity as follows: Males: 12.5% elect 50% Joint & Survivor option 12.5% elect 75% Joint & Survivor option 65.0% elect 100% Joint & Survivor option Females: 15.0% elect 50% Joint & Survivor option 10.0% elect 75% Joint & Survivor option 50.0% elect 100% Joint & Survivor option Remaining members and unmarried members are assumed to elect the Straight Life option. Members receiving deferred annuities (including current terminated deferred members) are assumed to elect a straight life annuity, except that current terminated deferred members who terminated prior to July 1, 1997, are assumed to receive the Level Social Security option to age 62.

Summary of Actuarial Assumptions (Continued)

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.
Unknown data for certain members	To prepare this report, GRS has used and relied on participant data supplied by the Fund. Although GRS has reviewed the data in accordance with Actuarial Standards of Practice No. 23, GRS has not verified or audited any of the data or information provided. In cases where submitted data was missing or incomplete, the following assumptions were applied: <u>Data for active members</u>: There were 15 members reported without a gender and no members reported with an invalid date of birth. We assumed male gender. There were 30 members reported with zero or invalid salary. We used prior year salary (25 members), if available, otherwise, high five salary with a 10% load to account for salary increases (3 members). If neither pay or high five salary was available, we assumed a value of $45,000 (2 members). There were no members reported with zero service.

Summary of Actuarial Assumptions (Continued)

Unknown data for certain members (Concluded)	Data for terminated members: There were no members reported with missing or invalid gender or birth dates. There were 36 members reported without a benefit. If available, we calculated benefits for these members using the reported Average Salary, Credited Service and Termination Date provided. If Average Salary was not reported (15 members), we assumed a value of $45,000. There were no members reported without Credited Service or a Termination Date. Data for members receiving benefits: There were 2 members 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 survivors reported on the data file with an expired benefit. There were 5 members reported without a benefit. Due to the small number of members with missing benefits, we made no adjustment to the reported data for members receiving benefits. There was 1 retiree 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. There were 20 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 are 2 retirees reported with an accelerated benefit election, are younger than the accelerated age, and are missing accelerated benefit amount and end date. Due to the small number of affected members, we did not modify the valuation data. There were retired members reported with a survivor option and an invalid or missing survivor gender (356 members) and/or survivor date of birth (298 members). We used the valuation assumptions if the survivor gender or date of birth was missing or invalid.
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	Percentage of Members Dying Each Year*					
	Healthy Post-Retirement Mortality**		Healthy Pre-Retirement Mortality**		Disability Mortality**	
	Male	Female	Male	Female	Male	Female
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	
	Disability Retirement	
	Male	Female
20	0.05%	0.05%
25	0.08	0.08
30	0.11	0.11
35	0.15	0.15
40	0.22	0.22
45	0.28	0.28
50	0.38	0.38
55	0.70	0.70
60	0.70	0.70
65	0.70	0.70
70	0.70	0.70

Summary of Actuarial Assumptions (Concluded)

	Percent	Salary Scale		Percent of Members Terminating (Withdrawing) Each Year		
Age	Retiring	Year	Increase	Year	Males	Females
50	4%	1	11.50%	1	20.00%	25.00%
51	3	2	7.00	2	15.00	15.00
52	3	3	5.00	3	10.00	15.00
53	3	4	5.00	4	10.00	15.00
54	3	5	4.75	5	8.50	12.50
55	50	6	4.75	6	7.75	10.00
56	30	7	4.75	7	6.75	10.00
57	15	8	4.75	8	5.50	10.00
58	15	9	4.50	9	5.00	10.00
59	15	10	4.50	10	2.75	7.50
60	15	11	4.50	11	2.75	7.25
61	15	12	4.50	12	2.50	7.00
62	30	13	4.25	13	2.25	5.00
63	30	14	4.00	14	2.25	5.00
64	15	15	3.75	15	2.00	4.00
65	30	16	3.75	16	2.00	4.00
66	30	17	3.75	17	2.00	4.00
67	25	18	3.50	18	1.50	4.00
68	25	19	3.50	19	1.25	3.00
69	25	20	3.50	20	1.00	3.00
70+	100	21	3.25	21	1.00	2.50
		22	3.25	22	1.00	2.25
		23	3.25	23	1.00	1.50
		24	3.25	24	1.00	0.75
		25+	3.00	25+	0.00	0.00

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 bond 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 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 6.75% (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, 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*	Total Contributions
	(a)	(b)	(c) = (a) + (b)	(d) = (a) x 9.60%	(e) = (a) x 18.85%**	(f)	(g) = (d) + (e) + (f)
2022	$ 294,479		$ 294,479				
2023	285,098	$ 10,545	295,643	$ 27,369	$ 53,741	$ 1,017	$ 82,127
2024	268,164	36,348	304,512	25,744	50,549	3,504	79,797
2025	253,562	60,086	313,648	24,342	47,796	5,792	77,930
2026	240,058	82,999	323,057	23,046	45,251	8,001	76,298
2027	227,306	105,443	332,749	21,821	42,847	10,165	74,833
2028	216,255	126,476	342,731	20,760	40,764	12,192	73,716
2029	206,399	146,614	353,013	19,814	38,906	14,134	72,854
2030	196,861	166,743	363,604	18,899	37,108	16,074	72,081
2031	187,820	186,692	374,512	18,031	35,404	17,997	71,432
2032	179,173	206,574	385,747	17,201	33,774	19,914	70,889
2033	170,613	226,707	397,320	16,379	32,161	21,855	70,395
2034	161,916	247,323	409,239	15,544	30,521	23,842	69,907
2035	153,144	268,372	421,516	14,702	28,868	25,871	69,441
2036	143,913	290,249	434,162	13,816	27,128	27,980	68,924
2037	134,217	312,970	447,187	12,885	25,300	30,170	68,355
2038	124,586	336,016	460,602	11,960	23,484	32,392	67,836
2039	115,334	359,086	474,420	11,072	21,740	34,616	67,428
2040	106,086	382,567	488,653	10,184	19,997	36,879	67,060
2041	96,619	406,693	503,312	9,275	18,213	39,205	66,693
2042	87,688	430,724	518,412	8,418	16,529	41,522	66,469
2043	79,407	454,557	533,964	7,623	14,968	43,819	66,410
2044	71,678	478,305	549,983	6,881	13,511	46,109	66,501
2045	64,249	502,234	566,483	6,168	12,111	48,415	66,694
2046	56,962	526,515	583,477	5,468	10,737	50,756	66,961
2047	50,056	550,925	600,981	4,805	9,436	53,109	67,350
2048	43,804	575,207	619,011	4,205	8,257	55,450	67,912
2049	38,151	599,430	637,581	3,662	7,191	57,785	68,638
2050	32,747	623,962	656,709	3,144	4,716	32,384	40,244
2051	27,434	648,976	676,410	2,634	3,951	33,682	40,267
2052	22,674	674,028	696,702	2,177	3,265	34,982	40,424
2053	18,623	698,980	717,603	1,788	2,682	36,277	40,747
2054	14,929	724,202	739,131	1,433	2,150	37,586	41,169
2055	11,722	749,583	761,305	1,125	1,688	38,903	41,716
2056	9,166	774,978	784,144	880	1,320	40,221	42,421
2057	7,110	800,559	807,669	683	1,024	41,549	43,256
2058	5,484	826,415	831,899	526	790	42,891	44,207
2059	4,252	852,604	856,856	408	612	44,250	45,270
2060	3,294	879,267	882,561	316	474	45,634	46,424
2061	2,502	906,536	909,038	240	360	47,049	47,649
2062	1,855	934,454	936,309	178	267	48,498	48,943
2063	1,360	963,039	964,399	131	196	49,982	50,309
2064	980	992,351	993,331	94	141	51,503	51,738
2065	682	1,022,449	1,023,131	66	98	53,065	53,229
2066	456	1,053,369	1,053,825	44	66	54,670	54,780
2067	298	1,085,141	1,085,439	29	43	56,319	56,391
2068	190	1,117,812	1,118,002	18	27	58,014	58,059
2069	109	1,151,434	1,151,543	10	16	59,759	59,785
2070	56	1,186,033	1,186,089	5	8	61,555	61,568
2071	27	1,221,644	1,221,671	3	4	63,403	63,410
2072	10	1,258,312	1,258,322	1	1	65,306	65,308

* *Equal to total contributions (28.45% of payroll for 27 years and 24.00% of payroll thereafter for new employee payroll) net of new employee normal cost and expenses (18.81% of pay).*

** *Employer contributions are equal to 18.85% for fiscal year ending June 30, 2022; the supplemental employer contribution equal to 4.45% of pay is assumed to stop after 27 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*	Total Contributions
	(a)	(b)	(c) = (a) + (b)	(d) = (a) x 9.60%	(e) = (a) x 18.85%	(f)	(g) = (d) + (e) + (f)
2073	$ 2	$ 1,296,069	$ 1,296,071	$ -	$ -	$ 67,266	$ 67,266
2074	-	1,334,953	1,334,953	-	-	69,284	69,284
2075	-	1,375,002	1,375,002	-	-	71,363	71,363
2076	-	1,416,252	1,416,252	-	-	73,503	73,503
2077	-	1,458,740	1,458,740	-	-	75,709	75,709
2078	-	1,502,502	1,502,502	-	-	77,980	77,980
2079	-	1,547,577	1,547,577	-	-	80,319	80,319
2080	-	1,594,004	1,594,004	-	-	82,729	82,729
2081	-	1,641,824	1,641,824	-	-	85,211	85,211
2082	-	1,691,079	1,691,079	-	-	87,767	87,767
2083	-	1,741,811	1,741,811	-	-	90,400	90,400
2084	-	1,794,066	1,794,066	-	-	93,112	93,112
2085	-	1,847,888	1,847,888	-	-	95,905	95,905
2086	-	1,903,324	1,903,324	-	-	98,783	98,783
2087	-	1,960,424	1,960,424	-	-	101,746	101,746
2088	-	2,019,237	2,019,237	-	-	104,798	104,798
2089	-	2,079,814	2,079,814	-	-	107,942	107,942
2090	-	2,142,208	2,142,208	-	-	111,181	111,181
2091	-	2,206,475	2,206,475	-	-	114,516	114,516
2092	-	2,272,669	2,272,669	-	-	117,952	117,952
2093	-	2,340,849	2,340,849	-	-	121,490	121,490
2094	-	2,411,074	2,411,074	-	-	125,135	125,135
2095	-	2,483,407	2,483,407	-	-	128,889	128,889
2096	-	2,557,909	2,557,909	-	-	132,755	132,755
2097	-	2,634,646	2,634,646	-	-	136,738	136,738
2098	-	2,713,685	2,713,685	-	-	140,840	140,840
2099	-	2,795,096	2,795,096	-	-	145,065	145,065
2100	-	2,878,949	2,878,949	-	-	149,417	149,417
2101	-	2,965,317	2,965,317	-	-	153,900	153,900
2102	-	3,054,277	3,054,277	-	-	158,517	158,517
2103	-	3,145,905	3,145,905	-	-	163,272	163,272
2104	-	3,240,282	3,240,282	-	-	168,171	168,171
2105	-	3,337,491	3,337,491	-	-	173,216	173,216
2106	-	3,437,615	3,437,615	-	-	178,412	178,412
2107	-	3,540,744	3,540,744	-	-	183,765	183,765
2108	-	3,646,966	3,646,966	-	-	189,278	189,278
2109	-	3,756,375	3,756,375	-	-	194,956	194,956
2110	-	3,869,066	3,869,066	-	-	200,805	200,805
2111	-	3,985,138	3,985,138	-	-	206,829	206,829
2112	-	4,104,693	4,104,693	-	-	213,034	213,034
2113	-	4,227,833	4,227,833	-	-	219,425	219,425
2114	-	4,354,668	4,354,668	-	-	226,007	226,007
2115	-	4,485,308	4,485,308	-	-	232,788	232,788
2116	-	4,619,868	4,619,868	-	-	239,771	239,771
2117	-	4,758,464	4,758,464	-	-	246,964	246,964
2118	-	4,901,218	4,901,218	-	-	254,373	254,373
2119	-	5,048,254	5,048,254	-	-	262,004	262,004
2120	-	5,199,702	5,199,702	-	-	269,865	269,865
2121	-	5,355,693	5,355,693	-	-	277,960	277,960
2122	-	5,516,364	5,516,364	-	-	286,299	286,299

* *Equal to total contributions (28.45% of payroll for 27 years and 24.00% of payroll thereafter for new employee payroll) net of new employee normal cost and expenses (18.81% of pay).*

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	$ 1,473,921	$ 82,127	$ 97,170	$ 884	$ 98,961	$ 1,556,955
2024	1,556,955	79,797	101,865	831	104,334	1,638,390
2025	1,638,390	77,930	106,441	786	109,619	1,718,712
2026	1,718,712	76,298	111,303	744	114,826	1,797,789
2027	1,797,789	74,833	116,325	705	119,950	1,875,542
2028	1,875,542	73,716	121,995	670	124,974	1,951,567
2029	1,951,567	72,854	127,444	640	129,897	2,026,234
2030	2,026,234	72,081	133,470	610	134,712	2,098,947
2031	2,098,947	71,432	140,102	582	139,380	2,169,075
2032	2,169,075	70,889	146,446	555	143,886	2,236,849
2033	2,236,849	70,395	153,332	529	148,216	2,301,599
2034	2,301,599	69,907	160,454	502	152,335	2,362,885
2035	2,362,885	69,441	167,762	475	156,215	2,420,304
2036	2,420,304	68,924	175,652	446	159,812	2,472,942
2037	2,472,942	68,355	184,072	416	163,068	2,519,877
2038	2,519,877	67,836	192,313	386	165,946	2,560,960
2039	2,560,960	67,428	200,167	358	168,446	2,596,309
2040	2,596,309	67,060	208,096	329	170,558	2,625,502
2041	2,625,502	66,693	215,771	300	172,262	2,648,386
2042	2,648,386	66,469	222,792	272	173,567	2,665,358
2043	2,665,358	66,410	229,098	246	174,502	2,676,926
2044	2,676,926	66,501	234,813	222	175,097	2,683,489
2045	2,683,489	66,694	240,056	199	175,374	2,685,302
2046	2,685,302	66,961	245,033	177	175,340	2,682,393
2047	2,682,393	67,350	249,585	155	175,007	2,675,010
2048	2,675,010	67,912	253,321	136	174,403	2,663,868
2049	2,663,868	68,638	256,328	118	173,576	2,649,636
2050	2,649,636	40,244	258,951	102	171,586	2,602,413
2051	2,602,413	40,267	261,237	85	168,324	2,549,682
2052	2,549,682	40,424	262,755	70	164,720	2,492,001
2053	2,492,001	40,747	263,458	58	160,814	2,430,046
2054	2,430,046	41,169	263,677	46	156,640	2,364,132
2055	2,364,132	41,716	263,189	36	152,225	2,294,848
2056	2,294,848	42,421	261,821	28	147,618	2,223,038
2057	2,223,038	43,256	259,766	22	142,866	2,149,372
2058	2,149,372	44,207	257,083	17	138,015	2,074,494
2059	2,074,494	45,270	253,814	13	133,105	1,999,042
2060	1,999,042	46,424	250,079	10	128,174	1,923,551
2061	1,923,551	47,649	245,968	8	123,256	1,848,480
2062	1,848,480	48,943	241,494	6	118,380	1,774,303
2063	1,774,303	50,309	236,651	4	113,579	1,701,536
2064	1,701,536	51,738	231,470	3	108,887	1,630,688
2065	1,630,688	53,229	225,979	2	104,336	1,562,272
2066	1,562,272	54,780	220,185	1	99,962	1,496,828
2067	1,496,828	56,391	214,093	1	95,800	1,434,925
2068	1,434,925	58,059	207,719	1	91,889	1,377,153
2069	1,377,153	59,785	201,085	-	88,267	1,324,120
2070	1,324,120	61,568	194,196	-	84,975	1,276,467
2071	1,276,467	63,410	187,066	-	82,056	1,234,867
2072	1,234,867	65,308	179,717	-	79,555	1,200,013

For purposes of this projection, we assumed the 14.4% 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	$ 1,200,013	$ 67,266	$ 172,169	$ -	$ 77,518	$ 1,172,628
2074	1,172,628	69,284	164,446	-	75,993	1,153,459
2075	1,153,459	71,363	156,574	-	75,030	1,143,278
2076	1,143,278	73,503	148,584	-	74,679	1,142,876
2077	1,142,876	75,709	140,506	-	74,993	1,153,072
2078	1,153,072	77,980	132,374	-	76,027	1,174,705
2079	1,174,705	80,319	124,222	-	77,835	1,208,637
2080	1,208,637	82,729	116,090	-	80,476	1,255,752
2081	1,255,752	85,211	108,019	-	84,006	1,316,950
2082	1,316,950	87,767	100,052	-	88,486	1,393,151
2083	1,393,151	90,400	92,232	-	93,977	1,485,296
2084	1,485,296	93,112	84,601	-	100,540	1,594,347
2085	1,594,347	95,905	77,202	-	108,240	1,721,290
2086	1,721,290	98,783	70,074	-	117,140	1,867,139
2087	1,867,139	101,746	63,252	-	127,310	2,032,943
2088	2,032,943	104,798	56,763	-	138,819	2,219,797
2089	2,219,797	107,942	50,633	-	151,739	2,428,845
2090	2,428,845	111,181	44,878	-	166,148	2,661,296
2091	2,661,296	114,516	39,514	-	182,128	2,918,426
2092	2,918,426	117,952	34,545	-	199,763	3,201,596
2093	3,201,596	121,490	29,974	-	219,146	3,512,258
2094	3,512,258	125,135	25,797	-	240,376	3,851,972
2095	3,851,972	128,889	22,008	-	263,557	4,222,410
2096	4,222,410	132,755	18,598	-	288,803	4,625,370
2097	4,625,370	136,738	15,554	-	316,236	5,062,790
2098	5,062,790	140,840	12,861	-	345,987	5,536,756
2099	5,536,756	145,065	10,505	-	378,198	6,049,514
2100	6,049,514	149,417	8,466	-	413,022	6,603,487
2101	6,603,487	153,900	6,725	-	450,622	7,201,284
2102	7,201,284	158,517	5,259	-	491,175	7,845,717
2103	7,845,717	163,272	4,045	-	534,872	8,539,816
2104	8,539,816	168,171	3,056	-	581,919	9,286,850
2105	9,286,850	173,216	2,265	-	632,538	10,090,339
2106	10,090,339	178,412	1,645	-	686,966	10,954,072
2107	10,954,072	183,765	1,170	-	745,462	11,882,129
2108	11,882,129	189,278	814	-	808,301	12,878,894
2109	12,878,894	194,956	553	-	875,779	13,949,076
2110	13,949,076	200,805	367	-	948,217	15,097,731
2111	15,097,731	206,829	237	-	1,025,956	16,330,279
2112	16,330,279	213,034	150	-	1,109,361	17,652,524
2113	17,652,524	219,425	92	-	1,198,827	19,070,684
2114	19,070,684	226,007	56	-	1,294,772	20,591,407
2115	20,591,407	232,788	33	-	1,397,647	22,221,809
2116	22,221,809	239,771	19	-	1,507,932	23,969,493
2117	23,969,493	246,964	11	-	1,626,139	25,842,585
2118	25,842,585	254,373	6	-	1,752,819	27,849,771
2119	27,849,771	262,004	3	-	1,888,558	30,000,330
2120	30,000,330	269,865	2	-	2,033,982	32,304,175
2121	32,304,175	277,960	1	-	2,189,760	34,771,894
2122	34,771,894	286,299	-	-	2,356,608	37,414,801

For purposes of this projection, we assumed the 14.4% 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	$ 1,473,921	$ 97,170	$ 97,170	$ -	$ 94,048	$ -	$ 94,048
2024	1,556,955	101,865	101,865	-	92,358	-	92,358
2025	1,638,390	106,441	106,441	-	90,404	-	90,404
2026	1,718,712	111,303	111,303	-	88,557	-	88,557
2027	1,797,789	116,325	116,325	-	86,700	-	86,700
2028	1,875,542	121,995	121,995	-	85,176	-	85,176
2029	1,951,567	127,444	127,444	-	83,354	-	83,354
2030	2,026,234	133,470	133,470	-	81,776	-	81,776
2031	2,098,947	140,102	140,102	-	80,411	-	80,411
2032	2,169,075	146,446	146,446	-	78,738	-	78,738
2033	2,236,849	153,332	153,332	-	77,227	-	77,227
2034	2,301,599	160,454	160,454	-	75,704	-	75,704
2035	2,362,885	167,762	167,762	-	74,147	-	74,147
2036	2,420,304	175,652	175,652	-	72,726	-	72,726
2037	2,472,942	184,072	184,072	-	71,393	-	71,393
2038	2,519,877	192,313	192,313	-	69,872	-	69,872
2039	2,560,960	200,167	200,167	-	68,127	-	68,127
2040	2,596,309	208,096	208,096	-	66,348	-	66,348
2041	2,625,502	215,771	215,771	-	64,445	-	64,445
2042	2,648,386	222,792	222,792	-	62,334	-	62,334
2043	2,665,358	229,098	229,098	-	60,045	-	60,045
2044	2,676,926	234,813	234,813	-	57,652	-	57,652
2045	2,683,489	240,056	240,056	-	55,212	-	55,212
2046	2,685,302	245,033	245,033	-	52,793	-	52,793
2047	2,682,393	249,585	249,585	-	50,374	-	50,374
2048	2,675,010	253,321	253,321	-	47,895	-	47,895
2049	2,663,868	256,328	256,328	-	45,399	-	45,399
2050	2,649,636	258,951	258,951	-	42,964	-	42,964
2051	2,602,413	261,237	261,237	-	40,602	-	40,602
2052	2,549,682	262,755	262,755	-	38,256	-	38,256
2053	2,492,001	263,458	263,458	-	35,933	-	35,933
2054	2,430,046	263,677	263,677	-	33,689	-	33,689
2055	2,364,132	263,189	263,189	-	31,500	-	31,500
2056	2,294,848	261,821	261,821	-	29,355	-	29,355
2057	2,223,038	259,766	259,766	-	27,283	-	27,283
2058	2,149,372	257,083	257,083	-	25,294	-	25,294
2059	2,074,494	253,814	253,814	-	23,393	-	23,393
2060	1,999,042	250,079	250,079	-	21,591	-	21,591
2061	1,923,551	245,968	245,968	-	19,894	-	19,894
2062	1,848,480	241,494	241,494	-	18,297	-	18,297
2063	1,774,303	236,651	236,651	-	16,796	-	16,796
2064	1,701,536	231,470	231,470	-	15,390	-	15,390
2065	1,630,688	225,979	225,979	-	14,075	-	14,075
2066	1,562,272	220,185	220,185	-	12,847	-	12,847
2067	1,496,828	214,093	214,093	-	11,701	-	11,701
2068	1,434,925	207,719	207,719	-	10,635	-	10,635
2069	1,377,153	201,085	201,085	-	9,644	-	9,644
2070	1,324,120	194,196	194,196	-	8,725	-	8,725
2071	1,276,467	187,066	187,066	-	7,873	-	7,873
2072	1,234,867	179,717	179,717	-	7,086	-	7,086

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	$ 1,200,013	$ 172,169	$ 172,169	$ -	$ 6,359	$ -	$ 6,359
2074	1,172,628	164,446	164,446	-	5,690	-	5,690
2075	1,153,459	156,574	156,574	-	5,075	-	5,075
2076	1,143,278	148,584	148,584	-	4,511	-	4,511
2077	1,142,876	140,506	140,506	-	3,996	-	3,996
2078	1,153,072	132,374	132,374	-	3,527	-	3,527
2079	1,174,705	124,222	124,222	-	3,100	-	3,100
2080	1,208,637	116,090	116,090	-	2,714	-	2,714
2081	1,255,752	108,019	108,019	-	2,366	-	2,366
2082	1,316,950	100,052	100,052	-	2,053	-	2,053
2083	1,393,151	92,232	92,232	-	1,773	-	1,773
2084	1,485,296	84,601	84,601	-	1,523	-	1,523
2085	1,594,347	77,202	77,202	-	1,302	-	1,302
2086	1,721,290	70,074	70,074	-	1,107	-	1,107
2087	1,867,139	63,252	63,252	-	936	-	936
2088	2,032,943	56,763	56,763	-	787	-	787
2089	2,219,797	50,633	50,633	-	658	-	658
2090	2,428,845	44,878	44,878	-	546	-	546
2091	2,661,296	39,514	39,514	-	450	-	450
2092	2,918,426	34,545	34,545	-	369	-	369
2093	3,201,596	29,974	29,974	-	300	-	300
2094	3,512,258	25,797	25,797	-	242	-	242
2095	3,851,972	22,008	22,008	-	193	-	193
2096	4,222,410	18,598	18,598	-	153	-	153
2097	4,625,370	15,554	15,554	-	120	-	120
2098	5,062,790	12,861	12,861	-	93	-	93
2099	5,536,756	10,505	10,505	-	71	-	71
2100	6,049,514	8,466	8,466	-	54	-	54
2101	6,603,487	6,725	6,725	-	40	-	40
2102	7,201,284	5,259	5,259	-	29	-	29
2103	7,845,717	4,045	4,045	-	21	-	21
2104	8,539,816	3,056	3,056	-	15	-	15
2105	9,286,850	2,265	2,265	-	10	-	10
2106	10,090,339	1,645	1,645	-	7	-	7
2107	10,954,072	1,170	1,170	-	5	-	5
2108	11,882,129	814	814	-	3	-	3
2109	12,878,894	553	553	-	2	-	2
2110	13,949,076	367	367	-	1	-	1
2111	15,097,731	237	237	-	1	-	1
2112	16,330,279	150	150	-	-	-	-
2113	17,652,524	92	92	-	-	-	-
2114	19,070,684	56	56	-	-	-	-
2115	20,591,407	33	33	-	-	-	-
2116	22,221,809	19	19	-	-	-	-
2117	23,969,493	11	11	-	-	-	-
2118	25,842,585	6	6	-	-	-	-
2119	27,849,771	3	3	-	-	-	-
2120	30,000,330	2	2	-	-	-	-
2121	32,304,175	1	1	-	-	-	-
2122	34,771,894	-	-	-	-	-	-
				Totals	$ 2,486,237	$ -	$ 2,486,237

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 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 (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 contributions 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.