Minnesota State Retirement System

State Patrol Retirement Fund
GASB Statement Nos. 67 and 68
Accounting and Financial Reporting for Pensions
June 30, 2021

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November 24, 2021

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

Dear Board of Directors:

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

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

Our calculation of the liability associated with the benefits described in this report was performed for the purpose of providing financial reporting and disclosure information that satisfies the requirements of GASB Statements No. 67 and No. 68. The Net Pension Liability is not an appropriate measure for measuring the sufficiency of plan assets to cover the estimated cost of settling the employer's benefit obligation. The Net Pension Liability is not an appropriate measure for assessing the need for or amount of future employer contributions. The calculation of the plan's liability for this report may not be applicable for purposes of funding the plan. A calculation of the plan's liability for purposes other than satisfying the requirements of GASB Statements No. 67 and No. 68 may produce significantly different results. The information in this report is calculated on a total plan basis. MSRS is responsible for preparing the Schedule of Employer Allocations and the Schedule of Pension Amounts by Employer, as applicable. This report may be provided to parties other than the Minnesota State Retirement System (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, 2021 for additional discussion of the nature of actuarial calculations and more information related to participant data, economic and demographic assumptions, and benefit provisions.

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

This report reflects the impact of COVID-19 through June 30, 2021. 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 and Bonita J. Wurst are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

Respectfully submitted,
Gabriel, Roeder, Smith & Company

Brian B. Murphy

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

Bonita J. Wurst

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

BBM/BJW:ah

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SECTION A

EXECUTIVE SUMMARY

Executive Summary
as of June 30, 2021 (Dollars in Thousands)

		2021
Actuarial Valuation Date		June 30, 2021
Measurement Date of the Net Pension Liability		June 30, 2021
Membership		
Number of		
- Service Retirements		895
- Survivors		154
- Disability Retirements		72
- Deferred Retirements		69
- Terminated other non-vested		36
- Active Members		912
- Total		2,138
Covered-employee Payroll [(1)]	$	88,351
Net Pension Liability		
Total Pension Liability	$	1,111,995
Plan Fiduciary Net Position		957,864
Net Pension Liability	$	154,131
Plan Fiduciary Net Position as a Percentage of Total Pension Liability		86.14%
Net Pension Liability as a Percentage of Covered-employee Payroll		174.45%
Development of the Single Discount Rate		
Single Discount Rate		6.50%
Long-Term Expected Rate of Investment Return		6.50%
Long-Term Municipal Bond Rate[(2)]		1.92%
Last year ending June 30 in the 2022 to 2121 projection period for which projected benefit payments are fully funded		2121
Total Pension Expense / (Income)	$	812

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

		Deferred Outflows of Resources		Deferred Inflows of Resources
Difference between expected and actual experience in the measurement of Total Pension Liability	$	2,707	$	3,549
Changes in assumptions		75,120		61,080
Net difference between projected and actual earnings on pension plan investments		15,385		138,645
Totals	$	93,212	$	203,274

(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 subsequent to the measurement date of June 30, 2021.

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

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

Notes to Financial Statements

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

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

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

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

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

MSRS' comprehensive annual financial report, which contains the basic financial statements and related note disclosures for the State Patrol Retirement Fund can be found online at www.msrs.state.mn.us/annual-reports-fy-2021 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 as a percentage of pay is expected to remain approximately level as a percentage of payroll;
2. The funded status of the plan is expected to gradually improve and is expected to be 100% funded within the next 27 years; and
3. The unfunded liability will grow initially as a dollar amount before beginning to decline.

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

Limitations of Funded Status Measurements

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

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

Limitation of Project Scope

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

Timing of the Valuation

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

The total pension liability shown in this report is based on an actuarial valuation performed as of June 30, 2021 and a measurement date of June 30, 2021.

Single Discount Rate

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

For the purpose of this valuation, the expected rate of return on pension plan investments is 6.50%; the municipal bond rate is 1.92% (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 6.50%.

SECTION B

FINANCIAL STATEMENTS

Statement of Pension Expense Under GASB Statement No. 68
Fiscal Year Ended June 30, 2021 (Dollars in Thousands)

A. Expense		
1. Service Cost	$	21,795
2. Interest on the Total Pension Liability		72,625
3. Current-Period Benefit Changes		-
4. Employee Contributions		(13,606)
5. Projected Earnings on Plan Investments		(55,919)
6. Pension Plan Administrative Expense		204
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		266
9. Recognition of Outflow (Inflow) of Resources due to assumption changes		
Arising from Current Reporting Period		15,024
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		(33,671)
11. Increases/(Decreases) from Experience in the Current Reporting Period	**$**	**6,718**
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	$	(5,129)
13. Recognition of Outflow (Inflow) of Resources due to assumption changes		
Arising from Prior Reporting Periods		7,334
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		(8,111)
15. Total Pension Expense / (Income)	**$**	**812**

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 12,622 years. Additionally, the total plan membership (active employees and inactive employees) was 2,137. 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 6.0000 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, 2021 (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	$	1,596
2. Assumption Changes (gains) or losses		90,144
3. Recognition period for Liabilities: Average of the expected remaining service lives of all employees {in years, rounded to the nearest whole number}		6
4. Outflow (Inflow) of Resources to be recognized in the current pension expense for the difference between expected and actual experience of the Total Pension Liability		266
5. Outflow (Inflow) of Resources to be recognized in the current pension expense for Assumption Changes		15,024
6. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Liabilities	$	15,290
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	$	1,330
8. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses for Assumption Changes		75,120
9. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Liabilities	$	76,450
B. Outflows (Inflows) of Resources due to Assets		
1. Net difference between projected and actual earnings on pension plan investments (gains) or losses	$	(168,354)
2. Recognition period for Assets {in years}		5
3. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Assets		(33,671)
4. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Assets	$	(134,683)

Statement of Outflows and Inflows
Arising from Current and Prior Reporting Periods
Fiscal Year Ended June 30, 2021 (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	$ 63,014	$ 45,519	$ 17,495
2. Due to Assets	5,252	47,034	(41,782)
3. Total	$ 68,266	$ 92,553	$ (24,287)

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	$ 726	$ 5,589	$ (4,863)
2. Assumption Changes	62,288	39,930	22,358
3. Net Difference between projected and actual earnings on pension plan investments	5,252	47,034	(41,782)
4. Total	$ 68,266	$ 92,553	$ (24,287)

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	$ 2,707	$ 3,549	$ (842)
2. Assumption Changes	75,120	61,080	14,040
3. Net Difference between projected and actual earnings on pension plan investments*	15,385	138,645	(123,260)
4. Total	$ 93,212	$ 203,274	$ (110,062)

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
2022	$ (58,451)
2023	(35,302)
2024	(13,129)
2025	(18,470)
2026	15,290
Thereafter	-
Total	$ (110,062)

** 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, 2021 (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					
2016	$ (22,222)	6.0000	$ (3,702)	$ 0	0.0000
2017	(2,418)	6.0000	(403)	(403)	1.0000
2018	(8,369)	6.0000	(1,395)	(2,789)	2.0000
2019	2,757	6.0000	460	1,377	3.0000
2020	(535)	6.0000	(89)	(357)	4.0000
2021	1,596	6.0000	266	1,330	5.0000
Total			**$ (4,863)**	**$ (842)**	
Deferred Outflow (Inflow) Due to Assumption Changes					
2016	$ 283,584	6.0000	$ 47,264	$ 0	0.0000
2017	(112,694)	6.0000	(18,782)	(18,784)	1.0000
2018	(126,888)	6.0000	(21,148)	(42,296)	2.0000
2021	90,144	6.0000	15,024	75,120	5.0000
Total			**$ 22,358**	**$ 14,040**	
Deferred Outflow (Inflow) Due to Differences Between Projected and Actual Earnings on Plan Investments					
2017	$ (47,008)	5.0000	$ (9,400)	$ 0	0.0000
2018	(19,814)	5.0000	(3,963)	(3,962)	1.0000
2019	1,844	5.0000	369	737	2.0000
2020	24,414	5.0000	4,883	14,648	3.0000
2021	(168,354)	5.0000	(33,671)	(134,683)	4.0000
Total			**$ (41,782)**	**$ (123,260)**	
Deferred Outflow (Inflow) due to All Sources					
Total			**$ (24,287)**	**$ (110,062)**	

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

Assets		**June 30, 2021**
Cash & Short-term Investments	$	16,040
Receivables		2,392
Investment Pools (at fair value)		939,872
Securities Lending Collateral		60,892
Capital Assets		-
Total Assets	**$**	**1,019,196**
Total Deferred Outflows of Resources	**$**	**-**
Total Liabilities	**$**	**(61,332)**
Total Deferred Inflows of Resources	**$**	**-**
Net Position Restricted for Pensions	**$**	**957,864**

Statement of Changes in Fiduciary Net Position for Year Ended (Dollars in Thousands)

1.	**Net Position at market value at beginning of year**	**$**	**757,590**
Additions			
2.	Contributions		
	a. Employee	$	13,606
	b. Employer		24,809
	c. Other sources - Supplemental State Aid		1,000
	d. Total contributions	$	39,415
3.	Investment income		
	a. Investment income/(loss)	$	225,179
	b. Investment expenses		(906)
	c. Net investment income/(loss)	$	224,273
4.	Other Additions	$	-
5.	**Total Additions** *(2.d.) + (3.c.) + (4.)*	**$**	**263,688**
Deductions			
6.	Benefits Paid		
	a. Annuity benefits	$	(63,094)
	b. Refunds		(116)
	c. Total benefits paid	$	(63,210)
7.	Expenses		
	a. Other deductions	$	-
	b. Administrative		(204)
	c. Total expenses	$	(204)
8.	**Total Deductions** *(6.c.) + (7.c.)*	**$**	**(63,414)**
9.	**Net increase/(decrease) in fiduciary net position** *(5.) + (8.)*	**$**	**200,274**
10.	**Net position at market value at end of year** *(1.) + (9.)*	**$**	**957,864**
11.	State Board of Investment calculated annual investment return for the State Patrol Retirement Fund*		30.3%

** The fiscal year 2021 investment return for the Combined Funds is 30.3%.*

SECTION C

REQUIRED SUPPLEMENTARY INFORMATION

Schedule of Changes in Net Pension Liability and Related Ratios
Current Period
Fiscal Year Ended June 30, 2021 (Dollars in Thousands)

A. Total pension liability		
1. Service Cost	$	21,795
2. Interest on the Total Pension Liability		72,625
3. Changes of benefit terms		-
4. Difference between expected and actual experience of the Total Pension Liability		1,596
5. Changes of assumptions		90,144
6. Benefit payments, including refunds of employee contributions		(63,210)
7. Net change in total pension liability	$	122,950
8. Total pension liability – beginning		989,045
9. Total pension liability – ending	**$**	**1,111,995**
B. Plan fiduciary net position		
1. Contributions – employer [1]	$	25,809
2. Contributions – employee		13,606
3. Net investment income		224,273
4. Benefit payments, including refunds of employee contributions		(63,210)
5. Pension Plan Administrative Expense		(204)
6. Other changes		-
7. Net change in plan fiduciary net position	$	200,274
8. Plan fiduciary net position – beginning		757,590
9. Plan fiduciary net position – ending	**$**	**957,864**
C. Net pension liability, *A.9. - B.9.*	**$**	**154,131**
D. Plan fiduciary net position as a percentage of the total pension liability, *B.9. / A.9.*		**86.14%**
E. Covered-employee payroll [2]	**$**	**88,351**
F. Net pension liability as a percentage of covered-employee payroll, *C. / E.*		**174.45%**

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

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

Last 10 Fiscal Years (which will be built prospectively)

Fiscal year ending June 30,	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012
Total Pension Liability										
Service Cost	$ 21,795	$ 21,122	$ 19,375	$ 24,935	$ 29,758	$ 16,555	$ 16,144	$ 14,514		
Interest on the Total Pension Liability	72,625	70,465	68,227	65,110	58,865	64,592	63,753	60,183		
Benefit Changes	-	-	-	(2,604)	-	-	-	0		
Difference between Expected and Actual Experience	1,596	(535)	2,757	(8,369)	(2,418)	(22,222)	(12,855)	(5,771)		
Assumption Changes	90,144	-	-	(126,888)	(112,694)	283,584	-	30,058		
Benefit Payments	(63,094)	(61,859)	(60,375)	(59,653)	(58,560)	(57,695)	(55,465)	(53,697)		
Refunds	(116)	(112)	(428)	(39)	(5)	(79)	(15)	(25)		
Net Change in Total Pension Liability	$ 122,950	$ 29,081	$ 29,556	$ (107,508)	$ (85,054)	$ 284,735	$ 11,562	$ 45,262		
Total Pension Liability - Beginning	989,045	959,964	930,408	1,037,916	1,122,970	838,235	826,673	781,411		
Total Pension Liability - Ending (a)	**$ 1,111,995**	**$ 989,045**	**$ 959,964**	**$ 930,408**	**$1,037,916**	**$1,122,970**	**$ 838,235**	**$ 826,673**		
Plan Fiduciary Net Position										
Employer Contributions [1]	$ 25,809	$ 22,975	$ 20,479	$ 16,952	$ 16,783	$ 14,938	$ 14,763	$ 12,894		
Employee Contributions	13,606	12,595	12,038	10,657	10,520	9,292	9,174	7,930		
Pension Plan Net Investment Income	224,273	31,073	51,823	70,474	93,077	(774)	28,903	107,187		
Benefit Payments	(63,094)	(61,859)	(60,375)	(59,653)	(58,560)	(57,695)	(55,465)	(53,697)		
Refunds	(116)	(112)	(428)	(39)	(5)	(79)	(15)	(25)		
Pension Plan Administrative Expense	(204)	(224)	(191)	(184)	(208)	(220)	(170)	(150)		
Other	-	(2)	(1)	(7)	-	-	-	0		
Net Change in Plan Fiduciary Net Position	**$ 200,274**	**$ 4,446**	**$ 23,345**	**$ 38,200**	**$ 61,607**	**$ (34,538)**	**$ (2,810)**	**$ 74,139**		
Plan Fiduciary Net Position - Beginning	**757,590**	**753,144**	**729,799**	**691,599**	**629,992**	**664,530**	**667,340**	**593,201**		
Plan Fiduciary Net Position - Ending (b)	**$ 957,864**	**$ 757,590**	**$ 753,144**	**$ 729,799**	**$ 691,599**	**$ 629,992**	**$ 664,530**	**$ 667,340**		
Net Pension Liability - Ending (a) - (b)	**$ 154,131**	**$ 231,455**	**$ 206,820**	**$ 200,609**	**$ 346,317**	**$ 492,978**	**$ 173,705**	**$ 159,333**		
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	**86.14 %**	**76.60 %**	**78.46 %**	**78.44 %**	**66.63 %**	**56.10 %**	**79.28 %**	**80.73 %**		
Covered-Employee Payroll [2]	**$ 88,351**	**$ 84,530**	**$ 80,792**	**$ 74,007**	**$ 73,056**	**$ 69,343**	**$ 68,463**	**$ 63,952**		
Net Pension Liability as a Percentage of Covered-Employee Payroll	**174.45 %**	**273.81 %**	**255.99 %**	**271.07 %**	**474.04 %**	**710.93 %**	**253.72 %**	**249.15 %**		

Notes to Schedule:

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

Schedule of Net Pension Liability Multiyear
(Dollars in Thousands)

Last 10 Fiscal Years (which will be built prospectively)

Fiscal Year Ending June 30,	Total Pension Liability	Plan Net Position	Net Pension Liability	Plan Net Position as a % of Total Pension Liability	Covered-Employee Payroll	Net Pension Liability as a % of Covered-Employee Payroll
	(a)	(b)	(a) - (b) = (c)	(b) / (c)	(d)	(c) / (d)
2012						
2013						
2014	$ 826,673	$ 667,340	$ 159,333	80.73%	$ 63,952	249.14%
2015	838,235	664,530	173,705	79.28	68,463	253.72
2016	1,122,970	629,992	492,978	56.10	69,343	710.93
2017	1,037,916	691,599	346,317	66.63	73,056	474.04
2018	930,408	729,799	200,609	78.44	74,007	271.07
2019	959,964	753,144	206,820	78.46	80,792	255.99
2020	989,045	757,590	231,455	76.60	84,530	273.81
2021	1,111,995	957,864	154,131	86.14	88,351	174.45

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)
2012	$ 14,912	$ 11,620		$ 3,292	$ 62,524	18.58%
2013	18,711	11,482		7,229	62,121	18.48
2014	18,444	12,894	(3)	5,550	63,952	20.16
2015	20,648	14,763	(3)	5,885	68,463	21.56
2016	20,463	14,938	(3)	5,525	69,343	21.54
2017	19,031	16,783	(3)	2,248	73,056	22.97
2018	20,900	16,952	(3)	3,948	74,007	22.91
2019	21,281	20,479	(3)	802	80,792	25.35
2020	21,580	22,975	(3)	(1,395)	84,530	27.18
2021	22,203	25,809	(3)	(3,606)	88,351	29.21

Notes to Schedule of Contributions

Methods and Assumptions Used to Determine Fiscal Year Ending June 30, 2021 Contribution Rates Reported in this Schedule:

Notes	(1) Actuarially determined contribution rates are calculated as of each June 30 and apply to the fiscal year beginning on the day after the measurement date. (2) Assumed equal to actual member contributions divided by employee contribution rate. (3) Includes supplemental state aid of $1,000.
Valuation Date	June 30, 2020
Actuarial Cost Method	Entry Age Normal
Amortization Method	Level Percentage of Payroll, Closed
Remaining Amortization Period	28 years
Asset Valuation Method	5-Year smoothed market; no corridor
Inflation	2.50%
Payroll Growth	3.25%
Salary Increases	Service based tables ranging from 15.25% with one year of service to 3.25% 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 2017 valuation pursuant to an experience study of the period 2011 - 2015.
Healthy Post-retirement Mortality	RP-2014 annuitant generational mortality table, projected with mortality improvement scale MP-2015, white collar adjustment.

Other Information:

Benefit Increases After Retirement	The post-retirement benefit increase is assumed to be 1.00% for all future years.

See separate funding actuarial valuation report as of July 1, 2020 for additional detail. To obtain this report, contact MSRS as noted on page 3. The report is also available online at https://www.msrs.state.mn.us/annual-reports-fy-2020

Schedule of Investment Returns Multiyear

Last 10 Fiscal Years

Fiscal Year Ending June 30,	Annual Return[1]
2012	
2013	
2014	18.7 %
2015	4.5
2016	(0.1)
2017	15.2
2018	10.5
2019	7.3
2020	4.2
2021	30.3

[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, 2021, the annual money-weighted rate of return for the State Patrol Retirement Fund was 30.3%. The money-weighted rate of return is a method of calculating period-by-period returns on pension plan investments that adjusts for the changing amounts actually invested. For purposes of this schedule, the money-weighted rate of return is calculated as the internal rate of return on pension plan investments, net of pension plan investment expense.

Ten-Year Schedule of Money-Weighted Investment Return

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

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

SECTION D

ADDITIONAL FINANCIAL STATEMENT DISCLOSURES

Asset Allocation

Long-Term Expected Return on Plan Assets

The long-term expected rate of return on pension plan investments was determined using a building-block method. Estimates for expected future real rates of return (expected returns, net of inflation) were developed for each asset class using both long-term historical returns and long-term capital market expectation from a number of investment management and consulting organizations. The asset class estimates and the target allocations were then combined to produce a geometric, long-term expected rate of return for the portfolio. Inflation expectations were applied to derive the nominal rate of return for the portfolio. For each major asset class that is included in the pension fund's target asset allocation as of June 30, 2021, 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 6.5%. This assumption is based on a review of inflation and investment return assumptions in our report dated June 24, 2021.

Sensitivity of Net Pension Liability to the Single Discount Rate Assumption

Single Discount Rate

A Single Discount Rate of 6.5% was used to measure the total pension liability. This Single Discount Rate was based on the expected rate of return on pension plan investments of 6.50%. The projection of cash flows used to determine this Single Discount Rate assumed that member, employer, and state contributions will be made at the current statutory contribution rates. Based on these assumptions, the pension plan's fiduciary net position and future contributions were sufficient to finance all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

Regarding the sensitivity of the net pension liability to changes in the Single Discount Rate, the following presents the plan's net pension liability, calculated using a Single Discount Rate of 6.5%, as well as what the plan's net pension liability would be if it were calculated using a Single Discount Rate that is one percent lower (5.50%) or one percent higher (7.50%) than the current rate:

Sensitivity of Net Pension Liability to the Single Discount Rate Assumption

(Dollars in Thousands)

	1% Decrease 5.50%	Current Single Discount Rate Assumption 6.50%	1% Increase 7.50%
Total Pension Liability	$1,258,560	$1,111,995	$991,850
Net Position Restricted for Pensions	957,864	957,864	957,864
Net Pension Liability	**$ 300,696**	**$154,131**	**$33,986**

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

Note that we believe the 7.5% 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	**$ 989,045**	**$ 757,590**	**$ 231,455**	**$ 69,738**	**$ 127,473**	
Changes for the Year:						
Service Cost	$ 21,795		$ 21,795			$ 21,795
Interest on Total Pension Liability	72,625		72,625			72,625
Interest on Fiduciary Net Position		$ 55,919 [1]	(55,919)			(55,919)
Changes in Benefit Terms	-		-			-
Liability Experience Gains and Losses	1,596		1,596	$ 1,330	$ -	266
Changes in Assumptions	90,144		90,144	75,120	-	15,024
Recognition of Deferred Outflows/(Inflows) of Resources Arising from Prior Reporting Periods						
Liability Experience Gains/(Losses)				(460)	(5,589)	(5,129)
Assumption Changes				(47,264)	(39,930)	7,334
Investment Gains/(Losses)				(5,252)	(13,363)	(8,111)
Contributions - Employer		25,809 [2]	(25,809)			
Contributions - Employees		13,606	(13,606)			(13,606)
Asset Gain/(Loss)		168,354 [1]	(168,354)	-	134,683	(33,671)
Benefit Payments and Refunds	(63,210)	(63,210)	-			
Administrative Expenses		(204)	204			204
Other changes		-	-			-
Net Changes	**$ 122,950**	**$ 200,274**	**$ (77,324)**	**$ 23,474**	**$ 75,801**	**$ 812**
Balance End of Year	**$ 1,111,995**	**$ 957,864**	**$ 154,131**	**$ 93,212**	**$ 203,274**	

[1] *The sum of these items in column (b) equals the net investment income of $224,273*

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

Summary of Population Statistics

	Actives	Terminated: Deferred Retirement	Terminated: Other Non-Vested	Recipients: Service Retirement	Recipients: Disability Retirement	Recipients: Survivor	Total
Members on 7/1/2020	**937**	**63**	**30**	**891**	**64**	**152**	**2,137**
New members	32						**32**
Return to active	2	(1)	(1)	0	0	0	**0**
Terminated non-vested	(7)	0	7	0	0	0	**0**
Service retirements	(27)	(2)	0	29	0	0	**0**
Terminated deferred	(10)	10	0	0	0	0	**0**
Terminated refund/transfer	(4)	0	0	0	0	0	**(4)**
Deaths	(2)	0	0	(26)	0	(7)	**(35)**
New beneficiary	0	0	0	0	0	10	**10**
Disabled	(9)	0	0	0	9	0	**0**
Unexpected status change	0	(1)	0	1	(1)	(1)	**(2)**
Net change	(25)	6	6	4	8	2	**1**
Members on 6/30/2021	**912**	**69**	**36**	**895**	**72**	**154**	**2,138**

SECTION E

SUMMARY OF BENEFITS

Summary of Plan Provisions

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

Plan year

July 1 through June 30

Eligibility

State troopers, conservation officers, certain crime bureau and gambling enforcement officers, and certain other persons listed in Minnesota Statutes 352B.011 subdivision 10.

Contributions

Percent of Salary:

Effective as of	Member	Regular Employer	Supplemental Employer	Total
Prior to July 1, 2018	14.40%	21.60%	0.00%	36.00%
July 1, 2018	14.90%	22.35%	1.75%	39.00%
July 1, 2019	14.90%	23.10%	3.00%	41.00%
July 1, 2020	15.40%	23.10%	5.00%	43.50%
July 1, 2021 and later	15.40%	23.10%	7.00%	45.50%

Supplemental employer contributions remain in effect until the plan is 100% funded on a market value of assets basis.

Member contributions are “picked up” according to the provisions of Internal Revenue Code 414(h).

State Contributions

$1 million paid annually on October 1 until the earlier of 1) both the Public Employees Retirement Association Police and Fire Plan and the State Patrol Retirement Fund attaining 90% funded status (on an actuarial value of assets basis), or 2) July 1, 2048.

Allowable service

Service during which member contributions were deducted. Includes period receiving temporary Worker's Compensation and reduced salary from employer. See Normal Retirement benefit definition below for information about service limits.

Salary

Salaries excluding lump sum payments at separation.

Average salary

Average of the five highest years of Salary. Average Salary is based on all Allowable Service if less than five years. Average Salary is based on all years without regard to any service limits.

Summary of Plan Provisions (Continued)

Retirement	
<u>Normal retirement benefit</u>	
Age/Service requirement	Age 55 and three years (ten years if first hired after June 30, 2013) of Allowable Service.
Amount	3.00% of Average Salary for each year of Allowable Service up to 33 years. Members with at least 28 years of service as of July 1, 2013, are not subject to this service limit. Member contributions made after the service cap will be refunded at retirement.
<u>Early retirement benefit</u>	
Age/Service requirement	Age 50 and three years (ten years if first hired after June 30, 2013) of Allowable Service.
Amount	Normal Retirement Benefit based on Allowable Service and Average Salary at retirement reduced by 0.34% for each month that the member is under age 55. If the effective date of retirement is before July 1, 2015, the reduction is 1/10% for each month that the member is under age 55 at the time of retirement.
<u>Form of payment</u>	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.
<u>Benefit increases</u>	1.00% per year. A benefit recipient who has been receiving a benefit for at least 12 full months as of the June 30 of the calendar year immediately before the adjustment will receive a full increase. Members receiving benefits for at least one month but less than 12 full months as of the June 30 of the calendar year immediately before the adjustment will receive a pro rata increase.
Disability	
<u>Occupational disability benefit</u>	
Age/Service requirement	Member who cannot perform his duties as a direct result of a disability relating to an act of duty.

Summary of Plan Provisions (Continued)

Disability (continued)

Occupational disability benefit (Continued)

Amount	60% of Average Salary plus 3.00% of Average Salary for each year in excess of 20 years of Allowable Service (pro rata for completed months). Payments cease at age 65 (age 55 if disabled after June 30, 2015) or the 5-year anniversary of the effective date of the disability benefit, whichever is later. Payments stop earlier if disability ceases or death occurs. Benefits may be paid upon re-employment but salary plus benefit cannot exceed current salary of position held at time of disability.

Non-duty disability benefit

Age/Service requirement	At least one year of Allowable Service and disability not related to covered employment.
Amount	Normal Retirement Benefit based on Allowable Service (minimum of 15 years) and Average Salary at disability without reduction for commencement before age 55. Payments cease at age 65 (age 55 if disabled after June 30, 2015) or earlier if disability ceases or death occurs. Benefits may be paid upon re-employment but salary plus benefit cannot exceed current salary of position held at time of disability.

Retirement after disability

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

Form of payment	Same as for retirement.
Benefit increases	Same as for retirement.

Summary of Plan Provisions (Continued)

Death

Surviving spouse benefit

Age/Service requirement	Member who is active or receiving a disability benefit or former member.
Amount	50% of Average Salary if member was active or occupational disability and either had less than three years (five years if first hired after June 30, 2013) of Allowable Service or was under age 55. Annuity is paid for life. Surviving spouse receives the 100% joint and survivor benefit commencing on the member's 55th birthday if member was active or a disability with three years (five years if first hired after June 30, 2013) of Allowable Service. A spouse who had been receiving the 50% benefit shall be entitled to the greater benefit. The surviving spouse of a former member receives the 100% joint and survivor benefit commencing on the member's 55th birthday if former member had three years (five years if first hired after June 30, 2013) of Allowable Service.
Benefit increases	Same as for retirement.

Surviving dependent children's benefit

Age/Service requirement	Member who is active or receiving a disability benefit. Child must be unmarried, under age 18 (or 23 if full-time student) and dependent upon the member.
Amount	10% of Average Salary for each child and $20 per month prorated among all dependent children. Benefit must not be less than 50% nor exceed 70% of Average Salary.
Benefit increases	Same as for retirement.

Refund of contributions

Age/Service requirement	Member dies before receiving any retirement benefits and survivor benefits are not payable.
Amount	Member's contributions with 6.00% interest through June 30, 2011. Beginning July 1, 2011, a member's contributions increase with 4.00% interest. Beginning July 1, 2018, member contributions increase with 3.00% interest.

Termination

Refund of contributions

Age/service requirement	Termination of state service.
Amount	Member's contributions with 6.00% interest through June 30, 2011. Beginning July 1, 2011, a member's contributions increase with 4.00% interest. Beginning July 1, 2018, member contributions increase with 3.00% interest. If a member is vested, a deferred annuity may be elected in lieu of a refund.

Summary of Plan Provisions (Concluded)

Termination (Continued)	
__**Deferred benefit**__	
Age/service requirement	Three years (ten years if first hired after June 30, 2013) of Allowable Service.
Amount	Benefit is computed under law in effect at termination and increased by the following annual augmentation percentage: (a.) 0.00% before July 1, 1971; (b.) 5.00% from July 1, 1971, to January 1, 1981; (c.) 3.00% thereafter (2.50% if hired after June 30, 2006) until January 1, 2012; (d.) 2.00% after December 31, 2011, through December 31, 2018; and (e.) 0.00% thereafter. Amount is payable at normal or early retirement. If a member terminated employment prior to July 1, 1997, but was not eligible to commence their pension before July 1, 1997, an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.
Optional form conversion factors	Effective July 1, 2019 and phased in over a 24-month period, actuarially equivalent factors based on the RP-2014 mortality table for healthy annuitants for a member turning age 55 in 2021, reflecting projected mortality improvements using Scale MP-2017, white collar adjustment, blended 90% males, 6.44% post-retirement interest, and 7.50% pre-retirement interest. Reflecting statutory requirements, joint and survivor factors are based on an interest assumption of 6.50%.
Combined service annuity	Members are eligible for combined service benefits if they: (a.) Have sufficient allowable service in total that equals or exceeds the applicable service credit vesting requirement of the retirement plan with the longest applicable service credit vesting requirement; and (b.) Have at least six months of allowable service credit in each plan worked under; and (c.) Are not in receipt of a benefit from another plan, or have applied for benefits with an effective date within one year. Members who meet the above requirements must have their benefit based on the following: (a.) Allowable service in all covered plans are combined in order to determine eligibility for early retirement. (b.) Average salary is based on the high five consecutive years during their entire service in all covered plans.
Changes in plan provisions	There have been no changes in plan provisions since the prior valuation.

SECTION F

ACTUARIAL COST METHOD AND ACTUARIAL ASSUMPTIONS

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

Actuarial Cost Method

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

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

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

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

Asset Valuation Method

Fair value of assets.

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

The following assumptions were used in valuing the liabilities and benefits under the plan. The assumptions are based on the last experience study, dated June 30, 2020, and a review of inflation and investment return assumptions, dated June 24, 2021.

The Allowance for Combined Service Annuity assumptions are based on an analysis completed by the LCPR actuary and documented in a report dated October 2016.

Investment return	6.50% per annum.
Single Discount Rate	6.50% per annum.
Salary increases	Reported salary at valuation date increased according to the rate table, to current fiscal year and annually for each future year. Prior fiscal year salary is annualized for members with less than one year of service.
Inflation	2.25% per year.
Payroll growth	3.00% per year.
Mortality rates	
Healthy pre-retirement	Pub-2010 General Employee Mortality Table adjusted for mortality improvements using mortality improvement Scale MP-2019.
Healthy post-retirement	Pub-2010 General Retired Mortality Table adjusted for mortality improvements using mortality improvement Scale MP-2019.
Disabled	Pub-2010 General Disabled Mortality Table adjusted for mortality improvements using mortality improvement Scale MP-2019.
Notes	The Pub-2010 employee mortality table as published by the Society of Actuaries (SOA) contains mortality rates for ages 18 to 80 and the annuitant mortality table contains mortality rates for ages 50 to 120. We have extended the annuitant mortality table as needed for members younger than age 50 who are receiving a benefit by deriving rates based on the employee table and the juvenile table. Similarly, we have extended the employee table as needed for members older than age 80 by deriving rates based on the annuitant table.
Retirement	Members retiring from active status are assumed to retire according to the age related rates shown in the rate table. Members who have attained the highest assumed retirement age are assumed to retire in one year. Note that plan changes reflected in this report may result in behavior changes that are not anticipated in the current retirement rates.
Withdrawal	Service-related rates based on experience; see table of sample rates.
Disability	Age-related rates based on experience; see table of sample rates. All incidences are assumed to be duty-related.
Allowance for combined service annuity	Liabilities for former, vested members are increased by 13.00% to account for the effect of some participants having eligibility for a Combined Service Annuity.

Summary of Actuarial Assumptions (Continued)

Administrative expenses	In the valuation year, equal to prior year administrative expenses expressed as percentage of prior year projected payroll. In each subsequent year, equal to the initial administrative expense percentage applied to payroll for the closed group.
Refund of contributions	For non-vested members, account balances accumulate interest until the assumed commencement date and are discounted back to the valuation date. Active members decrementing after becoming eligible for a benefit are assumed to take the contributions accumulated with interest if larger than the value of the benefit.
Commencement of deferred benefits	Members receiving deferred annuities (including current terminated deferred members) are assumed to begin receiving benefits at age 55.
Percentage married	85% of active members are assumed to be married. Actual marital status is used for members in payment status.
Age of spouse	Females are assumed to be two years younger than their spouses, and males are assumed to be two years older than their spouses.
Eligible children	Each member may have two dependent children depending on member's age. Assumed first child is born at member's age 28 and second child at member's age 31.
Form of payment	Married members retiring from active status are assumed to elect subsidized Joint and Survivor form of annuity as follows: 12.5% elect 50% Joint & Survivor option 12.5% elect 75% Joint & Survivor option 70.0% elect 100% Joint & Survivor option Remaining married and unmarried members are assumed to elect the Straight Life option.
Eligibility testing	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
Decrement operation	Withdrawal decrements do not operate during retirement eligibility. Decrements are assumed to occur mid-fiscal year.
Service credit accruals	It is assumed that members accrue one year of service credit per year.
Pay increases	Pay increases are assumed to happen at the beginning of the fiscal year. This is equivalent to assuming that reported earnings are pensionable earnings for the year ending on the valuation date.

Summary of Actuarial Assumptions (Continued)

Unknown data for certain members	To prepare this report, GRS has used and relied on participant data supplied by the Fund. Although GRS has reviewed the data in accordance with Actuarial Standards of Practice No. 23, GRS has not verified or audited any of the data or information provided. There are no members reported with missing birth dates. In cases where submitted data was missing or incomplete, the following assumptions were applied: <u>Data for active members</u>: There was one member reported with missing salary and no members reported with missing service. We used prior year salary. There were no members reported with a missing or invalid date of birth or gender. <u>Data for terminated members</u>: There were two members reported without a benefit. We calculated benefits using the reported Credited Service and Termination Date. Average Salary was not reported, so we assumed a value of $45,000. <u>Data for members receiving benefits</u>: There were no members reported with a missing or invalid birth date or gender. There were no members reported without a benefit. There were no survivors reported with an expired benefit. There were 7 retirees reported with a bounceback annuity and an unreasonable reduction factor. A factor of 0.80, 0.85 and 0.90 was assumed for the 100%, 75% and 50% joint and survivor annuity, respectively. There were 3 retirees reported with a survivor option and a survivor date of death. We assumed no benefit was payable to the survivor, and the member benefit already reflected the "pop-up," if any. For retirees who elected a survivor benefit option, we used the valuation assumptions if the survivor date of birth was missing or invalid (161 members) and/or the survivor gender was missing or invalid (175 members).

Summary of Actuarial Assumptions (Continued)

Changes in actuarial assumptions	The long-term investment rate of return was changed from 7.50% to 6.50%. The single discount rate was changed from 7.50% to 6.50%. The inflation assumption was changed from 2.50% to 2.25%. The payroll growth assumption was changed from 3.25% to 3.00% The base mortality table for healthy annuitants and employees was changed from the RP-2014 table to the Pub-2010 General Mortality table and the mortality improvement scale was changed from MP-2015 to MP-2019. The base mortality table for disabled annuitants was changed from the RP-2014 disabled annuitant mortality table to the Pub-2010 General disabled annuitant mortality table and the mortality improvement scale was changed from MP-2015 to MP-2019. Assumed salary increase rates were changed as recommended in the June 30, 2020 experience study. The net effect is proposed rates that average approximately 48 basis points higher than previous rates. Assumed rates of retirement were changed as recommended in the June 30, 2020 experience study, which results in fewer predicted retirements. Assumed rates of termination were changed as recommended in the June 30, 2020 experience study. The new rates are based on service and are generally higher than current rates for members with less than 22 years of service. Assumed rates of disability were changed as recommended in the June 30, 2020 experienced study. New rates, on average, result in a slight increase to assumed disability retirements. Minor changes to form of payment assumptions were applied.

Summary of Actuarial Assumptions (Continued)

	Percentage of Members Dying each Year*					
	Healthy Post-Retirement Mortality**		Healthy Pre-Retirement Mortality**		Disability Mortality**	
Age in 2021	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	0.35
35	0.07	0.03	0.07	0.03	0.67	0.55
40	0.08	0.04	0.08	0.04	0.82	0.74
45	0.11	0.06	0.10	0.06	1.04	0.98
50	0.28	0.21	0.14	0.08	1.50	1.42
55	0.42	0.30	0.21	0.13	2.06	1.82
60	0.64	0.41	0.33	0.20	2.60	2.08
65	0.92	0.59	0.47	0.29	3.07	2.18
70	1.42	0.96	0.66	0.44	3.64	2.58
75	2.42	1.71	0.99	0.73	4.70	3.63
80	4.36	3.14	1.58	1.24	6.70	5.62
85	7.96	5.91	6.70	5.08	10.03	8.89
90	13.77	10.98	13.77	10.98	15.25	13.06

* *Generally, mortality rates are expected to increase as age increases. These standard mortality rates have been adjusted slightly to prevent decreasing mortality rates. The adjustment has no material effect on these results.*

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

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

Summary of Actuarial Assumptions (Concluded)

Age	Percent Retiring
50	3 %
51	5
52	5
53	3
54	4
55	65
56	40
57	30
58	15
59	20
60+	100

Salary Scale	
Year	Increase
1	12.50%
2	8.50
3	7.50
4	7.25
5	7.00
6	6.75
7	6.50
8	5.50
9	5.00
10	4.50
11	4.25
12	4.00
13	4.00
14	4.00
15	4.00
16	3.75
17	3.50
18	3.50
19	3.50
20	3.50
21	3.40
22	3.30
23	3.20
24	3.10
25+	3.00

Year	Percent of Members Terminating (Withdrawing) Each Year
1	5.00%
2	3.50
3	2.50
4	2.25
5	2.00
6	1.75
7	1.50
8	1.25
9	1.00
10	0.75
11	0.75
12	0.75
13	0.75
14	0.75
15	0.50
16	0.50
17	0.50
18	0.50
19	0.50
20	0.50
21	0.50
22+	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 rate is required, as described in the following paragraph.

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

For the purpose of this valuation, the expected rate of return on pension plan investments is ; the municipal bond rate is (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 is** . 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)

Fiscal Year Ending	Projected Covered-Employee Payroll: Payroll for Current Employees	Payroll for New Employees	Total Employee Payroll	Projected Contributions: Contributions from Current Employees	Employer Contributions for Current Employees	Contributions on Future Payroll toward Current UAL*	Additional State Contributions**	Total Contributions
	(a)	(b)	(c) = (a) + (b)	(d) = (a) x 15.4%	(e) = (a) x 30.1%***	(f)	(g)	(h) = (d) + (e) + (f) + (g)
2021	$ 88,351		$ 88,351					
2022	88,362	$ -	88,362	$ 13,608	$ 26,597		$ 1,000	$ *41,205*
2023	88,318	2,694	91,012	13,601	26,584	$ 424	1,000	41,609
2024	87,733	6,010	93,743	13,511	26,408	945	-	40,864
2025	86,813	9,742	96,555	13,369	20,054	851	-	34,274
2026	85,545	13,907	99,452	13,174	19,761	1,214	-	34,149
2027	84,241	18,194	102,435	12,973	19,460	1,588	-	34,021
2028	82,333	23,175	105,508	12,679	19,019	2,023	-	33,721
2029	79,870	28,804	108,674	12,300	18,450	2,515	-	33,265
2030	77,291	34,643	111,934	11,903	17,854	3,024	-	32,781
2031	74,561	40,731	115,292	11,482	17,224	3,556	-	32,262
2032	71,588	47,163	118,751	11,025	16,537	4,117	-	31,679
2033	68,520	53,793	122,313	10,552	15,828	4,696	-	31,076
2034	65,756	60,227	125,983	10,126	15,190	5,258	-	30,574
2035	63,084	66,678	129,762	9,715	14,572	5,821	-	30,108
2036	60,143	73,512	133,655	9,262	13,893	6,418	-	29,573
2037	57,002	80,663	137,665	8,778	13,167	7,042	-	28,987
2038	53,932	87,862	141,794	8,305	12,458	7,670	-	28,433
2039	50,780	95,268	146,048	7,820	11,730	8,317	-	27,867
2040	47,252	103,178	150,430	7,277	10,915	9,007	-	27,199
2041	43,655	111,288	154,943	6,723	10,084	9,715	-	26,522
2042	39,778	119,813	159,591	6,126	9,189	10,460	-	25,775
2043	35,710	128,669	164,379	5,499	8,249	11,233	-	24,981
2044	31,910	137,400	169,310	4,914	7,371	11,995	-	24,280
2045	28,079	146,310	174,389	4,324	6,486	12,773	-	23,583
2046	23,890	155,731	179,621	3,679	5,519	13,595	-	22,793
2047	20,002	165,008	185,010	3,080	4,620	14,405	-	22,105
2048	16,231	174,329	190,560	2,500	3,749	15,219	-	21,468
2049	12,601	183,676	196,277	1,941	2,911	16,035	-	20,887
2050	9,381	192,784	202,165	1,445	2,167	16,830	-	20,442
2051	6,436	201,794	208,230	991	1,487	17,617	-	20,095
2052	4,145	210,332	214,477	638	958	18,362	-	19,958
2053	2,406	218,505	220,911	371	556	19,075	-	20,002
2054	1,402	226,136	227,538	216	324	19,742	-	20,282
2055	825	233,540	234,365	127	190	20,388	-	20,705
2056	435	240,961	241,396	67	101	21,036	-	21,204
2057	194	248,443	248,637	30	45	21,689	-	21,764
2058	49	256,048	256,097	8	11	22,353	-	22,372
2059	9	263,770	263,779	1	2	23,027	-	23,030
2060	2	271,691	271,693	-	-	23,719	-	23,719
2061	-	279,844	279,844	-	-	24,430	-	24,430
2062	-	288,239	288,239	-	-	25,163	-	25,163
2063	-	296,886	296,886	-	-	25,918	-	25,918
2064	-	305,793	305,793	-	-	26,696	-	26,696
2065	-	314,966	314,966	-	-	27,497	-	27,497
2066	-	324,415	324,415	-	-	28,321	-	28,321
2067	-	334,148	334,148	-	-	29,171	-	29,171
2068	-	344,172	344,172	-	-	30,046	-	30,046
2069	-	354,498	354,498	-	-	30,948	-	30,948
2070	-	365,132	365,132	-	-	31,876	-	31,876
2071	-	376,086	376,086	-	-	32,832	-	32,832

* *Equal to contributions (45.50% of payroll for 3 years and 38.50% of payroll thereafter for new employees) net of normal cost and expenses (29.77% of payroll).*

** *Additional state contributions assumed to end after 2 years. Actual end date will depend on the funding status of this plan and the PERA Police and Fire Plan.*

*** *Employer contributions are equal to 30.1% for fiscal year ending June 30, 2022; the supplemental employer contribution of 7% of payroll is assumed to stop after 3 years.*

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

	Projected Covered-Employee Payroll			Projected Contributions				
Fiscal Year Ending	Payroll for Current Employees	Payroll for New Employees	Total Employee Payroll	Contributions from Current Employees	Employer Contributions for Current Employees	Contributions on Future Payroll toward Current UAL*	Additional State Contributions	Total Contributions
	(a)	(b)	(c) = (a) + (b)	(d)	(e)	(f)	(g)	(h) = (d) + (e) + (f) + (g)
2072	$ -	$ 387,369	$ 387,369	$ -	$ -	$ 33,817	$ -	$ 33,817
2073	-	398,990	398,990	-	-	34,832	-	34,832
2074	-	410,960	410,960	-	-	35,877	-	35,877
2075	-	423,289	423,289	-	-	36,953	-	36,953
2076	-	435,987	435,987	-	-	38,062	-	38,062
2077	-	449,067	449,067	-	-	39,204	-	39,204
2078	-	462,539	462,539	-	-	40,380	-	40,380
2079	-	476,415	476,415	-	-	41,591	-	41,591
2080	-	490,708	490,708	-	-	42,839	-	42,839
2081	-	505,429	505,429	-	-	44,124	-	44,124
2082	-	520,592	520,592	-	-	45,448	-	45,448
2083	-	536,209	536,209	-	-	46,811	-	46,811
2084	-	552,296	552,296	-	-	48,215	-	48,215
2085	-	568,865	568,865	-	-	49,662	-	49,662
2086	-	585,930	585,930	-	-	51,152	-	51,152
2087	-	603,508	603,508	-	-	52,686	-	52,686
2088	-	621,614	621,614	-	-	54,267	-	54,267
2089	-	640,262	640,262	-	-	55,895	-	55,895
2090	-	659,470	659,470	-	-	57,572	-	57,572
2091	-	679,254	679,254	-	-	59,299	-	59,299
2092	-	699,632	699,632	-	-	61,078	-	61,078
2093	-	720,621	720,621	-	-	62,910	-	62,910
2094	-	742,239	742,239	-	-	64,797	-	64,797
2095	-	764,506	764,506	-	-	66,741	-	66,741
2096	-	787,442	787,442	-	-	68,744	-	68,744
2097	-	811,065	811,065	-	-	70,806	-	70,806
2098	-	835,397	835,397	-	-	72,930	-	72,930
2099	-	860,459	860,459	-	-	75,118	-	75,118
2100	-	886,272	886,272	-	-	77,372	-	77,372
2101	-	912,861	912,861	-	-	79,693	-	79,693
2102	-	940,246	940,246	-	-	82,084	-	82,084
2103	-	968,454	968,454	-	-	84,546	-	84,546
2104	-	997,507	997,507	-	-	87,082	-	87,082
2105	-	1,027,433	1,027,433	-	-	89,695	-	89,695
2106	-	1,058,256	1,058,256	-	-	92,386	-	92,386
2107	-	1,090,003	1,090,003	-	-	95,157	-	95,157
2108	-	1,122,703	1,122,703	-	-	98,012	-	98,012
2109	-	1,156,384	1,156,384	-	-	100,952	-	100,952
2110	-	1,191,076	1,191,076	-	-	103,981	-	103,981
2111	-	1,226,808	1,226,808	-	-	107,100	-	107,100
2112	-	1,263,613	1,263,613	-	-	110,313	-	110,313
2113	-	1,301,521	1,301,521	-	-	113,623	-	113,623
2114	-	1,340,567	1,340,567	-	-	117,031	-	117,031
2115	-	1,380,784	1,380,784	-	-	120,542	-	120,542
2116	-	1,422,207	1,422,207	-	-	124,159	-	124,159
2117	-	1,464,873	1,464,873	-	-	127,883	-	127,883
2118	-	1,508,819	1,508,819	-	-	131,720	-	131,720
2119	-	1,554,084	1,554,084	-	-	135,672	-	135,672
2120	-	1,600,707	1,600,707	-	-	139,742	-	139,742
2121	-	1,648,728	1,648,728	-	-	143,934	-	143,934

* *Equal to contributions (45.50% of payroll for 3 years and 38.50% of payroll thereafter for new employees) net of normal cost and expenses (29.77% of payroll).*

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

Fiscal Year Ending	Projected Beginning Plan Fiduciary Net Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expenses	Projected Investment Earnings at 6.50%	Projected Ending Plan Net Position
	(a)	(b)	(c)	(d)	(e)	(f)=(a)+(b)-(c)-(d)+(e)
2022	$ 957,864	$ 41,205	$ 64,546	$ 203	$ 61,508	$ 995,828
2023	995,828	41,609	65,882	203	63,946	1,035,298
2024	1,035,298	40,864	67,435	202	66,438	1,074,963
2025	1,074,963	34,274	69,107	200	68,752	1,108,682
2026	1,108,682	34,149	70,937	197	70,881	1,142,578
2027	1,142,578	34,021	72,856	194	73,019	1,176,568
2028	1,176,568	33,721	74,998	189	75,150	1,210,252
2029	1,210,252	33,265	77,212	184	77,255	1,243,376
2030	1,243,376	32,781	79,492	178	79,319	1,275,806
2031	1,275,806	32,262	81,892	171	81,334	1,307,339
2032	1,307,339	31,679	84,602	165	83,279	1,337,530
2033	1,337,530	31,076	87,108	158	85,142	1,366,482
2034	1,366,482	30,574	89,327	151	86,937	1,394,515
2035	1,394,515	30,108	91,434	145	88,677	1,421,721
2036	1,421,721	29,573	93,613	138	90,359	1,447,902
2037	1,447,902	28,987	95,846	131	91,970	1,472,882
2038	1,472,882	28,433	97,865	124	93,512	1,496,838
2039	1,496,838	27,867	99,978	117	94,984	1,519,594
2040	1,519,594	27,199	102,266	109	96,369	1,540,787
2041	1,540,787	26,522	104,635	100	97,649	1,560,223
2042	1,560,223	25,775	107,257	91	98,805	1,577,455
2043	1,577,455	24,981	109,898	82	99,815	1,592,271
2044	1,592,271	24,280	112,247	73	100,681	1,604,912
2045	1,604,912	23,583	114,610	65	101,405	1,615,225
2046	1,615,225	22,793	117,237	55	101,967	1,622,693
2047	1,622,693	22,105	119,562	46	102,356	1,627,546
2048	1,627,546	21,468	121,773	37	102,581	1,629,785
2049	1,629,785	20,887	123,786	29	102,644	1,629,501
2050	1,629,501	20,442	125,485	22	102,557	1,626,993
2051	1,626,993	20,095	126,841	15	102,339	1,622,571
2052	1,622,571	19,958	127,554	10	102,025	1,616,990
2053	1,616,990	20,002	127,755	6	101,657	1,610,888
2054	1,610,888	20,282	127,035	3	101,293	1,605,425
2055	1,605,425	20,705	126,018	2	100,984	1,601,094
2056	1,601,094	21,204	124,619	1	100,763	1,598,441
2057	1,598,441	21,764	123,111	-	100,657	1,597,751
2058	1,597,751	22,372	121,337	-	100,688	1,599,474
2059	1,599,474	23,030	119,444	-	100,882	1,603,942
2060	1,603,942	23,719	117,477	-	101,257	1,611,441
2061	1,611,441	24,430	115,415	-	101,833	1,622,289
2062	1,622,289	25,163	113,259	-	102,631	1,636,824
2063	1,636,824	25,918	111,004	-	103,672	1,655,410
2064	1,655,410	26,696	108,648	-	104,980	1,678,438
2065	1,678,438	27,497	106,188	-	106,581	1,706,328
2066	1,706,328	28,321	103,623	-	108,502	1,739,528
2067	1,739,528	29,171	100,952	-	110,773	1,778,520
2068	1,778,520	30,046	98,176	-	113,424	1,823,814
2069	1,823,814	30,948	95,296	-	116,489	1,875,955
2070	1,875,955	31,876	92,317	-	120,004	1,935,518
2071	1,935,518	32,832	89,243	-	124,004	2,003,111

For purposes of this projection, we assumed the current fixed rate contribution would continue after the plan becomes fully funded. If we reflected a decrease in contribution rates due to full funding, future assets and contributions would be less than what is shown herein.

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 6.50%	Projected Ending Plan Net Position
	(a)	(b)	(c)	(d)	(e)	(f)=(a)+(b)-(c)-(d)+(e)
2072	$ 2,003,111	$ 33,817	$ 86,081	$ -	$ 128,530	$ 2,079,377
2073	2,079,377	34,832	82,838	-	133,624	2,164,995
2074	2,164,995	35,877	79,523	-	139,329	2,260,678
2075	2,260,678	36,953	76,142	-	145,691	2,367,180
2076	2,367,180	38,062	72,706	-	152,759	2,485,295
2077	2,485,295	39,204	69,221	-	160,584	2,615,862
2078	2,615,862	40,380	65,697	-	169,221	2,759,766
2079	2,759,766	41,591	62,141	-	178,727	2,917,943
2080	2,917,943	42,839	58,562	-	189,163	3,091,383
2081	3,091,383	44,124	54,969	-	200,593	3,281,131
2082	3,281,131	45,448	51,371	-	213,084	3,488,292
2083	3,488,292	46,811	47,779	-	226,708	3,714,032
2084	3,714,032	48,215	44,204	-	241,540	3,959,583
2085	3,959,583	49,662	40,660	-	257,661	4,226,246
2086	4,226,246	51,152	37,163	-	275,154	4,515,389
2087	4,515,389	52,686	33,730	-	294,107	4,828,452
2088	4,828,452	54,267	30,383	-	314,613	5,166,949
2089	5,166,949	55,895	27,141	-	336,771	5,532,474
2090	5,532,474	57,572	24,027	-	360,684	5,926,703
2091	5,926,703	59,299	21,063	-	386,459	6,351,398
2092	6,351,398	61,078	18,268	-	414,210	6,808,418
2093	6,808,418	62,910	15,661	-	444,059	7,299,726
2094	7,299,726	64,797	13,258	-	476,131	7,827,396
2095	7,827,396	66,741	11,072	-	510,561	8,393,626
2096	8,393,626	68,744	9,112	-	547,493	9,000,751
2097	9,000,751	70,806	7,381	-	587,078	9,651,254
2098	9,651,254	72,930	5,879	-	629,476	10,347,781
2099	10,347,781	75,118	4,599	-	674,862	11,093,162
2100	11,093,162	77,372	3,530	-	723,418	11,890,422
2101	11,890,422	79,693	2,656	-	775,342	12,742,801
2102	12,742,801	82,084	1,956	-	830,845	13,653,774
2103	13,653,774	84,546	1,410	-	890,155	14,627,065
2104	14,627,065	87,082	993	-	953,513	15,666,667
2105	15,666,667	89,695	684	-	1,021,180	16,776,858
2106	16,776,858	92,386	461	-	1,093,436	17,962,219
2107	17,962,219	95,157	304	-	1,170,578	19,227,650
2108	19,227,650	98,012	197	-	1,252,926	20,578,391
2109	20,578,391	100,952	125	-	1,340,821	22,020,039
2110	22,020,039	103,981	80	-	1,434,626	23,558,566
2111	23,558,566	107,100	51	-	1,534,731	25,200,346
2112	25,200,346	110,313	33	-	1,641,550	26,952,176
2113	26,952,176	113,623	22	-	1,755,525	28,821,302
2114	28,821,302	117,031	16	-	1,877,128	30,815,445
2115	30,815,445	120,542	11	-	2,006,860	32,942,836
2116	32,942,836	124,159	8	-	2,145,256	35,212,243
2117	35,212,243	127,883	6	-	2,292,886	37,633,006
2118	37,633,006	131,720	5	-	2,450,359	40,215,080
2119	40,215,080	135,672	4	-	2,618,320	42,969,068
2120	42,969,068	139,742	3	-	2,797,459	45,906,266
2121	45,906,266	143,934	2	-	2,988,511	49,038,709

For purposes of this projection, we assumed the current fixed rate contribution would continue after the plan becomes fully funded. If we reflected a decrease in contribution rates due to full funding, future assets and contributions would be less than what is shown herein.

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)
2022	$ 957,864	$ 64,546	$ 64,546	$ 0	$ 62,546	$ 0	$ 62,546
2023	995,828	65,882	65,882	0	59,944	0	59,944
2024	1,035,298	67,435	67,435	0	57,612	0	57,612
2025	1,074,963	69,107	69,107	0	55,437	0	55,437
2026	1,108,682	70,937	70,937	0	53,432	0	53,432
2027	1,142,578	72,856	72,856	0	51,528	0	51,528
2028	1,176,568	74,998	74,998	0	49,806	0	49,806
2029	1,210,252	77,212	77,212	0	48,146	0	48,146
2030	1,243,376	79,492	79,492	0	46,543	0	46,543
2031	1,275,806	81,892	81,892	0	45,022	0	45,022
2032	1,307,339	84,602	84,602	0	43,673	0	43,673
2033	1,337,530	87,108	87,108	0	42,222	0	42,222
2034	1,366,482	89,327	89,327	0	40,655	0	40,655
2035	1,394,515	91,434	91,434	0	39,074	0	39,074
2036	1,421,721	93,613	93,613	0	37,563	0	37,563
2037	1,447,902	95,846	95,846	0	36,112	0	36,112
2038	1,472,882	97,865	97,865	0	34,623	0	34,623
2039	1,496,838	99,978	99,978	0	33,211	0	33,211
2040	1,519,594	102,266	102,266	0	31,898	0	31,898
2041	1,540,787	104,635	104,635	0	30,645	0	30,645
2042	1,560,223	107,257	107,257	0	29,496	0	29,496
2043	1,577,455	109,898	109,898	0	28,377	0	28,377
2044	1,592,271	112,247	112,247	0	27,215	0	27,215
2045	1,604,912	114,610	114,610	0	26,092	0	26,092
2046	1,615,225	117,237	117,237	0	25,061	0	25,061
2047	1,622,693	119,562	119,562	0	23,998	0	23,998
2048	1,627,546	121,773	121,773	0	22,950	0	22,950
2049	1,629,785	123,786	123,786	0	21,906	0	21,906
2050	1,629,501	125,485	125,485	0	20,851	0	20,851
2051	1,626,993	126,841	126,841	0	19,790	0	19,790
2052	1,622,571	127,554	127,554	0	18,687	0	18,687
2053	1,616,990	127,755	127,755	0	17,574	0	17,574
2054	1,610,888	127,035	127,035	0	16,408	0	16,408
2055	1,605,425	126,018	126,018	0	15,283	0	15,283
2056	1,601,094	124,619	124,619	0	14,191	0	14,191
2057	1,598,441	123,111	123,111	0	13,164	0	13,164
2058	1,597,751	121,337	121,337	0	12,182	0	12,182
2059	1,599,474	119,444	119,444	0	11,260	0	11,260
2060	1,603,942	117,477	117,477	0	10,399	0	10,399
2061	1,611,441	115,415	115,415	0	9,593	0	9,593
2062	1,622,289	113,259	113,259	0	8,839	0	8,839
2063	1,636,824	111,004	111,004	0	8,134	0	8,134
2064	1,655,410	108,648	108,648	0	7,476	0	7,476
2065	1,678,438	106,188	106,188	0	6,861	0	6,861
2066	1,706,328	103,623	103,623	0	6,286	0	6,286
2067	1,739,528	100,952	100,952	0	5,751	0	5,751
2068	1,778,520	98,176	98,176	0	5,251	0	5,251
2069	1,823,814	95,296	95,296	0	4,786	0	4,786
2070	1,875,955	92,317	92,317	0	4,353	0	4,353
2071	1,935,518	89,243	89,243	0	3,952	0	3,952

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)
2072	$ 2,003,111	$ 86,081	$ 86,081	$ -	$ 3,579	$ -	$ 3,579
2073	2,079,377	82,838	82,838	-	3,234	-	3,234
2074	2,164,995	79,523	79,523	-	2,915	-	2,915
2075	2,260,678	76,142	76,142	-	2,621	-	2,621
2076	2,367,180	72,706	72,706	-	2,350	-	2,350
2077	2,485,295	69,221	69,221	-	2,101	-	2,101
2078	2,615,862	65,697	65,697	-	1,872	-	1,872
2079	2,759,766	62,141	62,141	-	1,663	-	1,663
2080	2,917,943	58,562	58,562	-	1,471	-	1,471
2081	3,091,383	54,969	54,969	-	1,297	-	1,297
2082	3,281,131	51,371	51,371	-	1,138	-	1,138
2083	3,488,292	47,779	47,779	-	994	-	994
2084	3,714,032	44,204	44,204	-	863	-	863
2085	3,959,583	40,660	40,660	-	746	-	746
2086	4,226,246	37,163	37,163	-	640	-	640
2087	4,515,389	33,730	33,730	-	545	-	545
2088	4,828,452	30,383	30,383	-	461	-	461
2089	5,166,949	27,141	27,141	-	387	-	387
2090	5,532,474	24,027	24,027	-	322	-	322
2091	5,926,703	21,063	21,063	-	265	-	265
2092	6,351,398	18,268	18,268	-	216	-	216
2093	6,808,418	15,661	15,661	-	174	-	174
2094	7,299,726	13,258	13,258	-	138	-	138
2095	7,827,396	11,072	11,072	-	108	-	108
2096	8,393,626	9,112	9,112	-	84	-	84
2097	9,000,751	7,381	7,381	-	64	-	64
2098	9,651,254	5,879	5,879	-	48	-	48
2099	10,347,781	4,599	4,599	-	35	-	35
2100	11,093,162	3,530	3,530	-	25	-	25
2101	11,890,422	2,656	2,656	-	18	-	18
2102	12,742,801	1,956	1,956	-	12	-	12
2103	13,653,774	1,410	1,410	-	8	-	8
2104	14,627,065	993	993	-	6	-	6
2105	15,666,667	684	684	-	4	-	4
2106	16,776,858	461	461	-	2	-	2
2107	17,962,219	304	304	-	1	-	1
2108	19,227,650	197	197	-	1	-	1
2109	20,578,391	125	125	-	1	-	1
2110	22,020,039	80	80	-	-	-	-
2111	23,558,566	51	51	-	-	-	-
2112	25,200,346	33	33	-	-	-	-
2113	26,952,176	22	22	-	-	-	-
2114	28,821,302	16	16	-	-	-	-
2115	30,815,445	11	11	-	-	-	-
2116	32,942,836	8	8	-	-	-	-
2117	35,212,243	6	6	-	-	-	-
2118	37,633,006	5	5	-	-	-	-
2119	40,215,080	4	4	-	-	-	-
2120	42,969,068	3	3	-	-	-	-
2121	45,906,266	2	2	-	-	-	-
				Totals	$ 1,376,262	$ -	$ 1,376,262

SECTION H

GLOSSARY OF TERMS

Glossary of Terms

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

Glossary of Terms

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

Glossary of Terms

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

Glossary of Terms

Total Pension Expense	The total pension expense is the sum of the following items that are recognized at the end of the employer's fiscal year: 1. Service Cost 2. Interest on the Total Pension Liability 3. Current-Period Changes in Benefit Terms 4. Employee Contributions 5. Projected Earnings on Plan Investments 6. Pension Plan Administrative Expense 7. Other Changes in Plan Fiduciary Net Position 8. Recognition of Outflow (Inflow) of Resources due to the difference between expected and actual in measurement of the Total Pension Liability 9. Recognition of Outflow (Inflow) of Resources due to Assumption Changes 10. Recognition of Outflow (Inflow) of Resources due to the difference between projected and actual earnings on pension plan investments
Total Pension Liability (TPL)	The TPL is the portion of the actuarial present value of projected benefit payments that is attributed to past periods of member service.
Unfunded Actuarial Accrued Liability (UAAL)	The UAAL is the difference between actuarial accrued liability and valuation assets.
Valuation Assets	The valuation assets are the plan fiduciary net position used in determining the net position liability of the plan. For purposes of the GASB Statement No. 67, the asset valuation method is equal to the market value of assets.