

Minnesota State Retirement System

State Employees Retirement Fund

GASB Statement Nos. 67 and 68

Accounting and Financial Reporting for Pensions

June 30, 2019



November 27, 2019

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

Dear Board of Directors:

This report provides accounting and financial reporting information that is intended to comply with the Governmental Accounting Standards Board (GASB) Statements No. 67 and No. 68 for the State Employees Retirement Fund (“SERF”), as amended by 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 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 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 Statement 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, 2019 for additional discussion of the nature of actuarial calculations and more information related to participant data, economic and demographic assumptions, and benefit provisions.

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

The signing actuaries are independent of the plan sponsor.

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,



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



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

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SECTION A

EXECUTIVE SUMMARY

Executive Summary

as of June 30, 2019 (Dollars in Thousands)

	2019
Actuarial Valuation Date	June 30, 2019
Measurement Date of the Net Pension Liability	June 30, 2019
Membership	
Number of	
- Service Retirements	36,432
- Survivors	4,140
- Disability Retirements	1,801
- Deferred Retirements	17,154
- Terminated other non-vested	9,110
- Active Members	51,997
- Total	120,634
Covered-employee Payroll	\$ 3,168,870 ⁽¹⁾
Net Pension Liability	
Total Pension Liability	\$ 15,179,140
Plan Fiduciary Net Position	13,772,289
Net Pension Liability	\$ 1,406,851
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	90.73%
Net Pension Liability as a Percentage of Covered-employee Payroll	44.40%
Development of the Single Discount Rate	
Single Discount Rate	7.50%
Long-Term Expected Rate of Investment Return	7.50%
Long-Term Municipal Bond Rate	3.13% ⁽²⁾
Last year ending June 30 in the 2020 to 2119 projection period for which projected benefit payments are fully funded	2119
Total Pension Expense/ (Income)	\$ 295,915

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

	Deferred Outflows of Resources	Deferred Inflows of Resources
Difference between expected and actual experience in the measurement of the Total Pension Liability	\$ 42,648	\$ 4,880
Changes in assumptions	1,982,263	4,407,927
Net difference between projected and actual earnings on pension plan investments	207,434	551,034
Totals	\$ 2,232,345	\$ 4,963,841

⁽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 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 SERF subsequent to the measurement date of June 30, 2019.

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 Employees Retirement Fund can be found online at www.msrs.state.mn.us/financial-information 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 all actuarial assumptions are met (including the assumption of the plan earning 7.50%), 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 29 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 be performed at least every two years. The net pension liability and pension expense should be measured as of the pension plan's fiscal year end (measurement date) on a date that is within the employer's prior fiscal year. 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, 2019 and a measurement date of June 30, 2019.

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 7.50%; the municipal bond rate is 3.13% (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 7.50%.

SECTION B

FINANCIAL STATEMENTS

Statement of Pension Expense under GASB Statement No. 68

Fiscal Year Ended June 30, 2019 (Dollars in Thousands)

A. Expense/(Income)

1. Service Cost	\$	255,056
2. Interest on the Total Pension Liability		1,078,390
3. Current-Period Benefit Changes		-
4. Employee Contributions (made negative for addition here)		(182,210)
5. Projected Earnings on Plan Investments (made negative for addition here)		(979,400)
6. Pension Plan Administrative Expense		9,877
7. Other Changes in Plan Fiduciary Net Position		(32,204)
8. Recognition of Outflow (Inflow) of Resources due to differences between expected and actual experience in the measurement of the Total Pension Liability		
<i>Arising from Current Reporting Period</i>		4,636
9. Recognition of Outflow (Inflow) of Resources due to assumption changes		
<i>Arising from Current Reporting Period</i>		-
10. Recognition of Outflow (Inflow) of Resources due to the difference between projected (7.50%) and actual earnings on Pension Plan Investments		
<i>Arising from Current Reporting Period</i>		6,207
11. Increases/(Decreases) from Experience in the Current Reporting Period	\$	160,352
12. Recognition of Outflow (Inflow) of Resources due to differences between expected and actual experience in the measurement of the Total Pension Liability		
<i>Arising from Prior Reporting Periods</i>	\$	(86,092)
13. Recognition of Outflow (Inflow) of Resources due to assumption changes		
<i>Arising from Prior Reporting Periods</i>		200,207
14. Recognition of Outflow (Inflow) of Resources due to the difference between projected and actual earnings on Pension Plan Investments		
<i>Arising from Prior Reporting Periods</i>		21,448
15. Total Pension Expense/ (Income)	\$	295,915

Statement of Outflows and Inflows Arising from Current Reporting Period Fiscal Year Ended June 30, 2019 (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	\$ 23,180
2. Assumption Changes (gains) or losses	-
3. Recognition period for Liabilities: Average of the expected remaining service lives of all employees {in years, rounded to the nearest whole number}	5
4. Outflow (Inflow) of Resources to be recognized in the current pension expense for the difference between expected and actual experience in the measurement of the Total Pension Liability	4,636
5. Outflow (Inflow) of Resources to be recognized in the current pension expense for Assumption Changes	-
6. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Liabilities	<u>\$ 4,636</u>
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	\$ 18,544
8. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses for Assumption Changes	-
9. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Liabilities	<u>\$ 18,544</u>

B. Outflows (Inflows) of Resources due to Assets

1. Net difference between projected and actual earnings on pension plan investments (gains) or losses	\$ 31,034
2. Recognition period for Assets {in years}	5
3. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Assets	<u>6,207</u>
4. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Assets	<u>\$ 24,827</u>

Statement of Outflows and Inflows

Arising from Current and Prior Reporting Periods

Fiscal Year Ended June 30, 2019 (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	\$ 2,001,074	\$ 1,882,323	\$ 118,751
2. Due to Assets	267,400	239,745	27,655
3. Total	\$ 2,268,474	\$ 2,122,068	\$ 146,406

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	\$ 18,810	\$ 100,266	\$ (81,456)
2. Assumption Changes	1,982,264	1,782,057	200,207
3. Net Difference between projected and actual earnings on pension plan investments	267,400	239,745	27,655
4. Total	\$ 2,268,474	\$ 2,122,068	\$ 146,406

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	\$ 42,648	\$ 4,880	\$ 37,768
2. Assumption Changes	1,982,263	4,407,927	(2,425,664)
3. Net Difference between projected and actual earnings on pension plan investments*	207,434	551,034	(343,600)
4. Total	\$ 2,232,345	\$ 4,963,841	\$ (2,731,496)

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
2020	\$ 166,458
2021	(2,002,656)
2022	(906,140)
2023	10,842
2024	-
Thereafter	-
Total	\$ (2,731,496)

* 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, 2019 (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					
2015	\$ (493,197)	5.0000	\$ (98,640)	\$ 0	0.0000
2016	21,209	5.0000	4,242	4,241	1.0000
2017	49,659	5.0000	9,932	19,863	2.0000
2018	(8,132)	5.0000	(1,626)	(4,880)	3.0000
2019	23,180	5.0000	4,636	18,544	4.0000
Total			\$ (81,456)	\$ 37,768	
Deferred Outflow (Inflow) Due to Assumption Changes					
2016	\$ 9,911,319	5.0000	1,982,264	1,982,263	1.0000
2017	(4,691,209)	5.0000	(938,242)	(1,876,483)	2.0000
2018	(4,219,074)	5.0000	(843,815)	(2,531,444)	3.0000
Total			\$ 200,207	\$ (2,425,664)	
Deferred Outflow (Inflow) Due to Differences Between Projected and Actual Earnings on Plan Investments					
2015	\$ 392,927	5.0000	\$ 78,586	\$ 0	0.0000
2016	913,038	5.0000	182,607	182,607	1.0000
2017	(841,021)	5.0000	(168,204)	(336,409)	2.0000
2018	(357,707)	5.0000	(71,541)	(214,625)	3.0000
2019	31,034	5.0000	6,207	24,827	4.0000
Total			\$ 27,655	\$ (343,600)	

Statement of Fiduciary Net Position as of June 30, 2019 (Dollars in Thousands)

Assets	June 30, 2019
Cash & Short-term Investments	\$ 383,533
Receivables	28,337
Investment Pools (at fair value)	13,353,345
Securities Lending Collateral	1,022,558
Capital Assets	15,746
Total Assets	\$ 14,803,519
Total Deferred Outflows of Resources	\$ -
Total Liabilities	\$ (1,031,230)
Total Deferred Inflows of Resources	\$ -
Net Position Restricted for Pensions	\$ 13,772,289

Statement of Changes in Fiduciary Net Position for Year Ended June 30, 2019 (Dollars in Thousands)

1. Net Position at market value at beginning of year		<u>\$ 13,293,422</u>
Additions		
2. Contributions		
a. Employee	\$ 182,210	
b. Employer	182,939	
c. Other sources	-	
d. Total contributions	<u>\$ 365,149</u>	
3. Investment income		
a. Investment income/(loss)	\$ 961,489	
b. Investment expenses	<u>(13,123)</u>	
c. Net investment income/(loss)	\$ 948,366	
4. Other Additions	<u>32,320</u>	
5. Total Additions (2.d.) + (3.c.) + (4.)		<u>\$ 1,345,835</u>
Deductions		
6. Benefits Paid		
a. Annuity benefits	\$ (841,776)	
b. Refunds	<u>(15,199)</u>	
c. Total benefits paid	<u>\$ (856,975)</u>	
7. Expenses		
a. Other deductions	\$ (116)	
b. Administrative	<u>(9,877)</u>	
c. Total expenses	<u>\$ (9,993)</u>	
8. Total deductions (6.c.) + (7.c.)		<u>\$ (866,968)</u>
9. Net increase/(decrease) in fiduciary net position (5.) + (8.)		<u>\$ 478,867</u>
10. Net position at market value at end of year (1.) + (9.)		<u>\$ 13,772,289</u>
11. State Board of Investment calculated annual investment return for the State Employees Retirement Fund*		7.3%

* The fiscal year 2019 investment return for the Combined Funds is 7.3%.

SECTION C

REQUIRED SUPPLEMENTARY INFORMATION

Schedule of Changes in Net Pension Liability and Related Ratios

Current Period

Fiscal Year Ended June 30, 2019 (Dollars in Thousands)

A. Total pension liability		
1. Service Cost	\$	255,056
2. Interest on the Total Pension Liability		1,078,390
3. Changes of benefit terms		-
4. Difference between expected and actual experience of the Total Pension Liability		23,180
5. Changes of assumptions		-
6. Benefit payments, including refunds of employee contributions		(856,975)
7. Net change in total pension liability	\$	499,651
8. Total pension liability – beginning		14,679,489
9. Total pension liability – ending	<u>\$</u>	<u>15,179,140</u>
B. Plan fiduciary net position		
1. Contributions – employer	\$	182,939
2. Contributions – employee		182,210
3. Net investment income		948,366
4. Benefit payments, including refunds of employee contributions		(856,975)
5. Pension Plan Administrative Expense		(9,877)
6. Other changes		32,204
7. Net change in plan fiduciary net position	\$	478,867
8. Plan fiduciary net position – beginning		13,293,422
9. Plan fiduciary net position – ending	<u>\$</u>	<u>13,772,289</u>
C. Net pension liability, A.9. - B.9.	<u>\$</u>	<u>1,406,851</u>
D. Plan fiduciary net position as a percentage of the total pension liability, B.9. / A.9.		90.73%
E. Covered-employee payroll	\$	3,168,870 ⁽¹⁾
F. Net pension liability as a percentage of covered-employee payroll, C. / E.		44.40%

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

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

Last 10 Fiscal Years (which will be built prospectively)

Fiscal year ending June 30,	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
Total Pension Liability										
Service Cost	\$ 255,056	\$ 455,709	\$ 619,666	\$ 211,491	\$ 210,545	\$ 256,155				
Interest on the Total Pension Liability	1,078,390	1,069,154	982,066	1,020,925	1,018,035	922,181				
Benefit Changes	-	(1,711,128)	83,490	-	-	-				
Difference between Expected and Actual Experience	23,180	(8,132)	49,659	21,209	(493,197)	(44,023)				
Assumption Changes	-	(4,219,074)	(4,691,209)	9,911,319	-	(1,477,308)				
Benefit Payments	(841,776)	(797,027)	(750,526)	(707,361)	(665,821)	(623,942)				
Refunds	(15,199)	(13,533)	(11,576)	(13,345)	(12,026)	(11,986)				
Net Change in Total Pension Liability	\$ 499,651	\$ (5,224,031)	\$ (3,718,430)	\$10,444,238	\$ 57,536	\$ (978,923)				
Total Pension Liability - Beginning	14,679,489	19,903,520	23,621,950	13,177,712	13,120,176	14,099,099				
Total Pension Liability - Ending (a)	\$15,179,140	\$14,679,489	\$19,903,520	\$23,621,950	\$13,177,712	\$13,120,176				
Plan Fiduciary Net Position										
Employer Contributions	\$ 182,939	\$ 164,233	\$ 158,352	\$ 151,168	\$ 146,333	\$ 128,037				
Employee Contributions	182,210	166,726	161,670	153,854	149,293	131,033				
Pension Plan Net Investment Income	948,366	1,276,550	1,667,562	(9,633)	501,185	1,829,621				
Benefit Payments	(841,776)	(797,027)	(750,526)	(707,361)	(665,821)	(623,942)				
Refunds	(15,199)	(13,533)	(11,576)	(13,345)	(12,026)	(11,986)				
Pension Plan Administrative Expense	(9,877)	(9,564)	(10,165)	(10,196)	(8,719)	(8,125)				
Other Changes	32,204	20,423	47,232	20,259	29,470	20,528				
Net Change in Plan Fiduciary Net Position	\$ 478,867	\$ 807,808	\$ 1,262,549	\$ (415,254)	\$ 139,715	\$ 1,465,166				
Plan Fiduciary Net Position - Beginning	13,293,422	12,485,614	11,223,065	11,638,319	11,498,604	10,033,438				
Plan Fiduciary Net Position - Ending (b)	\$13,772,289	\$13,293,422	\$12,485,614	\$11,223,065	\$11,638,319	\$11,498,604				
Net Pension Liability - Ending (a) - (b)	\$ 1,406,851	\$ 1,386,067	\$ 7,417,906	\$12,398,885	\$ 1,539,393	\$ 1,621,572				
Plan Fiduciary Net Position as a Percentage										
of Total Pension Liability	90.73 %	90.56 %	62.73 %	47.51 %	88.32 %	87.64 %				
Covered-Employee Payroll ⁽¹⁾	\$ 3,168,870	\$ 3,031,382	\$ 2,939,455	\$ 2,797,345	\$ 2,714,418	\$ 2,620,660				
Net Pension Liability as a Percentage										
of Covered-Employee Payroll	44.40 %	45.72 %	252.36 %	443.24 %	56.71 %	61.88 %				

Notes to Schedule:

(1) Assumed equal to actual member contribution 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) / (a)	(d)	(c) / (d)	
2010						
2011						
2012						
2013						
2014	\$ 13,120,176	\$ 11,498,604	\$ 1,621,572	87.64%	\$ 2,620,660	61.88%
2015	13,177,712	11,638,319	1,539,393	88.32	2,714,418	56.71
2016	23,621,950	11,223,065	12,398,885	47.51	2,797,345	443.24
2017	19,903,520	12,485,614	7,417,906	62.73	2,939,455	252.36
2018	14,679,489	13,293,422	1,386,067	90.56	3,031,382	45.72
2019	15,179,140	13,772,289	1,406,851	90.73	3,168,870	44.40

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	Actual Contribution as a % of Covered- Employee Payroll
	(a)	(b)	(a) - (b) = (c)	(d)	(b) / (d)
2010	\$ 230,439	\$ 113,716	\$ 116,723	\$ 2,327,398	4.89%
2011	146,191	118,563	27,628	2,440,580	4.86
2012	142,740	115,159	27,581	2,367,160 ⁽²⁾	4.86
2013	181,756	121,673	60,083	2,483,000 ⁽²⁾	4.90
2014	195,239	128,037	67,202	2,620,660 ⁽²⁾	4.89
2015	198,695	146,333	52,362	2,714,418 ⁽²⁾	5.39
2016	194,136	151,168	42,968	2,797,345 ⁽²⁾	5.40
2017	264,257	158,352	105,905	2,939,455 ⁽²⁾	5.39
2018	234,629	164,233	70,396	3,031,382 ⁽²⁾	5.42
2019	183,161	182,939	222	3,168,870 ⁽²⁾	5.77

Notes to Schedule of Contributions

Methods and Assumptions Used to Determine Fiscal Year Ending June 30, 2019 Contribution Rates Reported in this Schedule:

Notes

(1) Actuarially determined contribution rates are calculated as of each June 30 and apply to the fiscal year beginning on the day after the measurement date.

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

Valuation Date	June 30, 2018
Actuarial Cost Method	Entry Age Normal
Amortization Method	Level Percentage of Payroll, Closed
Remaining Amortization Period	30 years
Asset Valuation Method	5-Year smoothed market; no corridor
Inflation	2.50%
Payroll Growth	3.25%
Salary Increases	Service based table of rates ranging from 13.75% 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.
Healthy Post-retirement Mortality	RP-2014 annuitant generational mortality table, projected with mortality improvement scale MP-2015 from a base year of 2014, white collar adjustment, set forward 2-years for males and no age adjustment for females.

Other Information

Benefit Increases After Retirement The post-retirement increase is 1.00% from January 1, 2019 through December 31, 2023, and 1.50% from January 1, 2024 and onward. See separate funding actuarial valuation report as of July 1, 2018 for additional detail. To obtain this report, contact MSRS at 60 Empire Drive, Suite 300, St. Paul, Minnesota, 55103 or request via email at info@msrs.us or telephone at 1.800.651.5757. This report can be found online at www.msrs.state.mn.us/actuarial-reports.

Schedule of Investment Returns Multiyear

Last 10 Fiscal Years

Fiscal Year Ending June 30,	Annual Return ¹
2010	
2011	
2012	
2013	
2014	18.7 %
2015	4.5
2016	-0.1
2017	15.2
2018	10.5
2019	7.3

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, 2019, the annual money-weighted rate of return for the State Employees Retirement Fund was 7.3%. 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, 2019, these estimates are summarized in the following table:

<u>Asset Class</u>	<u>Target Allocation</u>	<u>Long-Term Expected Real Rate of Return (Geometric Mean)</u>
Domestic Equity	36%	5.10%
International Equity	17%	5.30%
Private Markets	25%	5.90%
Fixed Income	20%	0.75%
Cash	2%	0.00%
Total	<u>100%</u>	

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 7.50%. This assumption is based on a review of inflation and investment return assumptions in our experience study report dated June 27, 2019.

Single Discount Rate

A Single Discount Rate of 7.50% was used to measure the total pension liability. This Single Discount Rate was based on an expected rate of return on pension plan investments of 7.50%. The projection of cash flows used to determine this Single Discount Rate assumed that employee and employer contributions will be made at the current statutory contribution rates. Based on these assumptions, the pension plan's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. As a result, 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 7.50%, as well as what the fund's net pension liability would be if it were calculated using a single discount rate that is 1-percentage-point lower (6.50%) or 1-percentage-point higher (8.50%) than the current rate.

Sensitivity of Net Pension Liability to the Single Discount Rate Assumption

(Dollars in Thousands)

	1% Decrease 6.50%	Current Single Discount Rate Assumption 7.50%	1% Increase 8.50%
Total Pension Liability	\$ 17,048,970	\$ 15,179,140	\$ 13,626,978
Net Position Restricted for Pensions	13,772,289	13,772,289	13,772,289
Net Pension Liability	\$ 3,276,681	\$ 1,406,851	\$ (145,311)

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

Note that we believe the 8.5% interest rate assumption would 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	\$ 14,679,489	\$ 13,293,422	\$ 1,386,067	\$ 4,446,605	\$ 7,085,909	
Changes for the Year:						
Service Cost	\$ 255,056		\$ 255,056			\$ 255,056
Interest on Total Pension Liability	1,078,390		1,078,390			1,078,390
Interest on Fiduciary Net Position		\$ 979,400 ⁽¹⁾	(979,400)			(979,400)
Changes in Benefit Terms	-		-			-
Liability Experience Gains and Losses	23,180		23,180	\$ 18,544	\$ -	4,636
Changes in Assumptions	-		-	-	-	-
Recognition of Deferred Outflows/(Inflows) of Resources Arising from Prior Reporting Periods						
Liability Experience Gains/(Losses)				(14,174)	(100,266)	(86,092)
Assumption Changes				(1,982,264)	(1,782,057)	200,207
Investment Gains/(Losses)				(261,193)	(239,745)	21,448
Contributions - Employer		182,939	(182,939)			
Contributions - Employees		182,210	(182,210)			(182,210)
Asset Gain/(Loss)		(31,034) ⁽¹⁾	31,034	24,827	-	6,207
Benefit Payments and Refunds	(856,975)	(856,975)	-			
Administrative Expenses		(9,877)	9,877			9,877
Other changes		32,204	(32,204)			(32,204)
Net Changes	\$ 499,651	\$ 478,867	\$ 20,784	\$ (2,214,260)	\$ (2,122,068)	\$ 295,915
Balance End of Year	\$ 15,179,140	\$ 13,772,289	\$ 1,406,851	\$ 2,232,345	\$ 4,963,841	

(1) The sum of these items in column (b) equals the net investment income of \$948,366.

Summary of Population Statistics

	Terminated*			Recipients**			Total
	Actives	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	
Members on July 1, 2018	51,223	17,109	8,235	34,937	1,826	4,058	117,388
New members	5,981	0	0	0	0	0	5,981
Return to active	366	(178)	(188)	0	0	0	0
Terminated non-vested	(2,092)	0	2,092	0	0	0	0
Service retirements	(1,477)	(792)	0	2,269	0	0	0
Unclassified retirements	0	0	0	63	0	0	63
Terminated deferred	(1,053)	1,053	0	0	0	0	0
Terminated refund/transfer	(836)	(170)	(1,436)	0	0	0	(2,442)
Deaths	(79)	(41)	(8)	(910)	(81)	(221)	(1,340)
New beneficiary	0	0	0	0	0	330	330
Disabled	(36)	0	0	0	36	0	0
Data adjustments	0	173	415	73	20	(27)	654
Net change	774	45	875	1,495	(25)	82	3,246
Members on July 1, 2019	51,997	17,154	9,110	36,432	1,801	4,140	120,634

* Includes members in the General or Military Affairs Plans.

** Includes members in the General, Military Affairs or Unclassified Plans.

SECTION E

SUMMARY OF BENEFITS

Summary of Plan Provisions

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

Plan Year	July 1 through June 30.		
Eligibility	State employees, non-academic staff of the University of Minnesota and employees of certain Metro level government units, unless excluded by law.		
Contributions	Shown as a percent of salary:		
	<u>Effective as of</u>	<u>Member</u>	<u>Employer</u>
	Prior to July 1, 2018	5.50%	5.50%
	July 1, 2018	5.75%	5.875%
	July 1, 2019	6.00%	6.25%
	Member contributions are “picked up” according to the provisions of Internal Revenue Code 414(h).		
Allowable Service	Service during which member contributions were made. May also include certain leaves of absence, military service and periods while temporary Worker's Compensation is paid. Excludes lump sum vacation and severance pay at termination.		
Average Salary	Average of the five highest successive years of Salary. Average Salary is based on all Allowable Service if less than five years.		
Salary	Includes wages, allowances and fees. Excludes lump sum payments at separation, employer contributions to deferred compensation and tax-sheltered annuity plans and benevolent vacation and sick leave donation programs.		
Retirement			
	<u>Normal retirement benefit</u>		
	Age/Service requirement		
	First hired before July 1, 1989:		
	(a.) Age 65 and three years of Allowable Service.		
	(b.) Proportionate Retirement Annuity is available at age 65 and one year of Allowable Service.		
	First hired after June 30, 1989:		
	(a.) The greater of age 65 or the age eligible for full Social Security retirement benefits (but not higher than age 66) and three years of Allowable Service (five years if hired after June 30, 2010).		
	(b.) Proportionate Retirement Annuity is available at normal retirement age and one year of Allowable Service.		
Amount	1.70% of Average Salary for each year of Allowable Service.		

Summary of Plan Provisions (Continued)

Retirement (Continued)

Early retirement

Age/Service requirement

First hired before July 1, 1989:

- (a.) Age 55 and three years of Allowable Service.
- (b.) Any age with 30 years of Allowable Service.
- (c.) Rule of 90: Age plus Allowable Service totals 90.

First hired after June 30, 1989:

- (a.) Age 55 and three years (five years if hired after June 30, 2010) of Allowable Service.

Amount

First hired before July 1, 1989:

The greater of (a) or (b):

- (a.) 1.20% of Average Salary for each of the first ten years of Allowable Service and 1.70% of Average Salary for each subsequent year with reduction of 0.25% for each month the member is under age 65 at time of retirement or under age 62 if 30 or more years of Allowable Service. No reduction if age plus years of Allowable Service totals 90.
- (b.) 1.70% of Average Salary for each year of Allowable Service assuming augmentation to age 65 at 3.00% per year and actuarial reduction for each month the member is under age 65. Augmentation adjustment is phased out over a five-year period starting July 1, 2019, resulting in no augmentation adjustment after June 30, 2024.

First hired after June 30, 1989:

1.70% of Average Salary for each year of Allowable Service assuming augmentation to the age eligible for full Social Security retirement benefit (but not higher than age 66) at 3.00% (2.50% if hired after June 30, 2006) per year and actuarial reduction for each month the member is under the normal retirement age. Augmentation adjustment is phased out over a five-year period starting July 1, 2019, resulting in no augmentation adjustment after June 30, 2024.

Form of payment

Life annuity with return on death of any balance of member contributions over aggregate monthly payments. Actuarially equivalent options are:

- (a.) 50%, 75%, or 100% Joint and Survivor with bounce back feature without additional reduction.
- (b.) 15-year Certain and Life.

Benefit increases

Through December 31, 2018: 2.0%

January 1, 2019 – December 31, 2023: 1.0%

January 1, 2024 and after: 1.5%

For retirements on or after January 1, 2024, the first benefit increase is delayed until the retiree reaches Normal Retirement Age (not applicable to Rule of 90 retirees, disability benefit recipients, or survivors).

Summary of Plan Provisions (Continued)

Retirement (Continued)

Benefit increases (Continued)

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.

Prior to 2002, members who retired under the laws in effect before July 1, 1973, received an additional lump sum payment each year. In 1989, this lump sum payment was the greater of \$25 times each full year of Allowable Service or \$400 per full year of service less any Social Security benefits received or annuity from a Minnesota public employee pension plan. In each following year, the lump sum payment was increased by the same percentage increase that was applied to regular annuities paid from the Minnesota Post Retirement Investment Fund. Effective January 1, 2002, the annual lump sum payment was divided by 12 and paid as a monthly life annuity in the annuity form elected.

Disability

Disability benefit

Age/Service requirement

Total and permanent disability before normal retirement age with three years of Allowable Service (five years if hired after June 30, 2010).

Amount

Normal Retirement benefit based on Allowable Service and Average Salary at disability without reduction for commencement before normal retirement age.

Payments stop if disability ceases or death occurs. Payments revert to a retirement annuity at normal retirement age. Benefits may be reduced on resumption of partial employment.

Retirement after disability

Age/Service requirement

Normal retirement age with continued disability.

Amount

Any optional annuity continues. Otherwise, a normal retirement benefit equal to the disability benefit paid before normal retirement age, or an actuarially equivalent optional annuity.

Form of payment

Same as for retirement.

Benefit Increases

Same as for retirement, except benefit increases are paid prior to Normal Retirement.

Summary of Plan Provisions (Continued)

Death

Surviving spouse optional benefit

Age/Service requirement	Member or former member who dies before retirement or disability benefits commence with three years of Allowable Service (five years if hired after June 30, 2010). If a former member dies before age 55 and has less than 30 years of Allowable Service, benefits commence when the former member would have been age 55. If an active member dies, benefits may commence immediately, regardless of age.
Amount	Surviving spouse receives the 100% joint and survivor benefits using the Normal Retirement formula above. If commencement is prior to age 55, the appropriate early retirement formula described above applies except that one-half the monthly reduction factor is used from age 55 to the commencement age and the Rule of 90 does not apply. In lieu of this benefit, the surviving spouse may elect a refund of member contributions with interest or an actuarially equivalent term certain annuity. If a member dies prior to July 1, 1997, and the beneficiary was not eligible to commence a survivor benefit as of July 1, 1997, an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.
Benefit increases	Same as for retirement, except benefit increases are paid prior to Normal Retirement.

Surviving dependent children's benefit

Age/Service requirement	If no surviving spouse, all children (biological or adopted) below age 20 who are dependent for more than half of their support on deceased member.
Amount	Actuarially equivalent 100% joint and survivor annuity to surviving spouse payable to the later of age 20 or five years. The amount is proportionally divided among surviving children.
Benefit increases	Same as for retirement, except benefit increases are paid prior to Normal Retirement.

Refund of contributions

Age/Service requirement	Active member dies and survivor benefits are not payable or a former member dies before annuity begins or former member who is not entitled to an annuity dies.
Amount	Member's contributions with 6.00% interest through June 30, 2011, compounded daily. Beginning July 1, 2011, a member's contributions increase at 4.00% interest compounded daily. Beginning July 1, 2018, a member's contributions increase at 3.00% interest compounded daily.

Summary of Plan Provisions (Continued)

Death (Continued)	
<u>Refund of contributions</u>	
<u>(Continued)</u>	
Age/Service requirement	Retired or disabled annuitant who did not select an optional annuity dies, or the remaining recipient of an option dies.
Amount	The excess of the member's contributions over all benefits paid.

Unclassified Plan Provision	Eligible members credited with employee shares in the Unclassified Plan may elect to terminate participation in the Unclassified Plan and be covered by the State Employees Retirement Fund prior to termination of covered employment assuming that the member has acquired at least 10 years of allowable state service (no more than seven years of service if hired after June 30, 2010).
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Termination	
<u>Refund of contributions</u>	
Age/Service requirement	Termination of state service.
Amount	Member's contributions with 6.00% interest through June 30, 2011, compounded daily. Beginning July 1, 2011, a member's contributions increase at 4.00% interest compounded daily. Beginning July 1, 2018, a member's contributions increase at 3.00% interest compounded daily. If a member is vested, a deferred annuity may be elected in lieu of a refund.
<u>Deferred benefit</u>	
Age/Service requirement	Three years of Allowable Service if hired prior to June 30, 2010, five years of Allowable Service if hired after June 30, 2010.
Amount	Benefit computed under law in effect at termination and increased by the following annual augmentation percentage: (a.) 0.00% before July 1, 1971; (b.) 5.00% from July 1, 1971 to January 1, 1981; (c.) 3.00% thereafter (2.50% if hired after June 30, 2006) until January 1 of the year following attainment of age 55 or January 1, 2012, whichever is earlier; (d.) 5.00% thereafter until the annuity begins (2.50% if hired after June 30, 2006), but before January 1, 2012; (e.) 2.00% from January 1, 2012 through December 31, 2018; and (f.) 0.00% from January 1, 2019, 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%.

Summary of Plan Provisions (Concluded)

Combined Service Annuity	<p>Members are eligible for combined service benefits if they:</p> <ul style="list-style-type: none">(a.) Have sufficient allowable service in total that equals or exceeds the applicable service credit vesting requirement of the retirement plan with the longest applicable service credit vesting requirement;(b.) Have at least six months of allowable service credit in each plan worked under; and(c.) Are not in receipt of a benefit from another plan, or have applied for benefits with an effective date within one year. <p>Members who meet the above requirements must have their benefit based on the following:</p> <ul style="list-style-type: none">(a.) Allowable service in all covered plans is combined in order to determine eligibility for early retirement.(b.) Average salary is based on the high five consecutive years during their entire service in all covered plans.
Actuarial Equivalent Factors	<p>Actuarially equivalent factors based on RP-2014 mortality for healthy annuitants, white collar adjustment, male rates set forward two years, projected to 2019 using Scale MP-2015, blended 50% males, 5.88% post-retirement interest, and 7.50% pre-retirement interest. Based upon statutory requirements; joint and survivor factors are based on an interest assumption of 6.50%. The actuarially equivalent factors are currently being updated to reflect changes adopted during the 2018 legislative session.</p>
Changes in Plan Provisions	<p>There have been no changes in plan provisions since the previous valuation.</p>

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, 2015, and a review of inflation and investment return assumptions in the last experience study for the State Employees Retirement Fund, dated June 27, 2019. The Allowance for Combined Service Annuity assumptions are based on an analysis completed by the LCPR actuary and documented in a report dated October 2016.

Investment return	7.50% per annum.
Single Discount Rate	7.50% 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	2.50% per year.
Payroll growth	3.25% per year.
Mortality rates	
Healthy Pre-retirement	RP-2014 employee generational mortality table projected with mortality improvement Scale MP-2015 from a base year of 2014, white collar adjustment, set forward one year for males and no age adjustment for females.
Healthy Post-retirement	RP-2014 annuitant generational mortality table projected with mortality improvement Scale MP-2015 from a base year of 2014, white collar adjustment, set forward two years for males and no age adjustment for females.
Disabled	RP-2014 disabled mortality table projected with mortality improvement Scale MP-2015 from a base year of 2014, set forward two years for males and four years for females.
Notes	The RP-2014 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 significant 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.

Summary of Actuarial Assumptions (Continued)

Allowance for combined service annuity	Liabilities for former, vested members are increased by 4.00%, and liabilities for former, non-vested members are increased by 5.00% to account for the effect of some participants having eligibility for a Combined Service Annuity.
Administrative expenses	In the valuation year, equal to prior year administrative expenses expressed as a percentage of prior year projected payroll. In each subsequent year, equal to the initial administrative expense percentage applied to payroll for the closed group.
Refund of contributions	Account balances accumulate interest until normal retirement date and are discounted back to the valuation date. All employees withdrawing after becoming eligible for a deferred benefit are assumed to take the larger of the contributions accumulated with interest or the value of the deferred benefit.
Commencement of deferred benefits	Members receiving deferred annuities (including current terminated deferred members) are assumed to begin receiving benefits at normal retirement age.
Percentage married	80% of active male members and 65% of female members are assumed to be married. Actual marital status is used for members in payment status.
Age of spouse	Male members are assumed to have a beneficiary three years younger and female members are assumed to have a beneficiary two years older.
Form of payment	<p>Married members retiring from active status are assumed to elect subsidized Joint and Survivor form of annuity as follows:</p> <p style="margin-left: 40px;">Males: 15% elect 50% Joint & Survivor option 15% elect 75% Joint & Survivor option 50% elect 100% Joint & Survivor option</p> <p style="margin-left: 40px;">Females: 15% elect 50% Joint & Survivor option 10% elect 75% Joint & Survivor option 30% elect 100% Joint & Survivor option</p> <p>Remaining married members and unmarried members are assumed to elect the Straight Life option. Members receiving deferred annuities (including current terminated deferred members) are assumed to elect a life annuity.</p>
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.

In cases where submitted data was missing or incomplete, the following assumptions, based on average results for applicable members at the time of the last experience study, were applied:

Data for active members:

There were 91 members reported with zero or invalid salary (<\$100). We used prior year salary (60 members), if available, otherwise, high five salary with a 10% load to account for salary increases (22 members). If neither pay or high five salary was available, we assumed a value of \$45,000 (9 members).

There were 8 members reported with zero or negative service. Due to the small number of members with zero service, and based on direction from MSRS, we used service of 0 years for these members.

There were also 126 members reported without a gender and 6 members reported with an invalid date of birth. We assumed the member was hired at age 37 and female gender.

Data for terminated members:

There were 366 members reported with a missing or invalid benefit. If available, we calculated benefits for these members using the reported Average Salary, Credited Service and Termination Date provided. If Average Salary was not reported or invalid (350 members), we assumed a value of \$40,000. If termination date was not reported (5 members), we assumed the member terminated at age 40 (or current age if younger than 40). If credited service was either not reported or invalid (13 members), we assumed a value of 5.0 years.

There were no members with a missing date of birth, and 1 member with a missing gender. We assumed female gender for the valuation.

Benefits were estimated for 8,571 members at the direction of MSRS.

Data for members receiving benefits:

There were 30 members reported without a gender. We assumed female gender for retirees and female gender for survivors. No retired members were reported with an invalid date of birth.

There were no members reported without a benefit.

There were 8 survivor members reported with a certain and life option but with a certain end date prior to the valuation date. These members were excluded from the valuation.

Summary of Actuarial Assumptions (Continued)

Unknown data for certain members – (Concluded)	<u>Data for members receiving benefits:</u> <p>There were 111 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 increase to the life annuity (i.e. "bounce back,") if applicable.</p> <p>There were 83 retirees reported with a bounce back 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.</p> <p>There were retired members reported with a survivor option and an invalid or missing survivor gender (3,765 members) and/or survivor date of birth (3,252 members). We used the valuation assumptions if the survivor gender or date of birth was missing or invalid.</p>
Changes in actuarial assumptions	There have been no changes in assumptions since the prior valuation.

Summary of Actuarial Assumptions (Continued)

Age in 2019	Percent of Members Dying Each Year*					
	Healthy Post-Retirement Mortality**		Healthy Pre-Retirement Mortality**		Disability Mortality**	
	Male	Female	Male	Female	Male	Female
20	0.03%	0.01%	0.03%	0.01%	0.08%	0.06%
25	0.04%	0.02%	0.03%	0.01%	0.26%	0.17%
30	0.06%	0.05%	0.03%	0.02%	0.56%	0.37%
35	0.09%	0.08%	0.03%	0.02%	0.93%	0.61%
40	0.13%	0.11%	0.04%	0.03%	1.29%	0.83%
45	0.19%	0.14%	0.07%	0.05%	1.60%	1.04%
50	0.28%	0.19%	0.11%	0.09%	1.89%	1.29%
55	0.40%	0.26%	0.20%	0.14%	2.28%	1.60%
60	0.58%	0.38%	0.35%	0.20%	2.73%	1.93%
65	0.87%	0.61%	0.62%	0.29%	3.31%	2.47%
70	1.44%	0.97%	1.08%	0.50%	4.22%	3.50%
75	2.46%	1.63%	1.89%	0.88%	5.75%	5.23%
80	4.41%	2.85%	3.44%	1.55%	8.30%	7.85%
85	8.19%	5.15%	7.20%	4.07%	12.52%	11.59%
90	14.81%	9.42%	13.37%	9.12%	18.93%	17.06%

* Generally, mortality rates are expected to increase as age increases. These standard mortality rates have been adjusted slightly to prevent decreasing mortality rates. If the rates were not adjusted as described, we would not expect the valuation results to be materially different.

** Rates are adjusted for mortality improvements using Scale MP-2015 from a base year of 2014.

Age	Percent of Members Decrementing Each Year	
	Disability Retirement	
	Male	Female
20	0.00%	0.00%
25	0.01	0.01
30	0.01	0.01
35	0.02	0.02
40	0.06	0.06
45	0.11	0.11
50	0.22	0.22
55	0.32	0.32
60	0.47	0.47
65	0.00	0.00

Summary of Actuarial Assumptions (Continued)

Age	Percent Retiring Each Year		
	Rule of 90 Eligible	Hired prior to 7/1/1989	Hired after 6/30/1989
55	15.0%	4.0%	4.0%
56	15.0	4.0	4.0
57	12.5	4.0	4.0
58	12.5	4.0	4.0
59	15.0	6.0	5.0
60	15.0	8.0	5.0
61	20.0	10.0	10.0
62	30.0	20.0	15.0
63	25.0	18.0	15.0
64	25.0	18.0	15.0
65	35.0	35.0	20.0
66	30.0	30.0	30.0
67	25.0	25.0	25.0
68	25.0	25.0	25.0
69	22.0	22.0	22.0
70	30.0	30.0	30.0
71+	100.0	100.0	100.0

Summary of Actuarial Assumptions (Concluded)

Salary Scale		Percent of Members Terminating (Withdrawing) Each Year		
Year	Increase	Year	Males	Females
1	13.75%	1	20.00%	24.00%
2	11.25	2	15.00	18.00
3	6.00	3	11.00	13.00
4	5.25	4	8.50	11.00
5	5.00	5	7.75	9.00
6	4.90	6	6.50	8.50
7	4.75	7	5.75	7.50
8	4.50	8	5.00	5.75
9	4.25	9	4.00	5.00
10	4.00	10	3.25	4.50
11	3.95	11	3.00	4.00
12	3.90	12	2.75	4.00
13	3.85	13	2.50	3.00
14	3.80	14	2.50	2.75
15	3.75	15	2.50	2.50
16	3.70	16	2.00	2.25
17	3.65	17	2.00	2.25
18	3.60	18	2.00	2.25
19	3.55	19	2.00	2.25
20	3.50	20	1.50	2.25
21	3.45	21	1.50	2.00
22	3.40	22	1.50	2.00
23	3.35	23	1.00	1.50
24	3.30	24	1.00	1.50
25+	3.25	25	1.00	1.50
		26	1.00	1.50
		27	1.00	1.25
		28	1.00	1.25
		29	1.00	1.25
		30+	1.00	1.00

SECTION G

CALCULATION OF THE SINGLE DISCOUNT RATE

Calculation of the Single Discount Rate

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

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

For the purpose of this valuation, the expected rate of return on pension plan investments is 7.50%; the municipal bond rate is 3.13% (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). **The resulting single discount rate as of June 30, 2019 is 7.50%.** 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			Projected Contributions			
	Payroll for Current Employees	Payroll for New Employees	Total Employee Payroll	Contributions from Current Employees	Employer Contributions for Current Employees	Contributions on Future Payroll toward current UAL*	Total Contributions
	(a)	(b)	(c) = (a) + (b)	(d) = (a) * 6.0%	(e) = (a) * 6.25%	(f)	(g) = (d) + (e) + (f)
2019	\$ 3,168,870		\$ 3,168,870				
2020	3,273,581		3,273,581	\$ 196,415	\$ 204,599		\$ 401,014
2021	3,095,224	\$ 284,748	3,379,972	185,713	193,451	\$ 10,678	389,842
2022	2,927,594	562,227	3,489,821	175,656	182,975	21,084	379,715
2023	2,789,876	813,364	3,603,240	167,393	174,367	30,501	372,261
2024	2,665,307	1,055,039	3,720,346	159,918	166,582	39,564	366,064
2025	2,550,231	1,291,026	3,841,257	153,014	159,389	48,413	360,816
2026	2,443,855	1,522,243	3,966,098	146,631	152,741	57,084	356,456
2027	2,345,242	1,749,754	4,094,996	140,714	146,578	65,616	352,908
2028	2,252,930	1,975,153	4,228,083	135,176	140,808	74,068	350,052
2029	2,166,000	2,199,496	4,365,496	129,960	135,375	82,481	347,816
2030	2,083,047	2,424,328	4,507,375	124,983	130,190	90,912	346,085
2031	2,002,981	2,650,883	4,653,864	120,179	125,186	99,408	344,773
2032	1,925,332	2,879,783	4,805,115	115,520	120,333	107,992	343,845
2033	1,849,666	3,111,615	4,961,281	110,980	115,604	116,686	343,270
2034	1,775,451	3,347,072	5,122,523	106,527	110,966	125,515	343,008
2035	1,702,272	3,586,733	5,289,005	102,136	106,392	134,502	343,030
2036	1,629,836	3,831,062	5,460,898	97,790	101,865	143,665	343,320
2037	1,558,208	4,080,169	5,638,377	93,492	97,388	153,006	343,886
2038	1,487,563	4,334,061	5,821,624	89,254	92,973	162,527	344,754
2039	1,417,110	4,593,717	6,010,827	85,027	88,569	172,264	345,860
2040	1,345,791	4,860,388	6,206,179	80,747	84,112	182,265	347,124
2041	1,272,968	5,134,911	6,407,879	76,378	79,561	192,559	348,498
2042	1,198,836	5,417,300	6,616,136	71,930	74,927	203,149	350,006
2043	1,124,098	5,707,062	6,831,160	67,446	70,256	214,015	351,717
2044	1,048,559	6,004,614	7,053,173	62,914	65,535	225,173	353,622
2045	971,874	6,310,527	7,282,401	58,312	60,742	236,645	355,699
2046	894,094	6,624,985	7,519,079	53,646	55,881	248,437	357,964
2047	815,940	6,947,509	7,763,449	48,956	50,996	260,532	360,484
2048	738,753	7,277,008	8,015,761	44,325	46,172	272,888	363,385
2049	662,928	7,613,345	8,276,273	39,776	41,433	285,500	366,709
2050	588,759	7,956,493	8,545,252	35,326	36,797	298,368	370,491
2051	517,136	8,305,837	8,822,973	31,028	32,321	311,469	374,818
2052	449,106	8,660,613	9,109,719	26,946	28,069	324,773	379,788
2053	385,367	9,020,418	9,405,785	23,122	24,085	338,266	385,473
2054	326,407	9,385,066	9,711,473	19,584	20,400	351,940	391,924
2055	272,323	9,754,773	10,027,096	16,339	17,020	365,804	399,163
2056	223,179	10,129,798	10,352,977	13,391	13,949	379,867	407,207
2057	179,484	10,509,964	10,689,448	10,769	11,218	394,124	416,111
2058	141,477	10,895,379	11,036,856	8,489	8,842	408,577	425,908
2059	109,065	11,286,488	11,395,553	6,544	6,817	423,243	436,604
2060	82,082	11,683,827	11,765,909	4,925	5,130	438,144	448,199
2061	59,989	12,088,312	12,148,301	3,599	3,749	453,312	460,660
2062	42,382	12,500,739	12,543,121	2,543	2,649	468,778	473,970
2063	29,024	12,921,748	12,950,772	1,741	1,814	484,566	488,121
2064	19,049	13,352,623	13,371,672	1,143	1,191	500,723	503,057
2065	11,704	13,794,548	13,806,252	702	731	517,296	518,729
2066	6,610	14,248,345	14,254,955	397	413	534,313	535,123
2067	3,303	14,714,938	14,718,241	198	206	551,810	552,214
2068	1,410	15,195,174	15,196,584	85	88	569,819	569,992
2069	576	15,689,896	15,690,472	35	36	588,371	588,442

* Equal to total contributions (12.25% of payroll for new employees) net of normal cost and expenses (8.50% of payroll).

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

Fiscal Year Ending	Projected Covered-Employee Payroll			Projected Contributions			
	Payroll for Current Employees	Payroll for New Employees	Total Employee Payroll	Contributions from Current Employees	Employer Contributions for Current Employees	Contributions on Future Payroll toward current UAL*	Total Contributions
	(a)	(b)	(c) = (a) + (b)	(d) = (a) * 6.0%	(e) = (a) * 6.25%	(f)	(g) = (d) + (e) + (f)
2070	\$ 223	\$ 16,200,190	\$ 16,200,413	\$ 13	\$ 14	\$ 607,507	\$ 607,534
2071	76	16,726,850	16,726,926	5	5	627,257	627,267
2072	21	17,270,530	17,270,551	1	1	647,645	647,647
2073	3	17,831,841	17,831,844	-	-	668,694	668,694
2074	-	18,411,379	18,411,379	-	-	690,427	690,427
2075	-	19,009,749	19,009,749	-	-	712,866	712,866
2076	-	19,627,566	19,627,566	-	-	736,034	736,034
2077	-	20,265,462	20,265,462	-	-	759,955	759,955
2078	-	20,924,089	20,924,089	-	-	784,653	784,653
2079	-	21,604,122	21,604,122	-	-	810,155	810,155
2080	-	22,306,256	22,306,256	-	-	836,485	836,485
2081	-	23,031,210	23,031,210	-	-	863,670	863,670
2082	-	23,779,724	23,779,724	-	-	891,740	891,740
2083	-	24,552,565	24,552,565	-	-	920,721	920,721
2084	-	25,350,523	25,350,523	-	-	950,645	950,645
2085	-	26,174,415	26,174,415	-	-	981,541	981,541
2086	-	27,025,084	27,025,084	-	-	1,013,441	1,013,441
2087	-	27,903,399	27,903,399	-	-	1,046,377	1,046,377
2088	-	28,810,259	28,810,259	-	-	1,080,385	1,080,385
2089	-	29,746,593	29,746,593	-	-	1,115,497	1,115,497
2090	-	30,713,357	30,713,357	-	-	1,151,751	1,151,751
2091	-	31,711,541	31,711,541	-	-	1,189,183	1,189,183
2092	-	32,742,166	32,742,166	-	-	1,227,831	1,227,831
2093	-	33,806,287	33,806,287	-	-	1,267,736	1,267,736
2094	-	34,904,991	34,904,991	-	-	1,308,937	1,308,937
2095	-	36,039,403	36,039,403	-	-	1,351,478	1,351,478
2096	-	37,210,684	37,210,684	-	-	1,395,401	1,395,401
2097	-	38,420,031	38,420,031	-	-	1,440,751	1,440,751
2098	-	39,668,682	39,668,682	-	-	1,487,576	1,487,576
2099	-	40,957,914	40,957,914	-	-	1,535,922	1,535,922
2100	-	42,289,046	42,289,046	-	-	1,585,839	1,585,839
2101	-	43,663,440	43,663,440	-	-	1,637,379	1,637,379
2102	-	45,082,502	45,082,502	-	-	1,690,594	1,690,594
2103	-	46,547,684	46,547,684	-	-	1,745,538	1,745,538
2104	-	48,060,483	48,060,483	-	-	1,802,268	1,802,268
2105	-	49,622,449	49,622,449	-	-	1,860,842	1,860,842
2106	-	51,235,179	51,235,179	-	-	1,921,319	1,921,319
2107	-	52,900,322	52,900,322	-	-	1,983,762	1,983,762
2108	-	54,619,582	54,619,582	-	-	2,048,234	2,048,234
2109	-	56,394,719	56,394,719	-	-	2,114,802	2,114,802
2110	-	58,227,547	58,227,547	-	-	2,183,533	2,183,533
2111	-	60,119,942	60,119,942	-	-	2,254,498	2,254,498
2112	-	62,073,841	62,073,841	-	-	2,327,769	2,327,769
2113	-	64,091,240	64,091,240	-	-	2,403,422	2,403,422
2114	-	66,174,206	66,174,206	-	-	2,481,533	2,481,533
2115	-	68,324,867	68,324,867	-	-	2,562,183	2,562,183
2116	-	70,545,426	70,545,426	-	-	2,645,453	2,645,453
2117	-	72,838,152	72,838,152	-	-	2,731,431	2,731,431
2118	-	75,205,392	75,205,392	-	-	2,820,202	2,820,202
2119	-	77,649,567	77,649,567	-	-	2,911,859	2,911,859

* Equal to total contributions (12.25% of payroll for new employees) net of normal cost and expenses (8.50% of payroll).

Single Discount Rate Development

Projection of Plan Fiduciary Net Position (Dollars in Thousands)

Fiscal Year Ending	Projected Beginning Plan Net Fiduciary Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expenses	Projected Investment Earnings at 7.50%	Projected Ending Plan Fiduciary Net Position
	(a)	(b)	(c)	(d)	(e)	(f)=(a)+(b)-(c)-(d)+(e)
2020	\$ 13,772,289	\$ 401,014	\$ 905,396	\$ 10,475	\$ 1,013,964	\$ 14,271,395
2021	14,271,395	389,842	953,884	9,905	1,049,221	14,746,670
2022	14,746,670	379,715	1,001,584	9,368	1,082,757	15,198,188
2023	15,198,188	372,261	1,040,484	8,928	1,114,930	15,635,967
2024	15,635,967	366,064	1,081,647	8,529	1,146,034	16,057,889
2025	16,057,889	360,816	1,126,377	8,161	1,175,852	16,460,020
2026	16,460,020	356,456	1,169,312	7,820	1,204,282	16,843,626
2027	16,843,626	352,908	1,209,398	7,505	1,231,458	17,211,089
2028	17,211,089	350,052	1,246,699	7,209	1,257,550	17,564,783
2029	17,564,783	347,816	1,281,253	6,931	1,282,732	17,907,147
2030	17,907,147	346,085	1,313,363	6,666	1,307,173	18,240,378
2031	18,240,378	344,773	1,343,221	6,410	1,331,027	18,566,548
2032	18,566,548	343,845	1,371,278	6,161	1,354,432	18,887,386
2033	18,887,386	343,270	1,396,849	5,919	1,377,541	19,205,429
2034	19,205,429	343,008	1,420,622	5,681	1,400,518	19,522,651
2035	19,522,651	343,030	1,442,909	5,447	1,423,498	19,840,824
2036	19,840,824	343,320	1,464,302	5,215	1,446,593	20,161,219
2037	20,161,219	343,886	1,483,834	4,986	1,469,933	20,486,218
2038	20,486,218	344,754	1,500,758	4,760	1,493,725	20,819,178
2039	20,819,178	345,860	1,514,865	4,535	1,518,226	21,163,864
2040	21,163,864	347,124	1,527,113	4,307	1,543,682	21,523,251
2041	21,523,251	348,498	1,538,398	4,073	1,570,279	21,899,556
2042	21,899,556	350,006	1,548,606	3,836	1,598,191	22,295,310
2043	22,295,310	351,717	1,557,146	3,597	1,627,629	22,713,913
2044	22,713,913	353,622	1,564,218	3,355	1,658,843	23,158,804
2045	23,158,804	355,699	1,570,587	3,110	1,692,061	23,632,867
2046	23,632,867	357,964	1,576,641	2,861	1,727,485	24,138,814
2047	24,138,814	360,484	1,582,309	2,611	1,765,325	24,679,702
2048	24,679,702	363,385	1,586,696	2,364	1,805,846	25,259,873
2049	25,259,873	366,709	1,589,844	2,121	1,849,374	25,883,991
2050	25,883,991	370,491	1,592,038	1,884	1,896,250	26,556,811
2051	26,556,811	374,818	1,592,764	1,655	1,946,853	27,284,063
2052	27,284,063	379,788	1,591,797	1,437	2,001,623	28,072,240
2053	28,072,240	385,473	1,588,440	1,233	2,061,077	28,929,117
2054	28,929,117	391,924	1,582,544	1,045	2,125,804	29,863,258
2055	29,863,258	399,163	1,574,090	871	2,196,449	30,883,909
2056	30,883,909	407,207	1,563,308	714	2,273,697	32,000,790
2057	32,000,790	416,111	1,549,883	574	2,358,290	33,224,734
2058	33,224,734	425,908	1,533,106	453	2,451,069	34,568,153
2059	34,568,153	436,604	1,513,192	349	2,552,956	36,044,172
2060	36,044,172	448,199	1,490,307	263	2,664,931	37,666,731
2061	37,666,731	460,660	1,464,037	192	2,788,051	39,451,214
2062	39,451,214	473,970	1,434,153	136	2,923,480	41,414,375
2063	41,414,375	488,121	1,400,448	93	3,072,481	43,574,436
2064	43,574,436	503,057	1,363,278	61	3,236,405	45,950,559
2065	45,950,559	518,729	1,323,812	37	3,416,646	48,562,084
2066	48,562,084	535,123	1,282,583	21	3,614,633	51,429,236
2067	51,429,236	552,214	1,239,957	11	3,831,868	54,573,352
2068	54,573,352	569,992	1,196,162	5	4,069,944	58,017,121
2069	58,017,121	588,442	1,151,390	2	4,330,555	61,784,726

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 Net Fiduciary Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expenses	Projected Investment Earnings at 7.50%	Projected Ending Plan Fiduciary Net Position
	(a)	(b)	(c)	(d)	(e)	(f)=(a)+(b)-(c)-(d)+(e)
2070	\$ 61,784,726	\$ 607,534	\$ 1,105,985	\$ 1	\$ 4,615,500	\$ 65,901,775
2071	65,901,775	627,267	1,060,070	-	4,926,696	70,395,667
2072	70,395,667	647,647	1,013,676	-	5,266,197	75,295,836
2073	75,295,836	668,694	966,811	-	5,636,210	80,633,930
2074	80,633,930	690,427	919,489	-	6,039,110	86,443,977
2075	86,443,977	712,866	871,747	-	6,477,448	92,762,544
2076	92,762,544	736,034	823,643	-	6,953,965	99,628,900
2077	99,628,900	759,955	775,268	-	7,471,604	107,085,190
2078	107,085,190	784,653	726,749	-	8,033,521	115,176,615
2079	115,176,615	810,155	678,246	-	8,643,103	123,951,628
2080	123,951,628	836,485	629,950	-	9,303,977	133,462,139
2081	133,462,139	863,670	582,081	-	10,020,029	143,763,758
2082	143,763,758	891,740	534,878	-	10,795,422	154,916,042
2083	154,916,042	920,721	488,601	-	11,634,615	166,982,776
2084	166,982,776	950,645	443,518	-	12,542,382	180,032,284
2085	180,032,284	981,541	399,899	-	13,523,839	194,137,765
2086	194,137,765	1,013,441	358,002	-	14,584,467	209,377,670
2087	209,377,670	1,046,377	318,072	-	15,730,143	225,836,119
2088	225,836,119	1,080,385	280,326	-	16,967,169	243,603,346
2089	243,603,346	1,115,497	244,952	-	18,302,306	262,776,198
2090	262,776,198	1,151,751	212,096	-	19,742,815	283,458,667
2091	283,458,667	1,189,183	181,867	-	21,296,492	305,762,475
2092	305,762,475	1,227,831	154,330	-	22,971,714	329,807,690
2093	329,807,690	1,267,736	129,512	-	24,777,489	355,723,403
2094	355,723,403	1,308,937	107,400	-	26,723,498	383,648,438
2095	383,648,438	1,351,478	87,940	-	28,820,159	413,732,135
2096	413,732,135	1,395,401	71,041	-	31,078,676	446,135,170
2097	446,135,170	1,440,751	56,571	-	33,511,106	481,030,457
2098	481,030,457	1,487,576	44,365	-	36,130,426	518,604,093
2099	518,604,093	1,535,922	34,234	-	38,950,602	559,056,384
2100	559,056,384	1,585,839	25,966	-	41,986,667	602,602,923
2101	602,602,923	1,637,379	19,340	-	45,254,799	649,475,760
2102	649,475,760	1,690,594	14,131	-	48,772,413	699,924,636
2103	699,924,636	1,745,538	10,117	-	52,558,250	754,218,307
2104	754,218,307	1,802,268	7,090	-	56,632,475	812,645,960
2105	812,645,960	1,860,842	4,858	-	61,016,788	875,518,733
2106	875,518,733	1,921,319	3,251	-	65,734,532	943,171,333
2107	943,171,333	1,983,762	2,122	-	70,810,818	1,015,963,791
2108	1,015,963,791	2,048,234	1,350	-	76,272,655	1,094,283,330
2109	1,094,283,330	2,114,802	836	-	82,149,090	1,178,546,386
2110	1,178,546,386	2,183,533	504	-	88,471,363	1,269,200,778
2111	1,269,200,778	2,254,498	295	-	95,273,063	1,366,728,044
2112	1,366,728,044	2,327,769	167	-	102,590,310	1,471,645,956
2113	1,471,645,956	2,403,422	92	-	110,461,942	1,584,511,228
2114	1,584,511,228	2,481,533	49	-	118,929,715	1,705,922,427
2115	1,705,922,427	2,562,183	25	-	128,038,526	1,836,523,110
2116	1,836,523,110	2,645,453	12	-	137,836,644	1,977,005,195
2117	1,977,005,195	2,731,431	6	-	148,375,966	2,128,112,586
2118	2,128,112,586	2,820,202	3	-	159,712,290	2,290,645,075
2119	2,290,645,075	2,911,859	2	-	171,905,601	2,465,462,533

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
2020	\$ 13,772,289	\$ 905,396	\$ 905,396	\$ -	\$ 873,242	\$ -	\$ 873,242
2021	14,271,395	953,884	953,884	-	855,821	-	855,821
2022	14,746,670	1,001,584	1,001,584	-	835,923	-	835,923
2023	15,198,188	1,040,484	1,040,484	-	807,804	-	807,804
2024	15,635,967	1,081,647	1,081,647	-	781,174	-	781,174
2025	16,057,889	1,126,377	1,126,377	-	756,724	-	756,724
2026	16,460,020	1,169,312	1,169,312	-	730,761	-	730,761
2027	16,843,626	1,209,398	1,209,398	-	703,082	-	703,082
2028	17,211,089	1,246,699	1,246,699	-	674,201	-	674,201
2029	17,564,783	1,281,253	1,281,253	-	644,547	-	644,547
2030	17,907,147	1,313,363	1,313,363	-	614,605	-	614,605
2031	18,240,378	1,343,221	1,343,221	-	584,723	-	584,723
2032	18,566,548	1,371,278	1,371,278	-	555,290	-	555,290
2033	18,887,386	1,396,849	1,396,849	-	526,181	-	526,181
2034	19,205,429	1,420,622	1,420,622	-	497,801	-	497,801
2035	19,522,651	1,442,909	1,442,909	-	470,336	-	470,336
2036	19,840,824	1,464,302	1,464,302	-	444,008	-	444,008
2037	20,161,219	1,483,834	1,483,834	-	418,540	-	418,540
2038	20,486,218	1,500,758	1,500,758	-	393,781	-	393,781
2039	20,819,178	1,514,865	1,514,865	-	369,751	-	369,751
2040	21,163,864	1,527,113	1,527,113	-	346,735	-	346,735
2041	21,523,251	1,538,398	1,538,398	-	324,928	-	324,928
2042	21,899,556	1,548,606	1,548,606	-	304,264	-	304,264
2043	22,295,310	1,557,146	1,557,146	-	284,597	-	284,597
2044	22,713,913	1,564,218	1,564,218	-	265,944	-	265,944
2045	23,158,804	1,570,587	1,570,587	-	248,397	-	248,397
2046	23,632,867	1,576,641	1,576,641	-	231,958	-	231,958
2047	24,138,814	1,582,309	1,582,309	-	216,550	-	216,550
2048	24,679,702	1,586,696	1,586,696	-	202,001	-	202,001
2049	25,259,873	1,589,844	1,589,844	-	188,280	-	188,280
2050	25,883,991	1,592,038	1,592,038	-	175,386	-	175,386
2051	26,556,811	1,592,764	1,592,764	-	163,224	-	163,224
2052	27,284,063	1,591,797	1,591,797	-	151,744	-	151,744
2053	28,072,240	1,588,440	1,588,440	-	140,860	-	140,860
2054	28,929,117	1,582,544	1,582,544	-	130,546	-	130,546
2055	29,863,258	1,574,090	1,574,090	-	120,789	-	120,789
2056	30,883,909	1,563,308	1,563,308	-	111,593	-	111,593
2057	32,000,790	1,549,883	1,549,883	-	102,916	-	102,916
2058	33,224,734	1,533,106	1,533,106	-	94,699	-	94,699
2059	34,568,153	1,513,192	1,513,192	-	86,948	-	86,948
2060	36,044,172	1,490,307	1,490,307	-	79,659	-	79,659
2061	37,666,731	1,464,037	1,464,037	-	72,795	-	72,795
2062	39,451,214	1,434,153	1,434,153	-	66,334	-	66,334
2063	41,414,375	1,400,448	1,400,448	-	60,256	-	60,256
2064	43,574,436	1,363,278	1,363,278	-	54,564	-	54,564
2065	45,950,559	1,323,812	1,323,812	-	49,288	-	49,288
2066	48,562,084	1,282,583	1,282,583	-	44,421	-	44,421
2067	51,429,236	1,239,957	1,239,957	-	39,949	-	39,949
2068	54,573,352	1,196,162	1,196,162	-	35,849	-	35,849
2069	58,017,121	1,151,390	1,151,390	-	32,100	-	32,100

Single Discount Rate Development

Present Values of Projected Benefits (Dollars in Thousands, Concluded)

Fiscal Year Ending	Projected Beginning Plan Fiduciary Net Position	Projected Benefit Payments	Funded Portion of Benefit Payments	Unfunded Portion of Benefit Payments	Present Value of Funded Benefit Payments using Expected Return Rate (v)	Present Value of Unfunded Benefit Payments using Municipal Bond Rate (vf)	Present Value of Benefit Payments using Single Discount Rate (sdr)
(a)	(b)	(c)	(d)	(e)	(f)=(d)*v ^{^(a)-.5)}	(g)=(e)*vf ^{^(a)-.5)}	(h)=(c)/(1+sdr) ^{^(a)-.5)}
2070	\$ 61,784,726	\$ 1,105,985	\$ 1,105,985	\$ -	\$ 28,683	\$ -	\$ 28,683
2071	65,901,775	1,060,070	1,060,070	-	25,574	-	25,574
2072	70,395,667	1,013,676	1,013,676	-	22,749	-	22,749
2073	75,295,836	966,811	966,811	-	20,183	-	20,183
2074	80,633,930	919,489	919,489	-	17,856	-	17,856
2075	86,443,977	871,747	871,747	-	15,748	-	15,748
2076	92,762,544	823,643	823,643	-	13,841	-	13,841
2077	99,628,900	775,268	775,268	-	12,119	-	12,119
2078	107,085,190	726,749	726,749	-	10,568	-	10,568
2079	115,176,615	678,246	678,246	-	9,175	-	9,175
2080	123,951,628	629,950	629,950	-	7,927	-	7,927
2081	133,462,139	582,081	582,081	-	6,813	-	6,813
2082	143,763,758	534,878	534,878	-	5,824	-	5,824
2083	154,916,042	488,601	488,601	-	4,949	-	4,949
2084	166,982,776	443,518	443,518	-	4,179	-	4,179
2085	180,032,284	399,899	399,899	-	3,505	-	3,505
2086	194,137,765	358,002	358,002	-	2,919	-	2,919
2087	209,377,670	318,072	318,072	-	2,412	-	2,412
2088	225,836,119	280,326	280,326	-	1,978	-	1,978
2089	243,603,346	244,952	244,952	-	1,608	-	1,608
2090	262,776,198	212,096	212,096	-	1,295	-	1,295
2091	283,458,667	181,867	181,867	-	1,033	-	1,033
2092	305,762,475	154,330	154,330	-	815	-	815
2093	329,807,690	129,512	129,512	-	636	-	636
2094	355,723,403	107,400	107,400	-	491	-	491
2095	383,648,438	87,940	87,940	-	374	-	374
2096	413,732,135	71,041	71,041	-	281	-	281
2097	446,135,170	56,571	56,571	-	208	-	208
2098	481,030,457	44,365	44,365	-	152	-	152
2099	518,604,093	34,234	34,234	-	109	-	109
2100	559,056,384	25,966	25,966	-	77	-	77
2101	602,602,923	19,340	19,340	-	53	-	53
2102	649,475,760	14,131	14,131	-	36	-	36
2103	699,924,636	10,117	10,117	-	24	-	24
2104	754,218,307	7,090	7,090	-	16	-	16
2105	812,645,960	4,858	4,858	-	10	-	10
2106	875,518,733	3,251	3,251	-	6	-	6
2107	943,171,333	2,122	2,122	-	4	-	4
2108	1,015,963,791	1,350	1,350	-	2	-	2
2109	1,094,283,330	836	836	-	1	-	1
2110	1,178,546,386	504	504	-	1	-	1
2111	1,269,200,778	295	295	-	-	-	-
2112	1,366,728,044	167	167	-	-	-	-
2113	1,471,645,956	92	92	-	-	-	-
2114	1,584,511,228	49	49	-	-	-	-
2115	1,705,922,427	25	25	-	-	-	-
2116	1,836,523,110	12	12	-	-	-	-
2117	1,977,005,195	6	6	-	-	-	-
2118	2,128,112,586	3	3	-	-	-	-
2119	2,290,645,075	2	2	-	-	-	-
Totals					\$ 17,190,098	\$ -	\$ 17,190,098

SECTION H

GLOSSARY OF TERMS

Glossary of Terms

<i>Accrued Service</i>	Service credited under the system which was rendered before the date of the actuarial valuation.
<i>Actuarial Accrued Liability (AAL)</i>	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.”
<i>Actuarial Assumptions</i>	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.
<i>Actuarial Cost Method</i>	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.
<i>Actuarial Equivalent</i>	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.
<i>Actuarial Gain (Loss)</i>	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.
<i>Actuarial Present Value (APV)</i>	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.
<i>Actuarial Valuation</i>	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.
<i>Actuarial Valuation Date</i>	The date as of which an actuarial valuation is performed.
<i>Actuarially Determined Contribution (ADC)</i>	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

<i>Amortization Payment</i>	The amortization payment is the periodic payment required to pay off an interest-discounted amount with payments of interest and principal.
<i>Amortization Method</i>	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).
<i>Cost-of-Living Adjustments</i>	Postemployment benefit changes intended to adjust benefit payments for the effects of inflation.
<i>Cost-Sharing Multiple-Employer Defined Benefit Pension Plan (cost-sharing pension plan)</i>	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.
<i>Covered-Employee Payroll</i>	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.
<i>Deferred Inflows and Outflows of Resources</i>	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.
<i>Discount Rate or Single Discount Rate</i>	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: <ol style="list-style-type: none">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.
<i>Entry Age Actuarial Cost Method or Entry Age Normal (EAN)</i>	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

<i>Fiduciary Net Position</i>	The fiduciary net position is the value of the net assets of the trust restricted for pension benefits.
<i>GASB</i>	The Governmental Accounting Standards Board is an organization that exists with authority to promulgate accounting standards for state and local governmental entities.
<i>Long-Term Expected Rate of Return</i>	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.
<i>Money-Weighted Rate of Return</i>	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.
<i>Multiple-Employer Defined Benefit Pension Plan</i>	A multiple-employer plan is a defined benefit pension plan that is used to provide pensions to the employees of more than one employer.
<i>Municipal Bond Rate</i>	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.
<i>Net Pension Liability (NPL)</i>	The NPL is the liability of employers and non-employer contributing entities to plan members for benefits provided through a defined benefit pension plan.
<i>Non-Employer Contributing Entities</i>	Non-employer contributing entities are entities that make contributions to a pension plan that is used to provide pensions to the employees of other entities. For purposes of the GASB Accounting Statements No. 67 and No. 68 plan members are not considered non-employer contributing entities.
<i>Normal Cost</i>	The actuarial present value of the pension trust benefits allocated to the current year by the actuarial cost method.
<i>Other Postemployment Benefits (OPEB)</i>	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.
<i>Real Rate of Return</i>	The real rate of return is the rate of return on an investment after adjustment to eliminate inflation.
<i>Service Cost</i>	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 experience 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 pension liability of the fund. For purposes of the GASB Statement No. 67, the asset valuation method is equal to the market value of assets.