Minnesota State Retirement System

GASB Statements No. 67 and 68

Accounting and Financial Reporting for Pensions

June 30, 2019

Minnesota State Retirement System

State Employees Retirement Fund
GASB Statement Nos. 67 and 68
Accounting and Financial Reporting for Pensions
June 30, 2019

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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

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

Bonita J. Wurst

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		
Arising from Current Reporting Period		4,636
9. Recognition of Outflow (Inflow) of Resources due to assumption changes		
Arising from Current Reporting Period		-
10. Recognition of Outflow (Inflow) of Resources due to the difference between projected (7.50%) and actual earnings on Pension Plan Investments		
Arising from Current Reporting Period		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		
Arising from Prior Reporting Periods	$	(86,092)
13. Recognition of Outflow (Inflow) of Resources due to assumption changes		
Arising from Prior Reporting Periods		200,207
14. Recognition of Outflow (Inflow) of Resources due to the difference between projected and actual earnings on Pension Plan Investments		
Arising from Prior Reporting Periods		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	$	4,636
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	$	18,544
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		6,207
4. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Assets	$	24,827

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**	**$ 13,293,422**
Additions		
2.	Contributions	
	a. Employee	$ 182,210
	b. Employer	182,939
	c. Other sources	-
	d. Total contributions	$ 365,149
3.	Investment income	
	a. Investment income/(loss)	$ 961,489
	b. Investment expenses	(13,123)
	c. Net investment income/(loss)	$ 948,366
4.	Other Additions	32,320
5.	**Total Additions (2.d.) + (3.c.) + (4.)**	**$ 1,345,835**
Deductions		
6.	Benefits Paid	
	a. Annuity benefits	$ (841,776)
	b. Refunds	(15,199)
	c. Total benefits paid	$ (856,975)
7.	Expenses	
	a. Other deductions	$ (116)
	b. Administrative	(9,877)
	c. Total expenses	$ (9,993)
8.	**Total deductions (6.c.) + (7.c.)**	**$ (866,968)**
9.	**Net increase/(decrease) in fiduciary net position (5.) + (8.)**	**$ 478,867**
10.	**Net position at market value at end of year (1.) + (9.)**	**$ 13,772,289**
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	**$**	**15,179,140**
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	**$**	**13,772,289**
C. Net pension liability, *A.9. - B.9.*	**$**	**1,406,851**
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:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return (Geometric Mean)
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	100%	

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**			
	Actives	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	Total
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:

Effective as of	Member	Employer
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

Normal retirement benefit

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)	
<u>Benefit increases (Continued)</u>	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	
<u>Disability benefit</u>	
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.
<u>Retirement after disability</u>	
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.
<u>Form of payment</u>	Same as for retirement.
<u>Benefit Increases</u>	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)	
Refund of contributions (Continued)	
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).
Termination	
Refund of contributions	
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.
Deferred benefit	
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	Members are eligible for combined service benefits if they: (a.) Have sufficient allowable service in total that equals or exceeds the applicable service credit vesting requirement of the retirement plan with the longest applicable service credit vesting requirement; (b.) Have at least six months of allowable service credit in each plan worked under; and (c.) Are not in receipt of a benefit from another plan, or have applied for benefits with an effective date within one year. Members who meet the above requirements must have their benefit based on the following: (a.) Allowable service in all covered plans 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	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.
Changes in Plan Provisions	There have been no changes in plan provisions since the previous valuation.

SECTION F

ACTUARIAL COST METHOD AND ACTUARIAL ASSUMPTIONS

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

Actuarial Cost Method

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

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

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

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

Asset Valuation Method

Fair value of assets.

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

The following assumptions were used in valuing the liabilities and benefits under the plan. The assumptions are based on the last experience study, dated June 30, 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	Married members retiring from active status are assumed to elect subsidized Joint and Survivor form of annuity as follows: Males: 15% elect 50% Joint & Survivor option 15% elect 75% Joint & Survivor option 50% elect 100% Joint & Survivor option Females: 15% elect 50% Joint & Survivor option 10% elect 75% Joint & Survivor option 30% elect 100% Joint & Survivor option Remaining married members and unmarried members are assumed to elect the Straight Life option. Members receiving deferred annuities (including current terminated deferred members) are assumed to elect a life annuity.
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: <u>Data for active members:</u> 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. <u>Data for terminated members:</u> 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. <u>Data for members receiving benefits:</u> 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)	Data for members receiving benefits: 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. 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. 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.
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** Male	Female	Healthy Pre-Retirement Mortality** Male	Female	Disability Mortality** 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	
Year	Increase
1	13.75%
2	11.25
3	6.00
4	5.25
5	5.00
6	4.90
7	4.75
8	4.50
9	4.25
10	4.00
11	3.95
12	3.90
13	3.85
14	3.80
15	3.75
16	3.70
17	3.65
18	3.60
19	3.55
20	3.50
21	3.45
22	3.40
23	3.35
24	3.30
25+	3.25

Percent of Members Terminating (Withdrawing) Each Year		
Year	Males	Females
1	20.00%	24.00%
2	15.00	18.00
3	11.00	13.00
4	8.50	11.00
5	7.75	9.00
6	6.50	8.50
7	5.75	7.50
8	5.00	5.75
9	4.00	5.00
10	3.25	4.50
11	3.00	4.00
12	2.75	4.00
13	2.50	3.00
14	2.50	2.75
15	2.50	2.50
16	2.00	2.25
17	2.00	2.25
18	2.00	2.25
19	2.00	2.25
20	1.50	2.25
21	1.50	2.00
22	1.50	2.00
23	1.00	1.50
24	1.00	1.50
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: Payroll for Current Employees	Payroll for New Employees	Total Employee Payroll	Projected Contributions: Contributions from Current Employees	Employer Contributions for Current Employees	Contributions on Future Payroll toward current UAL*	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

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

Glossary of Terms

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

Glossary of Terms

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

Glossary of Terms

Total Pension Expense	The total pension expense is the sum of the following items that are recognized at the end of the employer's fiscal year: 1. Service Cost 2. Interest on the Total Pension Liability 3. Current-Period Changes in Benefit Terms 4. Employee Contributions 5. Projected Earnings on Plan Investments 6. Pension Plan Administrative Expense 7. Other Changes in Plan Fiduciary Net Position 8. Recognition of Outflow (Inflow) of Resources due to the difference between expected and actual 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.

Minnesota State Retirement System
Correctional Employees Retirement Fund

GASB Statement Nos. 67 and 68

Accounting and Financial Reporting for Pensions

June 30, 2019

P: 800.521.0498 | F: 763.432.5842 | www.grsconsulting.com

November 27, 2019

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

Dear Board of Directors:

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

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

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

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

277 Coon Rapids Boulevard | Suite 212 | Coon Rapids, Minnesota 55433-2629

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 Correctional Employees Retirement Fund as of the measurement date. All calculations have been made in conformity with generally accepted actuarial principles and practices as well as with the Actuarial Standards of Practice issued by the Actuarial Standards Board.

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

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

Bonita J. Wurst

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

BBM/BJW:sc

Table of Contents

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	2,879
- Survivors	241
- Disability Retirements	308
- Deferred Retirements	1,386
- Terminated other non-vested	950
- Active Members	4,582
- Total	10,346
Covered-employee Payroll [1]	$ 267,563
Net Pension Liability	
Total Pension Liability	$ 1,579,374
Plan Fiduciary Net Position	1,183,995
Net Pension Liability	$ 395,379
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	74.97%
Net Pension Liability as a Percentage of Covered-Employee Payroll	147.77%
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 [2]	3.13%
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)	$ (2,734)

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

	Deferred Outflows of Resources	Deferred Inflows of Resources
Difference between expected and actual experience in the measurement of the Total Pension Liability	$ 10,356	$ 2,251
Changes in assumptions	135,046	455,967
Net difference between projected and actual earnings on pension plan investments	16,115	44,729
Total	$ 161,517	$ 502,947

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

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

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

Notes to Financial Statements

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

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

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

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

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

MSRS' comprehensive annual financial report, which contains the basic financial statements and related note disclosures for the Correctional Employees Retirement Fund can be found online at www.msrs.state.mn.us/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 normal cost of the plan is expected to remain approximately level as a percent of pay;
2. The funded status of the plan is expected to gradually improve and is expected to be 100% funded within the next 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 long-term 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

1.	Service Cost	$	44,912
2.	Interest on the Total Pension Liability		110,664
3.	Current-Period Benefit Changes		-
4.	Employee Contributions (made negative for addition here)		(25,686)
5.	Projected Earnings on Plan Investments (made negative for addition here)		(83,173)
6.	Pension Plan Administrative Expense		856
7.	Other Changes in Plan Fiduciary Net Position		6
8.	Recognition of Outflow (Inflow) of Resources due to differences between expected and actual experience in the measurement of the Total Pension Liability		
	Arising from Current Reporting Period		1,636
9.	Recognition of Outflow (Inflow) of Resources due to assumption changes		
	Arising from Current Reporting Period		-
10.	Recognition of Outflow (Inflow) of Resources due to the difference between projected (7.50%) and actual earnings on Pension Plan Investments		
	Arising from Current Reporting Period		446
11.	**Increases/(Decreases) from Experience in the Current Reporting Period**	**$**	**49,661**
12.	Recognition of Outflow (Inflow) of Resources due to differences between expected and actual experience in the measurement of the Total Pension Liability		
	Arising from Prior Reporting Periods		2,329
13.	Recognition of Outflow (Inflow) of Resources due to assumption changes		
	Arising from Prior Reporting Periods		(55,669)
14.	Recognition of Outflow (Inflow) of Resources due to the difference between projected and actual earnings on Pension Plan Investments		
	Arising from Prior Reporting Periods		945
15.	**Total Pension Expense / (Income)**	**$**	**(2,734)**

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	$	8,180
2. Assumption Changes (gains) or losses		-
3. Recognition period for Liabilities: Average of the expected remaining service lives of all employees {in years}		5
4. Outflow (Inflow) of Resources to be recognized in the current pension expense for the difference between expected and actual experience of the Total Pension Liability		1,636
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	$	1,636
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	$	6,544
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	$	6,544
B. Outflows (Inflows) of Resources due to Assets		
1. Net difference between projected and actual earnings on pension plan investments (gains) or losses	$	2,231
2. Recognition period for Assets {in years}		5
3. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Assets		446
4. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Assets	$	1,785

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	$ 139,861	$ 191,565	$ (51,704)
2. Due to Assets	20,854	19,463	1,391
3. Totals	$ 160,715	$ 211,028	$ (50,313)

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	$ 4,818	$ 853	$ 3,965
2. Assumption Changes	135,043	190,712	(55,669)
3. Net Difference between projected and actual earnings on pension plan investments	20,854	19,463	1,391
4. Totals	$ 160,715	$ 211,028	$ (50,313)

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	$ 10,356	$ 2,251	$ 8,105
2. Assumption Changes	135,046	455,967	(320,921)
3. Net Difference between projected and actual earnings on pension plan investments*	16,115	44,729	(28,614)
4. Total	$ 161,517	$ 502,947	$ (341,430)

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	$ (32,559)
2021	(182,968)
2022	(127,986)
2023	2,083
2024	-
Thereafter	-
Total	$ (341,430)

** 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					
2014	$ 4,103	6.0000	$ 683	$ -	0.0000
2015	7,115	6.0000	1,186	1,185	1.0000
2016	(764)	5.0000	(153)	(152)	1.0000
2017	6,566	5.0000	1,313	2,627	2.0000
2018	(3,499)	5.0000	(700)	(2,099)	3.0000
2019	8,180	5.0000	1,636	6,544	4.0000
Total			**$ 3,965**	**$ 8,105**	
Deferred Outflow (Inflow) due to Assumption Changes					
2014	$ (147,067)	6.0000	$ (24,512)	$ -	0.0000
2015	118,399	6.0000	19,733	19,734	1.0000
2016	576,552	5.0000	115,310	115,312	1.0000
2017	(213,159)	5.0000	(42,632)	(85,263)	2.0000
2018	(617,840)	5.0000	(123,568)	(370,704)	3.0000
Total			**$ (55,669)**	**$ (320,921)**	
Deferred Outflow (Inflow) due to Differences Between Projected and Actual Earnings on Plan Investments					
2015	$ 30,400	5.0000	$ 6,080	$ -	0.0000
2016	71,642	5.0000	14,328	14,330	1.0000
2017	(68,307)	5.0000	(13,661)	(27,324)	2.0000
2018	(29,009)	5.0000	(5,802)	(17,405)	3.0000
2019	2,231	5.0000	446	1,785	4.0000
Total			**$ 1,391**	**$ (28,614)**	

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

Assets		**June 30, 2019**
Cash & Short-term Investments	$	35,664
Receivables		3,306
Investment Pools (at fair value)		1,146,592
Securities Lending Collateral		87,803
Capital Assets		-
Total Assets	**$**	**1,273,365**
Total Deferred Outflows of Resources	**$**	**-**
Total Liabilities	**$**	**(89,370)**
Total Deferred Inflows of Resources	**$**	**-**
Net Position Restricted for Pensions	**$**	**1,183,995**

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	**$**	**1,114,887**
Additions		
2. Contributions		
a. Employee	$	25,686
b. Employer		38,245
c. Other sources		-
d. Total contributions	$	63,931
3. Investment income		
a. Investment income/(loss)	$	82,058
b. Investment expenses		(1,116)
c. Net investment income/(loss)	$	80,942
4. Other Additions		-
5. Total Additions *(2.d.) + (3.c.) + (4.)*	**$**	**144,873**
Deductions		
6. Benefits Paid		
a. Annuity benefits	$	(72,419)
b. Refunds		(2,484)
c. Total benefits paid	$	(74,903)
7. Expenses		
a. Other deductions	$	(6)
b. Administrative		(856)
c. Total expenses	$	(862)
8. Total deductions *(6.c.) + (7.c.)*	**$**	**(75,765)**
9. Net increase/(decrease) in fiduciary net position *(5.) + (8.)*	**$**	**69,108**
10. Net position at market value at end of year *(1.) + (9.)*	**$**	**1,183,995**
11. State Board of Investment calculated annual investment return for the Correctional 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	$	44,912
2. Interest on the Total Pension Liability		110,664
3. Changes of benefit terms		-
4. Difference between expected and actual experience of the Total Pension Liability		8,180
5. Changes of assumptions		-
6. Benefit payments, including refunds of employee contributions		(74,903)
7. Net change in Total Pension Liability	$	88,853
8. Total Pension Liability – Beginning		1,490,521
9. Total Pension Liability – Ending	**$**	**1,579,374**
B. Plan Fiduciary Net Position		
1. Contributions – Employer	$	38,245
2. Contributions – Employee		25,686
3. Net investment income		80,942
4. Benefit payments, including refunds of employee contributions		(74,903)
5. Pension Plan Administrative Expense		(856)
6. Other changes		(6)
7. Net change in Plan Fiduciary Net Position	$	69,108
8. Plan Fiduciary Net Position – Beginning		1,114,887
9. Plan Fiduciary Net Position – Ending	**$**	**1,183,995**
C. Net Pension Liability, *A.9 - B.9.*	**$**	**395,379**
D. Plan Fiduciary Net Position as a percentage of the Total Pension Liability, *B.9 / A.9.*		**74.97%**
E. Covered-Employee payroll	**$**	**267,563** (1)
F. Net Pension Liability as a percentage of Covered-Employee payroll, *C. / E.*		**147.77%**

(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	$ 44,912	$85,364	$ 95,522	$ 56,718	$ 48,805	$ 54,443				
Interest on the Total Pension Liability	110,664	108,421	95,307	97,571	92,039	85,702				
Benefit Changes	-	(164,182)	-	-	-	-				
Difference between Expected and Actual Experience	8,180	(3,499)	6,566	(764)	7,115	4,103				
Assumption Changes	-	(617,840)	(213,159)	576,552	118,399	(147,067)				
Benefit Payments	(72,419)	(67,622)	(63,221)	(59,045)	(54,909)	(50,842)				
Refunds	(2,484)	(2,052)	(1,466)	(1,895)	(1,590)	(1,447)				
Net Change in Total Pension Liability	**$ 88,853**	**($661,410)**	**$ (80,451)**	**$ 669,137**	**$ 209,859**	**$ (55,108)**				
Total Pension Liability - Beginning	**$ 1,490,521**	**$2,151,931**	**$ 2,232,382**	**$ 1,563,245**	**$ 1,353,386**	**$ 1,408,494**				
Total Pension Liability - Ending (a)	**$ 1,579,374**	**$1,490,521**	**$ 2,151,931**	**$ 2,232,382**	**$ 1,563,245**	**$ 1,353,386**				
Plan Fiduciary Net Position										
Employer Contributions	$ 38,245	$32,893	$ 31,763	$ 30,678	$ 29,480	$ 26,468				
Employee Contributions	25,686	23,417	22,648	21,953	21,061	18,855				
Pension Plan Net Investment Income	80,942	105,263	135,359	(195)	38,624	137,523				
Benefit Payments	(72,419)	(67,622)	(63,221)	(59,045)	(54,909)	(50,842)				
Refunds	(2,484)	(2,052)	(1,466)	(1,895)	(1,590)	(1,447)				
Pension Plan Administrative Expense	(856)	(827)	(856)	(906)	(720)	(657)				
Other Changes	(6)	(2)	(2)	-	-	(1)				
Net Change in Plan Fiduciary Net Position	**$ 69,108**	**$91,070**	**$ 124,225**	**$ (9,410)**	**$ 31,946**	**$ 129,899**				
Plan Fiduciary Net Position - Beginning	**$ 1,114,887**	**$1,023,817**	**$ 899,592**	**$ 909,002**	**$ 877,056**	**$ 747,157**				
Plan Fiduciary Net Position - Ending (b)	**$ 1,183,995**	**$1,114,887**	**$ 1,023,817**	**$ 899,592**	**$ 909,002**	**$ 877,056**				
Net Pension Liability - Ending (a) - (b)	**$ 395,379**	**$375,634**	**$ 1,128,114**	**$ 1,332,790**	**$ 654,243**	**$ 476,330**				
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	**74.97 %**	**74.80 %**	**47.58 %**	**40.30 %**	**58.15 %**	**64.80 %**				
Covered-Employee Payroll [1]	**$ 267,563**	**$257,330**	**$ 248,879**	**$241,242**	**$231,440**	**$219,244**				
Net Pension Liability as a Percentage of Covered-Employee Payroll	**147.77 %**	**145.97 %**	**453.28 %**	**552.47 %**	**282.68 %**	**217.26 %**				

Notes to Schedule:

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

Schedule of Net Pension Liability Multiyear
(Dollars in Thousands)

Last 10 Fiscal Years (which will be built prospectively)

Fiscal Year Ending June 30,	Total Pension Liability	Plan Net Position	Net Pension Liability	Plan Net Position as a % of Total Pension Liability	Covered-Employee Payroll	Net Pension Liability as a % of Covered-Employee Payroll
	(a)	(b)	(a) - (b) = (c)	(b)/(c)	(d)	(c)/(d)
2010						
2011						
2012						
2013						
2014	$ 1,353,386	$ 877,056	$ 476,330	64.80%	$ 219,244	217.26%
2015	1,563,245	909,002	654,243	58.15	231,440	282.68
2016	2,232,382	899,592	1,332,790	40.30	241,242	552.47
2017	2,151,931	1,023,817	1,128,114	47.58	248,879	453.28
2018	1,490,521	1,114,887	375,634	74.80	257,330	145.97
2019	1,579,374	1,183,995	395,379	74.97	267,563	147.77

Schedule of Contributions Multiyear
(Dollars in Thousands)

Last 10 Fiscal Years

Fiscal Year Ending June 30,	Actuarially Determined Contribution	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	$ 32,557	$ 21,988	$ 10,569	$ 192,450	11.43%
2011	33,274	23,892	9,382	197,702	12.08
2012	34,806	24,188	10,618	200,035 *	12.09
2013	34,060	24,632	9,428	204,198 *	12.06
2014	38,390	26,468	11,922	219,244 *	12.07
2015	40,109	29,480	10,629	231,440 *	12.74
2016	44,171	30,678	13,493	241,242 *	12.72
2017	45,943	31,763	14,180	248,879 *	12.76
2018	49,665	32,893	16,772	257,330 *	12.78
2019	43,265	38,245	5,020	267,563 *	14.29

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

Notes to Schedule of Contributions

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

Notes	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.
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 tables ranging from 12.25% with one year of service to 3.25% with 24 or more years of service, including inflation.
Investment Rate of Return	7.50%
Retirement Age	Experience-based table of rates that are specific to the type of eligibility condition. Last updated for the 2017 valuation pursuant to an experience study of the period 2011-2015.
Healthy Post-Retirement Mortality	RP-2014 annuitant generational mortality table, projected with mortality improvement scale MP-2015 from a base year of 2006, white collar adjustment, set forward 2-years for males and set forward 1-year for females.

Other Information

Benefit Increases After Retirement	1.5% per annum beginning January 1, 2019.
	See separate funding actuarial valuation report as of July 1, 2018 for additional detail. To obtain this report, contact MSRS as noted on page 3. This report is also available 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	18.6 %
2015	4.4
2016	(0.0)
2017	15.2
2018	10.4
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 Correctional 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.

10-Year Schedule of Money-Weighted Investment Return

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

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

SECTION D

ADDITIONAL FINANCIAL STATEMENT DISCLOSURES

Asset Allocation

Long-Term Expected Return on Plan Assets

The long-term expected rate of return on pension plan investments was determined using a building-block method. Estimates for expected future real rates of return (expected returns, net of inflation) were developed for each asset class using both long-term historical returns and long-term capital market expectation from a number of investment management and consulting organizations. The asset class estimates and the target allocations were then combined to produce a geometric, long-term expected real rate of return for the portfolio. Inflation expectations were applied to derive the nominal rate of return for the portfolio. For each major asset class that is included in the pension fund's target asset allocation as of June 30, 2019, these estimates are summarized in the following table:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return (Geometric Mean)
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	100%	

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 for the Minnesota State Employees Retirement Fund, dated June 27, 2019.

Sensitivity of Net Pension Liability to the Single Discount Rate Assumption

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 plan member, employer, and state contributions will be made at the current statutory contribution rates. Based on these assumptions, the pension plan's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

Regarding the sensitivity of the net pension liability to changes in the Single Discount Rate, the following presents the plan's net pension liability, calculated using a Single Discount Rate of 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 (8.5%) 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	$ 1,802,674	$ 1,579,374	$ 1,397,215
Net Position Restricted for Pensions	1,183,995	1,183,995	1,183,995
Net Pension Liability	**$ 618,679**	**$ 395,379**	**$ 213,220**

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	**$ 1,490,521**	**$ 1,114,887**	**$ 375,634**	**$ 311,821**	**$ 713,975**	
Changes for the Year:						
Service Cost	$ 44,912		$ 44,912			$ 44,912
Interest on Total Pension Liability	110,664		110,664			110,664
Interest on Plan Fiduciary Net Position [1]		$ 83,173 [1]	(83,173)			(83,173)
Changes in Benefit Terms	-		-			-
Liability Experience Gains and Losses	8,180		8,180	$ 6,544	$ -	1,636
Changes in Assumptions	-		-	-	-	-
Recognition of Deferred Outflows/(Inflows) of Resources Arising from Prior Reporting Periods						
Liability Experience Gains/(Losses)				(3,182)	(853)	2,329
Assumption Changes				(135,043)	(190,712)	(55,669)
Investment Gains/(Losses)				(20,408)	(19,463)	945
Contributions - Employer		38,245	(38,245)			
Contributions - Employees		25,686	(25,686)			(25,686)
Asset Gain/(Loss) [1]		(2,231) [1]	2,231	1,785	-	446
Benefit Payment and Refunds	(74,903)	(74,903)				
Administrative Expenses		(856)	856			856
Other Changes		(6)	6			6
Net Changes	**$ 88,853**	**$ 69,108**	**$ 19,745**	**$ (150,304)**	**$ (211,028)**	**$ (2,734)**
Balance End of Year	**$ 1,579,374**	**$ 1,183,995**	**$ 395,379**	**$ 161,517**	**$ 502,947**	

[1] *The sum of these items in column (b) equals the net investment income of $80,942.*

Summary of Population Statistics

		Terminated		Recipients			
	Actives	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	Total
Members on 7/1/2018	**4,650**	**1,347**	**843**	**2,736**	**297**	**226**	**10,099**
New members	455						**455**
Return to active	24	(13)	(11)	0	0	0	**0**
Terminated non-vested	(170)	0	170	0	0	0	**0**
Service retirements	(125)	(47)	0	172	0	0	**0**
Terminated deferred	(113)	113	0	0	0	0	**0**
Terminated refund/transfer	(122)	(12)	(84)	0	0	0	**(218)**
Deaths	(9)	(4)	(3)	(39)	(5)	(7)	**(67)**
New beneficiary	0	0	0	0	0	24	**24**
Disabled	(8)	0	0	0	8	0	**0**
Unexpected status changes	0	2	35	10	8	(2)	**53**
Net change	(68)	39	107	143	11	15	**247**
Members on 6/30/2019	**4,582**	**1,386**	**950**	**2,879**	**308**	**241**	**10,346**

SECTION E

SUMMARY OF BENEFITS

Summary of Plan Provisions

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

Plan year	July 1 through June 30
Eligibility	State employees in covered correctional service. Certain state employees with 75 percent working time spent in direct contact with inmates or patients are also eligible.
Contributions	Shown as a percent of salary:

Effective as of	Member	Regular Employer	Supplemental Employer	Total
Prior to July 1, 2018	9.10%	12.85%	0.00%	21.95%
July 1, 2018	9.60%	14.40%	0.00%	24.00%
July 1, 2019	9.60%	14.40%	1.45%	25.45%
July 1, 2020	9.60%	14.40%	2.95%	26.95%
July 1, 2021 and later	9.60%	14.40%	4.45%	28.45%

Supplemental employer contribution remains in effect until the plan is 100% funded on a Market Value of Assets basis.

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

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

Summary of Plan Provisions (Continued)

Retirement

Normal retirement benefit

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

Early retirement

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

Form of payment	Life annuity. Actuarially equivalent options are: 50%, 75%, or 100% Joint and Survivor, or 15-year certain. If a Joint and Survivor benefit is elected and the beneficiary predeceases the annuitant, the annuitant's benefit increases to the Life Annuity amount. This "bounce back" is subsidized by the plan.
Benefit increases	Through December 31, 2018: 2.00% January 1, 2019 and after: 1.50% A benefit recipient who has been receiving a benefit for at least 12 full months as of the June 30 of the calendar year immediately before the adjustment will receive a full increase. Members receiving benefits for at least one month but less than 12 full months as of the June 30 of the calendar year immediately before the adjustment will receive a pro rata increase.

Disability

Duty Disability

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

Summary of Plan Provisions (Continued)

Disability (Continued)

Duty Disability Continued

Amount (Continued)	Payment begins at disability and ends at age 55 (age 65 if disabled prior to July 1, 2009) or the five-year anniversary of the effective date of the disability benefit, whichever is later. Payments stop earlier if disability ceases or death occurs. Benefits may be paid upon re-employment but salary plus benefit cannot exceed current salary of position held at time of disability. Member is reclassified from disabled to retired at age 55 (age 65 if disabled prior to July 1, 2009). Optional amount continues. Otherwise, normal retirement benefit equal to the disability benefit paid, or an actuarially equivalent option.

Regular Disability

Age/Service requirement	At least one year of covered Correctional service for employees hired before July 1, 2009, or a vested Correctional employee hired after June 30, 2009, and the employee is determined to have a regular disability not related to an incident while performing the duties of the job.
Amount	Normal retirement benefit based on covered Correctional Service (minimum of 15 years if hired prior to July 1, 2009) and Average Salary at disability. Payment begins at disability and ends at age 55 (age 65 if disabled prior to July 1, 2009) or the five-year anniversary of the effective date of the disability benefit, whichever is later. Payments stop earlier if disability ceases or death occurs. Benefits may be paid upon re-employment but salary plus benefit cannot exceed current salary of position held at time of disability. Member is reclassified from disabled to retired at age 55 (age 65 if disabled prior to July 1, 2009). Optional amount continues. Otherwise, normal retirement benefit equal to the disability benefit paid, or an actuarially equivalent option.
Benefit Increases	Same as for retirement.

Death

Surviving spouse benefit

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

Summary of Plan Provisions (Continued)

Death (Continued)	
<u>Surviving spouse benefit Continued)</u>	
Amount	Surviving spouse receives the 100% joint and survivor benefits using the Normal Retirement formula above. If commencement is prior to age 55, the appropriate early retirement formula described above applies except that one-half the monthly reduction factor is used from age 50 to the commencement age and the Rule of 90 does not apply. In lieu of this benefit, the surviving spouse may elect a refund of member contributions with interest or an actuarially equivalent term certain annuity (lump sum payable to estate at death).
Benefit increases	Same as for retirement.
<u>Surviving dependent children's benefit</u>	
Age/service requirement	If no surviving spouse, all children (biological or adopted) below age 20 who are dependent for more than half of their support on deceased member.
Amount	Actuarially equivalent to surviving spouse 100% joint and survivor annuity payable to the later of age 20 or five years. The amount is to be proportionally divided among surviving children.
Benefit increases	Same as for retirement.
<u>Refund of contributions with interest</u>	
Age/service requirement	Active employee dies and survivor benefits are not payable or a former employee dies before annuity begins. If accumulated member contributions with interest exceed total payments to the surviving spouse and children, then the remainder is paid out.
Amount	Member's contributions with 6.00% interest through June 30, 2011, compounded daily. Beginning July 1, 2011, a member's contributions increase with 4.00% interest compounded daily. Beginning July 1, 2018, member contributions increase with 3.00% interest compounded daily.
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 with 4.00% interest compounded daily. Beginning July 1, 2018, member contributions increase with 3.00% interest compounded daily. If a member is vested, a deferred annuity may be elected in lieu of a refund.

Summary of Plan Provisions (Concluded)

Termination (Continued)	
<u>Deferred benefit</u>	
Age/service requirement	Partially or fully vested.
Amount	Benefit computed under law in effect at termination and increased by the following annual augmentation percentage: (a.) 0.00% before July 1, 1971; (b.) 5.00% from July 1, 1971, to January 1, 1981; (c.) 3.00% thereafter (2.50% if hired after June 30, 2006) until January 1 of the year following attainment of age 55 or January 1, 2012, whichever is earlier; (d.) 5.00% thereafter until the annuity begins (2.50% if hired after June 30, 2006), but before January 1, 2012; and (e.) 2.00% from January 1, 2012 to December 31, 2018; and (f.) 0.00% thereafter. Amount is payable at normal or early retirement.
Optional form conversion factors	Effective July 1, 2019 and phased in over a 12-month period, actuarially equivalent factors based on the RP-2014 mortality table for healthy annuitants for a member turning age 56 in 2021, reflecting projected mortality improvements using Scale MP-2017, white collar adjustment, male rates set forward two years, female rates set forward one year, blended 70% males, 5.91% post-retirement interest, and 7.50% pre-retirement interest. Reflecting statutory requirements, joint and survivor factors are based on an interest assumption of 6.50%.
Combined service annuity	Members are eligible for combined service benefits if they: (a.) Have sufficient allowable service in total that equals or exceeds the applicable service credit vesting requirement of the retirement plan with the longest applicable service credit vesting requirement; (b.) Have at least six months of allowable service credit in each plan worked under; and (c.) Are not in receipt of a benefit from another plan, or have applied for benefits with an effective date within one year. Members who meet the above requirements must have their benefit based on the following: (a.) Allowable service in all covered plans are combined in order to determine eligibility for early retirement. (b.) Average salary is based on the high five consecutive years during their entire service in all covered plans.
Changes in plan provisions	There were no changes in plan provisions since the prior valuation.

SECTION F

ACTUARIAL COST METHOD AND ACTUARIAL ASSUMPTIONS

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

Actuarial Cost Method

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

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

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

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

Asset Valuation Method

Fair value of assets.

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

The following assumptions were used in valuing the liabilities and benefits under the plan. The assumptions are based on the last experience study, dated July 26, 2016 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 Allowances for Combined Service Annuity 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.
Payroll growth	3.25% per year.
Inflation	2.50% 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 2006, white collar adjustment.
Healthy post-retirement	RP-2014 annuitant generational mortality table projected with mortality improvement Scale MP-2015 from a base year of 2006, white collar adjustment, set forward two years for males and set forward one year for females.
Disabled	RP-2014 disabled mortality table projected with mortality improvement Scale MP-2015 from a base year of 2006.
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 plan changes reflected in this report may ultimately result in behavior changes not anticipated in these actuarial assumptions.

Summary of Actuarial Assumptions (Continued)

Withdrawal	Select and Ultimate rates based on actual experience. Ultimate rates after the third year are shown in rate table. Select rates in the first three years are:

	Select Withdrawal Rates	
Year	**Male**	**Female**
1	10%	12%
2	10%	12%
3	10%	12%

Disability	Age-related rates based on experience; see table of sample rates. All incidences are assumed to be duty-related.
Allowance for combined service annuity	Liabilities for former members are increased by 17.0% for vested members and 6.0% for non-vested members to account for the effect of some participants having eligibility for a Combined Service Annuity.
Administrative expenses	In the valuation year, equal to prior year administrative expenses expressed as a percentage of prior year projected payroll. In each subsequent year, equal to the initial administrative expense percentage applied to payroll for the closed group.
Refund of contributions	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 take the larger of their contributions accumulated with interest or the value of their deferred benefit.
Commencement of deferred benefits	Members receiving deferred annuities (including current terminated deferred members) are assumed to begin receiving benefits at age 55.
Percentage married	75% of active members are assumed to be married. Actual marital status is used for members in payment status.
Age of spouse	Females are assumed to be two years younger than their male spouses.
Form of payment	Married members retiring from active status are assumed to elect subsidized joint and survivor form of annuity as follows: Males: 15% elect 50% Joint & Survivor option 15% elect 75% Joint & Survivor option 50% elect 100% Joint & Survivor option Females: 10% elect 50% Joint & Survivor option 10% elect 75% Joint & Survivor option 35% elect 100% Joint & Survivor option Remaining married members and unmarried members are assumed to elect the Straight Life option. Members receiving deferred annuities (including current terminated deferred members) are assumed to elect a straight life annuity, except that current terminated deferred members who terminated prior to July 1, 1997, are assumed to receive the Level Social Security option to age 62.

Summary of Actuarial Assumptions (Continued)

Eligibility testing	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
Decrement operation	Withdrawal decrements do not operate during retirement eligibility. Decrements are assumed to occur mid-fiscal year.
Service credit accruals	It is assumed that members accrue one year of service credit per year.
Pay increases	Pay increases are assumed to happen at the beginning of the fiscal year. This is equivalent to assuming that reported earnings are pensionable earnings for the year ending on the valuation date.
Unknown data for certain members	To prepare this report, GRS has used and relied on participant data supplied by MSRS. Although GRS has reviewed the data in accordance with Actuarial Standards of Practice No. 23, GRS has not verified or audited any of the data or information provided. In cases where submitted data was missing or incomplete, the following assumptions, based on average results for applicable members at the time of the last experience study, were applied: <u>Data for active members</u>: There were 11 members reported without a gender and no members reported with an invalid date of birth. We assumed male gender. There were 8 members reported with zero or invalid salary. We used prior year salary (7 members), if available, otherwise, high five salary with a 10% load to account for salary increases (0 member). If neither pay or high five salary was available, we assumed a value of $45,000 (1 member). There was 1 member reported with zero service. Due to the small number of members with 0 service, and based on direction from MSRS, we used service of 0 years for this member.

Summary of Actuarial Assumptions (Continued)

Unknown data for certain members	Data for terminated members: There were no members reported with missing or invalid gender or birth dates. There were 43 members reported without a benefit. If available, we calculated benefits for these members using the reported Average Salary, Credited Service and Termination Date provided. If Average Salary was not reported (15 members), we assumed a value of $45,000. There were no members reported without a Termination Date or Credited Service. There were 50 members who terminated after June 30, 1997 and who were reported with a benefit in the Accelerated to Age 62 option. Based on direction from MSRS, we adjusted benefits for these members to reflect the assumed life annuity election. Benefits were estimated for 247 members at the direction of MSRS. Data for members receiving benefits: There were 7 members reported with a missing gender. We assumed male gender for retirees and female gender for survivors. There were no members reported with a missing or invalid birth date. There were no survivors reported on the data file with an expired benefit. There were 2 members reported without a benefit. Due to the small number of members with missing benefits, we made no adjustment to the reported data for members receiving benefits. There were no retirees reported with a survivor option and a survivor date of death. There were 21 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. There was 1 retiree reported with an accelerated benefit election, who is younger than the accelerated age and is missing the accelerated benefit amount and end date. We assumed the accelerated period has ended. There were retired members reported with a survivor option and an invalid or missing survivor gender (362 members) and/or survivor date of birth (298 members). We used the valuation assumptions if the survivor gender or date of birth was missing or invalid.
Changes in actuarial assumptions	There were no changes in actuarial assumptions since the prior valuation.

Summary of Actuarial Assumptions (Continued)

	Percentage of Members Dying Each Year*					
	Healthy Post-Retirement Mortality**		Healthy Pre-Retirement Mortality**		Disability Mortality**	
Age in 2019	Male	Female	Male	Female	Male	Female
20	0.02%	0.01%	0.02%	0.01%	0.04%	0.02%
25	0.04	0.02	0.03	0.01	0.16	0.08
30	0.06	0.05	0.03	0.02	0.41	0.22
35	0.09	0.09	0.03	0.03	0.76	0.44
40	0.13	0.12	0.04	0.03	1.10	0.65
45	0.18	0.15	0.06	0.05	1.43	0.82
50	0.27	0.20	0.10	0.08	1.78	1.08
55	0.40	0.29	0.18	0.14	2.17	1.44
60	0.59	0.44	0.32	0.21	2.56	1.70
65	0.90	0.69	0.56	0.30	3.03	2.00
70	1.48	1.10	0.98	0.52	3.85	2.68
75	2.57	1.88	1.76	0.91	5.25	3.95
80	4.61	3.37	3.16	1.63	7.51	6.03
85	8.55	6.22	6.57	4.35	11.15	9.11
90	15.25	11.27	12.48	9.73	16.92	13.30

* *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 2006.*

	Percent of Members Decrementing Each Year			
	Termination (Withdrawal) Rates After Third Year		Disability Retirement	
Age	Male	Female	Male	Female
20	10.00%	12.00%	0.05%	0.05%
25	10.00	11.50	0.08	0.08
30	5.00	9.10	0.11	0.11
35	4.50	7.10	0.15	0.15
40	3.50	5.70	0.22	0.22
45	1.95	3.50	0.35	0.35
50	0.00	0.00	0.54	0.54
55	0.00	0.00	0.00	0.00
60	0.00	0.00	0.00	0.00
65	0.00	0.00	0.00	0.00
70	0.00	0.00	0.00	0.00

Summary of Actuarial Assumptions (Concluded)

Age	Percent Retiring
50	5%
51	3
52	3
53	3
54	5
55	45
56	20
57	15
58	15
59	15
60	15
61	15
62	25
63	25
64	25
65	30
66	30
67	25
68	25
69	40
70+	100

Salary Scale	
Year	Increase
1	12.25%
2	8.75
3	5.75
4	5.25
5	5.00
6	4.75
7	4.75
8	4.75
9	4.75
10	4.75
11	4.75
12	4.50
13	4.25
14	4.25
15	4.00
16	4.00
17	4.00
18	3.75
19	3.75
20	3.75
21	3.50
22	3.50
23	3.50
24+	3.25

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) and **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)

	Projected Covered-Employee Payroll			Projected Contributions			
Fiscal Year Ending	Payroll for Current Employees	Payroll for New Employees	Total Employee Payroll	Contributions from Current Employees	Employer Contributions for Current Employees	Contributions on Future Payroll toward Current UAL*	Total Contributions
	(a)	(b)	(c) = (a) + (b)	(d) = (a) x 9.60%	(e) = (a) x 18.85%**	(f)	(g) = (d) + (e) + (f)
2019	$ 267,563		$ 267,563				
2020	277,162		277,162	$ 26,608	$ 43,930		$ 70,538
2021	266,326	$ 19,843	286,169	25,567	46,208	$ 1,972	73,747
2022	255,152	40,318	295,470	24,495	48,096	4,612	77,203
2023	244,551	60,522	305,073	23,477	46,098	6,924	76,499
2024	234,174	80,814	314,988	22,481	44,142	9,245	75,868
2025	224,376	100,849	325,225	21,540	42,295	11,537	75,372
2026	214,407	121,387	335,794	20,583	40,416	13,887	74,886
2027	204,335	142,373	346,708	19,616	38,517	16,287	74,420
2028	195,137	162,839	357,976	18,733	36,783	18,629	74,145
2029	186,492	183,118	369,610	17,903	35,154	20,949	74,006
2030	177,797	203,825	381,622	17,069	33,515	23,318	73,902
2031	168,960	225,065	394,025	16,220	31,849	25,747	73,816
2032	160,090	246,741	406,831	15,369	30,177	28,227	73,773
2033	151,272	268,781	420,053	14,522	28,515	30,749	73,786
2034	142,404	291,301	433,705	13,671	26,843	33,325	73,839
2035	133,512	314,288	447,800	12,817	25,167	35,955	73,939
2036	124,225	338,128	462,353	11,926	23,416	38,682	74,024
2037	114,613	362,767	477,380	11,003	21,605	41,501	74,109
2038	105,388	387,507	492,895	10,117	19,866	44,331	74,314
2039	96,523	412,391	508,914	9,266	13,899	28,826	51,991
2040	87,584	437,870	525,454	8,408	12,612	30,607	51,627
2041	78,591	463,940	542,531	7,545	11,317	32,429	51,291
2042	70,063	490,100	560,163	6,726	10,089	34,258	51,073
2043	62,135	516,233	578,368	5,965	8,947	36,085	50,997
2044	54,677	542,488	597,165	5,249	7,873	37,920	51,042
2045	47,618	568,955	616,573	4,571	6,857	39,770	51,198
2046	40,885	595,727	636,612	3,925	5,887	41,641	51,453
2047	34,681	622,621	657,302	3,329	4,994	43,521	51,844
2048	29,166	649,498	678,664	2,800	4,200	45,400	52,400
2049	24,234	676,487	700,721	2,326	3,490	47,286	53,102
2050	19,810	703,684	723,494	1,902	2,853	49,187	53,942
2051	15,991	731,016	747,007	1,535	2,303	51,098	54,936
2052	12,836	758,449	771,285	1,232	1,848	53,016	56,096
2053	10,258	786,094	796,352	985	1,477	54,948	57,410
2054	8,071	814,162	822,233	775	1,162	56,910	58,847
2055	6,268	842,688	848,956	602	903	58,904	60,409
2056	4,829	871,718	876,547	464	695	60,933	62,092
2057	3,665	901,370	905,035	352	528	63,006	63,886
2058	2,734	931,715	934,449	262	394	65,127	65,783
2059	1,999	962,819	964,818	192	288	67,301	67,781
2060	1,426	994,749	996,175	137	205	69,533	69,875
2061	981	1,027,569	1,028,550	94	141	71,827	72,062
2062	654	1,061,324	1,061,978	63	94	74,187	74,344
2063	425	1,096,068	1,096,493	41	61	76,615	76,717
2064	263	1,131,866	1,132,129	25	38	79,117	79,180
2065	150	1,168,773	1,168,923	14	22	81,697	81,733
2066	79	1,206,834	1,206,913	8	11	84,358	84,377
2067	40	1,246,097	1,246,137	4	6	87,102	87,112
2068	19	1,286,618	1,286,637	2	3	89,935	89,940
2069	6	1,328,447	1,328,453	1	1	92,858	92,860

* *Equal to total contributions (ultimately 28.45% of new employee payroll) net of normal cost and expenses (17.01% of pay).*

** *Employer contributions are equal to15.85% and 17.35% for fiscal years ending June 30, 2020 and 2021 respectively; the supplemental employer contribution is assumed to stop after 20 years.*

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

	Projected Covered-Employee Payroll			Projected Contributions			
Fiscal Year Ending	Payroll for Current Employees	Payroll for New Employees	Total Employee Payroll	Contributions from Current Employees	Employer Contributions for Current Employees	Contributions on Future Payroll toward Current UAL*	Total Contributions
	(a)	(b)	(c) = (a) + (b)	(d) = (a) x 9.60%	(e) = (a) x 18.85%	(f)	(g) = (d) + (e) + (f)
2070	$ 1	$ 1,371,626	$ 1,371,627	$ -	$ -	$ 95,877	$ 95,877
2071	-	1,416,205	1,416,205	-	-	98,993	98,993
2072	-	1,462,232	1,462,232	-	-	102,210	102,210
2073	-	1,509,754	1,509,754	-	-	105,532	105,532
2074	-	1,558,821	1,558,821	-	-	108,962	108,962
2075	-	1,609,483	1,609,483	-	-	112,503	112,503
2076	-	1,661,791	1,661,791	-	-	116,159	116,159
2077	-	1,715,799	1,715,799	-	-	119,934	119,934
2078	-	1,771,563	1,771,563	-	-	123,832	123,832
2079	-	1,829,139	1,829,139	-	-	127,857	127,857
2080	-	1,888,586	1,888,586	-	-	132,012	132,012
2081	-	1,949,965	1,949,965	-	-	136,303	136,303
2082	-	2,013,339	2,013,339	-	-	140,732	140,732
2083	-	2,078,772	2,078,772	-	-	145,306	145,306
2084	-	2,146,332	2,146,332	-	-	150,029	150,029
2085	-	2,216,088	2,216,088	-	-	154,905	154,905
2086	-	2,288,111	2,288,111	-	-	159,939	159,939
2087	-	2,362,474	2,362,474	-	-	165,137	165,137
2088	-	2,439,255	2,439,255	-	-	170,504	170,504
2089	-	2,518,531	2,518,531	-	-	176,045	176,045
2090	-	2,600,383	2,600,383	-	-	181,767	181,767
2091	-	2,684,895	2,684,895	-	-	187,674	187,674
2092	-	2,772,154	2,772,154	-	-	193,774	193,774
2093	-	2,862,250	2,862,250	-	-	200,071	200,071
2094	-	2,955,273	2,955,273	-	-	206,574	206,574
2095	-	3,051,319	3,051,319	-	-	213,287	213,287
2096	-	3,150,487	3,150,487	-	-	220,219	220,219
2097	-	3,252,878	3,252,878	-	-	227,376	227,376
2098	-	3,358,596	3,358,596	-	-	234,766	234,766
2099	-	3,467,751	3,467,751	-	-	242,396	242,396
2100	-	3,580,452	3,580,452	-	-	250,274	250,274
2101	-	3,696,817	3,696,817	-	-	258,408	258,408
2102	-	3,816,964	3,816,964	-	-	266,806	266,806
2103	-	3,941,015	3,941,015	-	-	275,477	275,477
2104	-	4,069,098	4,069,098	-	-	284,430	284,430
2105	-	4,201,344	4,201,344	-	-	293,674	293,674
2106	-	4,337,887	4,337,887	-	-	303,218	303,218
2107	-	4,478,869	4,478,869	-	-	313,073	313,073
2108	-	4,624,432	4,624,432	-	-	323,248	323,248
2109	-	4,774,726	4,774,726	-	-	333,753	333,753
2110	-	4,929,905	4,929,905	-	-	344,600	344,600
2111	-	5,090,127	5,090,127	-	-	355,800	355,800
2112	-	5,255,556	5,255,556	-	-	367,363	367,363
2113	-	5,426,361	5,426,361	-	-	379,303	379,303
2114	-	5,602,718	5,602,718	-	-	391,630	391,630
2115	-	5,784,806	5,784,806	-	-	404,358	404,358
2116	-	5,972,812	5,972,812	-	-	417,500	417,500
2117	-	6,166,929	6,166,929	-	-	431,068	431,068
2118	-	6,367,354	6,367,354	-	-	445,078	445,078
2119	-	6,574,293	6,574,293	-	-	459,543	459,543

* *Equal to total contributions (ultimately 28.45% of new employee payroll) net of normal cost and expenses (17.01% of pay).*

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

Fiscal Year Ending	Projected Beginning Plan Fiduciary Net Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expenses	Projected Investment Earnings at 7.50%	Projected Ending Plan Net Position
	(a)	(b)	(c)	(d)	(e)	(f)=(a)+(b)-(c)-(d)+(e)
2020	$ 1,183,995	$ 70,538	$ 79,705	$ 887	$ 88,429	$ 1,262,370
2021	1,262,370	73,747	83,985	852	94,269	1,345,549
2022	1,345,549	77,203	88,393	816	100,474	1,434,017
2023	1,434,017	76,499	92,800	783	106,922	1,523,855
2024	1,523,855	75,868	97,483	749	113,466	1,614,957
2025	1,614,957	75,372	102,456	718	120,098	1,707,253
2026	1,707,253	74,886	107,649	686	126,812	1,800,616
2027	1,800,616	74,420	113,481	654	133,584	1,894,485
2028	1,894,485	74,145	119,423	624	140,396	1,988,979
2029	1,988,979	74,006	125,307	597	147,262	2,084,343
2030	2,084,343	73,902	131,600	569	154,180	2,180,256
2031	2,180,256	73,816	138,192	541	161,129	2,276,468
2032	2,276,468	73,773	144,642	512	168,107	2,373,194
2033	2,373,194	73,786	151,354	484	175,115	2,470,257
2034	2,470,257	73,839	158,099	456	182,150	2,567,691
2035	2,567,691	73,939	165,086	427	189,205	2,665,322
2036	2,665,322	74,024	172,519	398	196,258	2,762,687
2037	2,762,687	74,109	180,413	367	203,274	2,859,290
2038	2,859,290	74,314	187,981	337	210,249	2,955,535
2039	2,955,535	51,991	195,170	309	216,381	3,028,428
2040	3,028,428	51,627	202,467	280	221,567	3,098,875
2041	3,098,875	51,291	209,410	251	226,584	3,167,089
2042	3,167,089	51,073	215,718	224	231,461	3,233,681
2043	3,233,681	50,997	221,421	199	236,243	3,299,301
2044	3,299,301	51,042	226,598	175	240,977	3,364,547
2045	3,364,547	51,198	231,290	152	245,704	3,430,007
2046	3,430,007	51,453	235,656	131	250,463	3,496,136
2047	3,496,136	51,844	239,477	111	255,297	3,563,689
2048	3,563,689	52,400	242,436	93	260,275	3,633,835
2049	3,633,835	53,102	244,676	78	265,480	3,707,663
2050	3,707,663	53,942	246,295	63	270,989	3,786,236
2051	3,786,236	54,936	247,094	51	276,890	3,870,917
2052	3,870,917	56,096	246,935	41	283,290	3,963,327
2053	3,963,327	57,410	245,966	33	290,305	4,065,043
2054	4,065,043	58,847	244,417	26	298,044	4,177,491
2055	4,177,491	60,409	242,187	20	306,617	4,302,310
2056	4,302,310	62,092	239,300	15	316,147	4,441,234
2057	4,441,234	63,886	235,931	12	326,757	4,595,934
2058	4,595,934	65,783	232,128	9	338,569	4,768,149
2059	4,768,149	67,781	227,926	6	351,714	4,959,712
2060	4,959,712	69,875	223,360	5	366,326	5,172,548
2061	5,172,548	72,062	218,462	3	382,550	5,408,695
2062	5,408,695	74,344	213,247	2	400,537	5,670,327
2063	5,670,327	76,717	207,736	1	420,450	5,959,757
2064	5,959,757	79,180	201,959	1	442,460	6,279,437
2065	6,279,437	81,733	195,934	-	466,752	6,631,988
2066	6,631,988	84,377	189,672	-	493,522	7,020,215
2067	7,020,215	87,112	183,189	-	522,978	7,447,116
2068	7,447,116	89,940	176,502	-	555,346	7,915,900
2069	7,915,900	92,860	169,627	-	590,865	8,429,998

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

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

Fiscal Year Ending	Projected Beginning Plan Fiduciary Net Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expenses	Projected Investment Earnings at 7.50%	Projected Ending Plan Net Position
	(a)	(b)	(c)	(d)	(e)	(f)=(a)+(b)-(c)-(d)+(e)
2070	$ 8,429,998	$ 95,877	$ 162,576	$ -	$ 629,793	$ 8,993,092
2071	8,993,092	98,993	155,363	-	672,406	9,609,128
2072	9,609,128	102,210	148,010	-	718,998	10,282,326
2073	10,282,326	105,532	140,534	-	769,885	11,017,209
2074	11,017,209	108,962	132,959	-	825,407	11,818,619
2075	11,818,619	112,503	125,310	-	885,924	12,691,736
2076	12,691,736	116,159	117,616	-	951,826	13,642,105
2077	13,642,105	119,934	109,909	-	1,023,527	14,675,657
2078	14,675,657	123,832	102,225	-	1,101,470	15,798,734
2079	15,798,734	127,857	94,601	-	1,186,129	17,018,119
2080	17,018,119	132,012	87,077	-	1,278,013	18,341,067
2081	18,341,067	136,303	79,697	-	1,377,664	19,775,337
2082	19,775,337	140,732	72,505	-	1,485,662	21,329,226
2083	21,329,226	145,306	65,543	-	1,602,629	23,011,618
2084	23,011,618	150,029	58,854	-	1,729,228	24,832,021
2085	24,832,021	154,905	52,478	-	1,866,173	26,800,621
2086	26,800,621	159,939	46,449	-	2,014,225	28,928,336
2087	28,928,336	165,137	40,796	-	2,174,203	31,226,880
2088	31,226,880	170,504	35,541	-	2,346,985	33,708,828
2089	33,708,828	176,045	30,698	-	2,533,514	36,387,689
2090	36,387,689	181,767	26,274	-	2,734,802	39,277,984
2091	39,277,984	187,674	22,272	-	2,951,939	42,395,325
2092	42,395,325	193,774	18,686	-	3,186,096	45,756,509
2093	45,756,509	200,071	15,506	-	3,438,534	49,379,608
2094	49,379,608	206,574	12,718	-	3,710,608	53,284,072
2095	53,284,072	213,287	10,301	-	4,003,779	57,490,837
2096	57,490,837	220,219	8,234	-	4,319,618	62,022,440
2097	62,022,440	227,376	6,489	-	4,659,816	66,903,143
2098	66,903,143	234,766	5,037	-	5,026,194	72,159,066
2099	72,159,066	242,396	3,849	-	5,420,713	77,818,326
2100	77,818,326	250,274	2,892	-	5,845,483	83,911,191
2101	83,911,191	258,408	2,135	-	6,302,775	90,470,239
2102	90,470,239	266,806	1,548	-	6,795,035	97,530,532
2103	97,530,532	275,477	1,101	-	7,324,892	105,129,800
2104	105,129,800	284,430	768	-	7,895,180	113,308,642
2105	113,308,642	293,674	525	-	8,508,942	122,110,733
2106	122,110,733	303,218	352	-	9,169,457	131,583,056
2107	131,583,056	313,073	232	-	9,880,248	141,776,145
2108	141,776,145	323,248	150	-	10,645,107	152,744,350
2109	152,744,350	333,753	96	-	11,468,112	164,546,119
2110	164,546,119	344,600	60	-	12,353,645	177,244,304
2111	177,244,304	355,800	38	-	13,306,422	190,906,488
2112	190,906,488	367,363	24	-	14,331,512	205,605,339
2113	205,605,339	379,303	15	-	15,434,366	221,418,993
2114	221,418,993	391,630	9	-	16,620,844	238,431,458
2115	238,431,458	404,358	6	-	17,897,248	256,733,058
2116	256,733,058	417,500	4	-	19,270,352	276,420,906
2117	276,420,906	431,068	2	-	20,747,440	297,599,412
2118	297,599,412	445,078	1	-	22,336,344	320,380,833
2119	320,380,833	459,543	1	-	24,045,483	344,885,858

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	$ 1,183,995	$ 79,705	$ 79,705	$ -	$ 76,874	$ -	$ 76,874
2021	1,262,370	83,985	83,985	-	75,351	-	75,351
2022	1,345,549	88,393	88,393	-	73,773	-	73,773
2023	1,434,017	92,800	92,800	-	72,047	-	72,047
2024	1,523,855	97,483	97,483	-	70,403	-	70,403
2025	1,614,957	102,456	102,456	-	68,832	-	68,832
2026	1,707,253	107,649	107,649	-	67,275	-	67,275
2027	1,800,616	113,481	113,481	-	65,972	-	65,972
2028	1,894,485	119,423	119,423	-	64,583	-	64,583
2029	1,988,979	125,307	125,307	-	63,037	-	63,037
2030	2,084,343	131,600	131,600	-	61,584	-	61,584
2031	2,180,256	138,192	138,192	-	60,157	-	60,157
2032	2,276,468	144,642	144,642	-	58,572	-	58,572
2033	2,373,194	151,354	151,354	-	57,014	-	57,014
2034	2,470,257	158,099	158,099	-	55,400	-	55,400
2035	2,567,691	165,086	165,086	-	53,812	-	53,812
2036	2,665,322	172,519	172,519	-	52,311	-	52,311
2037	2,762,687	180,413	180,413	-	50,889	-	50,889
2038	2,859,290	187,981	187,981	-	49,324	-	49,324
2039	2,955,535	195,170	195,170	-	47,638	-	47,638
2040	3,028,428	202,467	202,467	-	45,971	-	45,971
2041	3,098,875	209,410	209,410	-	44,230	-	44,230
2042	3,167,089	215,718	215,718	-	42,383	-	42,383
2043	3,233,681	221,421	221,421	-	40,469	-	40,469
2044	3,299,301	226,598	226,598	-	38,526	-	38,526
2045	3,364,547	231,290	231,290	-	36,580	-	36,580
2046	3,430,007	235,656	235,656	-	34,670	-	34,670
2047	3,496,136	239,477	239,477	-	32,774	-	32,774
2048	3,563,689	242,436	242,436	-	30,864	-	30,864
2049	3,633,835	244,676	244,676	-	28,976	-	28,976
2050	3,707,663	246,295	246,295	-	27,133	-	27,133
2051	3,786,236	247,094	247,094	-	25,322	-	25,322
2052	3,870,917	246,935	246,935	-	23,540	-	23,540
2053	3,963,327	245,966	245,966	-	21,812	-	21,812
2054	4,065,043	244,417	244,417	-	20,162	-	20,162
2055	4,177,491	242,187	242,187	-	18,584	-	18,584
2056	4,302,310	239,300	239,300	-	17,082	-	17,082
2057	4,441,234	235,931	235,931	-	15,666	-	15,666
2058	4,595,934	232,128	232,128	-	14,338	-	14,338
2059	4,768,149	227,926	227,926	-	13,097	-	13,097
2060	4,959,712	223,360	223,360	-	11,939	-	11,939
2061	5,172,548	218,462	218,462	-	10,862	-	10,862
2062	5,408,695	213,247	213,247	-	9,863	-	9,863
2063	5,670,327	207,736	207,736	-	8,938	-	8,938
2064	5,959,757	201,959	201,959	-	8,083	-	8,083
2065	6,279,437	195,934	195,934	-	7,295	-	7,295
2066	6,631,988	189,672	189,672	-	6,569	-	6,569
2067	7,020,215	183,189	183,189	-	5,902	-	5,902
2068	7,447,116	176,502	176,502	-	5,290	-	5,290
2069	7,915,900	169,627	169,627	-	4,729	-	4,729

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	$ 8,429,998	$ 162,576	$ 162,576	$ -	$ 4,216	$ -	$ 4,216
2071	8,993,092	155,363	155,363	-	3,748	-	3,748
2072	9,609,128	148,010	148,010	-	3,322	-	3,322
2073	10,282,326	140,534	140,534	-	2,934	-	2,934
2074	11,017,209	132,959	132,959	-	2,582	-	2,582
2075	11,818,619	125,310	125,310	-	2,264	-	2,264
2076	12,691,736	117,616	117,616	-	1,976	-	1,976
2077	13,642,105	109,909	109,909	-	1,718	-	1,718
2078	14,675,657	102,225	102,225	-	1,486	-	1,486
2079	15,798,734	94,601	94,601	-	1,280	-	1,280
2080	17,018,119	87,077	87,077	-	1,096	-	1,096
2081	18,341,067	79,697	79,697	-	933	-	933
2082	19,775,337	72,505	72,505	-	789	-	789
2083	21,329,226	65,543	65,543	-	664	-	664
2084	23,011,618	58,854	58,854	-	555	-	555
2085	24,832,021	52,478	52,478	-	460	-	460
2086	26,800,621	46,449	46,449	-	379	-	379
2087	28,928,336	40,796	40,796	-	309	-	309
2088	31,226,880	35,541	35,541	-	251	-	251
2089	33,708,828	30,698	30,698	-	201	-	201
2090	36,387,689	26,274	26,274	-	160	-	160
2091	39,277,984	22,272	22,272	-	126	-	126
2092	42,395,325	18,686	18,686	-	99	-	99
2093	45,756,509	15,506	15,506	-	76	-	76
2094	49,379,608	12,718	12,718	-	58	-	58
2095	53,284,072	10,301	10,301	-	44	-	44
2096	57,490,837	8,234	8,234	-	33	-	33
2097	62,022,440	6,489	6,489	-	24	-	24
2098	66,903,143	5,037	5,037	-	17	-	17
2099	72,159,066	3,849	3,849	-	12	-	12
2100	77,818,326	2,892	2,892	-	9	-	9
2101	83,911,191	2,135	2,135	-	6	-	6
2102	90,470,239	1,548	1,548	-	4	-	4
2103	97,530,532	1,101	1,101	-	3	-	3
2104	105,129,800	768	768	-	2	-	2
2105	113,308,642	525	525	-	1	-	1
2106	122,110,733	352	352	-	1	-	1
2107	131,583,056	232	232	-	-	-	-
2108	141,776,145	150	150	-	-	-	-
2109	152,744,350	96	96	-	-	-	-
2110	164,546,119	60	60	-	-	-	-
2111	177,244,304	38	38	-	-	-	-
2112	190,906,488	24	24	-	-	-	-
2113	205,605,339	15	15	-	-	-	-
2114	221,418,993	9	9	-	-	-	-
2115	238,431,458	6	6	-	-	-	-
2116	256,733,058	4	4	-	-	-	-
2117	276,420,906	2	2	-	-	-	-
2118	297,599,412	1	1	-	-	-	-
2119	320,380,833	1	1	-	-	-	-
				Totals	$ 1,928,365	$ -	$ 1,928,365

SECTION H

GLOSSARY OF TERMS

Glossary of Terms

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

Glossary of Terms

Amortization Payment The amortization payment is the periodic payment required to pay off an interest-discounted amount with payments of interest and principal.

Amortization Method The method used to determine the periodic amortization payment may be a level dollar amount, or a level percent of pay amount. The period will typically be expressed in years, and the method will either be "open" (meaning, reset each year) or "closed" (the number of years remaining will decline each year).

Cost-of-Living Adjustments Postemployment benefit changes intended to adjust benefit payments for the effects of inflation.

Cost-Sharing Multiple-Employer Defined Benefit Pension Plan (cost-sharing pension plan) A multiple-employer defined benefit pension plan in which the pension obligations to the employees of more than one employer are pooled and pension plan assets can be used to pay the benefits of the employees of any employer that provides pensions through the pension plan.

Covered-Employee Payroll The payroll of covered employees, which is typically only the pensionable pay and does not include pay above any pay cap.

Deferred Inflows and Outflows of Resources The deferred inflows and outflows of pension resources are amounts used under GASB Statement No. 68 in developing the annual pension expense. Deferred inflows and outflows arise with differences between expected and actual experiences; changes of assumptions. The portion of these amounts not included in pension expense should be included in the deferred inflows or outflows of resources.

Discount Rate or Single Discount Rate For GASB purposes, the discount rate is the single rate of return that results in the present value of all projected benefit payments to be equal to the sum of the funded and unfunded projected benefit payments, specifically:

1. The benefit payments to be made while the pension plans' fiduciary net position is projected to be greater than the benefit payments that are projected to be made in the period; and
2. The present value of the benefit payments not in (1) above, discounted using the municipal bond rate.

Entry Age Actuarial Cost Method (EAN) The EAN is a funding method for allocating the costs of the plan between the normal cost and the accrued liability. The actuarial present value of the projected benefits of each individual included in an actuarial valuation is allocated on a level basis (either level dollar or level percent of pay) over the earnings or service of the individual between entry age and assumed exit age(s). The portion of the actuarial present value allocated to a valuation year is the normal cost. The portion of this actuarial present value not provided for at a valuation date by the actuarial present value of future normal costs is the actuarial accrued liability. The sum of the accrued liability plus the present value of all future normal costs is the present value of all benefits.

Glossary of Terms

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

Glossary of Terms

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

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

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

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

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

Minnesota State Retirement System

State Patrol Retirement Fund
GASB Statement Nos. 67 and 68
Accounting and Financial Reporting for Pensions
June 30, 2019

GRS Retirement Consulting
P: 800.521.0498 | F: 763.432.5842 | www.grsconsulting.com

November 27, 2019

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

Dear Board of Directors:

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

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

This report complements the actuarial valuation report for funding purposes that was or will be provided to the System and should be considered in conjunction with that report. Please see the actuarial valuation report as of June 30, 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 Patrol Retirement Fund as of the measurement date. All calculations have been made in conformity with generally accepted actuarial principles and practices as well as with the Actuarial Standards of Practice issued by the Actuarial Standards Board.

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

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

Bonita J. Wurst

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

BBM/BJW:bd

Table of Contents

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	863
- Survivors	155
- Disability Retirements	60
- Deferred Retirements	56
- Terminated other non-vested	31
- Active Members	943
- Total	2,108
Covered-employee Payroll [(1)]	$ 80,792
Net Pension Liability	
Total Pension Liability	$ 959,964
Plan Fiduciary Net Position	753,144
Net Pension Liability	$ 206,820
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	78.46%
Net Pension Liability as a Percentage of Covered-employee Payroll	255.99%
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[(2)]	3.13%
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)	$ 28,189

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

	Deferred Outflows of Resources	Deferred Inflows of Resources
Difference between expected and actual experience in the measurement of Total Pension Liability	$ 2,297	$ 16,334
Changes in assumptions	94,528	140,940
Net difference between projected and actual earnings on pension plan investments	11,861	30,690
Totals	$ 108,686	$ 187,964

(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 SPRF 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 Patrol 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		
1. Service Cost	$	19,375
2. Interest on the Total Pension Liability		68,227
3. Current-Period Benefit Changes		-
4. Employee Contributions (made negative for addition here)		(12,038)
5. Projected Earnings on Plan Investments (made negative for addition here)		(53,667)
6. Pension Plan Administrative Expense		191
7. Other Changes in Plan Fiduciary Net Position		1
8. Recognition of Outflow (Inflow) of Resources due to differences between expected and actual experience in the measurement of the Total Pension Liability		
Arising from Current Reporting Period		460
9. Recognition of Outflow (Inflow) of Resources due to assumption changes		
Arising from Current Reporting Period		-
10. Recognition of Outflow (Inflow) of Resources due to the difference between projected (7.50%) and actual earnings on Pension Plan Investments		
Arising from Current Reporting Period		369
11. Increases/(Decreases) from Experience in the Current Reporting Period	**$**	**22,918**
12. Recognition of Outflow (Inflow) of Resources due to differences between expected and actual experience in the measurement of the Total Pension Liability		
Arising from Prior Reporting Periods	$	(8,606)
13. Recognition of Outflow (Inflow) of Resources due to assumption changes		
Arising from Prior Reporting Periods		12,342
14. Recognition of Outflow (Inflow) of Resources due to the difference between projected and actual earnings on Pension Plan Investments		
Arising from Prior Reporting Periods		1,535
15. Total Pension Expense / (Income)	**$**	**28,189**

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	$	2,757
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}		6
4. Outflow (Inflow) of Resources to be recognized in the current pension expense for the difference between expected and actual experience of the Total Pension Liability		460
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	$	460
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	$	2,297
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	$	2,297
B. Outflows (Inflows) of Resources due to Assets		
1. Net difference between projected and actual earnings on pension plan investments (gains) or losses	$	1,844
2. Recognition period for Assets {in years}		5
3. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Assets		369
4. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Assets	$	1,475

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	$ 52,732	$ 48,536	$ 4,196
2. Due to Assets	15,269	13,365	1,904
3. Total	$ 68,001	$ 61,901	$ 6,100

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	$ 460	$ 8,606	$ (8,146)
2. Assumption Changes	52,272	39,930	12,342
3. Net Difference between projected and actual earnings on pension plan investments	15,269	13,365	1,904
4. Total	$ 68,001	$ 61,901	$ 6,100

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

	Deferred Outflows of Resources	Deferred Inflows of Resources	Net Deferred Outflows/ (Inflows) of Resources
1. Differences between expected and actual experience	$ 2,297	$ 16,334	$ (14,037)
2. Assumption Changes	94,528	140,940	(46,412)
3. Net Difference between projected and actual earnings on pension plan investments*	11,861	30,690	(18,829)
4. Total	$ 108,686	$ 187,964	$ (79,278)

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	$ (2,458)
2021	(10,700)
2022	(44,864)
2023	(21,715)
2024	459
Thereafter	-
Total	$ (79,278)

** 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					
2014	$ (5,771)	6.0000	$ (961)	$ 0	0.0000
2015	(12,855)	6.0000	(2,143)	(2,140)	1.0000
2016	(22,222)	6.0000	(3,704)	(7,406)	2.0000
2017	(2,418)	6.0000	(403)	(1,209)	3.0000
2018	(8,369)	6.0000	(1,395)	(5,579)	4.0000
2019	2,757	6.0000	460	2,297	5.0000
Total			**$ (8,146)**	**$ (14,037)**	
Deferred Outflow (Inflow) Due to Assumption Changes					
2014	$ 30,058	6.0000	$ 5,008	$ 0	0.0000
2015	0	6.0000	0	0	1.0000
2016	283,584	6.0000	47,264	94,528	2.0000
2017	(112,694)	6.0000	(18,782)	(56,348)	3.0000
2018	(126,888)	6.0000	(21,148)	(84,592)	4.0000
2019	0	6.0000	0	0	5.0000
Total			**$ 12,342**	**$ (46,412)**	
Deferred Outflow (Inflow) Due to Differences Between Projected and Actual Earnings on Plan Investments					
2015	$ 22,564	5.0000	$ 4,512	$ 0	0.0000
2016	51,938	5.0000	10,388	10,386	1.0000
2017	(47,008)	5.0000	(9,402)	(18,802)	2.0000
2018	(19,814)	5.0000	(3,963)	(11,888)	3.0000
2019	1,844	5.0000	369	1,475	4.0000
Total			**$ 1,904**	**$ (18,829)**	

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

Assets		**June 30, 2019**
Cash & Short-term Investments	$	23,416
Receivables		1,653
Investment Pools (at fair value)		728,418
Securities Lending Collateral		55,780
Capital Assets		-
Total Assets	**$**	**809,267**
Total Deferred Outflows of Resources	**$**	**-**
Total Liabilities	**$**	**(56,123)**
Total Deferred Inflows of Resources	**$**	**-**
Net Position Restricted for Pensions	**$**	**753,144**

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**	**$**	**729,799**
Additions			
2.	Contributions		
	a. Employee	$	12,038
	b. Employer		19,479
	c. Other sources - Supplemental State Aid		1,000
	d. Total contributions	$	32,517
3.	Investment income		
	a. Investment income/(loss)	$	52,541
	b. Investment expenses		(718)
	c. Net investment income/(loss)	$	51,823
4.	Other Additions	$	-
5.	**Total Additions** *(2.d.) + (3.c.) + (4.)*	**$**	**84,340**
Deductions			
6.	Benefits Paid		
	a. Annuity benefits	$	(60,375)
	b. Refunds		(428)
	c. Total benefits paid	$	(60,803)
7.	Expenses		
	a. Other deductions	$	(1)
	b. Administrative		(191)
	c. Total expenses	$	(192)
8.	**Total Deductions** *(6.c.) + (7.c.)*	**$**	**(60,995)**
9.	**Net increase/(decrease) in fiduciary net position** *(5.) + (8.)*	**$**	**23,345**
10.	**Net position at market value at end of year** *(1.) + (9.)*	**$**	**753,144**
11.	State Board of Investment calculated annual investment return for the State Patrol 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	$	19,375
2. Interest on the Total Pension Liability		68,227
3. Changes of benefit terms		-
4. Difference between expected and actual experience of the Total Pension Liability		2,757
5. Changes of assumptions		-
6. Benefit payments, including refunds of employee contributions		(60,803)
7. Net change in total pension liability	$	29,556
8. Total pension liability – beginning		930,408
9. Total pension liability – ending	**$**	**959,964**
B. Plan fiduciary net position		
1. Contributions – employer (1)	$	20,479
2. Contributions – employee		12,038
3. Net investment income		51,823
4. Benefit payments, including refunds of employee contributions		(60,803)
5. Pension Plan Administrative Expense		(191)
6. Other changes		(1)
7. Net change in plan fiduciary net position	$	23,345
8. Plan fiduciary net position – beginning		729,799
9. Plan fiduciary net position – ending	**$**	**753,144**
C. Net pension liability, *A.9. - B.9.*	**$**	**206,820**
D. Plan fiduciary net position as a percentage of the total pension liability, *B.9. / A.9.*		**78.46%**
E. Covered-employee payroll (2)	**$**	**80,792**
F. Net pension liability as a percentage of covered-employee payroll, *C. / E.*		**255.99%**

(1) Includes $1 million supplemental state aid.

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

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

Last 10 Fiscal Years (which will be built prospectively)

Fiscal year ending June 30,	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
Total Pension Liability										
Service Cost	$ 19,375	$ 24,935	$ 29,758	$ 16,555	$ 16,144	$ 14,514				
Interest on the Total Pension Liability	68,227	65,110	58,865	64,592	63,753	60,183				
Benefit Changes	-	(2,604)	-	-	-	-				
Difference between Expected and Actual Experience	2,757	(8,369)	(2,418)	(22,222)	(12,855)	(5,771)				
Assumption Changes	-	(126,888)	(112,694)	283,584	-	30,058				
Benefit Payments	(60,375)	(59,653)	(58,560)	(57,695)	(55,465)	(53,697)				
Refunds	(428)	(39)	(5)	(79)	(15)	(25)				
Net Change in Total Pension Liability	$ 29,556	$ (107,508)	$ (85,054)	$ 284,735	$ 11,562	$ 45,262				
Total Pension Liability - Beginning	930,408	1,037,916	1,122,970	838,235	826,673	781,411				
Total Pension Liability - Ending (a)	**$ 959,964**	**$ 930,408**	**$ 1,037,916**	**$ 1,122,970**	**$ 838,235**	**$ 826,673**				
Plan Fiduciary Net Position										
Employer Contributions (1)	$ 20,479	$ 16,952	$ 16,783	$ 14,938	$ 14,763	$ 12,894				
Employee Contributions	12,038	10,657	10,520	9,292	9,174	7,930				
Pension Plan Net Investment Income	51,823	70,474	93,077	(774)	28,903	107,187				
Benefit Payments	(60,375)	(59,653)	(58,560)	(57,695)	(55,465)	(53,697)				
Refunds	(428)	(39)	(5)	(79)	(15)	(25)				
Pension Plan Administrative Expense	(191)	(184)	(208)	(220)	(170)	(150)				
Other	(1)	(7)	-	-	-	-				
Net Change in Plan Fiduciary Net Position	**$ 23,345**	**$ 38,200**	**$ 61,607**	**$ (34,538)**	**$ (2,810)**	**$ 74,139**				
Plan Fiduciary Net Position - Beginning	**729,799**	**691,599**	**629,992**	**664,530**	**667,340**	**593,201**				
Plan Fiduciary Net Position - Ending (b)	**$ 753,144**	**$ 729,799**	**$ 691,599**	**$ 629,992**	**$ 664,530**	**$ 667,340**				
Net Pension Liability - Ending (a) - (b)	**$ 206,820**	**$ 200,609**	**$ 346,317**	**$ 492,978**	**$ 173,705**	**$ 159,333**				
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	**78.46 %**	**78.44 %**	**66.63 %**	**56.10 %**	**79.28 %**	**80.73 %**				
Covered-Employee Payroll (2)	**$ 80,792**	**$ 74,007**	**$ 73,056**	**$ 69,343**	**$ 68,463**	**$ 63,952**				
Net Pension Liability as a Percentage of Covered-Employee Payroll	**255.99 %**	**271.07 %**	**474.04 %**	**710.93 %**	**253.72 %**	**249.15 %**				

Notes to Schedule:

(1) Includes $1 million supplemental state aid.

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

Schedule of Net Pension Liability Multiyear
(Dollars in Thousands)

Last 10 Fiscal Years (which will be built prospectively)

Fiscal Year Ending June 30,	Total Pension Liability	Plan Net Position	Net Pension Liability	Plan Net Position as a % of Total Pension Liability	Covered-Employee Payroll	Net Pension Liability as a % of Covered-Employee Payroll
	(a)	(b)	(a) - (b) = (c)	(b) / (c)	(d)	(c) / (d)
2010						
2011						
2012						
2013						
2014	$ 826,673	$ 667,340	$ 159,333	80.73%	$ 63,952	249.14%
2015	838,235	664,530	173,705	79.28	68,463	253.72
2016	1,122,970	629,992	492,978	56.10	69,343	710.93
2017	1,037,916	691,599	346,317	66.63	73,056	474.04
2018	930,408	729,799	200,609	78.44	74,007	271.07
2019	959,964	753,144	206,820	78.46	80,792	255.99

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	$ 17,410	$ 10,104	$ 7,306	$ 63,250	15.97%
2011	14,826	9,873	4,953	63,250	15.61
2012	14,912	11,620	3,292	62,524 [2]	18.58
2013	18,711	11,482	7,229	62,121 [2]	18.48
2014	18,444	12,894 [3]	5,550	63,952 [2]	20.16
2015	20,648	14,763 [3]	5,885	68,463 [2]	21.56
2016	20,463	14,938 [3]	5,525	69,343 [2]	21.54
2017	19,031	16,783 [3]	2,248	73,056 [2]	22.97
2018	20,900	16,952 [3]	3,948	74,007 [2]	22.91
2019	21,281	20,479 [3]	802	80,792 [2]	25.35

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. (3) Includes supplemental state aid of $1,000.
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 tables ranging from 15.25% with one year of service to 3.25% with 25 or more years of service, including inflation
Investment Rate of Return	7.50%
Retirement Age	Experience-based table of rates that are specific to the type of eligibility condition. Last updated for the 2017 valuation pursuant to an experience study of the period 2011 - 2015.
Healthy Post-retirement Mortality	RP-2014 annuitant generational mortality table, projected with mortality improvement scale MP-2015, white collar adjustment.

Other Information:

Benefit Increases After Retirement	The post-retirement benefit increase is assumed to be 1.00% for all future years. See separate funding actuarial valuation report as of July 1, 2018 for additional detail. To obtain this report, contact MSRS as noted on page 3. The report is also available 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 Patrol 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:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return (Geometric Mean)
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	100%	

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 for the State Employees Retirement Fund dated June 27, 2019.

Sensitivity of Net Pension Liability to the Single Discount Rate Assumption

Single Discount Rate

A Single Discount Rate of 7.5% was used to measure the total pension liability. This Single Discount Rate was based on the expected rate of return on pension plan investments of 7.50%. The projection of cash flows used to determine this Single Discount Rate assumed that member, employer, and state contributions will be made at the current statutory contribution rates. Based on these assumptions, the pension plan's fiduciary net position and future contributions were sufficient to finance all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

Regarding the sensitivity of the net pension liability to changes in the Single Discount Rate, the following presents the plan's net pension liability, calculated using a Single Discount Rate of 7.5%, as well as what the plan's net pension liability would be if it were calculated using a Single Discount Rate that is one percent lower (6.50%) or one percent 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	$1,076,147	$959,964	$863,706
Net Position Restricted for Pensions	753,144	753,144	753,144
Net Pension Liability	**$ 323,003**	**$206,820**	**$110,562**

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	**$ 930,408**	**$ 729,799**	**$ 200,609**	**$ 172,086**	**$ 249,865**	
Changes for the Year:						
Service Cost	$ 19,375		$ 19,375			$ 19,375
Interest on Total Pension Liability	68,227		68,227			68,227
Interest on Fiduciary Net Position		$ 53,667 [1]	(53,667)			(53,667)
Changes in Benefit Terms	-		-			-
Liability Experience Gains and Losses	2,757		2,757	$ 2,297	$ -	460
Changes in Assumptions	-		-	-	-	-
Recognition of Deferred Outflows/(Inflows) of Resources Arising from Prior Reporting Periods						
Liability Experience Gains/(Losses)				-	(8,606)	(8,606)
Assumption Changes				(52,272)	(39,930)	12,342
Investment Gains/(Losses)				(14,900)	(13,365)	1,535
Contributions - Employer		20,479 [2]	(20,479)			
Contributions - Employees		12,038	(12,038)			(12,038)
Asset Gain/(Loss)		(1,844) [1]	1,844	1,475	-	369
Benefit Payments and Refunds	(60,803)	(60,803)	-			
Administrative Expenses		(191)	191			191
Other changes		(1)	1			1
Net Changes	**$ 29,556**	**$ 23,345**	**$ 6,211**	**$ (63,400)**	**$ (61,901)**	**$ 28,189**
Balance End of Year	**$ 959,964**	**$ 753,144**	**$ 206,820**	**$ 108,686**	**$ 187,964**	

[1] *The sum of these items in column (b) equals the net investment income of $51,823.*

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

Summary of Population Statistics

	Actives	Terminated: Deferred Retirement	Terminated: Other Non-Vested	Recipients: Service Retirement	Recipients: Disability Retirement	Recipients: Survivor	Total
Members on 7/1/2018	**921**	**56**	**22**	**862**	**59**	**150**	**2,070**
New members	64	0	0	0	0	0	**64**
Return to active	0	0	0	0	0	0	**0**
Terminated non-vested	(9)	0	9	0	0	0	**0**
Service retirements	(19)	(3)	0	22	0	0	**0**
Terminated deferred	(4)	4	0	0	0	0	**0**
Terminated refund/transfer	(4)	(2)	0	0	0	0	**(6)**
Deaths	(4)	0	0	(25)	(2)	(7)	**(38)**
New beneficiary	0	0	0	0	0	14	**14**
Disabled	(2)	0	0	0	2	0	**0**
Unexpected status change	0	1	0	4	1	(2)	**4**
Net change	22	0	9	1	1	5	**38**
Members on 6/30/2019	**943**	**56**	**31**	**863**	**60**	**155**	**2,108**

SECTION E

SUMMARY OF BENEFITS

Summary of Plan Provisions

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

Plan year — July 1 through June 30

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

Contributions — Percent of Salary:

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

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

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

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

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

Salary — Salaries excluding lump sum payments at separation.

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

Summary of Plan Provisions (Continued)

Retirement	
Normal retirement benefit	
Age/Service requirement	Age 55 and three years (ten years if first hired after June 30, 2013) of Allowable Service.
Amount	3.00% of Average Salary for each year of Allowable Service up to 33 years. Members with at least 28 years of service as of July 1, 2013, are not subject to this service limit. Member contributions made after the service cap will be refunded at retirement.
Early retirement benefit	
Age/Service requirement	Age 50 and three years (ten years if first hired after June 30, 2013) of Allowable Service.
Amount	Normal Retirement Benefit based on Allowable Service and Average Salary at retirement reduced by 1/10% for each month that the member is under age 55. If the effective date of retirement is after June 30, 2015, the reduction is 0.34% for each month that the member is under age 55 at the time of retirement.
Form of payment	Life annuity. Actuarially equivalent options are: 50%, 75%, or 100% Joint and Survivor, or 15-year certain. If a Joint and Survivor benefit is elected and the beneficiary predeceases the annuitant, the annuitant's benefit increases to the Life Annuity amount. This "bounce back" is subsidized by the plan.
Benefit increases	1.00% per year. A benefit recipient who has been receiving a benefit for at least 12 full months as of the June 30 of the calendar year immediately before the adjustment will receive a full increase. Members receiving benefits for at least one month but less than 12 full months as of the June 30 of the calendar year immediately before the adjustment will receive a pro rata increase.
Disability	
Occupational disability benefit	
Age/Service requirement	Member who cannot perform his duties as a direct result of a disability relating to an act of duty.

Summary of Plan Provisions (Continued)

Disability (continued)

<u>Occupational disability benefit (Continued)</u>

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

<u>Non-duty disability benefit</u>

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

<u>Retirement after disability</u>

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

<u>Form of payment</u>	Same as for retirement.
<u>Benefit increases</u>	Same as for retirement.

Death

Surviving spouse benefit

Age/Service requirement — Member who is active or receiving a disability benefit or former member.

Amount — 50% of Average Salary if member was active or occupational disability and either had less than three years (five years if first hired after June 30, 2013) of Allowable Service or was under age 55. Annuity is paid for life.

Surviving spouse receives the 100% joint and survivor benefit commencing on the member's 55th birthday if member was active or a disability with three years (five years if first hired after June 30, 2013) of Allowable Service. A spouse who had been receiving the 50% benefit shall be entitled to the greater benefit.

The surviving spouse of a former member receives the 100% joint and survivor benefit commencing on the member's 55th birthday if former member had three years (five years if first hired after June 30, 2013) of Allowable Service.

Benefit increases — Same as for retirement.

Surviving dependent children's benefit

Age/Service requirement — Member who is active or receiving a disability benefit. Child must be unmarried, under age 18 (or 23 if full-time student) and dependent upon the member.

Amount — 10% of Average Salary for each child and $20 per month prorated among all dependent children. Benefit must not be less than 50% nor exceed 70% of Average Salary.

Benefit increases — Same as for retirement.

Refund of contributions

Age/Service requirement — Member dies before receiving any retirement benefits and survivor benefits are not payable.

Amount — Member's contributions with 6.00% interest through June 30, 2011, compounded daily. Beginning July 1, 2011, a member's contributions increase with 4.00% interest compounded daily. Beginning July 1, 2018, member contributions increase with 3.00% interest compounded daily.

Termination

Refund of contributions

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 with 4.00% interest compounded daily. Beginning July 1, 2018, member contributions increase with 3.00% interest compounded daily. If a member is vested, a deferred annuity may be elected in lieu of a refund.

Summary of Plan Provisions (Concluded)

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

SECTION F

ACTUARIAL COST METHOD AND ACTUARIAL ASSUMPTIONS

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

Actuarial Cost Method

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

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

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

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

Asset Valuation Method

Fair value of assets.

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

The following assumptions were used in valuing the liabilities and benefits under the plan. The assumptions are based on the last experience study, dated July 26, 2016 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 was 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 2006, white collar adjustment.
Healthy post-retirement	RP-2014 annuitant generational mortality table projected with mortality improvement Scale MP-2015 from a base year of 2006, white collar adjustment.
Disabled	RP-2014 annuitant generational mortality table projected with mortality improvement Scale MP-2015 from a base year of 2006, white collar adjustment.
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 plan changes reflected in this report may ultimately result in behavior changes not anticipated in these actuarial assumptions.

Summary of Actuarial Assumptions (Continued)

Withdrawal	Select and Ultimate rates based on actual experience. Ultimate rates after the third year are shown in rate table. Select rates in the first three years are: **Year** — **Select Withdrawal Rates** 1 — 2.50% 2 — 2.00% 3 — 1.50%
Disability	Age-related rates based on experience; see table of sample rates. All incidences are assumed to be duty-related.
Allowance for combined service annuity	Liabilities for former, vested members are increased by 13.00% to account for the effect of some participants having eligibility for a Combined Service Annuity.
Administrative expenses	In the valuation year, equal to prior year administrative expenses expressed as percentage of prior year projected payroll. In each subsequent year, equal to the initial administrative expense percentage applied to payroll for the closed group.
Refund of contributions	All employees withdrawing after becoming eligible for a deferred benefit take the larger of their contributions accumulated with interest or the value of their deferred benefit. Account balances for deferred members accumulate interest until normal retirement date and are discounted back to the valuation date.
Commencement of deferred benefits	Members receiving deferred annuities (including current terminated deferred members) are assumed to begin receiving benefits at age 55.
Percentage married	85% of active members are assumed to be married. Actual marital status is used for members in payment status.
Age of spouse	Females are assumed to be two years younger than their spouses, and males are assumed to be two years older than their spouses.
Eligible children	Each member may have two dependent children depending on member's age. Assumed first child is born at member's age 28 and second child at member's age 31.
Form of payment	Married members retiring from active status are assumed to elect subsidized joint and survivor form of annuity as follows: 20% elect 50% Joint & Survivor option 10% elect 75% Joint & Survivor option 55% elect 100% Joint & Survivor option Remaining married and unmarried members are assumed to elect the Straight Life option.
Eligibility testing	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
Decrement operation	Withdrawal decrements do not operate during retirement eligibility. Decrements are assumed to occur mid-fiscal year.
Service credit accruals	It is assumed that members accrue one year of service credit per year.
Pay increases	Pay increases are assumed to happen at the beginning of the fiscal year. This is equivalent to assuming that reported earnings are pensionable earnings for the year ending on the valuation date.

Summary of Actuarial Assumptions (Continued)

Unknown data for certain members	To prepare this report, GRS has used and relied on participant data supplied by the Fund. Although GRS has reviewed the data in accordance with Actuarial Standards of Practice No. 23, GRS has not verified or audited any of the data or information provided. 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 was one member reported with missing salary and no members reported with missing service. We used prior year salary (0 members), if available, otherwise, high five average salary with a 10% load to account for salary increases (1 member). If neither pay nor high five average salary was available, we assumed a value of $65,000 (0 members). There were no members reported with a missing date of birth or gender. **Data for terminated members:** There was one member reported without a benefit. We calculated benefits for this member using the reported Credited Service and Termination Date. Average Salary was not reported, so we assumed a value of $45,000. There were no members reported with a missing date of birth or gender. Benefits were estimated for 15 members at the direction of MSRS. **Data for members receiving benefits:** There were three members reported with a missing gender and no members reported with an invalid date of birth. We assumed male gender for retirees and female gender for survivors. There were no members reported without a benefit. There were no survivors reported with an expired benefit. There were five retirees reported with a bounceback annuity and an unreasonable reduction factor. A factor of 0.80, 0.85 and 0.90 was assumed for the 100%, 75% and 50% joint and survivor annuity, respectively. There was one retiree reported with a survivor option and a survivor date of death. We assumed no benefit was payable to the survivor, and the member benefit already reflected the “pop-up,” if any. For retirees who elected a survivor benefit option, we used the valuation assumptions if the survivor date of birth was missing (177 members) and/or the survivor gender was missing (194 members).
Changes in actuarial assumptions	There have been no changes in actuarial assumptions since the prior valuation.

Summary of Actuarial Assumptions (Continued)

Age in 2019	Healthy Post-Retirement Mortality** Male	Healthy Post-Retirement Mortality** Female	Healthy Pre-Retirement Mortality** Male	Healthy Pre-Retirement Mortality** Female	Disability Mortality** Male	Disability Mortality** Female
	Percentage of Members Dying each Year*					
20	0.02%	0.01%	0.02%	0.01%	0.02%	0.01%
25	0.03	0.02	0.03	0.01	0.03	0.02
30	0.05	0.05	0.03	0.02	0.05	0.05
35	0.07	0.08	0.03	0.03	0.07	0.08
40	0.11	0.11	0.04	0.03	0.11	0.11
45	0.16	0.14	0.06	0.05	0.16	0.14
50	0.24	0.19	0.10	0.08	0.24	0.19
55	0.36	0.27	0.18	0.14	0.36	0.27
60	0.50	0.39	0.32	0.21	0.50	0.39
65	0.73	0.63	0.56	0.30	0.73	0.63
70	1.18	1.00	0.98	0.52	1.18	1.00
75	2.06	1.69	1.76	0.91	2.06	1.69
80	3.66	3.00	3.16	1.63	3.66	3.00
85	6.73	5.50	6.57	4.35	6.73	5.50
90	12.34	10.05	12.48	9.73	12.34	10.05

* *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 2006.*

Age	Termination (Withdrawal) Rates After Third Year Male	Termination (Withdrawal) Rates After Third Year Female	Disability Retirement Male	Disability Retirement Female
	Percent of Members Decrementing Each Year			
20	1.47%	1.47%	0.03%	0.03%
25	1.13	1.13	0.05	0.05
30	0.80	0.80	0.06	0.06
35	0.47	0.47	0.11	0.11
40	0.40	0.40	0.18	0.18
45	0.40	0.40	0.30	0.30
50	0.00	0.00	0.48	0.48
55	0.00	0.00	0.00	0.00
60	0.00	0.00	0.00	0.00
65	0.00	0.00	0.00	0.00

Summary of Actuarial Assumptions (Concluded)

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

Salary Scale	
Year	Increase
1	15.25%
2	9.25
3	7.75
4	7.25
5	6.75
6	6.25
7	6.00
8	5.75
9	5.50
10	5.25
11	5.00
12	4.75
13	4.50
14	4.25
15	4.25
16	4.25
17	4.00
18	4.00
19	3.75
20	3.75
21	3.65
22	3.55
23	3.45
24	3.35
25+	3.25

SECTION G

CALCULATION OF THE SINGLE DISCOUNT RATE

Calculation of the Single Discount Rate

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

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

For the purpose of this valuation, the expected rate of return on pension plan investments is 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) and **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)

	Projected Covered-Employee Payroll			Projected Contributions				
Fiscal Year Ending	Payroll for Current Employees	Payroll for New Employees	Total Employee Payroll	Contributions from Current Employees	Employer Contributions for Current Employees	Contributions on Future Payroll toward Current UAL*	Additional State Contributions**	Total Contributions
	(a)	(b)	(c) = (a) + (b)	(d) = (a) x 15.4%***	(e) = (a) x 30.1%***	(f)	(g)	(h) = (d) + (e) + (f) + (g)
2019	$ 80,792		$ 80,792					
2020	85,543		85,543	$ 12,746	$ 22,326		$ 1,000	$ 36,072
2021	85,761	$ 2,562	88,323	13,207	24,099	$ 476	1,000	38,782
2022	85,957	5,237	91,194	13,237	25,873	1,077	1,000	41,187
2023	86,151	8,007	94,158	13,267	25,931	1,646	1,000	41,844
2024	85,680	11,538	97,218	13,195	25,790	2,372	1,000	42,357
2025	84,806	15,571	100,377	13,060	25,527	3,202	1,000	42,789
2026	83,676	19,964	103,640	12,886	25,187	4,104	1,000	43,177
2027	82,422	24,586	107,008	12,693	24,809	5,055	1,000	43,557
2028	80,549	29,937	110,486	12,405	24,245	6,155	1,000	43,805
2029	78,010	36,066	114,076	12,014	23,481	7,415	1,000	43,910
2030	75,433	42,351	117,784	11,617	22,705	8,707	-	43,029
2031	72,855	48,757	121,612	11,220	21,929	10,024	-	43,173
2032	70,048	55,516	125,564	10,787	21,084	11,414	-	43,285
2033	67,154	62,491	129,645	10,342	20,213	12,848	-	43,403
2034	64,463	69,396	133,859	9,927	14,891	9,410	-	34,228
2035	61,646	76,563	138,209	9,494	14,240	10,382	-	34,116
2036	58,532	84,169	142,701	9,014	13,521	11,413	-	33,948
2037	55,197	92,142	147,339	8,500	12,751	12,494	-	33,745
2038	51,891	100,236	152,127	7,991	11,987	13,592	-	33,570
2039	48,526	108,545	157,071	7,473	11,209	14,719	-	33,401
2040	44,665	117,511	162,176	6,878	10,318	15,934	-	33,130
2041	40,810	126,637	167,447	6,285	9,427	17,172	-	32,884
2042	36,642	136,247	172,889	5,643	8,464	18,475	-	32,582
2043	32,084	146,424	178,508	4,941	7,411	19,855	-	32,207
2044	28,013	156,296	184,309	4,314	6,471	21,194	-	31,979
2045	24,118	166,181	190,299	3,714	5,571	22,534	-	31,819
2046	19,969	176,515	196,484	3,075	4,613	23,935	-	31,623
2047	16,164	186,706	202,870	2,489	3,734	25,317	-	31,540
2048	12,389	197,074	209,463	1,908	2,862	26,723	-	31,493
2049	8,946	207,324	216,270	1,378	2,067	28,113	-	31,558
2050	6,295	217,004	223,299	969	1,454	29,426	-	31,849
2051	4,101	226,455	230,556	632	947	30,707	-	32,286
2052	2,490	235,560	238,050	383	575	31,942	-	32,900
2053	1,297	244,489	245,786	200	300	33,153	-	33,653
2054	686	253,088	253,774	106	159	34,319	-	34,584
2055	383	261,639	262,022	59	88	35,478	-	35,625
2056	187	270,351	270,538	29	43	36,660	-	36,732
2057	70	279,260	279,330	11	16	37,868	-	37,895
2058	8	288,400	288,408	1	2	39,107	-	39,110
2059	-	297,782	297,782	-	-	40,379	-	40,379
2060	-	307,459	307,459	-	-	41,692	-	41,692
2061	-	317,452	317,452	-	-	43,046	-	43,046
2062	-	327,769	327,769	-	-	44,445	-	44,445
2063	-	338,422	338,422	-	-	45,890	-	45,890
2064	-	349,420	349,420	-	-	47,381	-	47,381
2065	-	360,776	360,776	-	-	48,921	-	48,921
2066	-	372,502	372,502	-	-	50,511	-	50,511
2067	-	384,608	384,608	-	-	52,153	-	52,153
2068	-	397,108	397,108	-	-	53,848	-	53,848
2069	-	410,014	410,014	-	-	55,598	-	55,598

* *Equal to contributions (ultimately 45.50% of payroll for new employees) net of normal cost and expenses (24.94% of payroll).*

** *Additional state contributions assumed to end after 10 years. Actual end date will depend on the funding status of this plan and the PERA Police and Fire Plan.*

*** *Employee contributions are equal to 14.9% of payroll in the fiscal year ending June 30, 2020. Employer contributions are equal to 26.1% and 28.1% for fiscal years ending June 30, 2020 and 2021, respectively; the supplemental employer contribution is assumed to stop after 15 years.*

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

	Projected Covered-Employee Payroll			Projected Contributions				
Fiscal Year Ending	Payroll for Current Employees	Payroll for New Employees	Total Employee Payroll	Contributions from Current Employees	Employer Contributions for Current Employees	Contributions on Future Payroll toward Current UAL*	Additional State Contributions	Total Contributions
	(a)	(b)	(c) = (a) + (b)	(d)	(e)	(f)	(g)	(h) = (d) + (e) + (f) + (g)
2070	$ -	$ 423,339	$ 423,339	$ -	$ -	$ 57,405	$ -	$ 57,405
2071	-	437,098	437,098	-	-	59,270	-	59,270
2072	-	451,303	451,303	-	-	61,197	-	61,197
2073	-	465,971	465,971	-	-	63,186	-	63,186
2074	-	481,115	481,115	-	-	65,239	-	65,239
2075	-	496,751	496,751	-	-	67,359	-	67,359
2076	-	512,895	512,895	-	-	69,549	-	69,549
2077	-	529,564	529,564	-	-	71,809	-	71,809
2078	-	546,775	546,775	-	-	74,143	-	74,143
2079	-	564,546	564,546	-	-	76,552	-	76,552
2080	-	582,893	582,893	-	-	79,040	-	79,040
2081	-	601,837	601,837	-	-	81,609	-	81,609
2082	-	621,397	621,397	-	-	84,261	-	84,261
2083	-	641,592	641,592	-	-	87,000	-	87,000
2084	-	662,444	662,444	-	-	89,827	-	89,827
2085	-	683,974	683,974	-	-	92,747	-	92,747
2086	-	706,203	706,203	-	-	95,761	-	95,761
2087	-	729,154	729,154	-	-	98,873	-	98,873
2088	-	752,852	752,852	-	-	102,087	-	102,087
2089	-	777,320	777,320	-	-	105,405	-	105,405
2090	-	802,582	802,582	-	-	108,830	-	108,830
2091	-	828,666	828,666	-	-	112,367	-	112,367
2092	-	855,598	855,598	-	-	116,019	-	116,019
2093	-	883,405	883,405	-	-	119,790	-	119,790
2094	-	912,116	912,116	-	-	123,683	-	123,683
2095	-	941,759	941,759	-	-	127,703	-	127,703
2096	-	972,367	972,367	-	-	131,853	-	131,853
2097	-	1,003,968	1,003,968	-	-	136,138	-	136,138
2098	-	1,036,597	1,036,597	-	-	140,563	-	140,563
2099	-	1,070,287	1,070,287	-	-	145,131	-	145,131
2100	-	1,105,071	1,105,071	-	-	149,848	-	149,848
2101	-	1,140,986	1,140,986	-	-	154,718	-	154,718
2102	-	1,178,068	1,178,068	-	-	159,746	-	159,746
2103	-	1,216,355	1,216,355	-	-	164,938	-	164,938
2104	-	1,255,887	1,255,887	-	-	170,298	-	170,298
2105	-	1,296,703	1,296,703	-	-	175,833	-	175,833
2106	-	1,338,846	1,338,846	-	-	181,548	-	181,548
2107	-	1,382,358	1,382,358	-	-	187,448	-	187,448
2108	-	1,427,285	1,427,285	-	-	193,540	-	193,540
2109	-	1,473,672	1,473,672	-	-	199,830	-	199,830
2110	-	1,521,566	1,521,566	-	-	206,324	-	206,324
2111	-	1,571,017	1,571,017	-	-	213,030	-	213,030
2112	-	1,622,075	1,622,075	-	-	219,953	-	219,953
2113	-	1,674,793	1,674,793	-	-	227,102	-	227,102
2114	-	1,729,223	1,729,223	-	-	234,483	-	234,483
2115	-	1,785,423	1,785,423	-	-	242,103	-	242,103
2116	-	1,843,449	1,843,449	-	-	249,972	-	249,972
2117	-	1,903,361	1,903,361	-	-	258,096	-	258,096
2118	-	1,965,221	1,965,221	-	-	266,484	-	266,484
2119	-	2,029,090	2,029,090	-	-	275,145	-	275,145

* *Equal to contributions (ultimately 45.50% of payroll for new employees) net of normal cost and expenses (24.94% of payroll).*

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

Fiscal Year Ending	Projected Beginning Plan Fiduciary Net Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expenses	Projected Investment Earnings at 7.50%	Projected Ending Plan Net Position
	(a)	(b)	(c)	(d)	(e)	(f)=(a)+(b)-(c)-(d)+(e)
2020	$ 753,144	$ 36,072	$ 61,553	$ 214	$ 55,540	$ 782,989
2021	782,989	38,782	63,317	214	57,813	816,053
2022	816,053	41,187	64,905	215	60,323	852,443
2023	852,443	41,844	66,490	215	63,018	890,600
2024	890,600	42,357	68,323	214	65,831	930,251
2025	930,251	42,789	70,307	212	68,748	971,269
2026	971,269	43,177	72,354	209	71,763	1,013,646
2027	1,013,646	43,557	74,415	206	74,879	1,057,461
2028	1,057,461	43,805	76,751	201	78,089	1,102,403
2029	1,102,403	43,910	79,216	195	81,373	1,148,275
2030	1,148,275	43,029	81,730	189	84,688	1,194,073
2031	1,194,073	43,173	84,229	182	88,037	1,240,872
2032	1,240,872	43,285	86,992	175	91,450	1,288,440
2033	1,288,440	43,403	89,613	168	94,925	1,336,987
2034	1,336,987	34,228	91,945	161	98,143	1,377,252
2035	1,377,252	34,116	94,272	154	101,073	1,418,015
2036	1,418,015	33,948	96,663	146	104,036	1,459,190
2037	1,459,190	33,745	99,064	138	107,029	1,500,762
2038	1,500,762	33,570	101,317	130	110,058	1,542,943
2039	1,542,943	33,401	103,553	121	113,133	1,585,803
2040	1,585,803	33,130	106,053	112	116,246	1,629,014
2041	1,629,014	32,884	108,567	102	119,386	1,672,615
2042	1,672,615	32,582	111,316	92	122,544	1,716,333
2043	1,716,333	32,207	114,228	80	125,702	1,759,934
2044	1,759,934	31,979	116,697	70	128,873	1,804,019
2045	1,804,019	31,819	119,062	60	132,087	1,848,803
2046	1,848,803	31,623	121,591	50	135,346	1,894,131
2047	1,894,131	31,540	123,818	40	138,661	1,940,474
2048	1,940,474	31,493	126,000	31	142,055	1,987,991
2049	1,987,991	31,558	127,803	22	145,555	2,037,279
2050	2,037,279	31,849	128,963	16	149,220	2,089,369
2051	2,089,369	32,286	129,628	10	153,118	2,145,135
2052	2,145,135	32,900	129,737	6	157,319	2,205,611
2053	2,205,611	33,653	129,359	3	161,897	2,271,799
2054	2,271,799	34,584	128,238	2	166,936	2,345,079
2055	2,345,079	35,625	126,895	1	172,520	2,426,328
2056	2,426,328	36,732	125,307	-	178,713	2,516,466
2057	2,516,466	37,895	123,643	-	185,578	2,616,296
2058	2,616,296	39,110	121,779	-	193,178	2,726,805
2059	2,726,805	40,379	119,843	-	201,584	2,848,925
2060	2,848,925	41,692	117,828	-	210,866	2,983,655
2061	2,983,655	43,046	115,724	-	221,098	3,132,075
2062	3,132,075	44,445	113,530	-	232,362	3,295,352
2063	3,295,352	45,890	111,243	-	244,745	3,474,744
2064	3,474,744	47,381	108,861	-	258,342	3,671,606
2065	3,671,606	48,921	106,382	-	273,255	3,887,400
2066	3,887,400	50,511	103,804	-	289,593	4,123,700
2067	4,123,700	52,153	101,124	-	307,474	4,382,203
2068	4,382,203	53,848	98,341	-	327,027	4,664,737
2069	4,664,737	55,598	95,457	-	348,388	4,973,266

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

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

Fiscal Year Ending	Projected Beginning Plan Fiduciary Net Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expenses	Projected Investment Earnings at 7.50%	Projected Ending Plan Net Position
	(a)	(b)	(c)	(d)	(e)	(f)=(a)+(b)-(c)-(d)+(e)
2070	$ 4,973,266	$ 57,405	$ 92,471	$ -	$ 371,704	$ 5,309,904
2071	5,309,904	59,270	89,388	-	397,134	5,676,920
2072	5,676,920	61,197	86,211	-	424,848	6,076,754
2073	6,076,754	63,186	82,945	-	455,029	6,512,024
2074	6,512,024	65,239	79,598	-	487,873	6,985,538
2075	6,985,538	67,359	76,178	-	523,591	7,500,310
2076	7,500,310	69,549	72,691	-	562,407	8,059,575
2077	8,059,575	71,809	69,149	-	604,566	8,666,801
2078	8,666,801	74,143	65,561	-	650,326	9,325,709
2079	9,325,709	76,552	61,935	-	699,966	10,040,292
2080	10,040,292	79,040	58,285	-	753,786	10,814,833
2081	10,814,833	81,609	54,620	-	812,106	11,653,928
2082	11,653,928	84,261	50,952	-	875,271	12,562,508
2083	12,562,508	87,000	47,295	-	943,650	13,545,863
2084	13,545,863	89,827	43,660	-	1,017,640	14,609,670
2085	14,609,670	92,747	40,062	-	1,097,665	15,760,020
2086	15,760,020	95,761	36,519	-	1,184,183	17,003,445
2087	17,003,445	98,873	33,049	-	1,277,682	18,346,951
2088	18,346,951	102,087	29,672	-	1,378,688	19,798,054
2089	19,798,054	105,405	26,410	-	1,487,763	21,364,812
2090	21,364,812	108,830	23,284	-	1,605,511	23,055,869
2091	23,055,869	112,367	20,315	-	1,732,580	24,880,501
2092	24,880,501	116,019	17,525	-	1,869,664	26,848,659
2093	26,848,659	119,790	14,933	-	2,017,510	28,971,026
2094	28,971,026	123,683	12,555	-	2,176,919	31,259,073
2095	31,259,073	127,703	10,405	-	2,348,749	33,725,120
2096	33,725,120	131,853	8,491	-	2,533,926	36,382,408
2097	36,382,408	136,138	6,816	-	2,733,442	39,245,172
2098	39,245,172	140,563	5,377	-	2,948,366	42,328,724
2099	42,328,724	145,131	4,164	-	3,179,845	45,649,536
2100	45,649,536	149,848	3,163	-	3,429,116	49,225,337
2101	49,225,337	154,718	2,354	-	3,697,510	53,075,211
2102	53,075,211	159,746	1,715	-	3,986,460	57,219,702
2103	57,219,702	164,938	1,223	-	4,297,506	61,680,923
2104	61,680,923	170,298	853	-	4,632,308	66,482,676
2105	66,482,676	175,833	582	-	4,992,653	71,650,580
2106	71,650,580	181,548	389	-	5,380,464	77,212,203
2107	77,212,203	187,448	256	-	5,797,808	83,197,203
2108	83,197,203	193,540	166	-	6,246,910	89,637,487
2109	89,637,487	199,830	107	-	6,730,165	96,567,375
2110	96,567,375	206,324	69	-	7,250,148	104,023,778
2111	104,023,778	213,030	46	-	7,809,625	112,046,387
2112	112,046,387	219,953	31	-	8,411,577	120,677,886
2113	120,677,886	227,102	22	-	9,059,203	129,964,169
2114	129,964,169	234,483	16	-	9,755,946	139,954,582
2115	139,954,582	242,103	12	-	10,505,508	150,702,181
2116	150,702,181	249,972	9	-	11,311,867	162,264,011
2117	162,264,011	258,096	7	-	12,179,304	174,701,404
2118	174,701,404	266,484	6	-	13,112,417	188,080,299
2119	188,080,299	275,145	4	-	14,116,153	202,471,593

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	$ 753,144	$ 61,553	$ 61,553	$ 0	$ 59,367	$ 0	$ 59,367
2021	782,989	63,317	63,317	0	56,808	0	56,808
2022	816,053	64,905	64,905	0	54,170	0	54,170
2023	852,443	66,490	66,490	0	51,621	0	51,621
2024	890,600	68,323	68,323	0	49,344	0	49,344
2025	930,251	70,307	70,307	0	47,234	0	47,234
2026	971,269	72,354	72,354	0	45,218	0	45,218
2027	1,013,646	74,415	74,415	0	43,261	0	43,261
2028	1,057,461	76,751	76,751	0	41,506	0	41,506
2029	1,102,403	79,216	79,216	0	39,850	0	39,850
2030	1,148,275	81,730	81,730	0	38,247	0	38,247
2031	1,194,073	84,229	84,229	0	36,666	0	36,666
2032	1,240,872	86,992	86,992	0	35,227	0	35,227
2033	1,288,440	89,613	89,613	0	33,756	0	33,756
2034	1,336,987	91,945	91,945	0	32,218	0	32,218
2035	1,377,252	94,272	94,272	0	30,729	0	30,729
2036	1,418,015	96,663	96,663	0	29,310	0	29,310
2037	1,459,190	99,064	99,064	0	27,943	0	27,943
2038	1,500,762	101,317	101,317	0	26,584	0	26,584
2039	1,542,943	103,553	103,553	0	25,275	0	25,275
2040	1,585,803	106,053	106,053	0	24,080	0	24,080
2041	1,629,014	108,567	108,567	0	22,931	0	22,931
2042	1,672,615	111,316	111,316	0	21,871	0	21,871
2043	1,716,333	114,228	114,228	0	20,877	0	20,877
2044	1,759,934	116,697	116,697	0	19,841	0	19,841
2045	1,804,019	119,062	119,062	0	18,830	0	18,830
2046	1,848,803	121,591	121,591	0	17,889	0	17,889
2047	1,894,131	123,818	123,818	0	16,945	0	16,945
2048	1,940,474	126,000	126,000	0	16,041	0	16,041
2049	1,987,991	127,803	127,803	0	15,135	0	15,135
2050	2,037,279	128,963	128,963	0	14,207	0	14,207
2051	2,089,369	129,628	129,628	0	13,284	0	13,284
2052	2,145,135	129,737	129,737	0	12,368	0	12,368
2053	2,205,611	129,359	129,359	0	11,471	0	11,471
2054	2,271,799	128,238	128,238	0	10,578	0	10,578
2055	2,345,079	126,895	126,895	0	9,737	0	9,737
2056	2,426,328	125,307	125,307	0	8,945	0	8,945
2057	2,516,466	123,643	123,643	0	8,210	0	8,210
2058	2,616,296	121,779	121,779	0	7,522	0	7,522
2059	2,726,805	119,843	119,843	0	6,886	0	6,886
2060	2,848,925	117,828	117,828	0	6,298	0	6,298
2061	2,983,655	115,724	115,724	0	5,754	0	5,754
2062	3,132,075	113,530	113,530	0	5,251	0	5,251
2063	3,295,352	111,243	111,243	0	4,786	0	4,786
2064	3,474,744	108,861	108,861	0	4,357	0	4,357
2065	3,671,606	106,382	106,382	0	3,961	0	3,961
2066	3,887,400	103,804	103,804	0	3,595	0	3,595
2067	4,123,700	101,124	101,124	0	3,258	0	3,258
2068	4,382,203	98,341	98,341	0	2,947	0	2,947
2069	4,664,737	95,457	95,457	0	2,661	0	2,661

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	$ 4,973,266	$ 92,471	$ 92,471	$ -	$ 2,398	$ -	$ 2,398
2071	5,309,904	89,388	89,388	-	2,156	-	2,156
2072	5,676,920	86,211	86,211	-	1,935	-	1,935
2073	6,076,754	82,945	82,945	-	1,732	-	1,732
2074	6,512,024	79,598	79,598	-	1,546	-	1,546
2075	6,985,538	76,178	76,178	-	1,376	-	1,376
2076	7,500,310	72,691	72,691	-	1,222	-	1,222
2077	8,059,575	69,149	69,149	-	1,081	-	1,081
2078	8,666,801	65,561	65,561	-	953	-	953
2079	9,325,709	61,935	61,935	-	838	-	838
2080	10,040,292	58,285	58,285	-	733	-	733
2081	10,814,833	54,620	54,620	-	639	-	639
2082	11,653,928	50,952	50,952	-	555	-	555
2083	12,562,508	47,295	47,295	-	479	-	479
2084	13,545,863	43,660	43,660	-	411	-	411
2085	14,609,670	40,062	40,062	-	351	-	351
2086	15,760,020	36,519	36,519	-	298	-	298
2087	17,003,445	33,049	33,049	-	251	-	251
2088	18,346,951	29,672	29,672	-	209	-	209
2089	19,798,054	26,410	26,410	-	173	-	173
2090	21,364,812	23,284	23,284	-	142	-	142
2091	23,055,869	20,315	20,315	-	115	-	115
2092	24,880,501	17,525	17,525	-	93	-	93
2093	26,848,659	14,933	14,933	-	73	-	73
2094	28,971,026	12,555	12,555	-	57	-	57
2095	31,259,073	10,405	10,405	-	44	-	44
2096	33,725,120	8,491	8,491	-	34	-	34
2097	36,382,408	6,816	6,816	-	25	-	25
2098	39,245,172	5,377	5,377	-	18	-	18
2099	42,328,724	4,164	4,164	-	13	-	13
2100	45,649,536	3,163	3,163	-	9	-	9
2101	49,225,337	2,354	2,354	-	6	-	6
2102	53,075,211	1,715	1,715	-	4	-	4
2103	57,219,702	1,223	1,223	-	3	-	3
2104	61,680,923	853	853	-	2	-	2
2105	66,482,676	582	582	-	1	-	1
2106	71,650,580	389	389	-	1	-	1
2107	77,212,203	256	256	-	-	-	-
2108	83,197,203	166	166	-	-	-	-
2109	89,637,487	107	107	-	-	-	-
2110	96,567,375	69	69	-	-	-	-
2111	104,023,778	46	46	-	-	-	-
2112	112,046,387	31	31	-	-	-	-
2113	120,677,886	22	22	-	-	-	-
2114	129,964,169	16	16	-	-	-	-
2115	139,954,582	12	12	-	-	-	-
2116	150,702,181	9	9	-	-	-	-
2117	162,264,011	7	7	-	-	-	-
2118	174,701,404	6	6	-	-	-	-
2119	188,080,299	4	4	-	-	-	-
				Totals	$ 1,164,831	$ -	$ 1,164,831

SECTION H

GLOSSARY OF TERMS

Glossary of Terms

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

Glossary of Terms

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

Glossary of Terms

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

Glossary of Terms

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

Minnesota State Retirement System
Judges Retirement Fund

GASB Statements No. 67 and No. 68

Accounting and Financial Reporting for Pensions

June 30, 2019

GRS Retirement Consulting

P: 800.521.0498 | F: 763.432.5842 | www.grsconsulting.com

November 27, 2019

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

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

This report complements the actuarial valuation report for funding purposes that was or will be provided to the System and should be considered in conjunction with that report. Please see the actuarial valuation report as of June 30, 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 Judges 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

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

Bonita J. Wurst

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

BBM/BJW:sc

Table of Contents

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	293
- Survivors	74
- Disability Retirements	16
- Deferred Retirements	19
- Terminated other non-vested	1
- Active Members	315
- Total	718
Covered-Employee Payroll	$ 50,164 [1]
Net Pension Liability	
Total Pension Liability	$ 391,146
Plan Fiduciary Net Position	212,262
Net Pension Liability	$ 178,884
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	54.27%
Net Pension Liability as a Percentage of Covered-Employee Payroll	356.60%
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)	$ 8,656

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

	Deferred Outflows of Resources	Deferred Inflows of Resources
Difference between expected and actual experience in the measurement of Total Pension Liability	$ 2,924	$ 1,982
Changes in assumptions	4,662	17,152
Net difference between projected and actual earnings on pension plan investments	3,122	8,285
Total	$ 10,708	$ 27,419

[1] *Assumed equal to actual employer contributions divided by employer 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.

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 JRF subsequent to the measurement date of June 30, 2019.

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

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

Notes to Financial Statements

GASB Statement No. 68 requires the notes to 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.

Both GASB Statements No. 67 and No. 68 require the notes to 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 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 Judges 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
- 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 decline 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 long-term 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

1.	Service Cost	$	9,881
2.	Interest on the Total Pension Liability		27,769
3.	Current-Period Benefit Changes		-
4.	Employee Contributions (made negative for addition here)		(4,049)
5.	Projected Earnings on Plan Investments (made negative for addition here)		(14,982)
6.	Pension Plan Administrative Expense		87
7.	Other Changes in Plan Fiduciary Net Position		-
8.	Recognition of Outflow (Inflow) of Resources due to differences between expected and actual experience in the measurement of the Total Pension Liability		
	Arising from Current Reporting Period		161
9.	Recognition of Outflow (Inflow) of Resources due to assumption changes		
	Arising from Current Reporting Period		-
10.	Recognition of Outflow (Inflow) of Resources due to the difference between projected (7.50%) and actual earnings on Pension Plan Investments		
	Arising from Current Reporting Period		98
11.	**Increases/(Decreases) from Experience in the Current Reporting Period**	**$**	**18,965**
12.	Recognition of Outflow (Inflow) of Resources due to differences between expected and actual experience in the measurement of the Total Pension Liability		
	Arising from Prior Reporting Periods	$	(154)
13.	Recognition of Outflow (Inflow) of Resources due to assumption changes		
	Arising from Prior Reporting Periods		(10,481)
14.	Recognition of Outflow (Inflow) of Resources due to the difference between projected and actual earnings on Pension Plan Investments		
	Arising from Prior Reporting Periods		326
15.	**Total Pension Expense / (Income)**	**$**	**8,656**

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	$	804
2. Assumption Changes (gains) or losses		-
3. Recognition period for Liabilities: Average of the expected remaining service lives of all employees {in years}		5
4. Outflow (Inflow) of Resources to be recognized in the current pension expense for the difference between expected and actual experience of the Total Pension Liability		161
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	$	161
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	$	643
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	$	643
B. Outflows (Inflows) of Resources due to Assets		
1. Net difference between projected and actual earnings on pension plan investments (gains) or losses	$	491
2. Recognition period for Assets {in years}		5
3. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Assets		98
4. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Assets	$	393

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	$ 8,543	$ 19,017	$ (10,474)
2. Due to Assets	4,018	3,594	424
3. Total	$ 12,561	$ 22,611	$ (10,050)

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	$ 1,873	$ 1,866	$ 7
2. Assumption Changes	6,670	17,151	(10,481)
3. Net Difference between projected and actual earnings on pension plan investments	4,018	3,594	424
4. Total	**$ 12,561**	**$ 22,611**	**$ (10,050)**

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

	Deferred Outflows of Resources	Deferred Inflows of Resources	Net Deferred Outflows/ (Inflows) of Resources
1. Differences between expected and actual experience	$ 2,924	$ 1,982	$ 942
2. Assumption Changes	4,662	17,152	(12,490)
3. Net Difference between projected and actual earnings on pension plan investments*	3,122	8,285	(5,163)
4. Total	**$ 10,708**	**$ 27,419**	**$ (16,711)**

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	$ (14,707)
2021	(1,711)
2022	(552)
2023	259
2024	-
Thereafter	-
Total	**$ (16,711)**

** 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	$ (4,366)	5.0000	$ (874)	$ 0	0.0000
2016	7,135	5.0000	1,427	1,427	1.0000
2017	(4,958)	5.0000	(992)	(1,982)	2.0000
2018	1,424	5.0000	285	854	3.0000
2019	804	5.0000	161	643	4.0000
Total			**$ 7**	**$ 942**	
Deferred Outflow (Inflow) Due to Assumption Changes					
2015	$ 21,696	5.0000	$ 4,340	$ 0	0.0000
2016	(85,756)	5.0000	(17,151)	(17,152)	1.0000
2017	11,652	5.0000	2,330	4,662	2.0000
Total			**$ (10,481)**	**$ (12,490)**	
Deferred Outflow (Inflow) Due to Differences Between Projected and Actual Earnings on Plan Investments					
2015	$ 5,959	5.0000	$ 1,191	$ 0	0.0000
2016	13,642	5.0000	2,729	2,729	1.0000
2017	(12,492)	5.0000	(2,498)	(4,998)	2.0000
2018	(5,479)	5.0000	(1,096)	(3,287)	3.0000
2019	491	5.0000	98	393	4.0000
Total			**$ 424**	**$ (5,163)**	

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

Assets		June 30, 2019
Cash & Short-term Investments	$	6,674
Receivables		304
Investment Pools (at fair value)		205,414
Securities Lending Collateral		15,730
Capital Assets		-
Total Assets	**$**	**228,122**
Total Deferred Outflows of Resources	**$**	**-**
Total Liabilities	**$**	**(15,860)**
Total Deferred Inflows of Resources	**$**	**-**
Net Position Restricted for Pensions	**$**	**212,262**

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

1. Net position at market value at beginning of year	**$**	**201,755**
Additions		
2. Contributions		
a. Employee	$	4,049
b. Employer		11,287
c. Other sources		6,000
d. Total contributions	$	21,336
3. Investment income		
a. Investment income/(loss)	$	14,694
b. Investment expenses		(203)
c. Net investment income/(loss)	$	14,491
4. Other Additions		-
5. Total Additions *(2.d.) + (3.c.) + (4.)*	**$**	**35,827**
Deductions		
6. Benefits Paid		
a. Annuity benefits	$	(25,233)
b. Refunds		-
c. Total benefits paid	$	(25,233)
7. Expenses		
a. Other deductions	$	-
b. Administrative		(87)
c. Total expenses	$	(87)
8. Total deductions *(6.c.) + (7.c.)*	**$**	**(25,320)**
9. Net increase/(decrease) in fiduciary net position *(5.) + (8.)*	**$**	**10,507**
10. Net position at market value at end of year *(1.) + (9.)*	**$**	**212,262**
11. State Board of Investment calculated annual investment return for the Judges Retirement Fund*		7.2%

** 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	$	9,881	
2. Interest on the Total Pension Liability		27,769	
3. Changes of benefit terms		-	
4. Difference between expected and actual experience of the Total Pension Liability		804	(1)
5. Changes of assumptions		-	
6. Benefit payments, including refunds of employee contributions		(25,233)	
7. Net change in total pension liability	$	13,221	
8. Total pension liability – beginning		377,925	
9. Total pension liability – ending	**$**	**391,146**	
B. Plan fiduciary net position			
1. Contributions – employer	$	17,287	(2)
2. Contributions – employee		4,049	
3. Net investment income		14,491	
4. Benefit payments, including refunds of employee contributions		(25,233)	
5. Pension Plan Administrative Expense		(87)	
6. Other changes		-	
7. Net change in plan fiduciary net position	$	10,507	
8. Plan fiduciary net position – beginning		201,755	
9. Plan fiduciary net position – ending	**$**	**212,262**	
C. Net pension liability, *A.9 - B.9.*	**$**	**178,884**	
D. Plan fiduciary net position as a percentage of the total pension liability, *B.9 / A.9.*		**54.27%**	
E. Covered-employee payroll	**$**	**50,164**	(3)
F. Net pension liability as a percentage of covered-employee payroll, *C. / E.*		**356.60%**	

(1) Includes impact of changes in expected timing of future post-retirement benefit increases.
(2) Includes $6 million supplemental state aid.
(3) Assumed equal to actual employer contributions divided by employer 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	$ 9,881	$ 9,857	$ 9,483	$ 13,711	$ 12,251	$ 12,075				
Interest on the Total Pension Liability	27,769	26,746	25,367	21,349	21,773	20,535				
Benefit Changes	-	-	-	-	0	0				
Experience[1]	804	1,424	(4,958)	7,135	(4,366)	5,080				
Assumption Changes	-	-	11,652	(85,756)	21,696	(8,416)				
Benefit Payments	(25,233)	(23,585)	(22,785)	(22,378)	(21,893)	(20,802)				
Refunds	-	-	(309)	-	0	0				
Net Change in Total Pension Liability	$ 13,221	$ 14,442	$ 18,450	$ (65,939)	29,461	8,472				
Total Pension Liability - Beginning	377,925	363,483	345,033	410,972	381,511	373,039				
Total Pension Liability - Ending (a)	**$ 391,146**	**$ 377,925**	**$ 363,483**	**$ 345,033**	**$ 410,972**	**$ 381,511**				
Plan Fiduciary Net Position										
Employer Contributions [2]	$ 17,287	$ 17,027	$ 13,758	$ 10,219	$ 9,776	$ 9,426				
Employee Contributions	4,049	3,973	3,932	3,763	3,629	3,578				
Pension Plan Net Investment Income	14,491	19,265	24,729	(186)	7,572	28,011				
Benefit Payments	(25,233)	(23,585)	(22,785)	(22,378)	(21,893)	(20,802)				
Refunds	-	-	(309)	-	0	0				
Pension Plan Administrative Expense	(87)	(66)	(89)	(93)	(60)	(55)				
Other Changes	-	-	-	-	0	0				
Net Change in Plan Fiduciary Net Position	**$ 10,507**	**$ 16,614**	**$ 19,236**	**$ (8,675)**	**(976)**	**20,158**				
Plan Fiduciary Net Position - Beginning	**$ 201,755**	**$ 185,141**	**$ 165,905**	**$ 174,580**	**175,556**	**155,398**				
Plan Fiduciary Net Position - Ending (b)	**$ 212,262**	**$ 201,755**	**$ 185,141**	**$ 165,905**	**$ 174,580**	**$ 175,556**				
Net Pension Liability - Ending (a) - (b)	**$ 178,884**	**$ 176,170**	**$ 178,342**	**$ 179,128**	**236,392**	**205,955**				
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	**54.27 %**	**53.38 %**	**50.94 %**	**48.08 %**	**42.48 %**	**46.02 %**				
Covered-Employee Payroll[3]	**$ 50,164**	**$ 49,009**	**$ 47,813**	**$ 45,418**	**$ 43,449**	**$ 41,893**				
Net Pension Liability as a Percentage of Covered-Employee Payroll	**356.60 %**	**359.46 %**	**373.00 %**	**394.40 %**	**544.07 %**	**491.62 %**				

[1] *Includes impact of changes in expected timing of future post-retirement benefit increases.*
[2] *Includes $3 million supplemental state aid for fiscal year ending 2017 and $6 million annual supplemental state aid thereafter.*
[3] *Assumed equal to actual employer contributions divided by employer 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 (a)	Plan Net Position (b)	Net Pension Liability (a) - (b) = (c)	Plan Net Position as a % of Total Pension Liability (b)/(c)	Covered-Employee Payroll (d)	Net Pension Liability as a % of Covered-Employee Payroll (c)/(d)
2010						
2011						
2012						
2013						
2014	$381,511	$175,556	$205,955	46.02%	$41,893	491.62%
2015	410,972	174,580	236,392	42.48	43,449	544.07
2016	345,033	165,905	179,128	48.08	45,418	394.40
2017	363,483	185,141	178,342	50.94	47,813	373.00
2018	377,925	201,755	176,170	53.38	49,009	359.46
2019	391,146	212,262	178,884	54.27	50,164	356.60

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 Contributions as a % of Covered-Employee Payroll
	(a)	(b)	(a) - (b) = (c)	(d)	(b)/(d)
2010	$ 9,400	$ 8,283	$ 1,117	$ 39,291	21.08%
2011	9,804	8,297	1,507	40,473	20.50
2012	9,879	7,922	1,957	38,644 [2]	20.50
2013	13,524	8,177	5,347	39,888 [2]	20.50
2014	14,193	9,426	4,767	41,893 [2]	22.50
2015	14,298	9,776	4,522	43,449 [2]	22.50
2016	15,644	10,219	5,425	45,418 [2]	22.50
2017	16,790	13,758 [3]	3,032	47,813 [2]	28.77
2018	18,032	17,027 [3]	1,005	49,009 [2]	34.74
2019	17,491	17,287 [3]	204	50,164 [2]	34.46

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 employer contributions divided by employer contribution rate. [3] Includes supplemental state aid of $3,000 for fiscal year ending June 30, 2017 and $6,000 annual supplemental state aid thereafter.
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 Increases	2.50%
Salary Increases	2.50%
Investment Rate of Return	7.50%
Retirement Age	Experience-based table of rates that are specific to the type of eligibility condition. Last updated for the 2017 valuation pursuant to an experience study of the period 2011 - 2015, dated July 26, 2016.
Healthy Post-Retirement Mortality	RP-2014 annuitant generational mortality table projected with mortality improvement Scale MP-2015 from a base year of 2006, white collar adjustment.
Other Information	
Benefit Increases After Retirement	The post-retirement increase is assumed to be 1.75% per year through 2037, 2% per year from 2038 through 2051 and 2.5% per year thereafter. 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	7.2

[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 Judges Retirement Fund was 7.20%. 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 1.651.296.3328.

SECTION D

ADDITIONAL FINANCIAL STATEMENT DISCLOSURES

Asset Allocation

Long-Term Expected Return on Plan Assets

The long-term expected rate of return on pension plan investments was determined using a building-block method. Estimates for expected future real rates of return (expected returns, net of inflation) were developed for each asset class using both long-term historical returns and long-term capital market expectation from a number of investment management and consulting organizations. The asset class estimates and the target allocations were then combined to produce a geometric, long-term expected real rate of return for the portfolio. Inflation expectations were applied to derive the nominal rate of return for the portfolio. For each 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:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return (Geometric Mean)
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	100%	

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 for the State Employees Retirement Fund dated June 27, 2019.

Sensitivity of Net Pension Liability to the Single Discount Rate Assumption

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 the 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 member, employer, and state contributions will be made at the current statutory contribution rates. Based on these assumptions, the pension plan's fiduciary net position and future contributions were projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

Regarding the sensitivity of the net pension liability to changes in the single discount rate, the following presents the fund'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	$430,855	$391,146	$357,140
Net Position Restricted for Pensions	212,262	212,262	212,262
Net Pension Liabitliy	**$218,593**	**$178,884**	**$144,878**

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	**$ 377,925**	**$ 201,755**	**$ 176,170**	**$ 21,974**	**$ 50,030**	
Changes for the Year:						
Service Cost	$ 9,881		$ 9,881			$ 9,881
Interest on Total Pension Liability	27,769		27,769			27,769
Interest on Plan Fiduciary Net Position		$ 14,982 [1]	(14,982)			(14,982)
Changes in Benefit Terms						
Liability Experience Gains and Losses	804		804	$ 643	$ -	161
Changes in Assumptions	-		-			-
Recognition of Deferred Outflows/(Inflows) of						
Resources Arising from Prior Reporting Periods						
Liability Experience Gains/(Losses)				(1,712)	(1,866)	(154)
Assumption Changes				(6,670)	(17,151)	(10,481)
Investment Gains/(Losses)				(3,920)	(3,594)	326
Contributions - Employer		17,287	(17,287)			
Contributions - Employees		4,049	(4,049)			(4,049)
Asset Gain/(Loss)		(491) [1]	491	393	-	98
Benefit Payments and Refunds	(25,233)	(25,233)	-			
Administrative Expenses		(87)	87			87
Other Changes						
Net Changes	**$ 13,221**	**$ 10,507**	**$ 2,714**	**$ (11,266)**	**$ (22,611)**	**$ 8,656**
Balance End of Year	**$ 391,146**	**$ 212,262**	**$ 178,884**	**$ 10,708**	**$ 27,419**	

(1) The sum of these items in column (b) equals the net investment income of $14,491.

Summary of Population Statistics

		Terminated		Recipients			
	Actives*	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	Total
Members on 7/1/2018	**317**	**15**	**0**	**272**	**16**	**81**	**701**
New Members	28	0	0	0	0	0	**28**
Return to active	0	0	0	0	0	0	**0**
Terminated non-vested	(1)	0	1	0	0	0	**0**
Service retirements	(23)	(1)	0	24	0	0	**0**
Terminated deferred	(5)	5	0	0	0	0	**0**
Terminated refund/transfer	0	0	0	0	0	0	**0**
Deaths	(1)	0	0	(6)	0	(8)	**(15)**
New beneficiary	0	0	0	0	0	2	**2**
Disabled	0	0	0	0	0	0	**0**
Unexpected status changes	0	0	0	3	0	(1)	**2**
Net change	(2)	4	1	21	0	(7)	**17**
Members on 6/30/2019	**315**	**19**	**1**	**293**	**16**	**74**	**718**

* *Includes active Judges who have reached the maximum benefit formula (employee contributions are directed to the Unclassified Employees Retirement Plan).*

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	A judge or justice of any court. If the member was active prior to January 1, 1974, benefits may be computed according to provisions of the prior plan.
Tier 1 / Tier 2 member	Tier 1 includes judges or justices first appointed or elected before July 1, 2013, and Tier 2 includes judges or justices first appointed or elected after June 30, 2013. A judge or justice with less than five years of service as of December 30, 2013, may make a one-time irrevocable election into Tier 2. For the purpose of this valuation, we have assumed no Tier 1 members elected Tier 2 benefits as of the valuation date.
Contributions	
Member	9.00% of salary for Tier 1 members, 7.00% of salary for Tier 2 members. Tier 1 member contributions after maximum benefit is reached are redirected to the Unclassified Employees Retirement Plan.
Employer	22.50% of salary.
	Member contributions are "picked up" according to the provisions of Internal Revenue Code 414(h).
State contributions	$6,000,000 per year until the earlier of 1) the year after the plan reaches full funding on an actuarial value of assets basis, and 2) July 1, 2048.
Allowable service	Service as a judge. Credit may also be earned for uncredited judicial service if the appropriate employee contributions, with interest, are made.
Salary	Salary set by law.
Average salary	Average of the five highest years of salary of the last 10 years prior to termination of judicial service.

Summary of Plan Provisions (Continued)

Retirement	
Normal retirement benefit	
Age/Service requirement	First appointed as a judge before July 1, 2013 (Tier 1): (a.) Age 65 and five years of Allowable Service (b.) Age 70 (mandatory retirement age) First appointed as a judge after June 30, 2013 (Tier 2): (a.) Age 66 and five years of Allowable Service (b.) Age 70 (mandatory retirement age) Judges appointed before July 1, 2013, with less than five years of allowable service on or before December 31, 2013, may make a one-time election for the Tier 2 benefit package.
Amount	First appointed as a judge before July 1, 2013 (Tier 1): 2.70% of Average Salary for each year of Allowable Service prior to July 1, 1980, and 3.20% of Average Salary for each year of Allowable Service after June 30, 1980. Maximum benefit equal to 76.80% of Average Salary. First appointed as a judge after June 30, 2013 (Tier 2): 2.50% of Average Salary for each year of Allowable Service. Tier 1 who elected into Tier 2: 3.20% of Average Salary for each year of Allowable Service prior to January 1, 2014, plus 2.50% of Average Salary for each year of Allowable Service after December 31, 2013.
Early retirement	
Age/Service requirement	Age 60 and five years of Allowable Service.
Amount	Normal Retirement Benefit based on Allowable Service and Average Salary at retirement date with reduction of 0.50% for each month the member is under Normal Retirement Age at time of retirement.
Form of payment	Life annuity. Actuarially equivalent options are: (a.) 50%,75% or 100% joint and survivor with no bounce back feature (b.) 50%, 75% or 100% with bounce back feature (c.) 15-year certain and life thereafter
Benefit increases	Since January 1, 2014, benefit recipients receive annual 1.75% benefit increases. If the accrued liability funding ratio reaches or exceeds 70% for two consecutive years (on a Market Value of Assets basis), the benefit increase will revert to 2.00%. If the accrued liability funding ratio reaches or exceeds 90% for two consecutive years (on a Market Value of Assets basis), the benefit increase will revert to 2.50%.

Summary of Plan Provisions (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.
Disability	
Disability benefit	
Age/Service requirement	Permanent inability to perform the function of judge.
Amount	No benefit is paid by the Fund. Instead salary is continued for one year but not beyond age 70. Employee contributions continue and Allowable Service is earned. If disability continues after the first year (or at age 70 if earlier), the larger of 25.00% of Average Salary or the Normal Retirement Benefit, without reduction.
Retirement after disability	
Age/Service requirement	Member is still disabled after salary payments cease after one year or at age 70, if earlier.
Amount	No change in disability benefit amount from pre-retirement computed benefit amount.
Form of payment	Same as for retirement.
Benefit increases	Same as for retirement.
Death	
Survivor's benefit	
Age/service requirement	Active or disabled member dies before retirement or a former member eligible for a deferred annuity dies.
Amount	Larger of 25% of Average Salary or 60% of Normal Retirement Benefit earned at date of death. If member dies after age 60 with five or more years of service, spouse may receive the 100% joint and survivor benefit the member had earned as of date of death. Benefit paid to spouse for life. If no spouse, benefit is paid to surviving dependent children until child marries, dies, or attains age 18 (age 22 if full-time student).
Benefit increases	Same as for retirement.
Refund of contributions	
Age/service requirement	Member dies prior to retirement or former member eligible for a deferred annuity dies and survivors' benefits are not payable.
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 (Concluded)

Termination	
Refund of contributions	
Age/Service requirement	Termination of service as a judge.
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.
Deferred benefit	
Age/service requirement	Five years of Allowable Service.
Amount	Benefit computed under law in effect at termination. 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%.
Form of payment	Same as for retirement.
Optional form conversion factors	Effective July 1, 2019 and phased in over a 24-month period, actuarially equivalent factors based on the RP-2014 mortality table for healthy annuitants for a member turning age 66 in 2021, reflecting projected mortality improvements using Scale MP-2017, white collar adjustment, blended 70% males, 5.65% post-retirement interest, and 7.50% pre-retirement interest. Reflecting statutory requirements, joint and survivor factors are based on an interest assumption of 6.50%.
Combined service annuity	Members are eligible for combined service benefits if they: (a.) Have sufficient allowable service in total that equals or exceeds the applicable service credit vesting requirement of the retirement plan with the longest applicable service credit vesting requirement; (b.) Have at least six months of allowable service credit in each plan worked under; and (c.) Are not in receipt of a benefit from another plan, or have applied for benefits with an effective date within one year. Members who meet the above requirements must have their benefit based on the following: (a.) Allowable service in all covered plans are combined in order to determine eligibility for early retirement; and (b.) Average salary is based on the high five consecutive years during their entire service in all covered plans.
Changes in plan provisions	There have been no changes in plan provisions since the previous valuation.

SECTION F

ACTUARIAL COST METHOD AND ACTUARIAL ASSUMPTIONS

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

Actuarial Cost Method

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

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

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

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

Valuation of Future Post-Retirement Benefit Increases

Benefit recipients receive a future annual 1.75% post-retirement benefit increase. If the funding ratio (determined on a market value of assets basis) reaches 70% (based on a 2.00% post-retirement benefit increase assumption) for two consecutive years, the benefit increase will increase to 2.00%, if the funding ratio reaches 90% (based on a 2.50% post-retirement benefit increase assumption) for two consecutive years, the benefit increase reverts to 2.50%.

To determine an assumption regarding a future change in the post-retirement benefit increase, we performed a projection of liabilities and assets based on the following methods and assumptions:

- Future investment returns of 7.50%
- Liabilities and normal cost based on statutory funding assumptions
  - Discount rate of 7.50%
  - Statutory salary increases of 2.50%
- Open group; stable active population (new member profile based on average new members hired in recent years)
- The post-retirement benefit increase rate is assumed to be 1.75% per year until the funding ratio threshold required to pay a 2.00% post-retirement benefit increase is reached and is assumed to be 2.00% per year until the threshold required to pay a 2.50% post-retirement benefit increase is reached
- Current statutory contributions as directed by MSRS

Based on these assumptions and methods, the projection indicates that this plan is expected to pay 1.75% per annum through 2039, 2.00% per annum for the years 2040 through 2056, and 2.50% per annum thereafter. This assumption is reflected in our calculations.

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 July 26, 2016, and a review of inflation and investment return assumptions in the last experience study for the State Employees Retirement Fund, dated June 27, 2019.

Investment return	7.50% per annum.
Single discount rate	7.50% per annum.
Benefit increases after retirement	1.75% per annum through 2039, 2.00% per annum from 2040 to 2056, and 2.50% per annum thereafter.
Salary increases	2.50% per year.
Payroll growth	2.50% per year.
Inflation	2.50% 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 2006, white collar adjustment.
Healthy post-retirement	RP-2014 annuitant generational mortality table projected with mortality improvement Scale MP-2015 from a base year of 2006, white collar adjustment.
Disabled	RP-2014 annuitant generational mortality table projected with mortality improvement Scale MP-2015 from a base year of 2006, white collar adjustment.
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.
Withdrawal	None.
Disability	Age-related rates based on experience; see table of sample rates.
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.

Summary of Actuarial Assumptions (Continued)

Refund of contributions	Account balances for deferred members accumulate interest until normal retirement date and are discounted back to the valuation date.
Commencement of deferred benefits	Members receiving deferred annuities (including current terminated deferred members) are assumed to begin receiving benefits at age 65.
Percentage married	Marital status as indicated by data.
Age of spouse	Females are assumed to be three years younger than their male spouses.
Form of payment	Members are assumed to elect a life annuity.
Allowance for Combined Service Annuity	None.
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	Decrements are assumed to occur mid-fiscal year.
Service credit accruals	It is assumed that members accrue one year of service credit per year.
Pay increases	Pay increases are assumed to happen at the beginning of the fiscal year. This is equivalent to assuming that reported earnings are pensionable earnings for the year ending on the valuation date.
Unknown data for certain members	To prepare this report, GRS has used and relied on participant data supplied by the Fund. Although GRS has reviewed the data in accordance with Actuarial Standards of Practice No. 23, GRS has not verified or audited any of the data or information provided. There were no members reported with missing or invalid birth dates or gender. In cases where submitted data was missing or incomplete, the following assumptions, based on average results for applicable members at the time of the last experience study, were applied: <u>Data for active members</u>: There were seven members who have reached the 24-year service cap. These members are reflected as active members in this valuation. We assumed these members earned the greater of the salary reported under the Unclassified Employees Retirement Plan or $157,159 for the July 1, 2018 to June 30, 2019 plan year. There were no members reported with missing service. There were no members reported with a missing or invalid gender. <u>Data for terminated members</u>: There were no members reported without a benefit and no members reported with a missing or invalid gender.

Summary of Actuarial Assumptions (Continued)

Unknown data for certain members	Data for members receiving benefits: There was one member reported with a missing gender. We assumed male gender for retirees and female gender for survivors. There were three 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 value (i.e., "bounce back"), if applicable. There were three retirees reported with a bounceback annuity and an unreasonable reduction factor. A factor of 0.80, 0.85 and 0.90 was assumed for the 100%, 75% and 50% joint and survivor annuity, respectively. There were retired members reported with a survivor option and an invalid or missing survivor gender (42 members) and/or survivor date of birth (34 members). We used the valuation assumptions if the survivor gender or date of birth was missing or invalid. There were no survivors reported on the data file with an expired benefit.
Changes in actuarial assumptions	The assumed post-retirement benefit increase rate was changed from 1.75% through 2037, 2.00% for 2038 through 2051, and 2.50% thereafter to 1.75% through 2039, 2.00% for 2040 through 2056, and 2.50% thereafter. For accounting purposes, this change was treated as a difference between expected and actual experience.

Summary of Actuarial Assumptions (Concluded)

	Percentage of Members Dying each Year*					
	Healthy Post-Retirement Mortality**		Healthy Pre-Retirement Mortality**		Disability Mortality**	
Age in 2019	Male	Female	Male	Female	Male	Female
20	0.02%	0.01%	0.02%	0.01%	0.02%	0.01%
25	0.03	0.02	0.03	0.01	0.03	0.02
30	0.05	0.05	0.03	0.02	0.05	0.05
35	0.07	0.08	0.03	0.03	0.07	0.08
40	0.11	0.11	0.04	0.03	0.11	0.11
45	0.16	0.14	0.06	0.05	0.16	0.14
50	0.24	0.19	0.10	0.08	0.24	0.19
55	0.36	0.27	0.18	0.14	0.36	0.27
60	0.50	0.39	0.32	0.21	0.50	0.39
65	0.73	0.63	0.56	0.30	0.73	0.63
70	1.18	1.00	0.98	0.52	1.18	1.00
75	2.06	1.69	1.76	0.91	2.06	1.69
80	3.66	3.00	3.16	1.63	3.66	3.00
85	6.73	5.50	6.57	4.35	6.73	5.50
90	12.34	10.05	12.48	9.73	12.34	10.05

* *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 2006.*

	Percentage of Eligible Members Retiring each Year			
	Disability Retirement			
Age	Male	Female	Age	Retirement
20	0.00%	0.00%	60	0%
25	0.00	0.00	61	0
30	0.00	0.00	62	8
35	0.00	0.00	63	8
40	0.01	0.01	64	5
45	0.03	0.03	65	20
50	0.05	0.05	66	23
55	0.12	0.12	67	23
60	0.31	0.31	68	20
65	0.00	0.00	69	20
70	0.00	0.00	70	100

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 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 plan fiduciary net position is projected to be sufficient to pay benefits) and (2) tax-exempt municipal bond rate based on an index of 20-year general obligation bonds with an average AA credit rating as of the measurement date (to the extent that the contributions for use with the long-term expected rate of return are not met).

For the purpose of this valuation, the expected rate of return on pension plan investments is 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) and **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)

	Projected Covered-Employee Payroll			Projected Contributions				
Fiscal Year Ending	Payroll for Current Employees	Payroll for New Employees	Total Employee Payroll	Contributions from Current Employees	Employer Contributions for Current Employees	Contributions on Future Payroll toward Current UAL*	Additional State Contributions	Total Contributions
	(a)	(b)	(c) = (a) + (b)	(d)	(e)	(f)		(g) = (d) + (e) + (f)
2019	$ 50,164		$ 50,164					
2020	50,756		50,756	$ 4,058	$ 11,420		$ 6,000	$ 21,478
2021	49,350	$ 2,674	52,024	3,930	11,104	$ 291	6,000	21,325
2022	47,326	5,999	53,325	3,751	10,648	654	6,000	21,053
2023	45,200	9,458	54,658	3,566	10,170	1,035	6,000	20,771
2024	43,266	12,759	56,025	3,397	9,735	1,401	6,000	20,533
2025	41,421	16,004	57,425	3,237	9,320	1,763	6,000	20,320
2026	39,556	19,305	58,861	3,077	8,900	2,135	6,000	20,112
2027	37,672	22,660	60,332	2,916	8,476	2,514	6,000	19,906
2028	35,752	26,089	61,841	2,754	8,044	2,904	6,000	19,702
2029	33,625	29,762	63,387	2,578	7,566	3,324	6,000	19,468
2030	31,256	33,715	64,971	2,385	7,033	3,779	6,000	19,197
2031	28,966	37,630	66,596	2,199	6,517	4,232	6,000	18,948
2032	26,735	41,526	68,261	2,020	6,015	4,685	6,000	18,720
2033	24,437	45,530	69,967	1,837	5,498	5,154	6,000	18,489
2034	22,230	49,486	71,716	1,663	5,002	5,621	6,000	18,286
2035	20,191	53,318	73,509	1,503	4,543	6,077	6,000	18,123
2036	18,079	57,268	75,347	1,339	4,068	6,548	6,000	17,955
2037	15,803	61,428	77,231	1,165	3,556	7,047	6,000	17,768
2038	13,698	65,463	79,161	1,005	3,082	7,535	6,000	17,622
2039	11,875	69,265	81,140	866	2,672	7,999	6,000	17,537
2040	10,227	72,942	83,169	742	2,301	8,451	6,000	17,494
2041	8,620	76,628	85,248	623	1,940	8,907	6,000	17,470
2042	7,150	80,229	87,379	514	1,609	9,356	6,000	17,479
2043	5,776	83,788	89,564	413	1,300	9,802	6,000	17,515
2044	4,550	87,253	91,803	324	1,024	10,241	6,000	17,589
2045	3,595	90,503	94,098	254	809	10,656	6,000	17,719
2046	2,662	93,788	96,450	187	599	11,078	6,000	17,864
2047	1,813	97,049	98,862	127	408	11,500	6,000	18,035
2048	1,224	100,109	101,333	86	275	11,863	6,000	18,224
2049	839	103,028	103,867	59	189	12,209	-	12,457
2050	524	105,939	106,463	37	118	12,554	-	12,709
2051	269	108,856	109,125	19	61	12,899	-	12,979
2052	126	111,727	111,853	9	28	13,240	-	13,277
2053	40	114,609	114,649	3	9	13,581	-	13,593
2054	-	117,515	117,515	-	-	13,926	-	13,926
2055	-	120,453	120,453	-	-	14,274	-	14,274
2056	-	123,465	123,465	-	-	14,631	-	14,631
2057	-	126,551	126,551	-	-	14,996	-	14,996
2058	-	129,715	129,715	-	-	15,371	-	15,371
2059	-	132,958	132,958	-	-	15,756	-	15,756
2060	-	136,282	136,282	-	-	16,149	-	16,149
2061	-	139,689	139,689	-	-	16,553	-	16,553
2062	-	143,181	143,181	-	-	16,967	-	16,967
2063	-	146,761	146,761	-	-	17,391	-	17,391
2064	-	150,430	150,430	-	-	17,826	-	17,826
2065	-	154,190	154,190	-	-	18,272	-	18,272
2066	-	158,045	158,045	-	-	18,728	-	18,728
2067	-	161,996	161,996	-	-	19,197	-	19,197
2068	-	166,046	166,046	-	-	19,676	-	19,676
2069	-	170,197	170,197	-	-	20,168	-	20,168

* *Equal to total contributions (29.50% of payroll for new employees) net of normal cost and expenses. Normal cost and expenses initially total 19.67% of pay but trend down over the projection period (based on the projection assumptions) due to the recognition of lower normal costs for Judges hired after June 30, 2013.*

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

	Projected Covered-Employee Payroll			Projected Contributions				
Fiscal Year Ending	Payroll for Current Employees	Payroll for New Employees	Total Employee Payroll	Contributions from Current Employees	Employer Contributions for Current Employees	Contributions on Future Payroll toward Current UAL*	Additional State Contributions	Total Contributions
	(a)	(b)	(c) = (a) + (b)	(d)	(e)	(f)		(g) = (d) + (e) + (f)
2070	$ -	$ 174,452	$ 174,452	$ -	$ -	$ 20,673	$ -	$ 20,673
2071	-	178,814	178,814	-	-	21,189	-	21,189
2072	-	183,284	183,284	-	-	21,719	-	21,719
2073	-	187,866	187,866	-	-	22,262	-	22,262
2074	-	192,563	192,563	-	-	22,819	-	22,819
2075	-	197,377	197,377	-	-	23,389	-	23,389
2076	-	202,311	202,311	-	-	23,974	-	23,974
2077	-	207,369	207,369	-	-	24,573	-	24,573
2078	-	212,553	212,553	-	-	25,188	-	25,188
2079	-	217,867	217,867	-	-	25,817	-	25,817
2080	-	223,314	223,314	-	-	26,463	-	26,463
2081	-	228,897	228,897	-	-	27,124	-	27,124
2082	-	234,619	234,619	-	-	27,802	-	27,802
2083	-	240,484	240,484	-	-	28,497	-	28,497
2084	-	246,497	246,497	-	-	29,210	-	29,210
2085	-	252,659	252,659	-	-	29,940	-	29,940
2086	-	258,975	258,975	-	-	30,689	-	30,689
2087	-	265,450	265,450	-	-	31,456	-	31,456
2088	-	272,086	272,086	-	-	32,242	-	32,242
2089	-	278,888	278,888	-	-	33,048	-	33,048
2090	-	285,860	285,860	-	-	33,874	-	33,874
2091	-	293,007	293,007	-	-	34,721	-	34,721
2092	-	300,332	300,332	-	-	35,589	-	35,589
2093	-	307,840	307,840	-	-	36,479	-	36,479
2094	-	315,536	315,536	-	-	37,391	-	37,391
2095	-	323,425	323,425	-	-	38,326	-	38,326
2096	-	331,510	331,510	-	-	39,284	-	39,284
2097	-	339,798	339,798	-	-	40,266	-	40,266
2098	-	348,293	348,293	-	-	41,273	-	41,273
2099	-	357,000	357,000	-	-	42,305	-	42,305
2100	-	365,925	365,925	-	-	43,362	-	43,362
2101	-	375,074	375,074	-	-	44,446	-	44,446
2102	-	384,450	384,450	-	-	45,557	-	45,557
2103	-	394,062	394,062	-	-	46,696	-	46,696
2104	-	403,913	403,913	-	-	47,864	-	47,864
2105	-	414,011	414,011	-	-	49,060	-	49,060
2106	-	424,361	424,361	-	-	50,287	-	50,287
2107	-	434,970	434,970	-	-	51,544	-	51,544
2108	-	445,845	445,845	-	-	52,833	-	52,833
2109	-	456,991	456,991	-	-	54,153	-	54,153
2110	-	468,416	468,416	-	-	55,507	-	55,507
2111	-	480,126	480,126	-	-	56,895	-	56,895
2112	-	492,129	492,129	-	-	58,317	-	58,317
2113	-	504,432	504,432	-	-	59,775	-	59,775
2114	-	517,043	517,043	-	-	61,270	-	61,270
2115	-	529,969	529,969	-	-	62,801	-	62,801
2116	-	543,218	543,218	-	-	64,371	-	64,371
2117	-	556,799	556,799	-	-	65,981	-	65,981
2118	-	570,719	570,719	-	-	67,630	-	67,630
2119	-	584,987	584,987	-	-	69,964	-	69,964

* *Equal to total contributions (29.50% of payroll for new employees) net of normal cost and expenses. Normal cost and expenses initially total 19.67% of pay but trend down over the projection period (based on the projection assumptions) due to the recognition of lower normal costs for Judges hired after June 30, 2013.*

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

Fiscal Year Ending	Projected Beginning Plan Fiduciary Net Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expenses	Projected Investment Earnings at 7.50%	Projected Ending Plan Net Position
	(a)	(b)	(c)	(d)	(e)	(f)=(a)+(b)-(c)-(d)+(e)
2020	$ 212,262	$ 21,478	$ 26,287	$ 86	$ 15,739	$ 223,106
2021	223,106	21,325	27,215	84	16,513	233,645
2022	233,645	21,053	28,518	80	17,246	243,346
2023	243,346	20,771	29,841	77	17,914	252,113
2024	252,113	20,533	31,144	74	18,515	259,943
2025	259,943	20,320	32,389	70	19,049	266,853
2026	266,853	20,112	33,501	67	19,519	272,916
2027	272,916	19,906	34,638	64	19,924	278,044
2028	278,044	19,702	35,762	61	20,260	282,183
2029	282,183	19,468	36,833	57	20,522	285,283
2030	285,283	19,197	38,052	53	20,700	287,075
2031	287,075	18,948	39,100	49	20,787	287,661
2032	287,661	18,720	40,069	45	20,787	287,054
2033	287,054	18,489	40,985	42	20,699	285,215
2034	285,215	18,286	41,687	38	20,528	282,304
2035	282,304	18,123	42,210	34	20,285	278,468
2036	278,468	17,955	42,717	31	19,972	273,647
2037	273,647	17,768	43,214	27	19,586	267,760
2038	267,760	17,622	43,501	23	19,128	260,986
2039	260,986	17,537	43,538	20	18,616	253,581
2040	253,581	17,494	43,477	17	18,061	245,642
2041	245,642	17,470	43,306	15	17,471	237,262
2042	237,262	17,479	42,955	12	16,856	228,630
2043	228,630	17,515	42,465	10	16,228	219,898
2044	219,898	17,589	41,809	8	15,600	211,270
2045	211,270	17,719	40,915	6	14,991	203,059
2046	203,059	17,864	39,941	5	14,416	195,393
2047	195,393	18,035	38,869	3	13,887	188,443
2048	188,443	18,224	37,611	2	13,419	182,473
2049	182,473	12,457	36,216	1	12,810	171,523
2050	171,523	12,709	34,768	1	12,052	161,515
2051	161,515	12,979	33,278	-	11,366	152,582
2052	152,582	13,277	31,732	-	10,764	144,891
2053	144,891	13,593	30,164	-	10,256	138,576
2054	138,576	13,926	28,586	-	9,853	133,769
2055	133,769	14,274	27,007	-	9,563	130,599
2056	130,599	14,631	25,452	-	9,396	129,174
2057	129,174	14,996	23,979	-	9,357	129,548
2058	129,548	15,371	22,582	-	9,450	131,787
2059	131,787	15,756	21,201	-	9,683	136,025
2060	136,025	16,149	19,839	-	10,066	142,401
2061	142,401	16,553	18,500	-	10,608	151,062
2062	151,062	16,967	17,185	-	11,321	162,165
2063	162,165	17,391	15,898	-	12,217	175,875
2064	175,875	17,826	14,641	-	13,308	192,368
2065	192,368	18,272	13,417	-	14,606	211,829
2066	211,829	18,728	12,231	-	16,126	234,452
2067	234,452	19,197	11,086	-	17,883	260,446
2068	260,446	19,676	9,988	-	19,890	290,024
2069	290,024	20,168	8,940	-	22,165	323,417

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

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

Fiscal Year Ending	Projected Beginning Plan Fiduciary Net Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expenses	Projected Investment Earnings at 7.50%	Projected Ending Plan Net Position
	(a)	(b)	(c)	(d)	(e)	(f)=(a)+(b)-(c)-(d)+(e)
2070	$ 323,417	$ 20,673	$ 7,948	$ -	$ 24,725	$ 360,867
2071	360,867	21,189	7,015	-	27,587	402,628
2072	402,628	21,719	6,144	-	30,771	448,974
2073	448,974	22,262	5,338	-	34,296	500,194
2074	500,194	22,819	4,596	-	38,186	556,603
2075	556,603	23,389	3,920	-	42,462	618,534
2076	618,534	23,974	3,311	-	47,151	686,348
2077	686,348	24,573	2,766	-	52,279	760,434
2078	760,434	25,188	2,285	-	57,876	841,213
2079	841,213	25,817	1,864	-	63,973	929,139
2080	929,139	26,463	1,500	-	70,605	1,024,707
2081	1,024,707	27,124	1,190	-	77,808	1,128,449
2082	1,128,449	27,802	930	-	85,623	1,240,944
2083	1,240,944	28,497	715	-	94,094	1,362,820
2084	1,362,820	29,210	540	-	103,267	1,494,757
2085	1,494,757	29,940	400	-	113,194	1,637,491
2086	1,637,491	30,689	291	-	123,931	1,791,820
2087	1,791,820	31,456	207	-	135,537	1,958,606
2088	1,958,606	32,242	143	-	148,077	2,138,782
2089	2,138,782	33,048	97	-	161,622	2,333,355
2090	2,333,355	33,874	64	-	176,247	2,543,412
2091	2,543,412	34,721	41	-	192,033	2,770,125
2092	2,770,125	35,589	26	-	209,069	3,014,757
2093	3,014,757	36,479	15	-	227,449	3,278,670
2094	3,278,670	37,391	9	-	247,277	3,563,329
2095	3,563,329	38,326	5	-	268,661	3,870,311
2096	3,870,311	39,284	3	-	291,720	4,201,312
2097	4,201,312	40,266	1	-	316,581	4,558,158
2098	4,558,158	41,273	1	-	343,382	4,942,812
2099	4,942,812	42,305	-	-	372,269	5,357,386
2100	5,357,386	43,362	-	-	403,400	5,804,148
2101	5,804,148	44,446	-	-	436,948	6,285,542
2102	6,285,542	45,557	-	-	473,093	6,804,192
2103	6,804,192	46,696	-	-	512,034	7,362,922
2104	7,362,922	47,864	-	-	553,981	7,964,767
2105	7,964,767	49,060	-	-	599,164	8,612,991
2106	8,612,991	50,287	-	-	647,826	9,311,104
2107	9,311,104	51,544	-	-	700,231	10,062,879
2108	10,062,879	52,833	-	-	756,661	10,872,373
2109	10,872,373	54,153	-	-	817,422	11,743,948
2110	11,743,948	55,507	-	-	882,840	12,682,295
2111	12,682,295	56,895	-	-	953,267	13,692,457
2112	13,692,457	58,317	-	-	1,029,081	14,779,855
2113	14,779,855	59,775	-	-	1,110,690	15,950,320
2114	15,950,320	61,270	-	-	1,198,530	17,210,120
2115	17,210,120	62,801	-	-	1,293,071	18,565,992
2116	18,565,992	64,371	-	-	1,394,820	20,025,183
2117	20,025,183	65,981	-	-	1,504,318	21,595,482
2118	21,595,482	67,630	-	-	1,622,151	23,285,263
2119	23,285,263	69,964	-	-	1,748,971	25,104,198

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)
2018	$ 212,262	$ 26,287	$ 26,287	$ -	$ 25,354	$ -	$ 25,354
2019	223,106	27,215	27,215	-	24,417	-	24,417
2020	233,645	28,518	28,518	-	23,801	-	23,801
2021	243,346	29,841	29,841	-	23,168	-	23,168
2022	252,113	31,144	31,144	-	22,492	-	22,492
2023	259,943	32,389	32,389	-	21,759	-	21,759
2024	266,853	33,501	33,501	-	20,937	-	20,937
2025	272,916	34,638	34,638	-	20,136	-	20,136
2026	278,044	35,762	35,762	-	19,340	-	19,340
2027	282,183	36,833	36,833	-	18,529	-	18,529
2028	285,283	38,052	38,052	-	17,807	-	17,807
2029	287,075	39,100	39,100	-	17,021	-	17,021
2030	287,661	40,069	40,069	-	16,226	-	16,226
2031	287,054	40,985	40,985	-	15,439	-	15,439
2032	285,215	41,687	41,687	-	14,608	-	14,608
2033	282,304	42,210	42,210	-	13,759	-	13,759
2034	278,468	42,717	42,717	-	12,953	-	12,953
2035	273,647	43,214	43,214	-	12,189	-	12,189
2036	267,760	43,501	43,501	-	11,414	-	11,414
2037	260,986	43,538	43,538	-	10,627	-	10,627
2038	253,581	43,477	43,477	-	9,872	-	9,872
2039	245,642	43,306	43,306	-	9,147	-	9,147
2040	237,262	42,955	42,955	-	8,440	-	8,440
2041	228,630	42,465	42,465	-	7,761	-	7,761
2042	219,898	41,809	41,809	-	7,108	-	7,108
2043	211,270	40,915	40,915	-	6,471	-	6,471
2044	203,059	39,941	39,941	-	5,876	-	5,876
2045	195,393	38,869	38,869	-	5,320	-	5,320
2046	188,443	37,611	37,611	-	4,788	-	4,788
2047	182,473	36,216	36,216	-	4,289	-	4,289
2048	171,523	34,768	34,768	-	3,830	-	3,830
2049	161,515	33,278	33,278	-	3,410	-	3,410
2050	152,582	31,732	31,732	-	3,025	-	3,025
2051	144,891	30,164	30,164	-	2,675	-	2,675
2052	138,576	28,586	28,586	-	2,358	-	2,358
2053	133,769	27,007	27,007	-	2,072	-	2,072
2054	130,599	25,452	25,452	-	1,817	-	1,817
2055	129,174	23,979	23,979	-	1,592	-	1,592
2056	129,548	22,582	22,582	-	1,395	-	1,395
2057	131,787	21,201	21,201	-	1,218	-	1,218
2058	136,025	19,839	19,839	-	1,060	-	1,060
2059	142,401	18,500	18,500	-	920	-	920
2060	151,062	17,185	17,185	-	795	-	795
2061	162,165	15,898	15,898	-	684	-	684
2062	175,875	14,641	14,641	-	586	-	586
2063	192,368	13,417	13,417	-	500	-	500
2064	211,829	12,231	12,231	-	424	-	424
2065	234,452	11,086	11,086	-	357	-	357
2066	260,446	9,988	9,988	-	299	-	299
2067	290,024	8,940	8,940	-	249	-	249

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)
2068	$ 323,417	$ 7,948	$ 7,948	$ -	$ 25,354	$ -	$ 206
2069	360,867	7,015	7,015	-	24,417	-	169
2070	402,628	6,144	6,144	-	23,801	-	138
2071	448,974	5,338	5,338	-	23,168	-	111
2072	500,194	4,596	4,596	-	22,492	-	89
2073	556,603	3,920	3,920	-	21,759	-	71
2074	618,534	3,311	3,311	-	20,937	-	56
2075	686,348	2,766	2,766	-	20,136	-	43
2076	760,434	2,285	2,285	-	19,340	-	33
2077	841,213	1,864	1,864	-	18,529	-	25
2078	929,139	1,500	1,500	-	17,807	-	19
2079	1,024,707	1,190	1,190	-	17,021	-	14
2080	1,128,449	930	930	-	16,226	-	10
2081	1,240,944	715	715	-	15,439	-	7
2082	1,362,820	540	540	-	14,608	-	5
2083	1,494,757	400	400	-	13,759	-	4
2084	1,637,491	291	291	-	12,953	-	2
2085	1,791,820	207	207	-	12,189	-	2
2086	1,958,606	143	143	-	11,414	-	1
2087	2,138,782	97	97	-	10,627	-	1
2088	2,333,355	64	64	-	9,872	-	0
2089	2,543,412	41	41	-	9,147	-	0
2090	2,770,125	26	26	-	8,440	-	0
2091	3,014,757	15	15	-	7,761	-	0
2092	3,278,670	9	9	-	7,108	-	0
2093	3,563,329	5	5	-	6,471	-	0
2094	3,870,311	3	3	-	5,876	-	0
2095	4,201,312	1	1	-	5,320	-	0
2096	4,558,158	1	1	-	4,788	-	0
2097	4,942,812	-	-	-	4,289	-	0
2098	5,357,386	-	-	-	3,830	-	0
2099	5,804,148	-	-	-	3,410	-	0
2100	6,285,542	-	-	-	3,025	-	0
2101	6,804,192	-	-	-	2,675	-	0
2102	7,362,922	-	-	-	2,358	-	-
2103	7,964,767	-	-	-	2,072	-	-
2104	8,612,991	-	-	-	1,817	-	-
2105	9,311,104	-	-	-	1,592	-	-
2106	10,062,879	-	-	-	1,395	-	-
2107	10,872,373	-	-	-	1,218	-	-
2108	11,743,948	-	-	-	1,060	-	-
2109	12,682,295	-	-	-	920	-	-
2110	13,692,457	-	-	-	795	-	-
2111	14,779,855	-	-	-	684	-	-
2112	15,950,320	-	-	-	586	-	-
2113	17,210,120	-	-	-	500	-	-
2114	18,565,992	-	-	-	424	-	-
2115	20,025,183	-	-	-	357	-	-
2116	21,595,482	-	-	-	299	-	-
2117	23,285,263	-	-	-	249	-	-
				Totals	$ 461,304	$ -	$ 461,304

SECTION H

GLOSSARY OF TERMS

Glossary of Terms

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

Glossary of Terms

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

Glossary of Terms

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

Glossary of Terms

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

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

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

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

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

Minnesota State Retirement System
Legislators Retirement Fund

GASB Statement No. 67 and No. 68
Accounting and Financial Reporting for Pensions
June 30, 2019

GRS Retirement Consulting
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November 27, 2019

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

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

This report complements the actuarial valuation report for funding purposes that was or will be provided to the System and should be considered in conjunction with that report. Please see the actuarial valuation report as of July 1, 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 Legislators 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

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

Bonita J. Wurst

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

BBM/BJW:sc

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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	287
- Survivors	83
- Disability Retirements	-
- Deferred Retirements	32
- Terminated other non-vested	-
- Active Members	17
- Total	419
Covered-employee Payroll [(1)]	$ 1,011
Net Pension Liability	
Total Pension Liability	$ 140,185
Plan Fiduciary Net Position	-
Net Pension Liability	$ 140,185
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	0.00%
Net Pension Liability as a Percentage of Covered-employee Payroll	13,865.97%
Development of the Single Discount Rate	
Single Discount Rate	3.13%
Long-Term Expected Rate of Investment Return	7.50%
Long-Term Municipal Bond Rate [(2)]	3.13%
Last year ending June 30 in the 2020 to 2119 projection period for which projected benefit payments are fully funded	N/A
Total Pension Expense/(Income)	$ 9,692

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	$ -	$ -
Changes in assumptions	-	-
Net difference between projected and actual earnings on pension plan investments	42	-
Totals	**$ 42**	**$ -**

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

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

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

Notes to Financial Statements

GASB Statement No. 68 requires the notes to 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.

Both GASB Statements No. 67 and No. 68 require the notes to 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 Legislators 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 unfunded actuarial accrued liabilities will increase and not be eliminated.
3. The funded status of the plan will remain at 0%.
4. The plan will be completely dependent upon current contributions to pay benefits.

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).

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).

A single discount rate of 3.13% was used to measure the total pension liability. This single discount rate was based on a municipal bond rate of 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 pay-as-you-go status of this plan. Since the plan's assets are $0, MSRS' long-term expected rate of investment return of 7.50% is not utilized in this valuation and no projection is done.

SECTION B

FINANCIAL STATEMENTS

Statement of Pension Expense under GASB Statement No. 68
Fiscal Year Ended June 30, 2019 (Dollars in Thousands)

A. Expense		
1. Service Cost	$	496
2. Interest on the Total Pension Liability		4,894
3. Current-Period Benefit Changes		-
4. Employee Contributions (made negative for addition here)		(91)
5. Projected Earnings on Plan Investments (made negative for addition here)		-
6. Pension Plan Administrative Expense		36
7. Other Changes in Plan Fiduciary Net Position		-
8. Recognition of Outflow (Inflow) of Resources due to differences between expected and actual experience in the measurement of the Total Pension		
Arising from Current Reporting Period		(2,441)
9. Recognition of Outflow (Inflow) of Resources due to assumption changes		
Arising from Current Reporting Period		6,722
10. Recognition of Outflow (Inflow) of Resources due to the difference between projected (7.50%) and actual earnings on Pension Plan Investments		
Arising from Current Reporting Period		-
11. Increases/(Decreases) from Experience in the Current Reporting Period	**$**	**9,616**
12. Recognition of Outflow (Inflow) of Resources due to differences between expected and actual experience in the measurement of the Total Pension		
Arising from Prior Reporting Periods	$	-
13. Recognition of Outflow (Inflow) of Resources due to assumption changes		
Arising from Prior Reporting Periods		-
14. Recognition of Outflow (Inflow) of Resources due to the difference between projected and actual earnings on Pension Plan Investments		
Arising from Prior Reporting Periods		76
15. Total Pension Expense / (Income)	**$**	**9,692**

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	$	(2,441)
2. Assumption Changes (gains) or losses		6,722
3. Recognition period for Liabilities: Average of the expected remaining service lives of all employees {in years}		1
4. Outflow (Inflow) of Resources to be recognized in the current pension expense for the difference between expected and actual experience of the Total Pension Liability		(2,441)
5. Outflow (Inflow) of Resources to be recognized in the current pension expense for Assumption Changes		6,722
6. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Liabilities	$	4,281
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	$	-
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	$	-
B. Outflows (Inflows) of Resources due to Assets		
1. Net difference between projected and actual earnings on pension plan investments (gains) or losses	$	-
2. Recognition period for Assets {in years}		5
3. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Assets		-
4. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Assets	$	-

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	$ 6,722	$ 2,441	$ 4,281
2. Due to Assets	76	-	76
3. Total	$ 6,798	$ 2,441	$ 4,357

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	$ -	$ 2,441	$ (2,441)
2. Assumption Changes	6,722	-	6,722
3. Net Difference between projected and actual earnings on pension plan investments	76	-	76
4. Total	$ 6,798	$ 2,441	$ 4,357

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

	Deferred Outflows of Resources	Deferred Inflows of Resources	Net Deferred Outflows/(Inflows) of Resources
1. Differences between expected and actual experience	$ -	$ -	$ -
2. Assumption Changes	-	-	-
3. Net Difference between projected and actual earnings on pension plan investments*	42	-	42
4. Total	$ 42	$ -	$ 42

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	$ 42
2021	-
2022	-
2023	-
2024	-
Thereafter	-
Total	$ 42

** 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					
2019	$ (2,441)	1.0000	$ (2,441)	0	0.0000
Total			**$ (2,441)**	**$ 0**	
Deferred Outflow (Inflow) Due to Assumption Changes					
2019	$ 6,722	1.0000	6,722	0	0.0000
Total			**$ 6,722**	**$ 0**	
Deferred Outflow (Inflow) Due to Differences Between Projected and Actual Earnings on Plan Investments					
2015	$ 170	5.0000	$ 34	$ 0	0.0000
2016	207	5.0000	42	42	1.0000
Total			**$ 76**	**$ 42**	

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

Assets	June 30, 2019	
Cash & Short-term Investments	$	272
Receivables		-
Investment Pools (at fair value)		-
Securities Lending Collateral		-
Capital Assets		-
Total Assets	**$**	**272**
Total Deferred Outflows of Resources	**$**	**-**
Total Liabilities	**$**	**(272)**
Total Deferred Inflows of Resources	**$**	**-**
Net Position Restricted for Pensions	**$**	**-**

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

1.	**Net position at market value at beginning of year**	**$**	**-**
Additions			
2.	Contributions		
	a. Employee	$	91
	b. Employer		-
	c. State General Fund Appropriations		8,798
	d. Total contributions	$	8,889
3.	Investment income		
	a. Investment income/(loss)	$	-
	b. Investment expenses		-
	c. Net investment income/(loss)	$	-
4.	Other Additions		-
5.	**Total Additions** *(2.d.) + (3.c.) + (4.)*	**$**	**8,889**
Deductions			
6.	Benefits Paid		
	a. Annuity benefits	$	(8,853)
	b. Refunds		-
	c. Total benefits paid	$	(8,853)
7.	Expenses		
	a. Other deductions	$	-
	b. Administrative		(36)
	c. Total expenses	$	(36)
8.	**Total deductions** *(6.c.) + (7.c.)*	**$**	**(8,889)**
9.	**Net increase/(decrease) in fiduciary net position** *(5.) + (8.)*	**$**	**-**
10.	**Net position at market value at end of year** *(1.) + (9.)*	$	-
11.	State Board of Investment calculated annual investment return		N/A

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	$	496
2. Interest on the Total Pension Liability		4,894
3. Changes of benefit terms		-
4. Difference between expected and actual experience of the Total Pension Liability		(2,441)
5. Changes of assumptions		6,722
6. Benefit payments, including refunds of employee contributions		(8,853)
7. Net change in Total Pension Liability	$	818
8. Total Pension Liability – Beginning		139,367
9. Total Pension Liability – Ending	**$**	**140,185**
B. Plan Fiduciary Net Position		
1. Contributions – State General Fund Appropriations	$	8,798
2. Contributions – Employee		91
3. Net investment income		-
4. Benefit payments, including refunds of employee contributions		(8,853)
5. Pension Plan Administrative Expense		(36)
6. Other changes		-
7. Net change in Plan Fiduciary Net Position	$	-
8. Plan Fiduciary Net Position – Beginning		-
9. Plan Fiduciary Net Position – Ending	**$**	**-**
C. Net Pension Liability, *A.9.-B.9.*	**$**	**140,185**
D. Plan Fiduciary Net Position as a percentage of the Total Pension Liability, *B.9./A.9.*		**0.00%**
E. Covered-Employee Payroll	**$**	**1,011** [1]
F. Net Pension Liability as a percentage of Covered-Employee Payroll, *C./E.*		**13,865.97%**

[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
Total Pension Liability									
Service Cost	$ 496	$ 437	$ 546	$ 495	$ 428	$ 398			
Interest on the Total Pension Liability	4,894	5,094	4,293	5,333	6,113	6,177			
Benefit Changes	-	(9,839)	-	-	-	-			
Difference between Expected and Actual Experience	(2,441)	6,119	1,517	(1,597)	(7,303)	(237)			
Assumption Changes	6,722	(856)	(5,017)	14,653	7,057	11,201			
Benefit Payments	(8,853)	(8,912)	(8,716)	(8,496)	(8,441)	(8,407)			
Refunds	-	-	-	(40)	-	(79)			
Net Change in Total Pension Liability	$ 818	$ (7,957)	$ (7,377)	$ 10,348	$ (2,146)	$ 9,053			
Total Pension Liability - Beginning	139,367	147,324	154,701	144,353	146,499	137,446			
Total Pension Liability - Ending (a)	**$ 140,185**	**$ 139,367**	**$ 147,324**	**$ 154,701**	**$ 144,353**	**$ 146,499**			
Plan Fiduciary Net Position									
State General Fund Appropriation	$ 8,798	$ 8,856	$ 8,716	$ 5,087	$ 3,216	$ 3,436			
Employee Contributions	91	93	80	89	153	101			
Pension Plan Net Investment Income	-	-	-	(69)	281	1,750			
Benefit Payments	(8,853)	(8,912)	(8,716)	(8,496)	(8,441)	(8,407)			
Refunds	-	-	-	(40)	-	(79)			
Pension Plan Administrative Expense	(36)	(37)	(39)	(42)	(37)	(36)			
Other Changes	-	-	(41)	41	-	-			
Net Change in Plan Fiduciary Net Position	$ -	$ -	$ -	$ (3,430)	$ (4,828)	$ (3,235)			
Plan Fiduciary Net Position - Beginning	-	-	-	3,430	8,258	11,493			
Plan Fiduciary Net Position - Ending (b)	**$ -**	**$ -**	**$ -**	**$ -**	**$ 3,430**	**$ 8,258**			
Net Pension Liability - Ending (a) - (b)	**$ 140,185**	**$ 139,367**	**$ 147,324**	**$ 154,701**	**$ 140,923**	**$ 138,241**			
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	**0.00 %**	**0.00 %**	**0.00 %**	**0.00 %**	**2.38 %**	**5.64 %**			
Covered-Employee Payroll (1)	**$ 1,011**	**$ 1,033**	**$ 889**	**$ 989**	**$ 1,700**	**$ 1,122**			
Net Pension Liability as a Percentage of Covered-Employee Payroll	**13,865.97 %**	**13,491.48 %**	**16,571.88 %**	**15,642.16 %**	**8,289.59 %**	**12,320.94 %**			

Notes to Schedule:

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

Schedule of Net Pension Liability Multiyear (Dollars in Thousands)

Last 10 Fiscal Years (which will be built prospectively)

Fiscal Year Ending June 30,	Total Pension Liability	Plan Net Position	Net Pension Liability	Plan Net Position as a % of Total Pension Liability	Covered-Employee Payroll	Net Pension Liability as a % of Covered-Employee Payroll
	(a)	(b)	(a)-(b)=(c)	(b)/(c)	(d)	(c)/(d)
2010						
2011						
2012						
2013						
2014	$ 146,499	$ 8,258	$ 138,241	5.64%	$ 1,122	12,320.94%
2015	144,353	3,430	140,923	2.38	1,700	8,289.59
2016	154,701	-	154,701	0.00	989	15,642.16
2017	147,324	-	147,324	0.00	889	16,571.88
2018	139,367	-	139,367	0.00	1,033	13,491.48
2019	140,185	-	140,185	0.00	1,011	13,865.97

Schedule of Contributions Multiyear* (Dollars in Thousands)

Last 10 Fiscal Years

Fiscal Year Ending June 30,	Actuarially Determined Contribution	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	$ 8,183	$ 2,428	$ 5,755	$ 1,877		129.36%
2011	8,164	3,265	4,899	1,774		184.05
2012	19,348	4,401	14,947	1,378	**	319.38
2013	17,402	3,869	13,533	1,233	**	313.79
2014	22,157	3,436	18,721	1,122	**	306.24
2015	38,736	3,216	35,520	1,700	**	189.18
2016	21,711	5,087	16,624	989	**	514.36
2017	22,844	8,716	14,128	889	**	980.43
2018	33,560	8,856	24,704	1,033	**	857.31
2019	27,373	8,798	18,575	1,011	**	870.23

* *Effective July 1, 2013, the Elective State Officers Retirement Fund was administratively consolidated with the Legislators Retirement Fund. All figures in the table above represent the combined total from both funds, as directed by MSRS.*

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

Notes to Schedule of Contributions

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

Notes	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.
Valuation Date	June 30, 2018
Actuarial Cost Method	Entry Age Normal
Amortization Method	Level Dollar, Closed
Remaining Amortization Period	8 years
Asset Valuation Method	Market value of assets
Salary Increases	5.00% including inflation
Investment Rate of Return	0.00% per annum
Inflation:	2.50% per annum
Retirement Age	Experience-based table of rates that are specific to the type of eligibility condition. Last updated for the 2012 valuation pursuant to an experience study prepared by a former actuary.
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.
Notes	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.

Schedule of Investment Returns Multiyear

Last 10 Fiscal Years

Fiscal Year Ending June 30,	Annual Return[1]
2010	
2011	
2012	
2013	
2014	19.3 %
2015	5.0
2016	NA
2017	NA
2018	NA
2019	NA

[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

Beginning with the year ended June 30, 2016, the Legislators Retirement Fund assets were depleted, and therefore an annual money-weighted rate of return cannot be calculated. 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 1.651.296.3328.

SECTION D

ADDITIONAL FINANCIAL STATEMENT DISCLOSURES

Asset Allocation

Long-Term Expected Return on Plan Assets

The long-term expected rate of return on pension plan investments was determined using a building-block method. Estimates for expected future real rates of return (expected returns, net of inflation) were developed for each asset class using both long-term historical returns and long-term capital market expectation from a number of investment management and consulting organizations. The asset class estimates and the target allocations were then combined to produce a geometric, long-term expected real rate of return for the portfolio. Inflation expectations were applied to derive the nominal rate of return for the portfolio. For each 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:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return (Geometric Mean)
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	100%	

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 for the State Employees Retirement Fund dated June 27, 2019. Since the plan's assets are $0, MSRS' long-term expected rate of investment return of 7.50% is not utilized in this valuation. A single discount rate of 3.13% was used to measure the total pension liability as of July 1, 2019.

Single Discount Rate

A single discount rate of 3.13% was used to measure the total pension liability. This single discount rate was based on a municipal bond rate of 3.13% and the pay-as-you-go status of this plan. Since the plan's assets are $0, MSRS' long-term expected rate of investment return of 7.50% is not utilized in this valuation.

Regarding the sensitivity of the net pension liability to changes in the single discount rate, the following presents the fund's net pension liability, calculated using a single discount rate of 3.13%, 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 (2.13%) or 1-percentage-point higher (4.13%) than the current rate:

Sensitivity of Net Pension Liability
to the Single Discount Rate Assumption

(Dollars in Thousands)

	1% Decrease 2.13%	Current Single Discount Rate Assumption 3.13%	1% Increase 4.13%
Total Pension Liability	$ 155,860	$ 140,185	$ 127,040
Net Position Restricted for Pensions	-	-	-
Net Pension Liability	$ 155,860	$ 140,185	$ 127,040

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

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	**$ 139,367**	**$ -**	**$ 139,367**	**$ 118**	**$ -**	
Changes for the Year:						
Service Cost	$ 496		$ 496			$ 496
Interest on Total Pension Liability	4,894		4,894			4,894
Interest on Plan Fiduciary Net Position		$ -	-			-
Changes in Benefit Terms	-		-			-
Liability Experience Gains and Losses	(2,441)		(2,441)	$ -	$ -	(2,441)
Changes in Assumptions	6,722		6,722	-	-	6,722
Recognition of Deferred Outflows/(Inflows) of						
Resources Arising from Prior Reporting Periods						
Liability Experience Gains/(Losses)				-	-	-
Assumption Changes				-	-	-
Investment Gains/(Losses)				(76)	-	76
State General Fund Appropriations		8,798	(8,798)			
Contributions - Employees		91	(91)			(91)
Asset Gain/(Loss)		-	-	-	-	-
Benefit Payouts	(8,853)	(8,853)				
Administrative Expenses		(36)	36			36
Other Changes			-			-
Net Changes	**$ 818**	**$ -**	**$ 818**	**$ (76)**	**$ 0**	**$ 9,692**
Balance End of Year	**$ 140,185**	**$ -**	**$ 140,185**	**$ 42**	**$ 0**	

Summary of Population Statistics

		Terminated		Recipients			
	Actives	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	Total
Members on 7/1/2018	**19**	**39**	**0**	**293**	**0**	**79**	**430**
Additions	0						**0**
Return to active	0	0	0	0	0	0	**0**
Terminated non-vested	0	0	0	0	0	0	**0**
Service retirements	(1)	(8)	0	9	0	0	**0**
Terminated deferred	(1)	1	0	0	0	0	**0**
Terminated refund/transfer	0	0	0	0	0	0	**0**
Deaths	0	0	0	(15)	0	(4)	**(19)**
New beneficiary	0	0	0	0	0	8	**8**
Disabled	0	0	0	0	0	0	**0**
Unexpected status changes	0	0	0	0	0	0	**0**
Net change	(2)	(7)	0	(6)	0	4	**(11)**
Members on 6/30/2019	**17**	**32**	**0**	**287**	**0**	**83**	**419**

SECTION E

SUMMARY OF BENEFITS

Summary of Plan Provisions – Legislators Retirement Plan

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	Members of the State Legislature first elected to office before July 1, 1997, and who elect to retain coverage under this plan (i.e., do not elect Social Security coverage). Plan is closed to new members.
Contributions	
Member	9.00% of salary which must be paid to the state's General Fund.
Employer	Plan is funded by annual appropriations from the state's General Fund. Employee contributions are "picked up" according to the provisions of Internal Revenue Code 414(h).
Allowable service	Service while in an eligible position.
Salary	Compensation received for service as a member of the legislature. Salary includes the monthly compensation paid to a legislator and the per diem payments paid during a regular or special session. Salary does not include additional compensation attributable to a leadership position.
Average salary	Average of the five highest successive years of salary.
Retirement	
<u>**Normal retirement benefit**</u>	
Age/Service requirements	Age 62 and either six full years of service or service during all or part of four regular legislative sessions. For eligibility purposes, service does not include credit for time not served when a member does not serve a full term of office.
Amount	A percentage of Average Salary for each year of service as follows: First elected prior to January 1, 1979: (a) 5.00% for the first eight years of service prior to January 1, 1979; and (b) 2.50% for subsequent years. Elected after December 31, 1978: (a) 2.50%.
<u>**Early retirement benefit**</u>	
Age/service requirements	Age 55 and either six full years of service or service during all or part of four regular legislative sessions.

Summary of Plan Provisions – Legislators Retirement Plan (Continued)

Retirement (Concluded)	
Early retirement benefit (Concluded)	
Amount	Normal retirement benefit based on service and Average Salary at retirement date and actuarially reduced for each month the member is under age 62 assuming augmentation to age 62 at 3.00% per year.
Form of payment	Paid as a 50% joint and survivor annuity to member, spouse and dependent children. Annuitants may elect 100% joint and survivor bounce back annuity, life annuity, or a term certain and life annuity on an actuarially equivalent basis.
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 disability benefit recipients, or survivors). A benefit recipient who has been receiving a benefit for at least 12 full months as of the June 30 of the calendar year immediately before the adjustment will receive a full increase. Members receiving benefits for at least one month but less than 12 full months as of the June 30 of the calendar year immediately before the adjustment will receive a pro rata increase.
Disability	No additional benefits provided beyond standard plan. Treated as retirement or termination, depending on age and service at termination.
Death	
Surviving spouse benefit	
Age/Service requirement	Death while active, or after termination if service requirements for a normal retirement benefit is met but payments have not begun.
Amount	Survivor payments of 50% of the retirement benefit of the member assuming the member had attained normal retirement age and had a minimum of eight years of service. Benefit is paid for life. A former member's benefit is augmented as a Deferred Annuity to date of death before determining the portion payable to the spouse. If the legislator was at least age 60 at death, the surviving spouse may elect an optional joint and survivor annuity. If a deferred benefit was not eligible to be in pay status 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%.
Benefit increases	Same as for retirement, except benefit increases are paid prior to Normal Retirement.

Summary of Plan Provisions – Legislators Retirement Plan (Continued)

Death (Concluded)

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

Age/Service requirement	Same as spouse's benefit.
Amount	Benefit for first child is 25.00% of the retirement benefit (computed as for surviving spouse) with 12.50% for each additional child. Maximum payable (including spouse) is 100.00% of the retirement benefit. Benefits cease when a child marries or attains age 18 (22 if a full-time student).
Benefit increases	Same as for retirement, except benefit increases are paid prior to Normal Retirement.

<u>**Refund of contributions**</u>

Age/Service requirement	Member dies before receiving any retirement benefits and survivor benefits are not payable.
Amount	Member's contributions with 6.00% interest through June 30, 2011, 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.

Termination

<u>**Refund of contributions**</u>

Age/Service requirement	Termination of 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	Same service requirements as for normal retirement.
Amount	Benefit computed under law in effect at termination and increased by the following annual augmentation percentage: (a.) 0.00% before July 1, 1973; (b.) 5.00% from July 1, 1973, to January 1, 1981; (c.) 3.00% until the earlier of January 1 of the year following attainment of age 55 and January 1, 2012; (d.) 5.00% until the earlier of January 1, 2012, and when the annuity begins; and (e.) 2.00% from January 1, 2012 through December 31, 2018; and (f.) 0.00% from January 1, 2019, thereafter.

Summary of Plan Provisions – Legislators Retirement Plan (Concluded)

<u>Deferred benefit - (Concluded)</u>	
Amount (Concluded)	Amount is payable at normal or early retirement. For members who terminated prior to July 1, 1997, but were not eligible to commence their pensions before July 1, 1997, the benefit shall be increased to reflect the actuarial equivalent change in post-retirement interest rate from 5.00% to 6.00%.
Adjustments for benefits not in pay status	Benefits are adjusted on an actuarial equivalent basis to reflect the 1997 change in post-retirement interest rate assumption from 5.00% to 6.00%.
Actuarial equivalent factors	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 8.00% pre-retirement interest. Based upon statutory requirements; Joint and Survivor factors are based on an interest assumption of 6.50%.
Combined service annuity	Members are eligible for combined service benefits if they: (a.) Have sufficient allowable service in total that equals or exceeds the applicable service credit vesting requirement of the retirement plan with the longest applicable service credit vesting requirement; (b.) Have at least six months of allowable service credit in each plan worked under; and (c.) Are not in receipt of a benefit from another plan, or have applied for benefits with an effective date within one year. Members who meet the above requirements must have their benefit based on the following: (a.) Allowable service in all covered plans are combined in order to determine eligibility for early retirement. (b.) Average salary is based on the high five consecutive years during their entire service in all covered plans.
Changes in Plan Provisions	There have been no changes in plan provisions since the previous valuation.

Summary of Plan Provisions – Elective State Officers Retirement Plan

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	Must be employed as a "Constitutional Officer" first elected prior to July 1, 1997, and must elect to retain coverage under this plan (i.e., does not elect Social Security coverage). Plan is closed to new members since July 1, 1997.
Contributions	Plan is funded by annual appropriations from the State's General Fund.
Allowable service	Service while in an eligible position as a constitution officer.
Salary	Salary upon which Elective State Officers Retirement Fund contributions have been made.
Average salary	Average of the five highest successive years of Salary.
Retirement	
<u>**Normal retirement benefit**</u>	
Age/Service requirements	Age 62 and eight years of Allowable Service.
Amount	2.50% of Average Salary for each year of Allowable Service. For members who terminated service after June 30, 1997, an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.
<u>**Early retirement benefit**</u>	
Age/Service requirement	Age 60 and eight years of Allowable Service.
Amount	Normal retirement benefit based on Allowable Service and Average Salary at retirement date with reduction of 0.50% for each month the member is under age 62 at the time of retirement.
<u>**Form of payment**</u>	Life annuity.
<u>**Benefit increases**</u>	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 disability benefit recipients, or survivors).

Summary of Plan Provisions – Elective State Officers Retirement Plan (Continued)

Retirement (Continued)	
<u>**Early retirement benefit**</u>	
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.
Disability	No additional benefits provided beyond standard plan. Treated as retirement or termination, depending on age and Allowable Service as of disablement.
Death	
<u>**Surviving spouse benefit**</u>	
Age/Service requirement	Death while active, or after retirement, or after termination but prior to retirement with at least eight years of Allowable Service.
Amount	Survivor payments of 50% of the retirement benefit of the member assuming the member had attained age 62 and had a minimum of eight years of Allowable Service. A former member's benefit is augmented as a Deferred Annuity to date of death before determining the portion payable to the spouse. 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.
<u>**Surviving dependent children's benefit**</u>	
Age/Service requirement	Same as spouse's benefit.
Amount	Benefit for first child is 25.00% of the retirement benefit (computed as for surviving spouse) with 12.50% for each additional eligible child. Maximum payable (including spouse) is 100.00% of the retirement benefit. Benefits cease when a child marries or attains age 18 (22 if a full-time student).
Benefit increases	Same as for retirement, except benefit increases are paid prior to Normal Retirement.
Termination	
<u>**Refund of contributions**</u>	
Age/Service requirement	Termination of service.

Summary of Plan Provisions – Elective State Officers Retirement Plan (Continued)

Termination (Concluded)	
Refund of contributions (Concluded)	
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.
Deferred benefit	
Age/service requirement	Eight years of Allowable Service.
Amount	Benefit computed under law in effect at termination and increased by the following annual augmentation percentage: (a.) 0.00% before July 1, 1979; (b.) 5.00% from July 1, 1979, to January 1, 1981; (c.) 3.00% until age 55, or until January 1, 2012, whichever is earlier; (d.) 5.00% thereafter until the annuity begins but prior to 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 prior to July 1, 1997, but was not eligible to commence his or her 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%.
Combined service annuity	Members are eligible for combined service benefits if they: (a.) Have sufficient allowable service in total that equals or exceeds the applicable service credit vesting requirement of the retirement plan with the longest applicable service credit vesting requirement; (b.) Have at least six months of allowable service credit in each plan worked under; and (c.) Are not in receipt of a benefit from another plan, or have applied for benefits with an effective date within one year.

Summary of Plan Provisions – Elective State Officers Retirement Plan (Concluded)

Combined service annuity (Concluded)	Members who meet the above requirements must have their benefit based on the following: (a.) Allowable service in all covered plans are combined in order to determine eligibility for early retirement. (b.) Average salary is based on the high five consecutive years during their entire service in all covered plans.
Actuarial equivalent factors	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 8.00% pre-retirement interest. Based upon statutory requirements; Joint and Survivor factors are based on an interest assumption of 6.50%.
Changes in plan provisions	There have been no changes in plan provisions since the previous valuation.

SECTION F

ACTUARIAL COST METHOD AND ACTUARIAL ASSUMPTIONS

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

Actuarial Cost Method

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

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

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

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

Asset Valuation Method

Fair value of assets.

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

The following assumptions were used in valuing the liabilities and benefits under the plan. Demographic assumptions other than mortality are based on the last assumption review, dated January 2012, prepared by a former actuary. The economic assumptions are based on a review of inflation and investment return assumptions of the State Employees Retirement Fund, dated June 27, 2019. The mortality assumption is based on the State Employees Retirement Fund experience study, dated June 30, 2015.

The Allowance for Combined Service Annuity was 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	3.13% per annum.
Salary increases	4.50% annually.
Inflation	2.50% annually.
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 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 adjustment 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.
Withdrawal	Ultimate rates based on actual experience. Rates are shown in rate table.
Disability	None.
Allowance for combined service annuity	None.

* *Since the plan's assets are $0, MSRS' long term expected rate of investment return of 7.50% is not used in this valuation.*

Summary of Actuarial Assumptions (Continued)

Administrative expenses	In the valuation year, equal to prior year administrative expenses expressed as percentage of prior year projected payroll. In each subsequent year, equal to the initial administrative expense percentage applied to payroll for the closed group.
Refund of contributions	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 take the larger of their contributions accumulated with interest or the value of their deferred benefit.
Commencement of deferred benefits	Members receiving deferred annuities (including current terminated deferred members) are assumed to begin receiving benefits at age 62.
Percentage married	85% of active members are assumed to be married. Legislators in payment status are assumed to be 100% married for purposes of a death benefit, except if reported with a joint & survivor benefit. 100% of Elective State Officers members are assumed to be eligible for the automatic survivor benefit.
Age of spouse	Females are assumed to be three years younger than their spouses, and males are assumed to be three years older than their spouses.
Eligible children	Each member may have two dependent children depending on member's age. Assumed first born child born at member's age 28 and second born child at member's age 31.
Form of payment	Active married members are assumed to elect 50% joint and survivor annuity. Active single members and deferred members are assumed to elect a life annuity. Unless reported with a joint & survivor option, retired members are assumed to have a spouse that is eligible for the automatic survivor benefit. Deferred Elective State Officers Retirement Fund members are assumed to elect a life annuity with automatic survivor benefits.
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, were applied:

Legislators Retirement Plan

<u>Data for active members:</u>

There were no members reported with zero or invalid salary.

There were no members reported with missing service.

There were no members reported with missing or invalid gender or birth dates.

<u>Data for terminated members:</u>

There was one member reported without a benefit. If available, we calculated benefits for this member using the reported Average Salary and credited service. If Average Salary was also not reported (1 member), we assumed a value of $30,000. There were no members reported without credited service or a termination date.

There were no members reported with missing or invalid gender or birth dates.

Benefits were estimated for 18 members at the direction of MSRS.

<u>Data for members receiving benefits:</u>

There were no members reported with missing or invalid gender, birth dates or benefits.

There were 279 retired members reported:

– 113 members were reported with the 75% or 100% joint and survivor option. These members were valued as indicated by the option elected.
– 165 members were reported with the life annuity option and 1 member was reported with the 50% joint and survivor option. All of these members were valued as a 50% joint & survivor annuity per MSRS' direction.

Of the 279 retired members, 134 members had an invalid or missing survivor gender and 126 members had a missing or invalid survivor date of birth. We used the valuation assumptions if the survivor gender or date of birth was missing or invalid.

There were no retirees reported with a bounce back annuity and an unreasonable reduction factor.

There were no survivors reported on the data file with an expired benefit.

Summary of Actuarial Assumptions (Continued)

Unknown data for certain members	**Elective State Officers Retirement Plan** <u>Data for members receiving benefits:</u> There were no members reported with missing or invalid birth dates, genders or benefits. All retired members were reported with a life annuity option. Members were assumed to have a spouse who is eligible for the automatic survivor benefits. Valuation assumptions were used if the survivor gender (5 members) or date of birth (5 members) were missing or invalid.
Changes in actuarial assumptions	The Single Discount Rate changed from 3.62% to 3.13%.

Summary of Actuarial Assumptions (Concluded)

Age in 2019	Percent of Members Dying Each Year*			
	Healthy Post-Retirement Mortality**		Healthy Pre-Retirement Mortality**	
	Male	Female	Male	Female
20	0.03%	0.01%	0.03%	0.01%
25	0.04%	0.02%	0.03%	0.01%
30	0.06%	0.05%	0.03%	0.02%
35	0.09%	0.08%	0.03%	0.02%
40	0.13%	0.11%	0.04%	0.03%
45	0.19%	0.14%	0.07%	0.05%
50	0.28%	0.19%	0.11%	0.09%
55	0.40%	0.26%	0.20%	0.14%
60	0.58%	0.38%	0.35%	0.20%
65	0.87%	0.61%	0.62%	0.29%
70	1.44%	0.97%	1.08%	0.50%
75	2.46%	1.63%	1.89%	0.88%
80	4.41%	2.85%	3.44%	1.55%
85	8.19%	5.15%	7.20%	4.07%
90	14.81%	9.42%	13.37%	9.12%

* *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 Retiring
60	0.00%
61	0.00
62	40.00
63	30.00
64	30.00
65	40.00
66	30.00
67	25.00
68	25.00
69	25.00
70	30.00
71+	100.00

Service	Percent Terminating (Withdrawing)	
	House	Senate
1	0.0%	0.0%
2	30.0	0.0
3	0.0	0.0
4	20.0	25.0
5	0.0	0.0
6	10.0	0.0
7	0.0	0.0
8	5.0	10.0
9+	0.0	0.0

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 plan fiduciary net position is projected to be sufficient to pay benefits) and (2) tax-exempt municipal bond rate based on an index of 20-year general obligation bonds with an average AA credit rating as of the measurement date (to the extent that the contributions for use with the long-term expected rate of return are not met).

This plan is currently funded on a pay-as-you-go basis by annual appropriations from the state's General Fund. The current contribution levels (member contributions and annual appropriations) are not sufficient to cover annual benefit payments. For the fiscal year ending June 30, 2019, total contributions (plan member contributions and state General Fund appropriations) were $8.9 million and total benefit payments were $8.9 million.

For the purpose of this valuation, we have recognized that the assets are not sufficient to pay benefits in any future year regardless of future investment income. 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 3.13%. In describing their index, Fidelity notes that the municipal curves are constructed using option-adjusted analytics of a diverse population of over 10,000 tax-exempt securities.

Section H

Glossary of Terms

Glossary of Terms

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

Glossary of Terms

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

Glossary of Terms

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

Glossary of Terms

Total Pension Expense

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

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

Total Pension Liability (TPL)

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

Unfunded Actuarial Accrued Liability (UAAL)

The UAAL is the difference between actuarial accrued liability and valuation assets.

Valuation Assets

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

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