Minnesota State Retirement System

State Employees Retirement Fund
GASB Statement Nos. 67 and 68
Accounting and Financial Reporting for Pensions
June 30, 2018

GRS Retirement Consulting

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

November 29, 2018

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, 2018 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

Bonita J. Wurst

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

Table of Contents

SECTION A

EXECUTIVE SUMMARY

Executive Summary
as of June 30, 2018 (Dollars in Thousands)

	2018
Actuarial Valuation Date	June 30, 2018
Measurement Date of the Net Pension Liability	June 30, 2018
Membership	
Number of	
- Service Retirements	34,937
- Survivors	4,058
- Disability Retirements	1,826
- Deferred Retirements	17,109
- Terminated other non-vested	8,235
- Active Members	51,223
- Total	117,388
Covered-employee Payroll	$ 3,031,382 [(1)]
Net Pension Liability	
Total Pension Liability	$ 14,679,489
Plan Fiduciary Net Position	13,293,422
Net Pension Liability	$ 1,386,067
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	90.56%
Net Pension Liability as a Percentage of Covered-employee Payroll	45.72%
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	3.62% [(2)]
Last year ending June 30 in the 2019 to 2118 projection period for which projected benefit payments are fully funded	2118
Total Pension Expense/ (Income)	$ (1,661,668)

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	$ 38,278	$ 105,146
Changes in assumptions	3,964,527	6,189,984
Net difference between projected and actual earnings on pension plan investments	443,800	790,779
Totals	$ 4,446,605	$ 7,085,909

[(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, 2018.

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, MN, 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 30 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, 2018 and a measurement date of June 30, 2018.

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 3.62% (based on the weekly rate closest to but not later than the measurement date of the Fidelity "20-Year Municipal GO AA Index"); 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, 2018 (Dollars in Thousands)

A. Expense/(Income)		
1. Service Cost	$	455,709
2. Interest on the Total Pension Liability		1,069,154
3. Current-Period Benefit Changes		(1,711,128)
4. Employee Contributions (made negative for addition here)		(166,726)
5. Projected Earnings on Plan Investments (made negative for addition here)		(918,843)
6. Pension Plan Administrative Expense		9,564
7. Other Changes in Plan Fiduciary Net Position		(20,423)
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		(1,626)
9. Recognition of Outflow (Inflow) of Resources due to assumption changes		
Arising from Current Reporting Period		(843,815)
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		(71,541)
11. Increases/(Decreases) from Experience in the Current Reporting Period	**$**	**(2,199,675)**
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	$	(93,269)
13. Recognition of Outflow (Inflow) of Resources due to assumption changes		
Arising from Prior Reporting Periods		748,562
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		(117,286)
15. Total Pension Expense/ (Income)	**$**	**(1,661,668)**

Benefit changes since the previous measurement date are described on page 25.

Statement of Outflows and Inflows
Arising from Current Reporting Period
Fiscal Year Ended June 30, 2018 (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	$	(8,132)
2. Assumption Changes (gains) or losses		(4,219,074)
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		(1,626)
5. Outflow (Inflow) of Resources to be recognized in the current pension expense for Assumption Changes		(843,815)
6. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Liabilities	$	(845,441)
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	$	(6,506)
8. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses for Assumption Changes		(3,375,259)
9. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Liabilities	$	(3,381,765)
B. Outflows (Inflows) of Resources due to Assets		
1. Net difference between projected and actual earnings on pension plan investments (gains) or losses	$	(357,707)
2. Recognition period for Assets {in years}		5
3. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Assets		(71,541)
4. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Assets	$	(286,166)

Statement of Outflows and Inflows
Arising from Current and Prior Reporting Periods
Fiscal Year Ended June 30, 2018 (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	$ 1,996,438	$ 2,186,586	$ (190,148)
2. Due to Assets	261,194	450,021	(188,827)
3. Total	$ 2,257,632	$ 2,636,607	$ (378,975)

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	$ 14,174	$ 109,069	$ (94,895)
2. Assumption Changes	1,982,264	2,077,517	(95,253)
3. Net Difference between projected and actual earnings on pension plan investments	261,194	450,021	(188,827)
4. Total	$ 2,257,632	$ 2,636,607	$ (378,975)

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	$ 38,278	$ 105,146	$ (66,868)
2. Assumption Changes	3,964,527	6,189,984	(2,225,457)
3. Net Difference between projected and actual earnings on pension plan investments*	443,800	790,779	(346,979)
4. Total	$ 4,446,605	$ 7,085,909	$ (2,639,304)

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
2019	$ 135,563
2020	155,615
2021	(2,013,499)
2022	(916,983)
2023	-
Thereafter	-
Total	$ (2,639,304)

** 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.*

Statement of Fiduciary Net Position
as of June 30, 2018 (Dollars in Thousands)

Assets		**June 30, 2018**
Cash & Short-term Investments	$	144,221
Receivables		24,772
Investment Pools (at fair value)		13,117,429
Securities Lending Collateral		1,334,503
Capital Assets		17,082
Total Assets	**$**	**14,638,007**
Total Deferred Outflows of Resources	**$**	**-**
Total Liabilities	**$**	**(1,344,585)**
Total Deferred Inflows of Resources	**$**	**-**
Net Position Restricted for Pensions	**$**	**13,293,422**

Statement of Changes in Fiduciary Net Position for Year Ended June 30, 2018 (Dollars in Thousands)

1.	**Net Position at market value at beginning of year**	**$ 12,485,614**
Additions		
2.	Contributions	
	a. Employee	$ 166,726
	b. Employer	164,233
	c. Other sources	-
	d. Total contributions	$ 330,959
3.	Investment income	
	a. Investment income/(loss)	$ 1,290,523
	b. Investment expenses	(13,973)
	c. Net investment income/(loss)	$ 1,276,550
4.	Other Additions	20,495
5.	**Total Additions (2.d.) + (3.c.) + (4.)**	**$ 1,628,004**
Deductions		
6.	Benefits Paid	
	a. Annuity benefits	$ (797,027)
	b. Refunds	(13,533)
	c. Total benefits paid	$ (810,560)
7.	Expenses	
	a. Other deductions	$ (72)
	b. Administrative	(9,564)
	c. Total expenses	$ (9,636)
8.	**Total deductions (6.c.) + (7.c.)**	**$ (820,196)**
9.	**Net increase/(decrease) in fiduciary net position (5.) + (8.)**	**$ 807,808**
10.	**Net position at market value at end of year (1.) + (9.)**	**$ 13,293,422**
11.	State Board of Investment calculated annual investment return for the State Employees Retirement Fund*	10.5%

** The fiscal year 2018 investment return for the Combined Funds is 10.3%.*

SECTION C

REQUIRED SUPPLEMENTARY INFORMATION

Schedule of Changes in Net Pension Liability and Related Ratios
Current Period
Fiscal Year Ended June 30, 2018 (Dollars in Thousands)

A. Total pension liability		
1. Service Cost	$	455,709
2. Interest on the Total Pension Liability		1,069,154
3. Changes of benefit terms		(1,711,128)
4. Difference between expected and actual experience of the Total Pension Liability		(8,132)
5. Changes of assumptions		(4,219,074)
6. Benefit payments, including refunds of employee contributions		(810,560)
7. Net change in total pension liability	$	(5,224,031)
8. Total pension liability – beginning		19,903,520
9. Total pension liability – ending	**$**	**14,679,489**
B. Plan fiduciary net position		
1. Contributions – employer	$	164,233
2. Contributions – employee		166,726
3. Net investment income		1,276,550
4. Benefit payments, including refunds of employee contributions		(810,560)
5. Pension Plan Administrative Expense		(9,564)
6. Other changes		20,423
7. Net change in plan fiduciary net position	$	807,808
8. Plan fiduciary net position – beginning		12,485,614
9. Plan fiduciary net position – ending	**$**	**13,293,422**
C. Net pension liability, *A.9. - B.9.*	**$**	**1,386,067**
D. Plan fiduciary net position as a percentage of the total pension liability, *B.9. / A.9.*		**90.56%**
E. Covered-employee payroll	**$**	**3,031,382** (1)
F. Net pension liability as a percentage of covered-employee payroll, *C. / E.*		**45.72%**

(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,	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Total Pension Liability										
Service Cost	$ 455,709	$ 619,666	$ 211,491	$ 210,545	$ 256,155					
Interest on the Total Pension Liability	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	(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	(797,027)	(750,526)	(707,361)	(665,821)	(623,942)					
Refunds	(13,533)	(11,576)	(13,345)	(12,026)	(11,986)					
Net Change in Total Pension Liability	$ (5,224,031)	$ (3,718,430)	$10,444,238	$ 57,536	$ (978,923)					
Total Pension Liability - Beginning	19,903,520	23,621,950	13,177,712	13,120,176	14,099,099					
Total Pension Liability - Ending (a)	**$14,679,489**	**$19,903,520**	**$23,621,950**	**$13,177,712**	**$13,120,176**					
Plan Fiduciary Net Position										
Employer Contributions	$ 164,233	$ 158,352	$ 151,168	$ 146,333	$ 128,037					
Employee Contributions	166,726	161,670	153,854	149,293	131,033					
Pension Plan Net Investment Income	1,276,550	1,667,562	(9,633)	501,185	1,829,621					
Benefit Payments	(797,027)	(750,526)	(707,361)	(665,821)	(623,942)					
Refunds	(13,533)	(11,576)	(13,345)	(12,026)	(11,986)					
Pension Plan Administrative Expense	(9,564)	(10,165)	(10,196)	(8,719)	(8,125)					
Other Changes	20,423	47,232	20,259	29,470	20,528					
Net Change in Plan Fiduciary Net Position	$ 807,808	$ 1,262,549	$ (415,254)	$ 139,715	$ 1,465,166					
Plan Fiduciary Net Position - Beginning	12,485,614	11,223,065	11,638,319	11,498,604	10,033,438					
Plan Fiduciary Net Position - Ending (b)	**$13,293,422**	**$12,485,614**	**$11,223,065**	**$11,638,319**	**$11,498,604**					
Net Pension Liability - Ending (a) - (b)	**$ 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	**90.56 %**	**62.73 %**	**47.51 %**	**88.32 %**	**87.64 %**					
Covered-Employee Payroll [1]	**$ 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	**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)
2009						
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

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)
2009	$ 179,759	$ 107,211	$ 72,548	$ 2,329,499		4.60%
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

Notes to Schedule of Contributions

Methods and Assumptions Used to Determine Fiscal Year Ending June 30, 2018 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, 2017
Actuarial Cost Method	Entry Age Normal
Amortization Method	Level Percentage of Payroll, Closed
Remaining Amortization Period	25 years
Asset Valuation Method	5-Year smoothed market; no corridor
Inflation	2.75%
Payroll Growth	3.50%
Salary Increases	Service based table of rates ranging from 14.00% with one year of service to 3.50% with 25 or more years of service, including inflation
Investment Rate of Return	8.00%
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 assumed to remain at 2.00% indefinitely. See separate funding actuarial valuation report as of July 1, 2017 for additional detail. To obtain this report, contact MSRS at 60 Empire Drive, Suite 300, St. Paul, MN, 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]
2009	
2010	
2011	
2012	
2013	
2014	18.67%
2015	4.45
2016	(0.08)
2017	15.24
2018	10.49

[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, 2018, the annual money-weighted rate of return for the State Employees Retirement Fund was 10.49%. 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. Best 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, 2018, these best estimates are summarized in the following table:

Asset Class	Transitional Target Allocation	Final Target Allocation	Long-Term Expected Real Rate of Return (Geometric Mean)
Domestic Equity[1]	33%	36%	5.10%
International Equity[2]	16%	17%	5.30%
Private Markets[3]	25%	25%	5.90%
Fixed Income	16%	20% [4]	0.75%
Treasuries	8%	0%	0.50%
Cash	2%	2%	0.00%
Total	100%	100%	

[1] Domestic Equity includes U.S. Stock Actively Managed and the U.S. Stock Index Fund.

[2] International Equity includes Broad International Stock Fund.

[3] Private Markets includes the Alternative Investment Pool. If a 25 percent allocation uncommitted allocation to Private Markets cannot be achieved, the uncommitted allocation is invested in Public Equities.

[4] The Final Target Allocation will combine Fixed Income investment options.

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 dated September 11, 2017.

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	$ 16,497,171	$ 14,679,489	$ 13,170,712
Net Position Restricted for Pensions	13,293,422	13,293,422	13,293,422
Net Pension Liability	**$ 3,203,749**	**$ 1,386,067**	**$ (122,710)**

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	**$ 19,903,520**	**$ 12,485,614**	**$ 7,417,906**	**$ 6,704,237**	**$ 5,137,603**	
Changes for the Year:						
Service Cost	$ 455,709		$ 455,709			$ 455,709
Interest on Total Pension Liability	1,069,154		1,069,154			1,069,154
Interest on Fiduciary Net Position		$ 918,843 [1]	(918,843)			(918,843)
Changes in Benefit Terms	(1,711,128)		(1,711,128)			(1,711,128)
Liability Experience Gains and Losses	(8,132)		(8,132)	$ -	$ 6,506	(1,626)
Changes in Assumptions	(4,219,074)		(4,219,074)	-	3,375,259	(843,815)
Recognition of Deferred Outflows/(Inflows) of Resources Arising from Prior Reporting Periods						
Liability Experience Gains/(Losses)				(14,174)	(107,443)	(93,269)
Assumption Changes				(1,982,264)	(1,233,702)	748,562
Investment Gains/(Losses)				(261,194)	(378,480)	(117,286)
Contributions - Employer		164,233	(164,233)			
Contributions - Employees		166,726	(166,726)			(166,726)
Asset Gain/(Loss)		357,707 [1]	(357,707)	-	286,166	(71,541)
Benefit Payments and Refunds	(810,560)	(810,560)	-			
Administrative Expenses		(9,564)	9,564			9,564
Other changes		20,423	(20,423)			(20,423)
Net Changes	**$ (5,224,031)**	**$ 807,808**	**$ (6,031,839)**	**$ (2,257,632)**	**$ 1,948,306**	**$ (1,661,668)**
Balance End of Year	**$ 14,679,489**	**$ 13,293,422**	**$ 1,386,067**	**$ 4,446,605**	**$ 7,085,909**	

(1) The sum of these items in column (b) equals the net investment income of $1,276,550.

Summary of Population Statistics

		Terminated*		Recipients**			
	Actives	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	Total
Members on July 1, 2017	**50,578**	**17,006**	**9,468**	**33,563**	**1,830**	**3,940**	**116,385**
New members	5,649	0	0	0	0	0	**5,649**
Return to active	347	(156)	(191)	0	0	0	**0**
Terminated non-vested	(1,944)	0	1,944	0	0	0	**0**
Service retirements	(1,450)	(709)	0	2,159	0	0	**0**
Unclassified retirements	0	0	0	62	0	0	**62**
Terminated deferred	(1,005)	1,005	0	0	0	0	**0**
Terminated refund/transfer	(823)	(164)	(3,278)	0	0	0	**(4,265)**
Deaths	(88)	(37)	(15)	(911)	(68)	(185)	**(1,304)**
New beneficiary	0	0	0	0	0	325	**325**
Disabled	(41)	0	0	0	41	0	**0**
Data adjustments	0	164	307	64	23	(22)	**536**
Net change	645	103	(1,233)	1,374	(4)	118	**1,003**
Members on July 1, 2018	**51,223**	**17,109**	**8,235**	**34,937**	**1,826**	**4,058**	**117,388**

* *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)	
Benefit increases (Continued)	A benefit recipient who has been receiving a benefit for at least 12 full months as of the June 30 of the calendar year immediately before the adjustment will receive a full increase. Members receiving benefits for at least one month but less than 12 full months as of the June 30 of the calendar year immediately before the adjustment will receive a pro rata increase. Prior to 2002, members who retired under the laws in effect before July 1, 1973, received an additional lump sum payment each year. In 1989, this lump sum payment was the greater of $25 times each full year of Allowable Service or $400 per full year of service less any Social Security benefits received or annuity from a Minnesota public employee pension plan. In each following year, the lump sum payment was increased by the same percentage increase that was applied to regular annuities paid from the Minnesota Post Retirement Investment Fund. Effective January 1, 2002, the annual lump sum payment was divided by 12 and paid as a monthly life annuity in the annuity form elected.
Disability	
Disability benefit	
Age/Service requirement	Total and permanent disability before normal retirement age with three years of Allowable Service (five years if hired after June 30, 2010).
Amount	Normal Retirement benefit based on Allowable Service and Average Salary at disability without reduction for commencement before normal retirement age. Payments stop if disability ceases or death occurs. Payments revert to a retirement annuity at normal retirement age. Benefits may be reduced on resumption of partial employment.
Retirement after disability	
Age/Service requirement	Normal retirement age with continued disability.
Amount	Any optional annuity continues. Otherwise, a normal retirement benefit equal to the disability benefit paid before normal retirement age, or an actuarially equivalent optional annuity.
Form of payment	Same as for retirement.
Benefit Increases	Same as for retirement, except benefit increases are paid prior to Normal Retirement.

Summary of Plan Provisions (Continued)

Death

Surviving spouse optional benefit

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

Surviving dependent children's benefit

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

Refund of contributions

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

Summary of Plan Provisions (Continued)

Death (Continued)	
<u>Refund of contributions (Continued)</u>	
Age/Service requirement	Retired or disabled annuitant who did not select an optional annuity dies, or the remaining recipient of an option dies.
Amount	The excess of the member's contributions over all benefits paid.
Unclassified Plan Provision	Eligible members credited with employee shares in the Unclassified Plan may elect to terminate participation in the Unclassified Plan and be covered by the State Employees Retirement Fund prior to termination of covered employment assuming that the member has acquired at least 10 years of allowable state service (no more than seven years of service if hired after June 30, 2010).
Termination	
<u>Refund of contributions</u>	
Age/Service requirement	Termination of state service.
Amount	Member's contributions with 6.00% interest through June 30, 2011, compounded daily. Beginning July 1, 2011, a member's contributions increase at 4.00% interest compounded daily. Beginning July 1, 2018, a member's contributions increase at 3.00% interest compounded daily. If a member is vested, a deferred annuity may be elected in lieu of a refund.
<u>Deferred benefit</u>	
Age/Service requirement	Three years of Allowable Service if hired prior to June 30, 2010, five years of Allowable Service if hired after June 30, 2010.
Amount	Benefit computed under law in effect at termination and increased by the following annual augmentation percentage: (a.) 0.00% before July 1, 1971; (b.) 5.00% from July 1, 1971 to January 1, 1981; (c.) 3.00% thereafter (2.50% if hired after June 30, 2006) until January 1 of the year following attainment of age 55 or January 1, 2012, whichever is earlier; (d.) 5.00% thereafter until the annuity begins (2.50% if hired after June 30, 2006), but before January 1, 2012; (e.) 2.00% from January 1, 2012 through December 31, 2018; and (f.) 0.00% from January 1, 2019, thereafter. Amount is payable at normal or early retirement. If a member terminated employment prior to July 1, 1997, but was not eligible to commence their pension before July 1, 1997, an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.

Summary of Plan Provisions (Concluded)

Combined Service Annuity	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	The augmentation adjustment in early retirement factors is eliminated over a five-year period starting July 1, 2019, resulting in actuarial equivalence after June 30, 2024. Member contributions were changed from 5.50% to 5.75% of pay, effective July 1, 2018 and 6.00% of pay, effective July 1, 2019. Employer contributions were changed from 5.50% to 5.875% of pay, effective July 1, 2018 and 6.25% of pay, effective July 1, 2019. Interest credited on member contributions will decrease from 4.0% to 3.0%, beginning July 1, 2018. Deferred augmentation was changed to 0.00% for future accruing benefits, effective January 1, 2019. Augmentation that has already accrued for deferred members will still apply. Contribution stabilizer provisions were repealed. Post-retirement benefit increases were changed from 2.0% per year, increasing to 2.5% per year upon achieving a 90% funding ratio to a fixed rate of 1.0% for five years (beginning January 1, 2019) and 1.5% per year thereafter. For retirements on or after January 1, 2024, the first benefit increase is delayed until the retiree reaches Normal Retirement Age.

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, dated September 11, 2017. 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	Prior year administrative expenses expressed as percentage of prior year projected payroll.
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 85 members reported with zero or invalid salary (<$100). We used prior year salary (57 members), if available, otherwise, high five salary with a 10% load to account for salary increases (21 members). If neither pay or high five salary was available, we assumed a value of $35,000 (7 members). There were 11 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 111 members reported without a gender and 9 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> Benefits were reported with full augmentation to Normal Retirement Age. Based on direction from MSRS, we adjusted benefits by removing augmentation on a prospective basis beginning January 1, 2019. There were 372 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 (357 members), we assumed a value of $30,000. If termination date was not reported (7 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 (10 members), we assumed a value of 7.5 years. There were no members with a missing date of birth, and no members with an invalid gender. <u>Data for members receiving benefits:</u> There were 16 members reported without a gender. We assumed female gender for the valuation. No retired members were reported with an invalid date of birth. There were no members reported without a benefit. There were 5 survivor members reported with a certain end date prior to the valuation date. These members were excluded from the valuation. There were 108 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.

Summary of Actuarial Assumptions (Continued)

Unknown data for certain members – (Concluded)	Data for members receiving benefits: There were no retirees reported with a bounce back annuity and an unreasonable reduction factor. There were retired members reported with a survivor option and an invalid or missing survivor gender (3,973 members) and/or survivor date of birth (3,444 members). We used the valuation assumptions if the survivor gender or date of birth was missing or invalid.
Changes in actuarial assumptions	The Single Discount Rate was changed from 5.42% to 7.50%.

Summary of Actuarial Assumptions (Continued)

	Percent of Members Dying Each Year*					
	Healthy Post-Retirement Mortality**		Healthy Pre-Retirement Mortality**		Disability Mortality**	
Age in 2018	Male	Female	Male	Female	Male	Female
20	0.03%	0.01%	0.03%	0.01%	0.08%	0.06%
25	0.04	0.02	0.03	0.01	0.27	0.18
30	0.06	0.05	0.03	0.02	0.57	0.37
35	0.09	0.08	0.04	0.02	0.95	0.61
40	0.13	0.11	0.04	0.03	1.32	0.84
45	0.20	0.15	0.07	0.05	1.64	1.05
50	0.29	0.19	0.12	0.09	1.94	1.31
55	0.41	0.27	0.20	0.14	2.31	1.61
60	0.58	0.38	0.36	0.20	2.76	1.94
65	0.88	0.62	0.63	0.30	3.34	2.50
70	1.45	0.99	1.09	0.51	4.27	3.55
75	2.50	1.65	1.92	0.89	5.83	5.30
80	4.47	2.89	3.48	1.57	8.41	7.94
85	8.29	5.21	7.29	4.12	12.68	11.72
90	14.99	9.53	13.53	9.22	19.16	17.26

* *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.*

	Percent of Members Decrementing Each Year	
	Disability Retirement	
Age	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 3.62% (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, 2018 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: 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)
2018	$ 3,031,382		$ 3,031,382				
2019	3,133,366		3,133,366	$ 180,169	$ 184,085		$ 364,254
2020	2,962,638	$ 272,562	3,235,200	177,758	185,165	$ 10,303	373,226
2021	2,802,091	538,253	3,340,344	168,125	175,131	20,346	363,602
2022	2,666,615	782,291	3,448,906	159,997	166,663	29,571	356,231
2023	2,543,613	1,017,382	3,560,995	152,617	158,976	38,457	350,050
2024	2,430,712	1,246,015	3,676,727	145,843	151,919	47,099	344,861
2025	2,325,792	1,470,429	3,796,221	139,548	145,362	55,582	340,492
2026	2,227,987	1,691,611	3,919,598	133,679	139,249	63,943	336,871
2027	2,136,253	1,910,732	4,046,985	128,175	133,516	72,226	333,917
2028	2,049,943	2,128,569	4,178,512	122,997	128,121	80,460	331,578
2029	1,968,623	2,345,691	4,314,314	118,117	123,039	88,667	329,823
2030	1,890,786	2,563,743	4,454,529	113,447	118,174	96,910	328,531
2031	1,815,300	2,784,001	4,599,301	108,918	113,456	105,235	327,609
2032	1,741,679	3,007,099	4,748,778	104,501	108,855	113,668	327,024
2033	1,669,881	3,233,233	4,903,114	100,193	104,368	122,216	326,777
2034	1,599,485	3,462,980	5,062,465	95,969	99,968	130,901	326,838
2035	1,530,015	3,696,980	5,226,995	91,801	95,626	139,746	327,173
2036	1,461,301	3,935,571	5,396,872	87,678	91,331	148,765	327,774
2037	1,393,464	4,178,807	5,572,271	83,608	87,092	157,959	328,659
2038	1,326,694	4,426,676	5,753,370	79,602	82,918	167,328	329,848
2039	1,260,267	4,680,087	5,940,354	75,616	78,767	176,907	331,290
2040	1,193,300	4,940,116	6,133,416	71,598	74,581	186,736	332,915
2041	1,124,933	5,207,819	6,332,752	67,496	70,308	196,856	334,660
2042	1,055,269	5,483,297	6,538,566	63,316	65,954	207,269	336,539
2043	985,265	5,765,804	6,751,069	59,116	61,579	217,947	338,642
2044	914,940	6,055,539	6,970,479	54,896	57,184	228,899	340,979
2045	843,964	6,353,056	7,197,020	50,638	52,748	240,146	343,532
2046	772,195	6,658,728	7,430,923	46,332	48,262	251,700	346,294
2047	700,333	6,972,095	7,672,428	42,020	43,771	263,545	349,336
2048	629,785	7,291,997	7,921,782	37,787	39,362	275,637	352,786
2049	560,946	7,618,294	8,179,240	33,657	35,059	287,971	356,687
2050	494,059	7,951,006	8,445,065	29,644	30,879	300,548	361,071
2051	429,951	8,289,579	8,719,530	25,797	26,872	313,346	366,015
2052	369,490	8,633,424	9,002,914	22,169	23,093	326,343	371,605
2053	313,265	8,982,244	9,295,509	18,796	19,579	339,529	377,904
2054	261,714	9,335,899	9,597,613	15,703	16,357	352,897	384,957
2055	214,962	9,694,574	9,909,536	12,898	13,435	366,455	392,788
2056	173,040	10,058,555	10,231,595	10,382	10,815	380,213	401,410
2057	136,288	10,427,834	10,564,122	8,177	8,518	394,172	410,867
2058	105,054	10,802,402	10,907,456	6,303	6,566	408,331	421,200
2059	79,107	11,182,842	11,261,949	4,746	4,944	422,711	432,401
2060	57,949	11,570,013	11,627,962	3,477	3,622	437,346	444,445
2061	40,986	11,964,885	12,005,871	2,459	2,562	452,273	457,294
2062	27,826	12,368,235	12,396,061	1,670	1,739	467,519	470,928
2063	18,181	12,780,752	12,798,933	1,091	1,136	483,112	485,339
2064	11,305	13,203,594	13,214,899	678	707	499,096	500,481
2065	6,437	13,637,946	13,644,383	386	402	515,514	516,302
2066	3,157	14,084,668	14,087,825	189	197	532,400	532,786
2067	1,341	14,544,339	14,545,680	80	84	549,776	549,940
2068	529	15,017,885	15,018,414	32	33	567,676	567,741

* *Contributions related to future employees in excess of normal cost and expenses of 8.47% of pay.*

** *5.75% Employee/5.875% Employer for fiscal year ending 2019.*

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) * 6.0%**	(e) = (a) * 6.25%**	(f)	(g) = (d) + (e) + (f)
2069	$ 209	$ 15,506,304	$ 15,506,513	$ 13	$ 13	$ 586,138	$ 586,164
2070	78	16,010,397	16,010,475	5	5	605,193	605,203
2071	19	16,530,796	16,530,815	1	1	624,864	624,866
2072	4	17,068,062	17,068,066	-	-	645,173	645,173
2073	-	17,622,779	17,622,779	-	-	666,141	666,141
2074	-	18,195,519	18,195,519	-	-	687,791	687,791
2075	-	18,786,873	18,786,873	-	-	710,144	710,144
2076	-	19,397,447	19,397,447	-	-	733,223	733,223
2077	-	20,027,864	20,027,864	-	-	757,053	757,053
2078	-	20,678,769	20,678,769	-	-	781,657	781,657
2079	-	21,350,829	21,350,829	-	-	807,061	807,061
2080	-	22,044,731	22,044,731	-	-	833,291	833,291
2081	-	22,761,185	22,761,185	-	-	860,373	860,373
2082	-	23,500,923	23,500,923	-	-	888,335	888,335
2083	-	24,264,704	24,264,704	-	-	917,206	917,206
2084	-	25,053,306	25,053,306	-	-	947,015	947,015
2085	-	25,867,539	25,867,539	-	-	977,793	977,793
2086	-	26,708,234	26,708,234	-	-	1,009,571	1,009,571
2087	-	27,576,251	27,576,251	-	-	1,042,382	1,042,382
2088	-	28,472,480	28,472,480	-	-	1,076,260	1,076,260
2089	-	29,397,835	29,397,835	-	-	1,111,238	1,111,238
2090	-	30,353,265	30,353,265	-	-	1,147,353	1,147,353
2091	-	31,339,746	31,339,746	-	-	1,184,642	1,184,642
2092	-	32,358,288	32,358,288	-	-	1,223,143	1,223,143
2093	-	33,409,932	33,409,932	-	-	1,262,895	1,262,895
2094	-	34,495,755	34,495,755	-	-	1,303,940	1,303,940
2095	-	35,616,867	35,616,867	-	-	1,346,318	1,346,318
2096	-	36,774,415	36,774,415	-	-	1,390,073	1,390,073
2097	-	37,969,584	37,969,584	-	-	1,435,250	1,435,250
2098	-	39,203,595	39,203,595	-	-	1,481,896	1,481,896
2099	-	40,477,712	40,477,712	-	-	1,530,058	1,530,058
2100	-	41,793,237	41,793,237	-	-	1,579,784	1,579,784
2101	-	43,151,518	43,151,518	-	-	1,631,127	1,631,127
2102	-	44,553,942	44,553,942	-	-	1,684,139	1,684,139
2103	-	46,001,945	46,001,945	-	-	1,738,874	1,738,874
2104	-	47,497,008	47,497,008	-	-	1,795,387	1,795,387
2105	-	49,040,661	49,040,661	-	-	1,853,737	1,853,737
2106	-	50,634,483	50,634,483	-	-	1,913,983	1,913,983
2107	-	52,280,103	52,280,103	-	-	1,976,188	1,976,188
2108	-	53,979,207	53,979,207	-	-	2,040,414	2,040,414
2109	-	55,733,531	55,733,531	-	-	2,106,727	2,106,727
2110	-	57,544,871	57,544,871	-	-	2,175,196	2,175,196
2111	-	59,415,079	59,415,079	-	-	2,245,890	2,245,890
2112	-	61,346,069	61,346,069	-	-	2,318,881	2,318,881
2113	-	63,339,816	63,339,816	-	-	2,394,245	2,394,245
2114	-	65,398,360	65,398,360	-	-	2,472,058	2,472,058
2115	-	67,523,807	67,523,807	-	-	2,552,400	2,552,400
2116	-	69,718,331	69,718,331	-	-	2,635,353	2,635,353
2117	-	71,984,176	71,984,176	-	-	2,721,002	2,721,002
2118	-	74,323,662	74,323,662	-	-	2,809,434	2,809,434

** Contributions related to future employees in excess of normal cost and expenses of 8.47% of pay.*

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)
2019	$ 13,293,422	$ 364,254	$ 860,794	$ 10,027	$ 978,354	$ 13,765,209
2020	13,765,209	373,226	910,768	9,480	1,012,248	14,230,435
2021	14,230,435	363,602	957,404	8,967	1,045,087	14,672,754
2022	14,672,754	356,231	998,783	8,533	1,076,482	15,098,151
2023	15,098,151	350,050	1,037,590	8,140	1,106,745	15,509,216
2024	15,509,216	344,861	1,080,999	7,778	1,135,799	15,901,099
2025	15,901,099	340,492	1,124,572	7,443	1,163,437	16,273,013
2026	16,273,013	336,871	1,166,020	7,130	1,189,682	16,626,417
2027	16,626,417	333,917	1,204,521	6,836	1,214,672	16,963,649
2028	16,963,649	331,578	1,240,260	6,560	1,238,573	17,286,979
2029	17,286,979	329,823	1,273,226	6,300	1,261,553	17,598,830
2030	17,598,830	328,531	1,303,826	6,051	1,283,777	17,901,261
2031	17,901,261	327,609	1,331,922	5,809	1,305,400	18,196,539
2032	18,196,539	327,024	1,358,553	5,573	1,326,552	18,485,989
2033	18,485,989	326,777	1,382,644	5,344	1,347,373	18,772,151
2034	18,772,151	326,838	1,405,003	5,118	1,368,023	19,056,890
2035	19,056,890	327,173	1,425,924	4,896	1,388,628	19,341,871
2036	19,341,871	327,774	1,445,508	4,676	1,409,311	19,628,772
2037	19,628,772	328,659	1,463,102	4,459	1,430,221	19,920,091
2038	19,920,091	329,848	1,478,034	4,245	1,451,572	20,219,231
2039	20,219,231	331,290	1,490,073	4,033	1,473,625	20,530,040
2040	20,530,040	332,915	1,500,212	3,819	1,496,630	20,855,556
2041	20,855,556	334,660	1,509,341	3,600	1,520,780	21,198,055
2042	21,198,055	336,539	1,517,241	3,377	1,546,254	21,560,231
2043	21,560,231	338,642	1,523,235	3,153	1,573,282	21,945,767
2044	21,945,767	340,979	1,527,659	2,928	1,602,129	22,358,288
2045	22,358,288	343,532	1,531,269	2,701	1,633,037	22,800,886
2046	22,800,886	346,294	1,534,457	2,471	1,666,225	23,276,476
2047	23,276,476	349,336	1,537,164	2,241	1,701,915	23,788,322
2048	23,788,322	352,786	1,538,221	2,015	1,740,400	24,341,271
2049	24,341,271	356,687	1,537,963	1,795	1,782,032	24,940,233
2050	24,940,233	361,071	1,536,535	1,581	1,827,176	25,590,364
2051	25,590,364	366,015	1,533,444	1,376	1,876,239	26,297,799
2052	26,297,799	371,605	1,528,561	1,182	1,929,690	27,069,351
2053	27,069,351	377,904	1,521,171	1,002	1,988,067	27,913,148
2054	27,913,148	384,957	1,511,174	837	2,051,986	28,838,079
2055	28,838,079	392,788	1,498,664	688	2,122,110	29,853,625
2056	29,853,625	401,410	1,483,784	554	2,199,146	30,969,844
2057	30,969,844	410,867	1,466,360	436	2,283,857	32,197,772
2058	32,197,772	421,200	1,445,658	336	2,377,098	33,550,076
2059	33,550,076	432,401	1,421,475	253	2,479,827	35,040,576
2060	35,040,576	444,445	1,394,266	185	2,593,062	36,683,632
2061	36,683,632	457,294	1,364,124	131	2,717,876	38,494,547
2062	38,494,547	470,928	1,330,403	89	2,855,440	40,490,422
2063	40,490,422	485,339	1,293,379	58	3,007,026	42,689,351
2064	42,689,351	500,481	1,254,078	36	3,173,951	45,109,669
2065	45,109,669	516,302	1,213,417	21	3,357,555	47,770,089
2066	47,770,089	532,786	1,171,758	10	3,559,228	50,690,336
2067	50,690,336	549,940	1,129,113	4	3,780,449	53,891,608
2068	53,891,608	567,741	1,085,773	2	4,022,796	57,396,370

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)
2069	$ 57,396,370	$ 586,164	$ 1,042,027	$ 1	$ 4,287,942	$ 61,228,448
2070	61,228,448	605,203	998,021	-	4,577,669	65,413,298
2071	65,413,298	624,866	953,777	-	4,893,886	69,978,273
2072	69,978,273	645,173	909,273	-	5,238,646	74,952,819
2073	74,952,819	666,141	864,511	-	5,614,157	80,368,606
2074	80,368,606	687,791	819,500	-	6,022,796	86,259,693
2075	86,259,693	710,144	774,275	-	6,467,116	92,662,677
2076	92,662,677	733,223	728,897	-	6,949,860	99,616,864
2077	99,616,864	757,053	683,456	-	7,473,975	107,164,436
2078	107,164,436	781,657	638,077	-	8,042,620	115,350,636
2079	115,350,636	807,061	592,913	-	8,659,183	124,223,967
2080	124,223,967	833,291	548,150	-	9,327,297	133,836,405
2081	133,836,405	860,373	503,993	-	10,050,853	144,243,638
2082	144,243,638	888,335	460,670	-	10,834,020	155,505,323
2083	155,505,323	917,206	418,420	-	11,681,266	167,685,374
2084	167,685,374	947,015	377,492	-	12,597,374	180,852,271
2085	180,852,271	977,793	338,129	-	13,587,474	195,079,409
2086	195,079,409	1,009,571	300,563	-	14,657,063	210,445,480
2087	210,445,480	1,042,382	265,003	-	15,812,036	227,034,895
2088	227,034,895	1,076,260	231,632	-	17,058,718	244,938,241
2089	244,938,241	1,111,238	200,601	-	18,403,900	264,252,778
2090	264,252,778	1,147,353	172,021	-	19,854,872	285,082,982
2091	285,082,982	1,184,642	145,966	-	21,419,470	307,541,128
2092	307,541,128	1,223,143	122,470	-	23,106,114	331,747,915
2093	331,747,915	1,262,895	101,529	-	24,923,858	357,833,139
2094	357,833,139	1,303,940	83,097	-	26,882,439	385,936,421
2095	385,936,421	1,346,318	67,093	-	28,992,335	416,207,981
2096	416,207,981	1,390,073	53,394	-	31,264,818	448,809,478
2097	448,809,478	1,435,250	41,846	-	33,712,019	483,914,901
2098	483,914,901	1,481,896	32,267	-	36,346,996	521,711,527
2099	521,711,527	1,530,058	24,456	-	39,183,804	562,400,932
2100	562,400,932	1,579,784	18,203	-	42,237,571	606,200,084
2101	606,200,084	1,631,127	13,291	-	45,524,578	653,342,498
2102	653,342,498	1,684,139	9,511	-	49,062,351	704,079,477
2103	704,079,477	1,738,874	6,662	-	52,869,744	758,681,433
2104	758,681,433	1,795,387	4,564	-	56,967,049	817,439,305
2105	817,439,305	1,853,737	3,055	-	61,376,094	880,666,082
2106	880,666,082	1,913,983	1,995	-	66,120,359	948,698,430
2107	948,698,430	1,976,188	1,270	-	71,225,103	1,021,898,450
2108	1,021,898,450	2,040,414	787	-	76,717,487	1,100,655,564
2109	1,100,655,564	2,106,727	475	-	82,626,724	1,185,388,540
2110	1,185,388,540	2,175,196	278	-	88,984,225	1,276,547,684
2111	1,276,547,684	2,245,890	158	-	95,823,769	1,374,617,184
2112	1,374,617,184	2,318,881	87	-	103,181,672	1,480,117,650
2113	1,480,117,650	2,394,245	47	-	111,096,983	1,593,608,831
2114	1,593,608,831	2,472,058	24	-	119,611,688	1,715,692,553
2115	1,715,692,553	2,552,400	12	-	128,770,926	1,847,015,867
2116	1,847,015,867	2,635,353	6	-	138,623,229	1,988,274,443
2117	1,988,274,443	2,721,002	3	-	149,220,776	2,140,216,218
2118	2,140,216,218	2,809,434	2	-	160,619,666	2,303,645,317

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)
2019	$ 13,293,422	$ 860,794	$ 860,794	$ -	$ 830,224	$ -	$ 830,224
2020	13,765,209	910,768	910,768	-	817,137	-	817,137
2021	14,230,435	957,404	957,404	-	799,050	-	799,050
2022	14,672,754	998,783	998,783	-	775,428	-	775,428
2023	15,098,151	1,037,590	1,037,590	-	749,355	-	749,355
2024	15,509,216	1,080,999	1,080,999	-	726,238	-	726,238
2025	15,901,099	1,124,572	1,124,572	-	702,801	-	702,801
2026	16,273,013	1,166,020	1,166,020	-	677,864	-	677,864
2027	16,626,417	1,204,521	1,204,521	-	651,392	-	651,392
2028	16,963,649	1,240,260	1,240,260	-	623,925	-	623,925
2029	17,286,979	1,273,226	1,273,226	-	595,822	-	595,822
2030	17,598,830	1,303,826	1,303,826	-	567,574	-	567,574
2031	17,901,261	1,331,922	1,331,922	-	539,353	-	539,353
2032	18,196,539	1,358,553	1,358,553	-	511,755	-	511,755
2033	18,485,989	1,382,644	1,382,644	-	484,493	-	484,493
2034	18,772,151	1,405,003	1,405,003	-	457,979	-	457,979
2035	19,056,890	1,425,924	1,425,924	-	432,371	-	432,371
2036	19,341,871	1,445,508	1,445,508	-	407,730	-	407,730
2037	19,628,772	1,463,102	1,463,102	-	383,900	-	383,900
2038	19,920,091	1,478,034	1,478,034	-	360,761	-	360,761
2039	20,219,231	1,490,073	1,490,073	-	338,325	-	338,325
2040	20,530,040	1,500,212	1,500,212	-	316,862	-	316,862
2041	20,855,556	1,509,341	1,509,341	-	296,549	-	296,549
2042	21,198,055	1,517,241	1,517,241	-	277,304	-	277,304
2043	21,560,231	1,523,235	1,523,235	-	258,976	-	258,976
2044	21,945,767	1,527,659	1,527,659	-	241,608	-	241,608
2045	22,358,288	1,531,269	1,531,269	-	225,282	-	225,282
2046	22,800,886	1,534,457	1,534,457	-	210,001	-	210,001
2047	23,276,476	1,537,164	1,537,164	-	195,695	-	195,695
2048	23,788,322	1,538,221	1,538,221	-	182,167	-	182,167
2049	24,341,271	1,537,963	1,537,963	-	169,429	-	169,429
2050	24,940,233	1,536,535	1,536,535	-	157,462	-	157,462
2051	25,590,364	1,533,444	1,533,444	-	146,182	-	146,182
2052	26,297,799	1,528,561	1,528,561	-	135,550	-	135,550
2053	27,069,351	1,521,171	1,521,171	-	125,483	-	125,483
2054	27,913,148	1,511,174	1,511,174	-	115,962	-	115,962
2055	28,838,079	1,498,664	1,498,664	-	106,978	-	106,978
2056	29,853,625	1,483,784	1,483,784	-	98,527	-	98,527
2057	30,969,844	1,466,360	1,466,360	-	90,576	-	90,576
2058	32,197,772	1,445,658	1,445,658	-	83,068	-	83,068
2059	33,550,076	1,421,475	1,421,475	-	75,979	-	75,979
2060	35,040,576	1,394,266	1,394,266	-	69,326	-	69,326
2061	36,683,632	1,364,124	1,364,124	-	63,095	-	63,095
2062	38,494,547	1,330,403	1,330,403	-	57,242	-	57,242
2063	40,490,422	1,293,379	1,293,379	-	51,767	-	51,767
2064	42,689,351	1,254,078	1,254,078	-	46,692	-	46,692
2065	45,109,669	1,213,417	1,213,417	-	42,026	-	42,026
2066	47,770,089	1,171,758	1,171,758	-	37,752	-	37,752
2067	50,690,336	1,129,113	1,129,113	-	33,840	-	33,840
2068	53,891,608	1,085,773	1,085,773	-	30,271	-	30,271

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)
2069	$ 57,396,370	$ 1,042,027	$ 1,042,027	$ -	$ 27,024	$ -	$ 27,024
2070	61,228,448	998,021	998,021	-	24,077	-	24,077
2071	65,413,298	953,777	953,777	-	21,404	-	21,404
2072	69,978,273	909,273	909,273	-	18,982	-	18,982
2073	74,952,819	864,511	864,511	-	16,788	-	16,788
2074	80,368,606	819,500	819,500	-	14,804	-	14,804
2075	86,259,693	774,275	774,275	-	13,011	-	13,011
2076	92,662,677	728,897	728,897	-	11,394	-	11,394
2077	99,616,864	683,456	683,456	-	9,938	-	9,938
2078	107,164,436	638,077	638,077	-	8,631	-	8,631
2079	115,350,636	592,913	592,913	-	7,461	-	7,461
2080	124,223,967	548,150	548,150	-	6,416	-	6,416
2081	133,836,405	503,993	503,993	-	5,488	-	5,488
2082	144,243,638	460,670	460,670	-	4,666	-	4,666
2083	155,505,323	418,420	418,420	-	3,942	-	3,942
2084	167,685,374	377,492	377,492	-	3,309	-	3,309
2085	180,852,271	338,129	338,129	-	2,757	-	2,757
2086	195,079,409	300,563	300,563	-	2,280	-	2,280
2087	210,445,480	265,003	265,003	-	1,870	-	1,870
2088	227,034,895	231,632	231,632	-	1,520	-	1,520
2089	244,938,241	200,601	200,601	-	1,225	-	1,225
2090	264,252,778	172,021	172,021	-	977	-	977
2091	285,082,982	145,966	145,966	-	771	-	771
2092	307,541,128	122,470	122,470	-	602	-	602
2093	331,747,915	101,529	101,529	-	464	-	464
2094	357,833,139	83,097	83,097	-	353	-	353
2095	385,936,421	67,093	67,093	-	265	-	265
2096	416,207,981	53,394	53,394	-	196	-	196
2097	448,809,478	41,846	41,846	-	143	-	143
2098	483,914,901	32,267	32,267	-	103	-	103
2099	521,711,527	24,456	24,456	-	72	-	72
2100	562,400,932	18,203	18,203	-	50	-	50
2101	606,200,084	13,291	13,291	-	34	-	34
2102	653,342,498	9,511	9,511	-	23	-	23
2103	704,079,477	6,662	6,662	-	15	-	15
2104	758,681,433	4,564	4,564	-	9	-	9
2105	817,439,305	3,055	3,055	-	6	-	6
2106	880,666,082	1,995	1,995	-	4	-	4
2107	948,698,430	1,270	1,270	-	2	-	2
2108	1,021,898,450	787	787	-	1	-	1
2109	1,100,655,564	475	475	-	1	-	1
2110	1,185,388,540	278	278	-	-	-	-
2111	1,276,547,684	158	158	-	-	-	-
2112	1,374,617,184	87	87	-	-	-	-
2113	1,480,117,650	47	47	-	-	-	-
2114	1,593,608,831	24	24	-	-	-	-
2115	1,715,692,553	12	12	-	-	-	-
2116	1,847,015,867	6	6	-	-	-	-
2117	1,988,274,443	3	3	-	-	-	-
2118	2,140,216,218	2	2	-	-	-	-
				Totals	$ 16,586,206	$ -	$ 16,586,206

SECTION H

GLOSSARY OF TERMS

Glossary of Terms

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.
Accrued Service	Service credited under the system which was rendered before the date of the actuarial valuation.
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 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 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 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 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, 2018

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

November 29, 2018

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.

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, 2018 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

Bonita J. Wurst

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

BBM/BJW:rmn

Table of Contents

SECTION A

EXECUTIVE SUMMARY

Executive Summary
as of June 30, 2018 (Dollars in Thousands)

		2018
Actuarial Valuation Date		June 30, 2018
Measurement Date of the Net Pension Liability		June 30, 2018
Membership		
Number of		
- Service Retirements		2,736
- Survivors		226
- Disability Retirements		297
- Deferred Retirements		1,347
- Terminated other non-vested		843
- Active Members		4,650
- Total		10,099
Covered-employee Payroll [1]	$	257,330
Net Pension Liability		
Total Pension Liability	$	1,490,521
Plan Fiduciary Net Position		1,114,887
Net Pension Liability	$	375,634
Plan Fiduciary Net Position as a Percentage of Total Pension Liability		74.80%
Net Pension Liability as a Percentage of Covered-Employee Payroll		145.97%
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]		3.62%
Last year ending June 30 in the 2019 to 2118 projection period for which projected benefit payments are fully funded		2118
Total Pension Expense/ (Income)	$	(137,391)

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	$ 6,994	$ 3,104
Changes in assumptions	270,089	646,679
Net difference between projected and actual earnings on pension plan investments	34,738	64,192
Total	$ 311,821	$ 713,975

(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, 2018.

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, MN, 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 30 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, 2018 and a measurement date of June 30, 2018.

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 3.62% (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, 2018 (Dollars in Thousands)

A. Expense

1.	Service Cost	$	85,364
2.	Interest on the Total Pension Liability		108,421
3.	Current-Period Benefit Changes		(164,182)
4.	Employee Contributions (made negative for addition here)		(23,417)
5.	Projected Earnings on Plan Investments (made negative for addition here)		(76,254)
6.	Pension Plan Administrative Expense		827
7.	Other Changes in Plan Fiduciary Net Position		2
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		(700)
9.	Recognition of Outflow (Inflow) of Resources due to assumption changes		
	Arising from Current Reporting Period		(123,568)
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		(5,802)
11.	**Increases/(Decreases) from Experience in the Current Reporting Period**	**$**	**(199,309)**
12.	Recognition of Outflow (Inflow) of Resources due to differences between expected and actual experience in the measurement of the Total Pension Liability		
	Arising from Prior Reporting Periods		3,030
13.	Recognition of Outflow (Inflow) of Resources due to assumption changes		
	Arising from Prior Reporting Periods		67,900
14.	Recognition of Outflow (Inflow) of Resources due to the difference between projected and actual earnings on Pension Plan Investments		
	Arising from Prior Reporting Periods		(9,012)
15.	**Total Pension Expense / (Income)**	**$**	**(137,391)**

Benefit changes since the previous measurement date are described on page 26.

Statement of Outflows and Inflows
Arising from Current Reporting Period
Fiscal Year Ended June 30, 2018 (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	$	(3,499)
2. Assumption Changes (gains) or losses		(617,840)
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		(700)
5. Outflow (Inflow) of Resources to be recognized in the current pension expense for Assumption Changes		(123,568)
6. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Liabilities	$	(124,268)
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	$	(2,799)
8. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses for Assumption Changes		(494,272)
9. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Liabilities	$	(497,071)
B. Outflows (Inflows) of Resources due to Assets		
1. Net difference between projected and actual earnings on pension plan investments (gains) or losses	$	(29,009)
2. Recognition period for Assets {in years}		5
3. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Assets		(5,802)
4. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Assets	$	(23,207)

Statement of Outflows and Inflows
Arising from Current and Prior Reporting Periods
Fiscal Year Ended June 30, 2018 (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	$ 138,226	$ 191,564	$ (53,338)
2. Due to Assets	20,408	35,222	(14,814)
3. Totals	$ 158,634	$ 226,786	$ (68,152)

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	$ 3,183	$ 853	$ 2,330
2. Assumption Changes	135,043	190,711	(55,668)
3. Net Difference between projected and actual earnings on pension plan investments	20,408	35,222	(14,814)
4. Totals	$ 158,634	$ 226,786	$ (68,152)

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	$ 6,994	$ 3,104	$ 3,890
2. Assumption Changes	270,089	646,679	(376,590)
3. Net Difference between projected and actual earnings on pension plan investments*	34,738	64,192	(29,454)
4. Total	$ 311,821	$ 713,975	$ (402,154)

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
2019	$ (52,395)
2020	(34,641)
2021	(185,050)
2022	(130,068)
2023	-
Thereafter	-
Total	$ (402,154)

** 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.*

Statement of Fiduciary Net Position as of June 30, 2018 (Dollars in Thousands)

Assets		**June 30, 2018**
Cash & Short-term Investments	$	15,753
Receivables		2,873
Investment Pools (at fair value)		1,097,846
Securities Lending Collateral		111,689
Capital Assets		-
Total Assets	**$**	**1,228,161**
Total Deferred Outflows of Resources	**$**	**-**
Total Liabilities	**$**	**(113,274)**
Total Deferred Inflows of Resources	**$**	**-**
Net Position Restricted for Pensions	**$**	**1,114,887**

Statement of Changes in Fiduciary Net Position for Year Ended June 30, 2018 (Dollars in Thousands)

1. Net position at market value at beginning of year	**$**	**1,023,817**
Additions		
2. Contributions		
a. Employee	$	23,417
b. Employer		32,893
c. Other sources		-
d. Total contributions	$	56,310
3. Investment income		
a. Investment income/(loss)	$	106,422
b. Investment expenses		(1,159)
c. Net investment income/(loss)	$	105,263
4. Other Additions		-
5. Total Additions *(2.d.) + (3.c.) + (4.)*	**$**	**161,573**
Deductions		
6. Benefits Paid		
a. Annuity benefits	$	(67,622)
b. Refunds		(2,052)
c. Total benefits paid	$	(69,674)
7. Expenses		
a. Other deductions	$	(2)
b. Administrative		(827)
c. Total expenses	$	(829)
8. Total deductions *(6.c.) + (7.c.)*	**$**	**(70,503)**
9. Net increase/(decrease) in fiduciary net position *(5.) + (8.)*	**$**	**91,070**
10. Net position at market value at end of year *(1.) + (9.)*	**$**	**1,114,887**
11. State Board of Investment calculated annual investment return for the Correctional Employees Retirement Fund*		10.4%

** The fiscal year 2018 investment return for the Combined Funds is 10.3%.*

SECTION C

REQUIRED SUPPLEMENTARY INFORMATION

Schedule of Changes in Net Pension Liability and Related Ratios
Current Period
Fiscal Year Ended June 30, 2018 (Dollars in Thousands)

A. Total Pension Liability		
1. Service Cost	$	85,364
2. Interest on the Total Pension Liability		108,421
3. Changes of benefit terms		(164,182)
4. Difference between expected and actual experience of the Total Pension Liability		(3,499)
5. Changes of assumptions		(617,840)
6. Benefit payments, including refunds of employee contributions		(69,674)
7. Net change in Total Pension Liability	$	(661,410)
8. Total Pension Liability – Beginning		2,151,931
9. Total Pension Liability – Ending	**$**	**1,490,521**
B. Plan Fiduciary Net Position		
1. Contributions – Employer	$	32,893
2. Contributions – Employee		23,417
3. Net investment income		105,263
4. Benefit payments, including refunds of employee contributions		(69,674)
5. Pension Plan Administrative Expense		(827)
6. Other changes		(2)
7. Net change in Plan Fiduciary Net Position	$	91,070
8. Plan Fiduciary Net Position – Beginning		1,023,817
9. Plan Fiduciary Net Position – Ending	**$**	**1,114,887**
C. Net Pension Liability, *A.9 - B.9.*	**$**	**375,634**
D. Plan Fiduciary Net Position as a percentage of the Total Pension Liability, *B.9 / A.9.*		**74.80%**
E. Covered-Employee payroll	**$**	**257,330** [1]
F. Net Pension Liability as a percentage of Covered-Employee payroll, *C. / E.*		**145.97%**

[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,	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Total Pension Liability										
Service Cost	$ 85,364	$ 95,522	$ 56,718	$ 48,805	$ 54,443					
Interest on the Total Pension Liability	108,421	95,307	97,571	92,039	85,702					
Benefit Changes	(164,182)	-	-	-	-					
Difference between Expected and Actual Experience	(3,499)	6,566	(764)	7,115	4,103					
Assumption Changes	(617,840)	(213,159)	576,552	118,399	(147,067)					
Benefit Payments	(67,622)	(63,221)	(59,045)	(54,909)	(50,842)					
Refunds	(2,052)	(1,466)	(1,895)	(1,590)	(1,447)					
Net Change in Total Pension Liability	**$ (661,410)**	**$ (80,451)**	**$ 669,137**	**$ 209,859**	**$ (55,108)**					
Total Pension Liability - Beginning	**$ 2,151,931**	**$ 2,232,382**	**$ 1,563,245**	**$ 1,353,386**	**$ 1,408,494**					
Total Pension Liability - Ending (a)	**$ 1,490,521**	**$ 2,151,931**	**$ 2,232,382**	**$ 1,563,245**	**$ 1,353,386**					
Plan Fiduciary Net Position										
Employer Contributions	$ 32,893	$ 31,763	$ 30,678	$ 29,480	$ 26,468					
Employee Contributions	23,417	22,648	21,953	21,061	18,855					
Pension Plan Net Investment Income	105,263	135,359	(195)	38,624	137,523					
Benefit Payments	(67,622)	(63,221)	(59,045)	(54,909)	(50,842)					
Refunds	(2,052)	(1,466)	(1,895)	(1,590)	(1,447)					
Pension Plan Administrative Expense	(827)	(856)	(906)	(720)	(657)					
Other Changes	(2)	(2)	-	-	(1)					
Net Change in Plan Fiduciary Net Position	**$ 91,070**	**$ 124,225**	**$ (9,410)**	**$ 31,946**	**$ 129,899**					
Plan Fiduciary Net Position - Beginning	**$ 1,023,817**	**$ 899,592**	**$ 909,002**	**$ 877,056**	**$ 747,157**					
Plan Fiduciary Net Position - Ending (b)	**$ 1,114,887**	**$ 1,023,817**	**$ 899,592**	**$ 909,002**	**$ 877,056**					
Net Pension Liability - Ending (a) - (b)	**$ 375,634**	**$ 1,128,114**	**$ 1,332,790**	**$ 654,243**	**$ 476,330**					
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	**74.80 %**	**47.58 %**	**40.30 %**	**58.15 %**	**64.80 %**					
Covered-Employee Payroll (1)	**$ 257,330**	**$ 248,879**	**$ 241,242**	**$ 231,440**	**$ 219,244**					
Net Pension Liability as a Percentage of Covered-Employee Payroll	**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)
2009						
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

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)
2009	$ 31,738	$ 20,126	$ 11,612	$ 193,445	10.40%
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

* 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, 2018 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, 2017
Actuarial Cost Method	Entry Age Normal
Amortization Method	Level Percentage of Payroll, Closed
Remaining Amortization Period	21 years
Asset Valuation Method	5-Year smoothed market; no corridor
Inflation	2.75%
Payroll Growth	3.50%
Salary Increases	Service based tables ranging from 5.75% with one year of service to 3.50% with 19 or more years of service, including inflation.
Investment Rate of Return	8.00%
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	The post-retirement increase is assumed to stay at 2.0% indefinitely. See separate funding actuarial valuation report as of July 1, 2017 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]
2009	
2010	
2011	
2012	
2013	
2014	18.62 %
2015	4.44
2016	(0.02)
2017	15.23
2018	10.43

[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, 2018, the annual money-weighted rate of return for the Correctional Employees Retirement Fund was 10.43%. 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. Best 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, 2018, these best estimates are summarized in the following table:

Asset Class	Transitional Target Allocation	Final Target Allocation	Long-Term Expected Real Rate of Return (Geometric Mean)
Domestic Equity[1]	33%	36%	5.10%
International Equity[2]	16%	17%	5.30%
Private Markets[3]	25%	25%	5.90%
Fixed Income	16%	20% [4]	0.75%
Treasuries	8%	0%	0.50%
Cash	2%	2%	0.00%
Total	100%	100%	

[1] Domestic Equity includes U.S. Stock Actively Managed and the U.S. Stock Index Fund.

[2] International Equity includes Broad International Stock Fund.

[3] Private Markets includes the Alternative Investment Pool. If a 25 percent allocation uncommitted allocation to Private Markets cannot be achieved, the uncommitted allocation is invested in Public Equities.

[4] The Final Target Allocation will combine Fixed Income investment options.

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 dated September 11, 2017.

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	$ 1,701,556	$ 1,490,521	$ 1,318,394
Net Position Restricted for Pensions	1,114,887	1,114,887	1,114,887
Net Pension Liability	**$ 586,669**	**$ 375,634**	**$ 203,507**

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	**$ 2,151,931**	**$ 1,023,817**	**$ 1,128,114**	**$ 470,455**	**$ 290,413**	
Changes for the Year:						
Service Cost	$ 85,364		$ 85,364			$ 85,364
Interest on Total Pension Liability	108,421		108,421			108,421
Interest on Plan Fiduciary Net Position [1]		$ 76,254 [1]	(76,254)			(76,254)
Changes in Benefit Terms	(164,182)		(164,182)			(164,182)
Liability Experience Gains and Losses	(3,499)		(3,499)	$ -	$ 2,799	(700)
Changes in Assumptions	(617,840)		(617,840)	-	494,272	(123,568)
Recognition of Deferred Outflows/(Inflows) of Resources Arising from Prior Reporting Periods						
Liability Experience Gains/(Losses)				(3,183)	(153)	3,030
Assumption Changes				(135,043)	(67,143)	67,900
Investment Gains/(Losses)				(20,408)	(29,420)	(9,012)
Contributions - Employer		32,893	(32,893)			
Contributions - Employees		23,417	(23,417)			(23,417)
Asset Gain/(Loss) [1]		29,009 [1]	(29,009)	-	23,207	(5,802)
Benefit Payment and Refunds	(69,674)	(69,674)				
Administrative Expenses		(827)	827			827
Other Changes		(2)	2			2
Net Changes	**$ (661,410)**	**$ 91,070**	**$ (752,480)**	**$ (158,634)**	**$ 423,562**	**$ (137,391)**
Balance End of Year	**$ 1,490,521**	**$ 1,114,887**	**$ 375,634**	**$ 311,821**	**$ 713,975**	

[1] *The sum of these items in column (b) equals the net investment income of $105,263.*

Summary of Population Statistics

		Terminated		Recipients			
	Actives	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	Total
Members on 7/1/2017	**4,579**	**1,310**	**818**	**2,576**	**292**	**216**	**9,791**
New members	554	0	0	0	0	0	**554**
Return to active	33	(15)	(18)	0	0	0	**0**
Terminated non-vested	(170)	0	170	0	0	0	**0**
Service retirements	(148)	(33)	0	181	0	0	**0**
Terminated deferred	(78)	78	0	0	0	0	**0**
Terminated refund/transfer	(114)	(13)	(171)	0	0	0	**(298)**
Deaths	(2)	(1)	(1)	(28)	(5)	(7)	**(44)**
New beneficiary	0	0	0	0	0	17	**17**
Disabled	(4)	0	0	0	4	0	**0**
Unexpected status changes	0	21	45	7	6	0	**79**
Net change	71	37	25	160	5	10	**308**
Members on 6/30/2018	**4,650**	**1,347**	**843**	**2,736**	**297**	**226**	**10,099**

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.

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)

Surviving spouse benefit Continued)

Amount	Surviving spouse receives the 100% joint and survivor benefits using the Normal Retirement formula above. If commencement is prior to age 55, the appropriate early retirement formula described above applies except that one-half the monthly reduction factor is used from age 50 to the commencement age and the Rule of 90 does not apply. In lieu of this benefit, the surviving spouse may elect a refund of member contributions with interest or an actuarially equivalent term certain annuity (lump sum payable to estate at death).
Benefit increases	Same as for retirement.

Surviving dependent children's benefit

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

Refund of contributions with interest

Age/service requirement	Active employee dies and survivor benefits are not payable or a former employee dies before annuity begins. If accumulated member contributions with interest exceed total payments to the surviving spouse and children, then the remainder is paid out.
Amount	Member's contributions with 6.00% interest through June 30, 2011, 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 (Continued)

Termination (Continued)	
Deferred benefit	
Age/service requirement	Partially or fully vested.
Amount	Benefit computed under law in effect at termination and increased by the following annual augmentation percentage: (a.) 0.00% before July 1, 1971; (b.) 5.00% from July 1, 1971, to January 1, 1981; (c.) 3.00% thereafter (2.50% if hired after June 30, 2006) until January 1 of the year following attainment of age 55 or January 1, 2012, whichever is earlier; (d.) 5.00% thereafter until the annuity begins (2.50% if hired after June 30, 2006), but before January 1, 2012; 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	Actuarially equivalent factors based on the RP-2000 mortality for healthy annuitants, white collar adjustment, projected to 2027 using scale AA, set forward one year for males and set back one year for females, blended 70% males, and 6.50% post-retirement interest. The actuarially equivalent factors are currently being updated to reflect changes adopted during the 2018 legislative session.
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.

Summary of Plan Provisions (Concluded)

Changes in plan provisions	Member contributions were increased from 9.10% of pay to 9.60% of pay, effective July 1, 2018. Regular employer contributions were increased from 12.85% of pay to 14.40% of pay, effective July 1, 2018. Supplemental employer contributions totaling 4.45% of pay will be phased-in through fiscal year 2022; supplemental employer contributions remain in effect until the plan is 100% funded. Interest credited on member contributions will decrease from 4.0% to 3.0%, beginning July 1, 2018. Deferred augmentation was changed to 0.00% for future accruing benefits, effective January 1, 2019. Augmentation that has already accrued for deferred members will still apply. Contribution stabilizer provisions were repealed. Post-retirement benefit increases were changed from 2.0% per year, increasing to 2.5% per year upon achieving a 90% funding ratio to a fixed rate of 1.5% per year.

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, dated September 11, 2017.

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 13 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 (5 members), if available, otherwise, high five salary with a 10% load to account for salary increases (1 member). If neither pay or high five salary was available, we assumed a value of $30,000 (2 members). There was 1 member reported with zero service. Due to the small number of members with zero 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: Benefits were reported with full augmentation to Normal Retirement age. Based on direction from MSRS, we adjusted benefits by removing augmentation on a prospective basis beginning January 1, 2019. There were no members reported with missing or invalid gender or birth dates. There were 48 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 (20 members), we assumed a value of $30,000. There were no members reported without a Termination Date or Credited Service. There were 52 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. Data for members receiving benefits: There were 3 members reported with a missing gender. We assumed male gender. 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 no retirees reported with a bounce back annuity and an unreasonable reduction factor. There was one retiree reported with an accelerated benefit election and a missing 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 (360 members) and/or survivor date of birth (296 members). We used the valuation assumptions if the survivor gender or date of birth was missing or invalid.
Changes in actuarial assumptions	The single discount rate changed from 5.02% per annum to 7.50% per annum.

Summary of Actuarial Assumptions (Continued)

Age in 2018	Percentage 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%	0.02%	0.01%	0.04%	0.02%
25	0.04	0.03	0.03	0.01	0.17	0.08
30	0.06	0.05	0.03	0.02	0.42	0.22
35	0.09	0.09	0.03	0.03	0.78	0.44
40	0.13	0.12	0.04	0.03	1.13	0.66
45	0.19	0.15	0.06	0.05	1.46	0.84
50	0.28	0.20	0.11	0.09	1.83	1.10
55	0.40	0.29	0.18	0.14	2.21	1.45
60	0.60	0.45	0.32	0.21	2.59	1.71
65	0.90	0.70	0.56	0.30	3.06	2.02
70	1.50	1.12	0.99	0.52	3.89	2.71
75	2.60	1.91	1.79	0.93	5.33	4.01
80	4.67	3.41	3.20	1.65	7.61	6.10
85	8.66	6.29	6.66	4.41	11.29	9.22
90	15.43	11.40	12.64	9.84	17.12	13.45

* *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	Percent of Members Decrementing Each Year: Termination (Withdrawal) Rates After Third Year Male	Female	Disability Retirement 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 3.62% (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, 2018 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)
2018	$ 257,330		$ 257,330				
2019	267,975		267,975	$ 25,726	$ 38,588		$ 64,314
2020	257,992	$ 18,692	276,684	24,767	40,892	$ 1,565	67,224
2021	247,649	38,028	285,677	23,774	42,967	3,753	70,494
2022	237,495	57,466	294,961	22,800	44,768	6,534	74,102
2023	227,253	77,294	304,547	21,816	42,837	8,788	73,441
2024	217,314	97,131	314,445	20,862	40,964	11,044	72,870
2025	208,096	116,568	324,664	19,977	39,226	13,254	72,457
2026	198,740	136,476	335,216	19,079	37,463	15,517	72,059
2027	189,292	156,819	346,111	18,172	35,682	17,830	71,684
2028	180,585	176,774	357,359	17,336	34,040	20,099	71,475
2029	172,322	196,651	368,973	16,543	32,483	22,359	71,385
2030	163,974	216,991	380,965	15,742	30,909	24,672	71,323
2031	155,579	237,767	393,346	14,936	29,327	27,034	71,297
2032	147,213	258,917	406,130	14,132	27,750	29,439	71,321
2033	138,903	280,426	419,329	13,335	26,183	31,884	71,402
2034	130,561	302,397	432,958	12,534	24,611	34,382	71,527
2035	122,191	324,838	447,029	11,730	23,033	36,934	71,697
2036	113,493	348,064	461,557	10,895	21,393	39,575	71,863
2037	104,411	372,147	476,558	10,023	19,681	42,313	72,017
2038	95,584	396,462	492,046	9,176	18,018	45,078	72,272
2039	87,087	420,950	508,037	8,360	16,416	47,862	72,638
2040	78,499	446,050	524,549	7,536	14,797	50,716	73,049
2041	69,882	471,714	541,596	6,709	13,173	53,634	73,516
2042	61,781	497,417	559,198	5,931	11,646	56,556	74,133
2043	54,384	522,988	577,372	5,221	10,251	59,464	74,936
2044	47,537	548,600	596,137	4,564	8,961	62,376	75,901
2045	41,069	574,442	615,511	3,943	7,742	65,314	76,999
2046	34,923	600,592	635,515	3,353	6,583	68,287	78,223
2047	29,265	626,905	656,170	2,809	5,516	71,279	79,604
2048	24,253	653,242	677,495	2,328	4,572	74,274	81,174
2049	19,926	679,588	699,514	1,913	3,756	77,269	82,938
2050	16,133	706,115	722,248	1,549	3,041	80,285	84,875
2051	12,890	732,831	745,721	1,237	2,430	83,323	86,990
2052	10,246	759,711	769,957	984	1,931	86,379	89,294
2053	8,083	786,897	794,980	776	1,524	89,470	91,770
2054	6,305	814,512	820,817	605	1,188	92,610	94,403
2055	4,851	842,643	847,494	466	914	95,808	97,188
2056	3,669	871,368	875,037	352	692	99,075	100,119
2057	2,724	900,752	903,476	262	514	102,416	103,192
2058	1,985	930,854	932,839	191	374	105,838	106,403
2059	1,418	961,738	963,156	136	267	109,350	109,753
2060	981	993,478	994,459	94	185	112,958	113,237
2061	650	1,026,129	1,026,779	62	123	116,671	116,856
2062	413	1,059,736	1,060,149	40	78	120,492	120,610
2063	253	1,094,351	1,094,604	24	48	124,428	124,500
2064	148	1,130,031	1,130,179	14	28	128,484	128,526
2065	77	1,166,833	1,166,910	7	15	132,669	132,691
2066	35	1,204,799	1,204,834	3	7	136,986	136,996
2067	15	1,243,976	1,243,991	1	3	141,440	141,444
2068	5	1,284,416	1,284,421	-	1	146,038	146,039

** Contributions related to future employees in excess of normal cost and expenses of 17.08% of pay.*
*** Employer contributions are equal to 14.40%, 15.85% and 17.35% for fiscal years ending June 30, 2019, 2020 and 2021 respectively.*

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) x 9.60%	(e) = (a) x 18.85%	(f)	(g) = (d) + (e) + (f)
2069	$ 1	$ 1,326,164	$ 1,326,165	$ -	$ -	$ 150,785	$ 150,785
2070	-	1,369,265	1,369,265	-	-	155,685	155,685
2071	-	1,413,766	1,413,766	-	-	160,745	160,745
2072	-	1,459,713	1,459,713	-	-	165,969	165,969
2073	-	1,507,154	1,507,154	-	-	171,363	171,363
2074	-	1,556,137	1,556,137	-	-	176,933	176,933
2075	-	1,606,711	1,606,711	-	-	182,683	182,683
2076	-	1,658,929	1,658,929	-	-	188,620	188,620
2077	-	1,712,844	1,712,844	-	-	194,750	194,750
2078	-	1,768,512	1,768,512	-	-	201,080	201,080
2079	-	1,825,988	1,825,988	-	-	207,615	207,615
2080	-	1,885,333	1,885,333	-	-	214,362	214,362
2081	-	1,946,606	1,946,606	-	-	221,329	221,329
2082	-	2,009,871	2,009,871	-	-	228,522	228,522
2083	-	2,075,192	2,075,192	-	-	235,949	235,949
2084	-	2,142,636	2,142,636	-	-	243,618	243,618
2085	-	2,212,271	2,212,271	-	-	251,535	251,535
2086	-	2,284,170	2,284,170	-	-	259,710	259,710
2087	-	2,358,406	2,358,406	-	-	268,151	268,151
2088	-	2,435,054	2,435,054	-	-	276,866	276,866
2089	-	2,514,193	2,514,193	-	-	285,864	285,864
2090	-	2,595,904	2,595,904	-	-	295,154	295,154
2091	-	2,680,271	2,680,271	-	-	304,747	304,747
2092	-	2,767,380	2,767,380	-	-	314,651	314,651
2093	-	2,857,320	2,857,320	-	-	324,877	324,877
2094	-	2,950,183	2,950,183	-	-	335,436	335,436
2095	-	3,046,064	3,046,064	-	-	346,337	346,337
2096	-	3,145,061	3,145,061	-	-	357,593	357,593
2097	-	3,247,275	3,247,275	-	-	369,215	369,215
2098	-	3,352,812	3,352,812	-	-	381,215	381,215
2099	-	3,461,778	3,461,778	-	-	393,604	393,604
2100	-	3,574,286	3,574,286	-	-	406,396	406,396
2101	-	3,690,450	3,690,450	-	-	419,604	419,604
2102	-	3,810,390	3,810,390	-	-	433,241	433,241
2103	-	3,934,228	3,934,228	-	-	447,322	447,322
2104	-	4,062,090	4,062,090	-	-	461,860	461,860
2105	-	4,194,108	4,194,108	-	-	476,870	476,870
2106	-	4,330,416	4,330,416	-	-	492,368	492,368
2107	-	4,471,155	4,471,155	-	-	508,370	508,370
2108	-	4,616,467	4,616,467	-	-	524,892	524,892
2109	-	4,766,503	4,766,503	-	-	541,951	541,951
2110	-	4,921,414	4,921,414	-	-	559,565	559,565
2111	-	5,081,360	5,081,360	-	-	577,751	577,751
2112	-	5,246,504	5,246,504	-	-	596,528	596,528
2113	-	5,417,015	5,417,015	-	-	615,915	615,915
2114	-	5,593,068	5,593,068	-	-	635,932	635,932
2115	-	5,774,843	5,774,843	-	-	656,600	656,600
2116	-	5,962,526	5,962,526	-	-	677,939	677,939
2117	-	6,156,308	6,156,308	-	-	699,972	699,972
2118	-	6,356,388	6,356,388	-	-	722,721	722,721

* *Contributions related to future employees in excess of normal cost and expenses of 17.08% 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)
2019	$ 1,114,887	$ 64,314	$ 75,368	$ 858	$ 83,178	$ 1,186,153
2020	1,186,153	67,224	78,771	826	88,506	1,262,286
2021	1,262,286	70,494	82,881	792	94,186	1,343,293
2022	1,343,293	74,102	87,296	760	100,233	1,429,572
2023	1,429,572	73,441	91,860	727	106,513	1,516,939
2024	1,516,939	72,870	96,780	695	112,864	1,605,198
2025	1,605,198	72,457	101,722	666	119,288	1,694,555
2026	1,694,555	72,059	107,076	636	125,779	1,784,681
2027	1,784,681	71,684	113,012	606	132,307	1,875,054
2028	1,875,054	71,475	118,855	578	138,863	1,965,959
2029	1,965,959	71,385	124,680	551	145,464	2,057,577
2030	2,057,577	71,323	130,806	525	152,109	2,149,678
2031	2,149,678	71,297	137,158	498	158,782	2,242,101
2032	2,242,101	71,321	143,375	471	165,487	2,335,063
2033	2,335,063	71,402	149,813	444	172,226	2,428,434
2034	2,428,434	71,527	156,257	418	178,997	2,522,283
2035	2,522,283	71,697	162,964	391	185,796	2,616,421
2036	2,616,421	71,863	169,996	363	192,605	2,710,530
2037	2,710,530	72,017	177,471	334	199,395	2,804,137
2038	2,804,137	72,272	184,682	306	206,160	2,897,581
2039	2,897,581	72,638	191,576	279	212,929	2,991,293
2040	2,991,293	73,049	198,478	251	219,719	3,085,332
2041	3,085,332	73,516	205,158	224	226,545	3,180,011
2042	3,180,011	74,133	211,101	198	233,450	3,276,295
2043	3,276,295	74,936	216,412	174	240,507	3,375,152
2044	3,375,152	75,901	221,085	152	247,785	3,477,601
2045	3,477,601	76,999	225,302	131	255,354	3,584,521
2046	3,584,521	78,223	229,153	112	263,277	3,696,756
2047	3,696,756	79,604	232,435	94	271,626	3,815,457
2048	3,815,457	81,174	234,862	78	280,498	3,942,189
2049	3,942,189	82,938	236,463	64	290,009	4,078,609
2050	4,078,609	84,875	237,413	52	300,277	4,226,296
2051	4,226,296	86,990	237,545	41	311,427	4,387,127
2052	4,387,127	89,294	236,774	33	323,603	4,563,217
2053	4,563,217	91,770	235,307	26	336,955	4,756,609
2054	4,756,609	94,403	233,224	20	351,634	4,969,402
2055	4,969,402	97,188	230,555	16	367,794	5,203,813
2056	5,203,813	100,119	227,389	12	385,600	5,462,131
2057	5,462,131	103,192	223,790	9	405,219	5,746,743
2058	5,746,743	106,403	219,791	6	426,831	6,060,180
2059	6,060,180	109,753	215,426	5	450,623	6,405,125
2060	6,405,125	113,237	210,734	3	476,795	6,784,420
2061	6,784,420	116,856	205,744	2	505,559	7,201,089
2062	7,201,089	120,610	200,472	1	537,141	7,658,367
2063	7,658,367	124,500	194,940	1	571,784	8,159,710
2064	8,159,710	128,526	189,172	-	609,745	8,708,809
2065	8,708,809	132,691	183,190	-	651,301	9,309,611
2066	9,309,611	136,996	177,005	-	696,748	9,966,350
2067	9,966,350	141,444	170,630	-	746,402	10,683,566
2068	10,683,566	146,039	164,082	-	800,603	11,466,126

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)
2069	$ 11,466,126	$ 150,785	$ 157,371	$ -	$ 859,717	$ 12,319,257
2070	12,319,257	155,685	150,511	-	924,135	13,248,566
2071	13,248,566	160,745	143,516	-	994,277	14,260,072
2072	14,260,072	165,969	136,402	-	1,070,595	15,360,234
2073	15,360,234	171,363	129,186	-	1,153,571	16,555,982
2074	16,555,982	176,933	121,891	-	1,243,726	17,854,750
2075	17,854,750	182,683	114,542	-	1,341,616	19,264,507
2076	19,264,507	188,620	107,167	-	1,447,838	20,793,798
2077	20,793,798	194,750	99,798	-	1,563,032	22,451,782
2078	22,451,782	201,080	92,469	-	1,687,883	24,248,276
2079	24,248,276	207,615	85,219	-	1,823,128	26,193,800
2080	26,193,800	214,362	78,085	-	1,969,553	28,299,630
2081	28,299,630	221,329	71,111	-	2,128,004	30,577,852
2082	30,577,852	228,522	64,339	-	2,299,385	33,041,420
2083	33,041,420	235,949	57,812	-	2,484,666	35,704,223
2084	35,704,223	243,618	51,570	-	2,684,889	38,581,160
2085	38,581,160	251,535	45,651	-	2,901,168	41,688,212
2086	41,688,212	259,710	40,088	-	3,134,703	45,042,537
2087	45,042,537	268,151	34,909	-	3,386,779	48,662,558
2088	48,662,558	276,866	30,129	-	3,658,778	52,568,073
2089	52,568,073	285,864	25,762	-	3,952,183	56,780,358
2090	56,780,358	295,154	21,810	-	4,268,592	61,322,294
2091	61,322,294	304,747	18,271	-	4,609,721	66,218,491
2092	66,218,491	314,651	15,137	-	4,977,416	71,495,421
2093	71,495,421	324,877	12,392	-	5,373,663	77,181,569
2094	77,181,569	335,436	10,017	-	5,800,601	83,307,589
2095	83,307,589	346,337	7,989	-	6,260,528	89,906,465
2096	89,906,465	357,593	6,281	-	6,755,922	97,013,699
2097	97,013,699	369,215	4,864	-	7,289,444	104,667,494
2098	104,667,494	381,215	3,707	-	7,863,963	112,908,965
2099	112,908,965	393,604	2,778	-	8,482,564	121,782,355
2100	121,782,355	406,396	2,046	-	9,148,566	131,335,271
2101	131,335,271	419,604	1,479	-	9,865,542	141,618,938
2102	141,618,938	433,241	1,049	-	10,637,335	152,688,465
2103	152,688,465	447,322	730	-	11,468,080	164,603,137
2104	164,603,137	461,860	498	-	12,362,224	177,426,723
2105	177,426,723	476,870	334	-	13,324,552	191,227,811
2106	191,227,811	492,368	220	-	14,360,208	206,080,167
2107	206,080,167	508,370	142	-	15,474,727	222,063,122
2108	222,063,122	524,892	91	-	16,674,059	239,261,982
2109	239,261,982	541,951	58	-	17,964,603	257,768,478
2110	257,768,478	559,565	37	-	19,353,240	277,681,246
2111	277,681,246	577,751	23	-	20,847,367	299,106,341
2112	299,106,341	596,528	15	-	22,454,941	322,157,795
2113	322,157,795	615,915	10	-	24,184,514	346,958,214
2114	346,958,214	635,932	7	-	26,045,283	373,639,422
2115	373,639,422	656,600	4	-	28,047,134	402,343,152
2116	402,343,152	677,939	3	-	30,200,700	433,221,788
2117	433,221,788	699,972	2	-	32,517,409	466,439,167
2118	466,439,167	722,721	1	-	35,009,550	502,171,437

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)
2019	$ 1,114,887	$ 75,368	$ 75,368	$ -	$ 72,691	$ -	$ 72,691
2020	1,186,153	78,771	78,771	-	70,673	-	70,673
2021	1,262,286	82,881	82,881	-	69,173	-	69,173
2022	1,343,293	87,296	87,296	-	67,774	-	67,774
2023	1,429,572	91,860	91,860	-	66,342	-	66,342
2024	1,516,939	96,780	96,780	-	65,019	-	65,019
2025	1,605,198	101,722	101,722	-	63,571	-	63,571
2026	1,694,555	107,076	107,076	-	62,249	-	62,249
2027	1,784,681	113,012	113,012	-	61,116	-	61,116
2028	1,875,054	118,855	118,855	-	59,791	-	59,791
2029	1,965,959	124,680	124,680	-	58,345	-	58,345
2030	2,057,577	130,806	130,806	-	56,942	-	56,942
2031	2,149,678	137,158	137,158	-	55,541	-	55,541
2032	2,242,101	143,375	143,375	-	54,008	-	54,008
2033	2,335,063	149,813	149,813	-	52,496	-	52,496
2034	2,428,434	156,257	156,257	-	50,934	-	50,934
2035	2,522,283	162,964	162,964	-	49,414	-	49,414
2036	2,616,421	169,996	169,996	-	47,950	-	47,950
2037	2,710,530	177,471	177,471	-	46,566	-	46,566
2038	2,804,137	184,682	184,682	-	45,077	-	45,077
2039	2,897,581	191,576	191,576	-	43,498	-	43,498
2040	2,991,293	198,478	198,478	-	41,921	-	41,921
2041	3,085,332	205,158	205,158	-	40,309	-	40,309
2042	3,180,011	211,101	211,101	-	38,583	-	38,583
2043	3,276,295	216,412	216,412	-	36,794	-	36,794
2044	3,375,152	221,085	221,085	-	34,966	-	34,966
2045	3,477,601	225,302	225,302	-	33,147	-	33,147
2046	3,584,521	229,153	229,153	-	31,361	-	31,361
2047	3,696,756	232,435	232,435	-	29,591	-	29,591
2048	3,815,457	234,862	234,862	-	27,814	-	27,814
2049	3,942,189	236,463	236,463	-	26,050	-	26,050
2050	4,078,609	237,413	237,413	-	24,330	-	24,330
2051	4,226,296	237,545	237,545	-	22,645	-	22,645
2052	4,387,127	236,774	236,774	-	20,997	-	20,997
2053	4,563,217	235,307	235,307	-	19,411	-	19,411
2054	4,756,609	233,224	233,224	-	17,897	-	17,897
2055	4,969,402	230,555	230,555	-	16,458	-	16,458
2056	5,203,813	227,389	227,389	-	15,099	-	15,099
2057	5,462,131	223,790	223,790	-	13,823	-	13,823
2058	5,746,743	219,791	219,791	-	12,629	-	12,629
2059	6,060,180	215,426	215,426	-	11,515	-	11,515
2060	6,405,125	210,734	210,734	-	10,478	-	10,478
2061	6,784,420	205,744	205,744	-	9,516	-	9,516
2062	7,201,089	200,472	200,472	-	8,626	-	8,626
2063	7,658,367	194,940	194,940	-	7,802	-	7,802
2064	8,159,710	189,172	189,172	-	7,043	-	7,043
2065	8,708,809	183,190	183,190	-	6,345	-	6,345
2066	9,309,611	177,005	177,005	-	5,703	-	5,703
2067	9,966,350	170,630	170,630	-	5,114	-	5,114
2068	10,683,566	164,082	164,082	-	4,574	-	4,574

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)
2069	$ 11,466,126	$ 157,371	$ 157,371	$ -	$ 4,081	$ -	$ 4,081
2070	12,319,257	150,511	150,511	-	3,631	-	3,631
2071	13,248,566	143,516	143,516	-	3,221	-	3,221
2072	14,260,072	136,402	136,402	-	2,848	-	2,848
2073	15,360,234	129,186	129,186	-	2,509	-	2,509
2074	16,555,982	121,891	121,891	-	2,202	-	2,202
2075	17,854,750	114,542	114,542	-	1,925	-	1,925
2076	19,264,507	107,167	107,167	-	1,675	-	1,675
2077	20,793,798	99,798	99,798	-	1,451	-	1,451
2078	22,451,782	92,469	92,469	-	1,251	-	1,251
2079	24,248,276	85,219	85,219	-	1,072	-	1,072
2080	26,193,800	78,085	78,085	-	914	-	914
2081	28,299,630	71,111	71,111	-	774	-	774
2082	30,577,852	64,339	64,339	-	652	-	652
2083	33,041,420	57,812	57,812	-	545	-	545
2084	35,704,223	51,570	51,570	-	452	-	452
2085	38,581,160	45,651	45,651	-	372	-	372
2086	41,688,212	40,088	40,088	-	304	-	304
2087	45,042,537	34,909	34,909	-	246	-	246
2088	48,662,558	30,129	30,129	-	198	-	198
2089	52,568,073	25,762	25,762	-	157	-	157
2090	56,780,358	21,810	21,810	-	124	-	124
2091	61,322,294	18,271	18,271	-	97	-	97
2092	66,218,491	15,137	15,137	-	74	-	74
2093	71,495,421	12,392	12,392	-	57	-	57
2094	77,181,569	10,017	10,017	-	43	-	43
2095	83,307,589	7,989	7,989	-	32	-	32
2096	89,906,465	6,281	6,281	-	23	-	23
2097	97,013,699	4,864	4,864	-	17	-	17
2098	104,667,494	3,707	3,707	-	12	-	12
2099	112,908,965	2,778	2,778	-	8	-	8
2100	121,782,355	2,046	2,046	-	6	-	6
2101	131,335,271	1,479	1,479	-	4	-	4
2102	141,618,938	1,049	1,049	-	3	-	3
2103	152,688,465	730	730	-	2	-	2
2104	164,603,137	498	498	-	1	-	1
2105	177,426,723	334	334	-	1	-	1
2106	191,227,811	220	220	-	-	-	-
2107	206,080,167	142	142	-	-	-	-
2108	222,063,122	91	91	-	-	-	-
2109	239,261,982	58	58	-	-	-	-
2110	257,768,478	37	37	-	-	-	-
2111	277,681,246	23	23	-	-	-	-
2112	299,106,341	15	15	-	-	-	-
2113	322,157,795	10	10	-	-	-	-
2114	346,958,214	7	7	-	-	-	-
2115	373,639,422	4	4	-	-	-	-
2116	402,343,152	3	3	-	-	-	-
2117	433,221,788	2	2	-	-	-	-
2118	466,439,167	1	1	-	-	-	-
				Totals	$ 1,830,691	$ -	$ 1,830,691

SECTION H

GLOSSARY OF TERMS

Glossary of Terms

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.
Accrued Service	Service credited under the system which was rendered before the date of the actuarial valuation.
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 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 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 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 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

State Patrol Retirement Fund

GASB Statement Nos. 67 and 68

Accounting and Financial Reporting for Pensions

June 30, 2018

GRS

GRS Retirement Consulting

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

November 29, 2018

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.

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, 2018 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

Bonita J. Wurst

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

BBM/BJW:rmn

Table of Contents

SECTION A

EXECUTIVE SUMMARY

Executive Summary
as of June 30, 2018 (Dollars in Thousands)

	2018
Actuarial Valuation Date	June 30, 2018
Measurement Date of the Net Pension Liability	June 30, 2018
Membership	
Number of	
- Service Retirements	862
- Survivors	150
- Disability Retirements	59
- Deferred Retirements	56
- Terminated other non-vested	22
- Active Members	921
- Total	2,070
Covered-employee Payroll [1]	$ 74,007
Net Pension Liability	
Total Pension Liability	$ 930,408
Plan Fiduciary Net Position	729,799
Net Pension Liability	$ 200,609
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	78.44%
Net Pension Liability as a Percentage of Covered-employee Payroll	271.07%
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]	3.62%
Last year ending June 30 in the 2019 to 2118 projection period for which projected benefit payments are fully funded	2118
Total Pension Expense / (Income)	$ 19,262

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	$ -	$ 24,940
Changes in assumptions	146,800	180,870
Net difference between projected and actual earnings on pension plan investments	25,286	44,055
Totals	$ 172,086	$ 249,865

(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 closes 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, 2018.

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, MN, 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 30 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, 2018 and a measurement date of June 30, 2018.

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 3.62% (based on the weekly rate closest to but not later than the measurement date of the Fidelity "20-Year Municipal GO AA Index"); 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, 2018 (Dollars in Thousands)

A. Expense

1.	Service Cost	$	24,935
2.	Interest on the Total Pension Liability		65,110
3.	Current-Period Benefit Changes		(2,604)
4.	Employee Contributions (made negative for addition here)		(10,657)
5.	Projected Earnings on Plan Investments (made negative for addition here)		(50,660)
6.	Pension Plan Administrative Expense		184
7.	Other Changes in Plan Fiduciary Net Position		7
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		(1,395)
9.	Recognition of Outflow (Inflow) of Resources due to assumption changes		
	Arising from Current Reporting Period		(21,148)
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		(3,963)
11.	**Increases/(Decreases) from Experience in the Current Reporting Period**	**$**	**(191)**
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	$	(7,212)
13.	Recognition of Outflow (Inflow) of Resources due to assumption changes		
	Arising from Prior Reporting Periods		33,492
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		(6,827)
15.	**Total Pension Expense / (Income)**	**$**	**19,262**

Benefit changes since the previous measurement date are described on page 25.

Statement of Outflows and Inflows
Arising from Current Reporting Period
Fiscal Year Ended June 30, 2018 (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	$	(8,369)
2. Assumption Changes (gains) or losses		(126,888)
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		(1,395)
5. Outflow (Inflow) of Resources to be recognized in the current pension expense for Assumption Changes		(21,148)
6. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Liabilities	$	(22,543)
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	$	(6,974)
8. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses for Assumption Changes		(105,740)
9. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Liabilities	$	(112,714)
B. Outflows (Inflows) of Resources due to Assets		
1. Net difference between projected and actual earnings on pension plan investments (gains) or losses	$	(19,814)
2. Recognition period for Assets {in years}		5
3. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Assets		(3,963)
4. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Assets	$	(15,851)

Statement of Outflows and Inflows
Arising from Current and Prior Reporting Periods
Fiscal Year Ended June 30, 2018 (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	$ 52,274	$ 48,537	$ 3,737
2. Due to Assets	14,901	25,691	(10,790)
3. Total	$ 67,175	$ 74,228	$ (7,053)

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	$ -	$ 8,607	$ (8,607)
2. Assumption Changes	52,274	39,930	12,344
3. Net Difference between projected and actual earnings on pension plan investments	14,901	25,691	(10,790)
4. Total	$ 67,175	$ 74,228	$ (7,053)

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	$ -	$ 24,940	$ (24,940)
2. Assumption Changes	146,800	180,870	(34,070)
3. Net Difference between projected and actual earnings on pension plan investments*	25,286	44,055	(18,769)
4. Total	$ 172,086	$ 249,865	$ (77,779)

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
2019	$ 5,271
2020	(3,287)
2021	(11,529)
2022	(45,692)
2023	(22,542)
Thereafter	-
Total	$ (77,779)

** 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.*

Statement of Fiduciary Net Position as of June 30, 2018 (Dollars in Thousands)

Assets		**June 30, 2018**
Cash & Short-term Investments	$	9,241
Receivables		1,412
Investment Pools (at fair value)		719,503
Securities Lending Collateral		73,199
Capital Assets		-
Total Assets	**$**	**803,355**
Total Deferred Outflows of Resources	**$**	**-**
Total Liabilities	**$**	**(73,556)**
Total Deferred Inflows of Resources	**$**	**-**
Net Position Restricted for Pensions	**$**	**729,799**

Statement of Changes in Fiduciary Net Position for Year Ended June 30, 2018 (Dollars in Thousands)

1.	**Net Position at market value at beginning of year**	**$**	**691,599**
Additions			
2.	Contributions		
	a. Employee	$	10,657
	b. Employer		15,952
	c. Other sources - Supplemental State Aid		1,000
	d. Total contributions	$	27,609
3.	Investment income		
	a. Investment income/(loss)	$	71,244
	b. Investment expenses		(770)
	c. Net investment income/(loss)	$	70,474
4.	Other Additions	$	-
5.	**Total Additions** *(2.d.) + (3.c.) + (4.)*	**$**	**98,083**
Deductions			
6.	Benefits Paid		
	a. Annuity benefits	$	(59,653)
	b. Refunds		(39)
	c. Total benefits paid	$	(59,692)
7.	Expenses		
	a. Other deductions	$	(7)
	b. Administrative		(184)
	c. Total expenses	$	(191)
8.	**Total Deductions** *(6.c.) + (7.c.)*	**$**	**(59,883)**
9.	**Net increase/(decrease) in fiduciary net position** *(5.) + (8.)*	**$**	**38,200**
10.	**Net position at market value at end of year** *(1.) + (9.)*	**$**	**729,799**
11.	State Board of Investment calculated annual investment return for the State Patrol Retirement Fund*		10.5%

** The fiscal year 2018 investment return for the Combined Funds is 10.3%.*

SECTION C

REQUIRED SUPPLEMENTARY INFORMATION

Schedule of Changes in Net Pension Liability and Related Ratios
Current Period
Fiscal Year Ended June 30, 2018 (Dollars in Thousands)

A. Total pension liability		
1. Service Cost	$	24,935
2. Interest on the Total Pension Liability		65,110
3. Changes of benefit terms		(2,604)
4. Difference between expected and actual experience of the Total Pension Liability		(8,369)
5. Changes of assumptions		(126,888)
6. Benefit payments, including refunds of employee contributions		(59,692)
7. Net change in total pension liability	$	(107,508)
8. Total pension liability – beginning		1,037,916
9. Total pension liability – ending	**$**	**930,408**
B. Plan fiduciary net position		
1. Contributions – employer [1]	$	16,952
2. Contributions – employee		10,657
3. Net investment income		70,474
4. Benefit payments, including refunds of employee contributions		(59,692)
5. Pension Plan Administrative Expense		(184)
6. Other changes		(7)
7. Net change in plan fiduciary net position	$	38,200
8. Plan fiduciary net position – beginning		691,599
9. Plan fiduciary net position – ending	**$**	**729,799**
C. Net pension liability, *A.9. - B.9.*	**$**	**200,609**
D. Plan fiduciary net position as a percentage of the total pension liability, *B.9. / A.9.*		**78.44%**
E. Covered-employee payroll [2]	**$**	**74,007**
F. Net pension liability as a percentage of covered-employee payroll, *C. / E.*		**271.07%**

(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,	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Total Pension Liability										
Service Cost	$ 24,935	$ 29,758	$ 16,555	$ 16,144	$ 14,514					
Interest on the Total Pension Liability	65,110	58,865	64,592	63,753	60,183					
Benefit Changes	(2,604)	-	-	-	0					
Difference between Expected and Actual Experience	(8,369)	(2,418)	(22,222)	(12,855)	(5,771)					
Assumption Changes	(126,888)	(112,694)	283,584	-	30,058					
Benefit Payments	(59,653)	(58,560)	(57,695)	(55,465)	(53,697)					
Refunds	(39)	(5)	(79)	(15)	(25)					
Net Change in Total Pension Liability	$ (107,508)	$ (85,054)	$ 284,735	$ 11,562	$ 45,262					
Total Pension Liability - Beginning	1,037,916	1,122,970	838,235	826,673	781,411					
Total Pension Liability - Ending (a)	**$ 930,408**	**$ 1,037,916**	**$ 1,122,970**	**$ 838,235**	**$ 826,673**					
Plan Fiduciary Net Position										
Employer Contributions (1)	$ 16,952	$ 16,783	$ 14,938	$ 14,763	$ 12,894					
Employee Contributions	10,657	10,520	9,292	9,174	7,930					
Pension Plan Net Investment Income	70,474	93,077	(774)	28,903	107,187					
Benefit Payments	(59,653)	(58,560)	(57,695)	(55,465)	(53,697)					
Refunds	(39)	(5)	(79)	(15)	(25)					
Pension Plan Administrative Expense	(184)	(208)	(220)	(170)	(150)					
Other	(7)	-	-	-	0					
Net Change in Plan Fiduciary Net Position	**$ 38,200**	**$ 61,607**	**$ (34,538)**	**$ (2,810)**	**$ 74,139**					
Plan Fiduciary Net Position - Beginning	**691,599**	**629,992**	**664,530**	**667,340**	**593,201**					
Plan Fiduciary Net Position - Ending (b)	**$ 729,799**	**$ 691,599**	**$ 629,992**	**$ 664,530**	**$ 667,340**					
Net Pension Liability - Ending (a) - (b)	**$ 200,609**	**$ 346,317**	**$ 492,978**	**$ 173,705**	**$ 159,333**					
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	**78.44 %**	**66.63 %**	**56.10 %**	**79.28 %**	**80.73 %**					
Covered-Employee Payroll (2)	**$ 74,007**	**$ 73,056**	**$ 69,343**	**$ 68,463**	**$ 63,952**					
Net Pension Liability as a Percentage of Covered-Employee Payroll	**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)
2009						
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

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)
2009	$ 14,999	$ 9,178	$ 5,821	$ 61,511	14.92%
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

Notes to Schedule of Contributions

Methods and Assumptions Used to Determine Fiscal Year Ending June 30, 2018 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, 2017
Actuarial Cost Method	Entry Age Normal
Amortization Method	Level Percentage of Payroll, Closed
Remaining Amortization Period	21 years
Asset Valuation Method	5-Year smoothed market; no corridor
Inflation	2.75%
Payroll Growth	3.50%
Salary Increases	Service based tables ranging from 7.75% with one year of service to 3.75% with 21 or more years of service, including inflation
Investment Rate of Return	8.00%
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% through 2034, 1.50% from 2035 through 2053 and 2.50% thereafter. See separate funding actuarial valuation report as of July 1, 2017 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]
2009	
2010	
2011	
2012	
2013	
2014	18.69 %
2015	4.46
2016	(0.12)
2017	15.24
2018	10.51

[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, 2018, the annual money-weighted rate of return for the State Patrol Retirement Fund was 10.51%. 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. Best 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, 2018, these best estimates are summarized in the following table:

Asset Class	Transitional Target Allocation	Final Target Allocation	Long-Term Expected Real Rate of Return (Geometric Mean)
Domestic Equity[1]	33%	36%	5.10%
International Equity[2]	16%	17%	5.30%
Private Markets[3]	25%	25%	5.90%
Fixed Income	16%	20% [4]	0.75%
Treasuries	8%	0%	0.50%
Cash	2%	2%	0.00%
Total	100%	100%	

[1] Domestic Equity includes U.S. Stock Actively Managed and the U.S. Stock Index Fund.

[2] International Equity includes Broad International Stock Fund.

[3] Private Markets includes the Alternative Investment Pool. If a 25 percent allocation uncommitted allocation to Private Markets cannot be achieved, the uncommitted allocation is invested in Public Equities.

[4] The Final Target Allocation will combine Fixed Income investment options.

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 dated September 11, 2017.

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	$1,042,337	$930,408	$837,625
Net Position Restricted for Pensions	729,799	729,799	729,799
Net Pension Liability	**$ 312,538**	**$ 200,609**	**$107,826**

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	**$ 1,037,916**	**$ 691,599**	**$ 346,317**	**$ 239,261**	**$ 169,022**	
Changes for the Year:						
Service Cost	$ 24,935		$ 24,935			$ 24,935
Interest on Total Pension Liability	65,110		65,110			65,110
Interest on Fiduciary Net Position		$ 50,660 (1)	(50,660)			(50,660)
Changes in Benefit Terms	(2,604)		(2,604)			(2,604)
Liability Experience Gains and Losses	(8,369)		(8,369)	$ -	$ 6,974	(1,395)
Changes in Assumptions	(126,888)		(126,888)	-	105,740	(21,148)
Recognition of Deferred Outflows/(Inflows) of Resources Arising from Prior Reporting Periods						
Liability Experience Gains/(Losses)				-	(7,212)	(7,212)
Assumption Changes				(52,274)	(18,782)	33,492
Investment Gains/(Losses)				(14,901)	(21,728)	(6,827)
Contributions - Employer		16,952 (2)	(16,952)			
Contributions - Employees		10,657	(10,657)			(10,657)
Asset Gain/(Loss)		19,814 (1)	(19,814)	-	15,851	(3,963)
Benefit Payments and Refunds	(59,692)	(59,692)	-			
Administrative Expenses		(184)	184			184
Other changes		(7)	7			7
Net Changes	**$ (107,508)**	**$ 38,200**	**$ (145,708)**	**$ (67,175)**	**$ 80,843**	**$ 19,262**
Balance End of Year	**$ 930,408**	**$ 729,799**	**$ 200,609**	**$ 172,086**	**$ 249,865**	

(1) *The sum of these items in column (b) equals the net investment income of $70,474.*

(2) *Includes supplemental state aid of $1,000.*

Summary of Population Statistics

		Terminated		Recipients			
	Actives	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	Total
Members on 7/1/2017	**902**	**59**	**28**	**847**	**57**	**148**	**2,041**
New members	60	0	0	0	0	0	**60**
Return to active	1	0	(1)	0	0	0	**0**
Terminated non-vested	(4)	0	4	0	0	0	**0**
Service retirements	(28)	(3)	0	31	0	0	**0**
Terminated deferred	(4)	4	0	0	0	0	**0**
Terminated refund/transfer	(1)	(3)	(9)	0	0	0	**(13)**
Deaths	(2)	0	0	(19)	0	(8)	**(29)**
New beneficiary	0	0	0	0	0	11	**11**
Disabled	(3)	0	0	0	3	0	**0**
Unexpected status change	0	(1)	0	3	(1)	(1)	**0**
Net change	19	(3)	(6)	15	2	2	**29**
Members on 6/30/2018	**921**	**56**	**22**	**862**	**59**	**150**	**2,070**

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.

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 a Market 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.

Summary of Plan Provisions (Continued)

Death

Surviving spouse benefit

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

Surviving dependent children's benefit

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

Refund of contributions

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

Termination (Continued)

Deferred benefit

Age/service requirement	Three years (ten years if first hired after June 30, 2013) of Allowable Service.
Amount	Benefit is computed under law in effect at termination and increased by the following annual augmentation percentage: (a.) 0.00% before July 1, 1971; (b.) 5.00% from July 1, 1971, to January 1, 1981; (c.) 3.00% thereafter (2.50% if hired after June 30, 2006) until January 1, 2012; (d.) 2.00% after December 31, 2011, through December 31, 2018; and (e.) 0.00% thereafter. Amount is payable at normal or early retirement. If a member terminated employment prior to July 1, 1997, but was not eligible to commence their pension before July 1, 1997, an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.
Optional form conversion factors	Actuarially equivalent factors based on RP-2000 for healthy annuitants, white collar adjustment, projected to 2027 using scale AA, set back two years for males and set forward one year for females, blended 95% males, 6.50% post-retirement interest, and 8.50% pre-retirement interest. The actuarially equivalent factors are currently being updated to reflect changes adopted during the 2018 legislative session.
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.

Summary of Plan Provisions (Concluded)

Changes in plan provisions	Member contributions were increased from 14.4% of pay to 15.4% of pay over three years, effective July 1, 2018. Regular employer contributions were increased from 21.6% of pay to 23.1% of pay over two years, effective July 1, 2018. Supplemental employer contributions totaling 7.0% of pay will be phased-in through fiscal year 2022; the supplemental employer contributions remain in effect until the plan is 100% funded. Interest credited on member contributions will decrease from 4.0% to 3.0%, beginning July 1, 2018. Deferred augmentation was changed to 0.00% for future accruing benefits, effective January 1, 2019. Augmentation that has already accrued for deferred members will still apply. Contribution stabilizer provisions were repealed. Post-retirement benefit increases were changed from 1.0% per year, increasing to 2.5% per year upon achieving a 90% funding ratio to a fixed rate of 1.0% per year. An end date of July 1, 2048 was added for the $1 million state contribution.

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, dated September 11, 2017.

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 were two members reported with missing salary and no members reported with missing service. We used prior year reported salary. There were no members reported with a missing or invalid date of birth or gender. **Data for terminated members:** Benefits were reported with full augmentation to Normal Retirement Age. Based on direction from MSRS, we adjusted benefits by removing augmentation on a prospective basis beginning January 1, 2019. 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 $35,000. **Data for members receiving benefits:** There was one member reported with a missing gender and no members reported with an invalid date of birth. We assumed male gender. There were no members reported without a benefit. There were no survivors reported with an expired benefit. There were no retirees reported with a bounce back annuity and an unreasonable reduction factor. There were no retirees reported with a survivor option and a survivor date of death. For retirees who elected a survivor benefit option, we used the valuation assumptions if the survivor date of birth was missing or invalid (184 members) and/or the survivor gender was missing or invalid (201 members).
Changes in actuarial assumptions	The Single Discount Rate changed from 6.38% per annum to 7.50% per annum.

Summary of Actuarial Assumptions (Continued)

Age in 2018	Percentage of Members Dying each Year* Healthy Post-Retirement Mortality** Male	Female	Healthy Pre-Retirement Mortality** Male	Female	Disability Mortality** 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	0.08	0.08	0.03	0.03	0.08	0.08
40	0.11	0.12	0.04	0.03	0.11	0.12
45	0.16	0.14	0.06	0.05	0.16	0.14
50	0.25	0.19	0.11	0.09	0.25	0.19
55	0.37	0.27	0.18	0.14	0.37	0.27
60	0.51	0.39	0.32	0.21	0.51	0.39
65	0.73	0.63	0.56	0.30	0.73	0.63
70	1.20	1.02	0.99	0.52	1.20	1.02
75	2.09	1.72	1.79	0.93	2.09	1.72
80	3.70	3.04	3.20	1.65	3.70	3.04
85	6.82	5.57	6.66	4.41	6.82	5.57
90	12.49	10.16	12.64	9.84	12.49	10.16

* *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	Percent of Members Decrementing Each Year Termination (Withdrawal) Rates After Third Year Male	Female	Disability Retirement Male	Female
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 3.62% (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, 2018 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: Payroll for Current Employees	Payroll for New Employees	Total Employee Payroll	Projected Contributions: Contributions from Current Employees	Employer Contributions for Current Employees	Contributions on Future Payroll toward Current UAL*	Additional State Contributions	Total Contributions
	(a)	(b)	(c) = (a) + (b)	(d) = (a) x 15.4%**	(e) = (a) x 30.1%**	(f)	(g)	(h) = (d) + (e) + (f) + (g)
2018	$ 74,007		$ 74,007					
2019	77,874		77,874	$ 11,603	$ 18,768		$ 1,000	$ 31,371
2020	78,198	$ 2,207	80,405	11,652	20,410	$ 351	1,000	33,413
2021	78,158	4,861	83,019	12,036	21,962	893	1,000	35,891
2022	78,446	7,271	85,717	12,081	23,612	1,482	1,000	38,175
2023	78,457	10,045	88,502	12,082	23,616	2,047	1,000	38,745
2024	77,867	13,512	91,379	11,992	23,438	2,754	1,000	39,184
2025	76,741	17,608	94,349	11,818	23,099	3,588	1,000	39,505
2026	75,343	22,072	97,415	11,603	22,678	4,498	1,000	39,779
2027	73,873	26,708	100,581	11,376	22,236	5,443	1,000	40,055
2028	71,810	32,040	103,850	11,059	21,615	6,530	1,000	40,204
2029	69,308	37,917	107,225	10,673	20,862	7,727	1,000	40,262
2030	66,744	43,966	110,710	10,279	20,090	8,960	1,000	40,329
2031	64,058	50,250	114,308	9,865	19,281	10,241	1,000	40,387
2032	61,226	56,797	118,023	9,429	18,429	11,575	1,000	40,433
2033	58,297	63,561	121,858	8,978	17,547	12,954	1,000	40,479
2034	55,477	70,342	125,819	8,544	16,699	14,336	1,000	40,579
2035	52,515	77,393	129,908	8,087	15,807	15,773	1,000	40,667
2036	49,456	84,674	134,130	7,616	14,886	17,257	1,000	40,759
2037	46,346	92,143	138,489	7,137	13,950	18,779	1,000	40,866
2038	43,290	99,700	142,990	6,667	13,030	20,319	1,000	41,016
2039	40,148	107,489	147,637	6,183	12,085	21,906	1,000	41,174
2040	36,603	115,832	152,435	5,637	11,018	23,607	1,000	41,262
2041	33,231	124,159	157,390	5,118	10,002	25,304	1,000	41,424
2042	29,591	132,914	162,505	4,557	8,907	27,088	1,000	41,552
2043	25,577	142,209	167,786	3,939	7,699	28,982	1,000	41,620
2044	21,910	151,329	173,239	3,374	6,595	30,841	1,000	41,810
2045	18,379	160,491	178,870	2,830	5,532	32,708	1,000	42,070
2046	14,810	169,873	184,683	2,281	4,458	34,620	1,000	42,359
2047	11,385	179,300	190,685	1,753	3,427	36,541	1,000	42,721
2048	8,040	188,842	196,882	1,238	2,420	38,486	1,000	43,144
2049	5,344	197,937	203,281	823	1,608	40,340	-	42,771
2050	3,447	206,441	209,888	531	1,038	42,073	-	43,642
2051	2,005	214,704	216,709	309	603	43,757	-	44,669
2052	1,148	222,604	223,752	177	345	45,367	-	45,889
2053	585	230,439	231,024	90	176	46,963	-	47,229
2054	291	238,241	238,532	45	88	48,554	-	48,687
2055	137	246,147	246,284	21	41	50,165	-	50,227
2056	44	254,245	254,289	7	13	51,815	-	51,835
2057	13	262,540	262,553	2	4	53,506	-	53,512
2058	-	271,086	271,086	-	-	55,247	-	55,247
2059	-	279,896	279,896	-	-	57,043	-	57,043
2060	-	288,993	288,993	-	-	58,897	-	58,897
2061	-	298,385	298,385	-	-	60,811	-	60,811
2062	-	308,083	308,083	-	-	62,787	-	62,787
2063	-	318,095	318,095	-	-	64,828	-	64,828
2064	-	328,434	328,434	-	-	66,935	-	66,935
2065	-	339,108	339,108	-	-	69,110	-	69,110
2066	-	350,129	350,129	-	-	71,356	-	71,356
2067	-	361,508	361,508	-	-	73,675	-	73,675
2068	-	373,257	373,257	-	-	76,070	-	76,070

* *Contributions related to future employees in excess of normal cost and expenses of 25.12% of pay.*

** *Employee contributions are equal to 14.9% of payroll in fiscal years ending June 30, 2019 and 2020. Employer contributions are equal to 24.1%, 26.1% and 28.1% for fiscal years ending June 30, 2019 through 2022, respectively.*

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)
2069	$ -	$ 385,388	$ 385,388	$ -	$ -	$ 78,542	$ -	$ 78,542
2070	-	397,913	397,913	-	-	81,095	-	81,095
2071	-	410,845	410,845	-	-	83,730	-	83,730
2072	-	424,197	424,197	-	-	86,451	-	86,451
2073	-	437,984	437,984	-	-	89,261	-	89,261
2074	-	452,218	452,218	-	-	92,162	-	92,162
2075	-	466,915	466,915	-	-	95,157	-	95,157
2076	-	482,090	482,090	-	-	98,250	-	98,250
2077	-	497,758	497,758	-	-	101,443	-	101,443
2078	-	513,935	513,935	-	-	104,740	-	104,740
2079	-	530,638	530,638	-	-	108,144	-	108,144
2080	-	547,884	547,884	-	-	111,659	-	111,659
2081	-	565,690	565,690	-	-	115,288	-	115,288
2082	-	584,075	584,075	-	-	119,034	-	119,034
2083	-	603,057	603,057	-	-	122,903	-	122,903
2084	-	622,657	622,657	-	-	126,897	-	126,897
2085	-	642,893	642,893	-	-	131,022	-	131,022
2086	-	663,787	663,787	-	-	135,280	-	135,280
2087	-	685,360	685,360	-	-	139,676	-	139,676
2088	-	707,634	707,634	-	-	144,216	-	144,216
2089	-	730,632	730,632	-	-	148,903	-	148,903
2090	-	754,378	754,378	-	-	153,742	-	153,742
2091	-	778,895	778,895	-	-	158,739	-	158,739
2092	-	804,209	804,209	-	-	163,898	-	163,898
2093	-	830,346	830,346	-	-	169,225	-	169,225
2094	-	857,333	857,333	-	-	174,724	-	174,724
2095	-	885,196	885,196	-	-	180,403	-	180,403
2096	-	913,965	913,965	-	-	186,266	-	186,266
2097	-	943,669	943,669	-	-	192,320	-	192,320
2098	-	974,338	974,338	-	-	198,570	-	198,570
2099	-	1,006,004	1,006,004	-	-	205,024	-	205,024
2100	-	1,038,699	1,038,699	-	-	211,687	-	211,687
2101	-	1,072,457	1,072,457	-	-	218,567	-	218,567
2102	-	1,107,311	1,107,311	-	-	225,670	-	225,670
2103	-	1,143,299	1,143,299	-	-	233,004	-	233,004
2104	-	1,180,456	1,180,456	-	-	240,577	-	240,577
2105	-	1,218,821	1,218,821	-	-	248,396	-	248,396
2106	-	1,258,433	1,258,433	-	-	256,469	-	256,469
2107	-	1,299,332	1,299,332	-	-	264,804	-	264,804
2108	-	1,341,560	1,341,560	-	-	273,410	-	273,410
2109	-	1,385,161	1,385,161	-	-	282,296	-	282,296
2110	-	1,430,179	1,430,179	-	-	291,470	-	291,470
2111	-	1,476,659	1,476,659	-	-	300,943	-	300,943
2112	-	1,524,651	1,524,651	-	-	310,724	-	310,724
2113	-	1,574,202	1,574,202	-	-	320,822	-	320,822
2114	-	1,625,363	1,625,363	-	-	331,249	-	331,249
2115	-	1,678,188	1,678,188	-	-	342,015	-	342,015
2116	-	1,732,729	1,732,729	-	-	353,130	-	353,130
2117	-	1,789,043	1,789,043	-	-	364,607	-	364,607
2118	-	1,847,186	1,847,186	-	-	376,457	-	376,457

**Contributions related to future employees in excess of normal cost and expenses of 25.12% 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)
2019	$ 729,799	$ 31,371	$ 60,715	$ 187	$ 53,648	$ 753,916
2020	753,916	33,413	62,176	188	55,478	780,443
2021	780,443	35,891	63,767	188	57,500	809,879
2022	809,879	38,175	65,065	188	59,744	842,545
2023	842,545	38,745	66,536	188	62,160	876,726
2024	876,726	39,184	68,197	187	64,679	912,205
2025	912,205	39,505	70,041	184	67,284	948,769
2026	948,769	39,779	71,994	181	69,965	986,338
2027	986,338	40,055	73,959	177	72,720	1,024,977
2028	1,024,977	40,204	76,250	172	75,540	1,064,299
2029	1,064,299	40,262	78,596	166	78,405	1,104,204
2030	1,104,204	40,329	80,992	160	81,312	1,144,693
2031	1,144,693	40,387	83,414	154	84,262	1,185,774
2032	1,185,774	40,433	86,057	147	87,247	1,227,250
2033	1,227,250	40,479	88,529	140	90,269	1,269,329
2034	1,269,329	40,579	90,823	133	93,344	1,312,296
2035	1,312,296	40,667	93,072	126	96,487	1,356,252
2036	1,356,252	40,759	95,295	119	99,706	1,401,303
2037	1,401,303	40,866	97,446	111	103,010	1,447,622
2038	1,447,622	41,016	99,456	104	106,416	1,495,494
2039	1,495,494	41,174	101,449	96	109,939	1,545,062
2040	1,545,062	41,262	103,650	88	113,579	1,596,165
2041	1,596,165	41,424	105,769	80	117,340	1,649,080
2042	1,649,080	41,552	108,077	71	121,228	1,703,712
2043	1,703,712	41,620	110,523	61	125,238	1,759,986
2044	1,759,986	41,810	112,633	53	129,389	1,818,499
2045	1,818,499	42,070	114,650	44	133,713	1,879,588
2046	1,879,588	42,359	116,676	36	138,231	1,943,466
2047	1,943,466	42,721	118,550	27	142,966	2,010,576
2048	2,010,576	43,144	120,308	19	147,951	2,081,344
2049	2,081,344	42,771	121,443	13	153,240	2,155,899
2050	2,155,899	43,642	121,891	8	158,922	2,236,564
2051	2,236,564	44,669	121,838	5	165,087	2,324,477
2052	2,324,477	45,889	121,165	3	171,825	2,421,023
2053	2,421,023	47,229	120,120	1	179,229	2,527,360
2054	2,527,360	48,687	118,690	1	187,385	2,644,741
2055	2,644,741	50,227	117,168	-	196,377	2,774,177
2056	2,774,177	51,835	115,445	-	206,282	2,916,849
2057	2,916,849	53,512	113,655	-	217,185	3,073,891
2058	3,073,891	55,247	111,760	-	229,172	3,246,550
2059	3,246,550	57,043	109,796	-	242,335	3,436,132
2060	3,436,132	58,897	107,752	-	256,772	3,644,049
2061	3,644,049	60,811	105,627	-	272,589	3,871,822
2062	3,871,822	62,787	103,419	-	289,902	4,121,092
2063	4,121,092	64,828	101,125	-	308,831	4,393,626
2064	4,393,626	66,935	98,743	-	329,512	4,691,330
2065	4,691,330	69,110	96,271	-	352,086	5,016,255
2066	5,016,255	71,356	93,708	-	376,707	5,370,610
2067	5,370,610	73,675	91,053	-	403,542	5,756,774
2068	5,756,774	76,070	88,305	-	432,769	6,177,308

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)
2069	$ 6,177,308	$ 78,542	$ 85,464	$ -	$ 464,579	$ 6,634,965
2070	6,634,965	81,095	82,534	-	499,180	7,132,706
2071	7,132,706	83,730	79,518	-	536,794	7,673,712
2072	7,673,712	86,451	76,421	-	577,659	8,261,401
2073	8,261,401	89,261	73,250	-	622,031	8,899,443
2074	8,899,443	92,162	70,014	-	670,185	9,591,776
2075	9,591,776	95,157	66,721	-	722,416	10,342,628
2076	10,342,628	98,250	63,382	-	779,042	11,156,538
2077	11,156,538	101,443	60,007	-	840,402	12,038,376
2078	12,038,376	104,740	56,607	-	906,862	12,993,371
2079	12,993,371	108,144	53,193	-	978,812	14,027,134
2080	14,027,134	111,659	49,777	-	1,056,675	15,145,691
2081	15,145,691	115,288	46,372	-	1,140,900	16,355,507
2082	16,355,507	119,034	42,989	-	1,231,974	17,663,526
2083	17,663,526	122,903	39,641	-	1,330,416	19,077,204
2084	19,077,204	126,897	36,340	-	1,436,786	20,604,547
2085	20,604,547	131,022	33,101	-	1,551,683	22,254,151
2086	22,254,151	135,280	29,938	-	1,675,751	24,035,244
2087	24,035,244	139,676	26,867	-	1,809,683	25,957,736
2088	25,957,736	144,216	23,906	-	1,954,221	28,032,267
2089	28,032,267	148,903	21,072	-	2,110,163	30,270,261
2090	30,270,261	153,742	18,381	-	2,278,365	32,683,987
2091	32,683,987	158,739	15,851	-	2,459,746	35,286,621
2092	35,286,621	163,898	13,499	-	2,655,296	38,092,316
2093	38,092,316	169,225	11,340	-	2,866,073	41,116,274
2094	41,116,274	174,724	9,387	-	3,093,220	44,374,831
2095	44,374,831	180,403	7,649	-	3,337,959	47,885,544
2096	47,885,544	186,266	6,127	-	3,601,610	51,667,293
2097	51,667,293	192,320	4,821	-	3,885,587	55,740,379
2098	55,740,379	198,570	3,721	-	4,191,414	60,126,642
2099	60,126,642	205,024	2,815	-	4,520,730	64,849,581
2100	64,849,581	211,687	2,085	-	4,875,298	69,934,481
2101	69,934,481	218,567	1,510	-	5,257,014	75,408,552
2102	75,408,552	225,670	1,069	-	5,667,923	81,301,076
2103	81,301,076	233,004	739	-	6,110,219	87,643,560
2104	87,643,560	240,577	499	-	6,586,268	94,469,906
2105	94,469,906	248,396	329	-	7,098,613	101,816,586
2106	101,816,586	256,469	213	-	7,649,991	109,722,833
2107	109,722,833	264,804	135	-	8,243,344	118,230,846
2108	118,230,846	273,410	85	-	8,881,839	127,386,010
2109	127,386,010	282,296	53	-	9,568,879	137,237,132
2110	137,237,132	291,470	34	-	10,308,127	147,836,695
2111	147,836,695	300,943	22	-	11,103,519	159,241,135
2112	159,241,135	310,724	15	-	11,959,287	171,511,131
2113	171,511,131	320,822	11	-	12,879,984	184,711,926
2114	184,711,926	331,249	8	-	13,870,502	198,913,669
2115	198,913,669	342,015	7	-	14,936,105	214,191,782
2116	214,191,782	353,130	5	-	16,082,447	230,627,354
2117	230,627,354	364,607	4	-	17,315,613	248,307,570
2118	248,307,570	376,457	4	-	18,642,141	267,326,164

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)
2019	$ 729,799	$ 60,715	$ 60,715	$ 0	$ 58,559	$ 0	$ 58,559
2020	753,916	62,176	62,176	0	55,784	0	55,784
2021	780,443	63,767	63,767	0	53,220	0	53,220
2022	809,879	65,065	65,065	0	50,515	0	50,515
2023	842,545	66,536	66,536	0	48,053	0	48,053
2024	876,726	68,197	68,197	0	45,816	0	45,816
2025	912,205	70,041	70,041	0	43,772	0	43,772
2026	948,769	71,994	71,994	0	41,853	0	41,853
2027	986,338	73,959	73,959	0	39,996	0	39,996
2028	1,024,977	76,250	76,250	0	38,358	0	38,358
2029	1,064,299	78,596	78,596	0	36,780	0	36,780
2030	1,104,204	80,992	80,992	0	35,257	0	35,257
2031	1,144,693	83,414	83,414	0	33,778	0	33,778
2032	1,185,774	86,057	86,057	0	32,417	0	32,417
2033	1,227,250	88,529	88,529	0	31,022	0	31,022
2034	1,269,329	90,823	90,823	0	29,605	0	29,605
2035	1,312,296	93,072	93,072	0	28,221	0	28,221
2036	1,356,252	95,295	95,295	0	26,879	0	26,879
2037	1,401,303	97,446	97,446	0	25,569	0	25,569
2038	1,447,622	99,456	99,456	0	24,275	0	24,275
2039	1,495,494	101,449	101,449	0	23,034	0	23,034
2040	1,545,062	103,650	103,650	0	21,892	0	21,892
2041	1,596,165	105,769	105,769	0	20,781	0	20,781
2042	1,649,080	108,077	108,077	0	19,753	0	19,753
2043	1,703,712	110,523	110,523	0	18,791	0	18,791
2044	1,759,986	112,633	112,633	0	17,813	0	17,813
2045	1,818,499	114,650	114,650	0	16,867	0	16,867
2046	1,879,588	116,676	116,676	0	15,968	0	15,968
2047	1,943,466	118,550	118,550	0	15,092	0	15,092
2048	2,010,576	120,308	120,308	0	14,248	0	14,248
2049	2,081,344	121,443	121,443	0	13,379	0	13,379
2050	2,155,899	121,891	121,891	0	12,491	0	12,491
2051	2,236,564	121,838	121,838	0	11,615	0	11,615
2052	2,324,477	121,165	121,165	0	10,745	0	10,745
2053	2,421,023	120,120	120,120	0	9,909	0	9,909
2054	2,527,360	118,690	118,690	0	9,108	0	9,108
2055	2,644,741	117,168	117,168	0	8,364	0	8,364
2056	2,774,177	115,445	115,445	0	7,666	0	7,666
2057	2,916,849	113,655	113,655	0	7,020	0	7,020
2058	3,073,891	111,760	111,760	0	6,422	0	6,422
2059	3,246,550	109,796	109,796	0	5,869	0	5,869
2060	3,436,132	107,752	107,752	0	5,358	0	5,358
2061	3,644,049	105,627	105,627	0	4,886	0	4,886
2062	3,871,822	103,419	103,419	0	4,450	0	4,450
2063	4,121,092	101,125	101,125	0	4,047	0	4,047
2064	4,393,626	98,743	98,743	0	3,676	0	3,676
2065	4,691,330	96,271	96,271	0	3,334	0	3,334
2066	5,016,255	93,708	93,708	0	3,019	0	3,019
2067	5,370,610	91,053	91,053	0	2,729	0	2,729
2068	5,756,774	88,305	88,305	0	2,462	0	2,462

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)
2069	$ 6,177,308	$ 85,464	$ 85,464	$ -	$ 2,216	$ -	$ 2,216
2070	6,634,965	82,534	82,534	-	1,991	-	1,991
2071	7,132,706	79,518	79,518	-	1,785	-	1,785
2072	7,673,712	76,421	76,421	-	1,595	-	1,595
2073	8,261,401	73,250	73,250	-	1,422	-	1,422
2074	8,899,443	70,014	70,014	-	1,265	-	1,265
2075	9,591,776	66,721	66,721	-	1,121	-	1,121
2076	10,342,628	63,382	63,382	-	991	-	991
2077	11,156,538	60,007	60,007	-	873	-	873
2078	12,038,376	56,607	56,607	-	766	-	766
2079	12,993,371	53,193	53,193	-	669	-	669
2080	14,027,134	49,777	49,777	-	583	-	583
2081	15,145,691	46,372	46,372	-	505	-	505
2082	16,355,507	42,989	42,989	-	435	-	435
2083	17,663,526	39,641	39,641	-	374	-	374
2084	19,077,204	36,340	36,340	-	319	-	319
2085	20,604,547	33,101	33,101	-	270	-	270
2086	22,254,151	29,938	29,938	-	227	-	227
2087	24,035,244	26,867	26,867	-	190	-	190
2088	25,957,736	23,906	23,906	-	157	-	157
2089	28,032,267	21,072	21,072	-	129	-	129
2090	30,270,261	18,381	18,381	-	104	-	104
2091	32,683,987	15,851	15,851	-	84	-	84
2092	35,286,621	13,499	13,499	-	66	-	66
2093	38,092,316	11,340	11,340	-	52	-	52
2094	41,116,274	9,387	9,387	-	40	-	40
2095	44,374,831	7,649	7,649	-	30	-	30
2096	47,885,544	6,127	6,127	-	23	-	23
2097	51,667,293	4,821	4,821	-	17	-	17
2098	55,740,379	3,721	3,721	-	12	-	12
2099	60,126,642	2,815	2,815	-	8	-	8
2100	64,849,581	2,085	2,085	-	6	-	6
2101	69,934,481	1,510	1,510	-	4	-	4
2102	75,408,552	1,069	1,069	-	3	-	3
2103	81,301,076	739	739	-	2	-	2
2104	87,643,560	499	499	-	1	-	1
2105	94,469,906	329	329	-	1	-	1
2106	101,816,586	213	213	-	-	-	-
2107	109,722,833	135	135	-	-	-	-
2108	118,230,846	85	85	-	-	-	-
2109	127,386,010	53	53	-	-	-	-
2110	137,237,132	34	34	-	-	-	-
2111	147,836,695	22	22	-	-	-	-
2112	159,241,135	15	15	-	-	-	-
2113	171,511,131	11	11	-	-	-	-
2114	184,711,926	8	8	-	-	-	-
2115	198,913,669	7	7	-	-	-	-
2116	214,191,782	5	5	-	-	-	-
2117	230,627,354	4	4	-	-	-	-
2118	248,307,570	4	4	-	-	-	-
				Totals	$ 1,118,851	$ -	$ 1,118,851

SECTION H

GLOSSARY OF TERMS

Glossary of Terms

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.
Accrued Service	Service credited under the system which was rendered before the date of the actuarial valuation.
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 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 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 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, 2018

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

November 29, 2018

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. 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, 2018 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

Bonita J. Wurst

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

BBM/BJW:rmn

Table of Contents

SECTION A

EXECUTIVE SUMMARY

Executive Summary
as of June 30, 2018 (Dollars in Thousands)

	2018
Actuarial Valuation Date	June 30, 2018
Measurement Date of the Net Pension Liability	June 30, 2018
Membership	
Number of	
- Service Retirements	272
- Survivors	81
- Disability Retirements	16
- Deferred Retirements	15
- Terminated other non-vested	0
- Active Members	317
- Total	701
Covered-Employee Payroll	$ 49,009 [1]
Net Pension Liability	
Total Pension Liability	$ 377,925
Plan Fiduciary Net Position	201,755
Net Pension Liability	$ 176,170
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	53.38%
Net Pension Liability as a Percentage of Covered-Employee Payroll	359.46%
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	3.62% [2]
Last year ending June 30 in the 2019 to 2118 projection period for which projected benefit payments are fully funded	2118
Total Pension Expense/(Income)	$ 4,723

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	$ 3,993	$ 3,848
Changes in assumptions	11,332	34,303
Net difference between projected and actual earnings on pension plan investments	6,649	11,879
Total	$ 21,974	$ 50,030

[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, 2018.

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, MN, 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 30 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, 2018 and a measurement date of June 30, 2018.

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 3.62% (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 is 7.50%.

SECTION B

FINANCIAL STATEMENTS

Statement of Pension Expense Under GASB Statement No. 68
Fiscal Year Ended June 30, 2018 (Dollars in Thousands)

A. Expense

1.	Service Cost	$	9,857
2.	Interest on the Total Pension Liability		26,746
3.	Current-Period Benefit Changes		-
4.	Employee Contributions (made negative for addition here)		(3,973)
5.	Projected Earnings on Plan Investments (made negative for addition here)		(13,786)
6.	Pension Plan Administrative Expense		66
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		285
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		(1,096)
11.	**Increases/(Decreases) from Experience in the Current Reporting Period**	**$**	**18,099**
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	$	578
13.	Recognition of Outflow (Inflow) of Resources due to assumption changes		
	Arising from Prior Reporting Periods		(12,166)
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		(1,788)
15.	**Total Pension Expense / (Income)**	**$**	**4,723**

Benefit changes since the previous measurement date are described on page 23.

Statement of Outflows and Inflows
Arising from Current Reporting Period
Fiscal Year Ended June 30, 2018 (Dollars in Thousands)

A. Outflows (Inflows) of Resources due to Liabilities		
1. Difference between expected and actual experience of the Total Pension Liability (gains) or losses	$	1,424
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		285
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	$	285
7. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses for the difference between expected and actual experience of the Total Pension Liability	$	1,139
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	$	1,139
B. Outflows (Inflows) of Resources due to Assets		
1. Net difference between projected and actual earnings on pension plan investments (gains) or losses	$	(5,479)
2. Recognition period for Assets {in years}		5
3. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Assets		(1,096)
4. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Assets	$	(4,383)

Statement of Outflows and Inflows
Arising from Current and Prior Reporting Periods
Fiscal Year Ended June 30, 2018 (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	$ 9,397	$ 20,700	$ (11,303)
2. Due to Assets	3,920	6,804	(2,884)
3. Total	$ 13,317	$ 27,504	$ (14,187)

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	$ 2,728	$ 1,865	$ 863
2. Assumption Changes	6,669	18,835	(12,166)
3. Net Difference between projected and actual earnings on pension plan investments	3,920	6,804	(2,884)
4. Total	**$ 13,317**	**$ 27,504**	**$ (14,187)**

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	$ 3,993	$ 3,848	$ 145
2. Assumption Changes	11,332	34,303	(22,971)
3. Net Difference between projected and actual earnings on pension plan investments*	6,649	11,879	(5,230)
4. Total	**$ 21,974**	**$ 50,030**	**$ (28,056)**

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
2019	$ (10,309)
2020	(14,966)
2021	(1,970)
2022	(811)
2023	-
Thereafter	-
Total	**$ (28,056)**

** 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.*

Statement of Fiduciary Net Position as of June 30, 2018 (Dollars in Thousands)

Assets		**June 30, 2018**
Cash & Short-term Investments	$	3,458
Receivables		241
Investment Pools (at fair value)		198,170
Securities Lending Collateral		20,161
Capital Assets		-
Total Assets	**$**	**222,030**
Total Deferred Outflows of Resources	**$**	**-**
Total Liabilities	**$**	**(20,275)**
Total Deferred Inflows of Resources	**$**	**-**
Net Position Restricted for Pensions	**$**	**201,755**

Statement of Changes in Fiduciary Net Position for the Fiscal Year Ended June 30, 2018 (Dollars in Thousands)

1. Net position at market value at beginning of year	**$**	**185,141**
Additions		
2. Contributions		
a. Employee	$	3,973
b. Employer		11,027
c. Other sources		6,000
d. Total contributions	$	21,000
3. Investment income		
a. Investment income/(loss)	$	19,477
b. Investment expenses		(212)
c. Net investment income/(loss)	$	19,265
4. Other Additions		-
5. Total Additions *(2.d.) + (3.c.) + (4.)*	**$**	**40,265**
Deductions		
6. Benefits Paid		
a. Annuity benefits	$	(23,585)
b. Refunds		-
c. Total benefits paid	$	(23,585)
7. Expenses		
a. Other deductions	$	-
b. Administrative		(66)
c. Total expenses	$	(66)
8. Total deductions *(6.c.) + (7.c.)*	**$**	**(23,651)**
9. Net increase/(decrease) in fiduciary net position *(5.) + (8.)*	**$**	**16,614**
10. Net position at market value at end of year *(1.) + (9.)*	**$**	**201,755**
11. State Board of Investment calculated annual investment return for the Judges Retirement Fund*		10.5%

** The fiscal year 2018 investment return for the Combined Funds is 10.3%.*

SECTION C

REQUIRED SUPPLEMENTARY INFORMATION

Schedule of Changes in Net Pension Liability and Related Ratios
Current Period
Fiscal Year Ended June 30, 2018 (Dollars in Thousands)

A. Total pension liability			
1. Service Cost	$	9,857	
2. Interest on the Total Pension Liability		26,746	
3. Changes of benefit terms		-	
4. Difference between expected and actual experience of the Total Pension Liability		1,424	(1)
5. Changes of assumptions		-	
6. Benefit payments, including refunds of employee contributions		(23,585)	
7. Net change in total pension liability	$	14,442	
8. Total pension liability – beginning		363,483	
9. Total pension liability – ending	**$**	**377,925**	
B. Plan fiduciary net position			
1. Contributions – employer	$	17,027	(2)
2. Contributions – employee		3,973	
3. Net investment income		19,265	
4. Benefit payments, including refunds of employee contributions		(23,585)	
5. Pension Plan Administrative Expense		(66)	
6. Other changes		-	
7. Net change in plan fiduciary net position	$	16,614	
8. Plan fiduciary net position – beginning		185,141	
9. Plan fiduciary net position – ending	**$**	**201,755**	
C. Net pension liability, *A.9 - B.9.*	**$**	**176,170**	
D. Plan fiduciary net position as a percentage of the total pension liability, *B.9 / A.9.*		**53.38%**	
E. Covered-employee payroll	**$**	**49,009**	(3)
F. Net pension liability as a percentage of covered-employee payroll, *C. / E.*		**359.46%**	

(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,	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Total Pension Liability										
Service Cost	$ 9,857	$9,483	$ 13,711	$ 12,251	$ 12,075					
Interest on the Total Pension Liability	26,746	25,367	21,349	21,773	20,535					
Benefit Changes	-	-	-	-	0					
Experience[1]	1,424	(4,958)	7,135	(4,366)	5,080					
Assumption Changes	-	11,652	(85,756)	21,696	(8,416)					
Benefit Payments	(23,585)	(22,785)	(22,378)	(21,893)	(20,802)					
Refunds	-	(309)	-	-	0					
Net Change in Total Pension Liability	$ 14,442	$18,450	$ (65,939)	$ 29,461	8,472					
Total Pension Liability - Beginning	363,483	345,033	410,972	381,511	373,039					
Total Pension Liability - Ending (a)	**$ 377,925**	**$363,483**	**$ 345,033**	**$ 410,972**	**$ 381,511**					
Plan Fiduciary Net Position										
Employer Contributions [2]	$ 17,027	$13,758	$ 10,219	$ 9,776	$ 9,426					
Employee Contributions	3,973	3,932	3,763	3,629	3,578					
Pension Plan Net Investment Income	19,265	24,729	(186)	7,572	28,011					
Benefit Payments	(23,585)	(22,785)	(22,378)	(21,893)	(20,802)					
Refunds	-	(309)	-	-	0					
Pension Plan Administrative Expense	(66)	(89)	(93)	(60)	(55)					
Other Changes	-	-	-	-	0					
Net Change in Plan Fiduciary Net Position	**$ 16,614**	**$19,236**	**$ (8,675)**	**$ (976)**	**20,158**					
Plan Fiduciary Net Position - Beginning	**$ 185,141**	**$165,905**	**$ 174,580**	**$ 175,556**	**155,398**					
Plan Fiduciary Net Position - Ending (b)	**$ 201,755**	**$185,141**	**$ 165,905**	**$ 174,580**	**$ 175,556**					
Net Pension Liability - Ending (a) - (b)	**$ 176,170**	**$178,342**	**$ 179,128**	**$ 236,392**	**205,955**					
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	**53.38 %**	**50.94 %**	**48.08 %**	**42.48 %**	**46.02 %**					
Covered-Employee Payroll[3]	**$ 49,009**	**$47,813**	**$ 45,418**	**$ 43,449**	**$ 41,893**					
Net Pension Liability as a Percentage of Covered-Employee Payroll	**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)
2009						
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

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)
2009	$ 8,985	$ 8,219	$ 766	$ 39,444	20.84%
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

Notes to Schedule of Contributions

Methods and Assumptions Used to Determine Fiscal Year Ending June 30, 2018 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, 2017
Actuarial Cost Method	Entry Age Normal
Amortization Method	Level Percentage of Payroll, Closed
Remaining Amortization Period	22 years
Asset Valuation Method	5-Year smoothed market; no corridor
Inflation	2.75%
Payroll Increases	2.75%
Salary Increases	2.75%
Investment Rate of Return	8.00%
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 2032, 2% per year from 2033 through 2044 and 2.5% per year thereafter.
	See separate funding actuarial valuation report as of July 1, 2017 for additional detail. To obtain this report, contact MSRS at 60 Empire Drive, Suite 300, St. Paul, MN, 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]
2009	
2010	
2011	
2012	
2013	
2014	18.66 %
2015	0.04
2016	(0.11)
2017	15.18
2018	10.46

[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, 2018, the annual money-weighted rate of return for the Judges Retirement Fund was 10.46%. 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. Best 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, 2018, these best estimates are summarized in the following table:

Asset Class	Transitional Target Allocation	Final Target Allocation	Long-Term Expected Real Rate of Return (Geometric Mean)
Domestic Equity[1]	33%	36%	5.10%
International Equity[2]	16%	17%	5.30%
Private Markets[3]	25%	25%	5.90%
Fixed Income	16%	20% [4]	0.75%
Treasuries	8%	0%	0.50%
Cash	2%	2%	0.00%
Total	100%	100%	

(1) Domestic Equity includes U.S. Stock Actively Managed and the U.S. Stock Index Fund.

(2) International Equity includes Broad International Stock Fund.

(3) Private Markets includes the Alternative Investment Pool. If a 25 percent allocation uncommitted allocation to Private Markets cannot be achieved, the uncommitted allocation is invested in Public Equities.

(4) The Final Target Allocation will combine Fixed Income investment options.

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 dated September 11, 2017.

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	$416,575	$377,925	$344,834
Net Position Restricted for Pensions	201,755	201,755	201,755
Net Pension Liabitliy	**$214,820**	**$176,170**	**$143,079**

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	**$ 363,483**	**$ 185,141**	**$ 178,342**	**$ 33,867**	**$ 72,055**	
Changes for the Year:						
Service Cost	$ 9,857		$ 9,857			$ 9,857
Interest on Total Pension Liability	26,746		26,746			26,746
Interest on Plan Fiduciary Net Position		$ 13,786 (1)	(13,786)			(13,786)
Changes in Benefit Terms						
Liability Experience Gains and Losses	1,424		1,424	$ 1,139	$ -	285
Changes in Assumptions	-		-			-
Recognition of Deferred Outflows/(Inflows) of Resources Arising from Prior Reporting Periods						
Liability Experience Gains/(Losses)				(2,443)	(1,865)	578
Assumption Changes				(6,669)	(18,835)	(12,166)
Investment Gains/(Losses)				(3,920)	(5,708)	(1,788)
Contributions - Employer		17,027	(17,027)			
Contributions - Employees		3,973	(3,973)			(3,973)
Asset Gain/(Loss)		5,479 (1)	(5,479)		4,383	(1,096)
Benefit Payments and Refunds	(23,585)	(23,585)	-			
Administrative Expenses		(66)	66			66
Other Changes						
Net Changes	**$ 14,442**	**$ 16,614**	**$ (2,172)**	**$ (11,893)**	**$ (22,025)**	**$ 4,723**
Balance End of Year	**$ 377,925**	**$ 201,755**	**$ 176,170**	**$ 21,974**	**$ 50,030**	

(1) The sum of these items in column (b) equals the net investment income of $19,265.

Summary of Population Statistics

		Terminated		Recipients			
	Actives*	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	Total
Members on 7/1/2017	**317**	**15**	**0**	**255**	**16**	**80**	**683**
New members	27	0	0	0	0	0	**27**
Return to active	0	0	0	0	0	0	**0**
Terminated non-vested	0	0	0	0	0	0	**0**
Service retirements	(26)	(1)	0	27	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	(10)	0	(3)	**(13)**
New beneficiary	0	0	0	0	0	4	**4**
Disabled	0	0	0	0	0	0	**0**
Unexpected status changes	0	0	0	0	0	0	**0**
Net change	0	0	0	17	0	1	**18**
Members on 6/30/2018	**317**	**15**	**0**	**272**	**16**	**81**	**701**

** 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

Actuarial Basis

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, 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.

Actuarial Basis

Summary of Plan Provisions (Continued)

Retirement	
<u>Normal retirement benefit</u>	
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.
<u>Early retirement</u>	
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.
<u>Form of payment</u>	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
<u>Benefit increases</u>	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%.

Actuarial Basis

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.

Actuarial Basis

Summary of Plan Provisions (Concluded)

Termination	
<u>Refund of contributions</u>	
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.
<u>Deferred benefit</u>	
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%.
<u>Form of payment</u>	Same as for retirement.
Optional form conversion factors	Actuarially equivalent factors based on RP-2000 for healthy annuitants, white collar adjustment, projected to 2022 using scale AA, set back one year for males and set back two years for females, blended 80% males, and 6.50% interest. The actuarially equivalent factors are currently being updated to reflect changes adopted during the 2018 legislative session.
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	Interest credited on member contributions will decrease from 4.0% to 3.0%, beginning July 1, 2018. An end date of July 1, 2048 was added for the $6 million state contribution.

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 2037, 2.00% per annum for the years 2038 through 2051, 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, dated September 11, 2017.

Investment return	7.50% per annum.
Single discount rate	7.50% per annum.
Benefit increases after retirement	1.75% per annum through 2037, 2.00% per annum from 2038 to 2051, 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 13 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 $153,345 for the July 1, 2017 to June 30, 2018 plan year. There were no members reported with missing service. <u>Data for terminated members</u>: There were no members reported without a benefit.

Summary of Actuarial Assumptions (Continued)

Unknown data for certain members	<u>Data for members receiving benefits</u>: There were no members reported without a benefit. 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 no retirees reported with a bounce back annuity and an unreasonable reduction factor. There were retired members reported with a survivor option and an invalid or missing survivor gender (41 members) and/or survivor date of birth (33 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 2038, 2.00% for 2039 through 2053, and 2.50% thereafter to 1.75% through 2037, 2.00% for 2038 through 2051, 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 2018	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	0.08	0.08	0.03	0.03	0.08	0.08
40	0.11	0.12	0.04	0.03	0.11	0.12
45	0.16	0.14	0.06	0.05	0.16	0.14
50	0.25	0.19	0.11	0.09	0.25	0.19
55	0.37	0.27	0.18	0.14	0.37	0.27
60	0.51	0.39	0.32	0.21	0.51	0.39
65	0.73	0.63	0.56	0.30	0.73	0.63
70	1.20	1.02	0.99	0.52	1.20	1.02
75	2.09	1.72	1.79	0.93	2.09	1.72
80	3.70	3.04	3.20	1.65	3.70	3.04
85	6.82	5.57	6.66	4.41	6.82	5.57
90	12.49	10.16	12.64	9.84	12.49	10.16

* *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 3.62% (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, 2018 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)
2018	$ 49,009		$ 49,009					
2019	49,824		49,824	$ 3,986	$ 11,210		$ 6,000	$ 21,196
2020	47,889	$ 3,180	51,069	3,814	10,775	$ 337	6,000	20,926
2021	45,681	6,665	52,346	3,622	10,278	708	6,000	20,608
2022	43,643	10,012	53,655	3,445	9,820	1,068	6,000	20,333
2023	41,453	13,543	54,996	3,257	9,327	1,450	6,000	20,034
2024	39,318	17,053	56,371	3,075	8,847	1,832	6,000	19,754
2025	37,215	20,565	57,780	2,897	8,373	2,218	6,000	19,488
2026	35,205	24,020	59,225	2,728	7,921	2,601	6,000	19,250
2027	33,262	27,443	60,705	2,566	7,484	2,983	6,000	19,033
2028	31,333	30,890	62,223	2,406	7,050	3,370	6,000	18,826
2029	29,170	34,609	63,779	2,229	6,563	3,790	6,000	18,582
2030	26,749	38,624	65,373	2,035	6,019	4,245	6,000	18,299
2031	24,423	42,584	67,007	1,849	5,495	4,698	6,000	18,042
2032	22,220	46,463	68,683	1,674	4,999	5,145	6,000	17,818
2033	19,982	50,418	70,400	1,499	4,496	5,604	6,000	17,599
2034	17,831	54,329	72,160	1,331	4,012	6,061	6,000	17,404
2035	15,870	58,094	73,964	1,179	3,571	6,505	6,000	17,255
2036	13,899	61,914	75,813	1,028	3,127	6,958	6,000	17,113
2037	11,825	65,883	77,708	870	2,661	7,431	6,000	16,962
2038	10,002	69,649	79,651	732	2,250	7,885	6,000	16,867
2039	8,471	73,171	81,642	617	1,906	8,313	6,000	16,836
2040	7,118	76,565	83,683	516	1,601	8,730	6,000	16,847
2041	5,888	79,887	85,775	425	1,325	9,142	6,000	16,892
2042	4,794	83,126	87,920	344	1,079	9,547	6,000	16,970
2043	3,782	86,336	90,118	270	851	9,951	6,000	17,072
2044	2,907	89,463	92,370	207	654	10,348	6,000	17,209
2045	2,201	92,479	94,680	156	495	10,735	6,000	17,386
2046	1,520	95,527	97,047	107	342	11,128	6,000	17,577
2047	968	98,505	99,473	68	218	11,515	6,000	17,801
2048	635	101,325	101,960	44	143	11,845	-	12,032
2049	427	104,082	104,509	30	96	12,167	-	12,293
2050	199	106,922	107,121	14	45	12,499	-	12,558
2051	40	109,759	109,799	3	9	12,831	-	12,843
2052	-	112,544	112,544	-	-	13,156	-	13,156
2053	-	115,358	115,358	-	-	13,485	-	13,485
2054	-	118,242	118,242	-	-	13,822	-	13,822
2055	-	121,198	121,198	-	-	14,168	-	14,168
2056	-	124,228	124,228	-	-	14,522	-	14,522
2057	-	127,334	127,334	-	-	14,885	-	14,885
2058	-	130,517	130,517	-	-	15,257	-	15,257
2059	-	133,780	133,780	-	-	15,639	-	15,639
2060	-	137,124	137,124	-	-	16,030	-	16,030
2061	-	140,553	140,553	-	-	16,431	-	16,431
2062	-	144,066	144,066	-	-	16,841	-	16,841
2063	-	147,668	147,668	-	-	17,262	-	17,262
2064	-	151,360	151,360	-	-	17,694	-	17,694
2065	-	155,144	155,144	-	-	18,136	-	18,136
2066	-	159,022	159,022	-	-	18,590	-	18,590
2067	-	162,998	162,998	-	-	19,054	-	19,054
2068	-	167,073	167,073	-	-	19,531	-	19,531

** Contributions related to future employees in excess of normal cost and expenses. Normal cost and expenses initially total 19.96% 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)
2069	$ -	$ 171,250	$ 171,250	$ -	$ -	$ 20,019	$ -	$ 20,019
2070	-	175,531	175,531	-	-	20,520	-	20,520
2071	-	179,919	179,919	-	-	21,033	-	21,033
2072	-	184,417	184,417	-	-	21,558	-	21,558
2073	-	189,028	189,028	-	-	22,097	-	22,097
2074	-	193,753	193,753	-	-	22,650	-	22,650
2075	-	198,597	198,597	-	-	23,216	-	23,216
2076	-	203,562	203,562	-	-	23,796	-	23,796
2077	-	208,651	208,651	-	-	24,391	-	24,391
2078	-	213,867	213,867	-	-	25,001	-	25,001
2079	-	219,214	219,214	-	-	25,626	-	25,626
2080	-	224,694	224,694	-	-	26,267	-	26,267
2081	-	230,312	230,312	-	-	26,923	-	26,923
2082	-	236,070	236,070	-	-	27,597	-	27,597
2083	-	241,971	241,971	-	-	28,286	-	28,286
2084	-	248,021	248,021	-	-	28,994	-	28,994
2085	-	254,221	254,221	-	-	29,718	-	29,718
2086	-	260,577	260,577	-	-	30,461	-	30,461
2087	-	267,091	267,091	-	-	31,223	-	31,223
2088	-	273,768	273,768	-	-	32,004	-	32,004
2089	-	280,613	280,613	-	-	32,804	-	32,804
2090	-	287,628	287,628	-	-	33,624	-	33,624
2091	-	294,819	294,819	-	-	34,464	-	34,464
2092	-	302,189	302,189	-	-	35,326	-	35,326
2093	-	309,744	309,744	-	-	36,209	-	36,209
2094	-	317,487	317,487	-	-	37,114	-	37,114
2095	-	325,424	325,424	-	-	38,042	-	38,042
2096	-	333,560	333,560	-	-	38,993	-	38,993
2097	-	341,899	341,899	-	-	39,968	-	39,968
2098	-	350,447	350,447	-	-	40,967	-	40,967
2099	-	359,208	359,208	-	-	41,991	-	41,991
2100	-	368,188	368,188	-	-	43,041	-	43,041
2101	-	377,393	377,393	-	-	44,117	-	44,117
2102	-	386,827	386,827	-	-	45,220	-	45,220
2103	-	396,498	396,498	-	-	46,351	-	46,351
2104	-	406,411	406,411	-	-	47,509	-	47,509
2105	-	416,571	416,571	-	-	48,697	-	48,697
2106	-	426,985	426,985	-	-	49,915	-	49,915
2107	-	437,660	437,660	-	-	51,162	-	51,162
2108	-	448,601	448,601	-	-	52,441	-	52,441
2109	-	459,816	459,816	-	-	53,753	-	53,753
2110	-	471,312	471,312	-	-	55,096	-	55,096
2111	-	483,094	483,094	-	-	56,474	-	56,474
2112	-	495,172	495,172	-	-	57,886	-	57,886
2113	-	507,551	507,551	-	-	59,333	-	59,333
2114	-	520,240	520,240	-	-	60,816	-	60,816
2115	-	533,246	533,246	-	-	62,336	-	62,336
2116	-	546,577	546,577	-	-	63,895	-	63,895
2117	-	560,241	560,241	-	-	65,492	-	65,492
2118	-	574,248	574,248	-	-	67,761	-	67,761

** Contributions related to future employees in excess of normal cost and expenses. Normal cost and expenses initially total 19.96% 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)
2019	$ 201,755	$ 21,196	$ 24,630	$ 60	$ 15,003	$ 213,264
2020	213,264	20,926	25,904	62	15,809	224,033
2021	224,033	20,608	27,252	59	16,555	233,885
2022	233,885	20,333	28,491	57	17,238	242,908
2023	242,908	20,034	29,813	54	17,856	250,931
2024	250,931	19,754	31,187	51	18,396	257,843
2025	257,843	19,488	32,454	48	18,859	263,688
2026	263,688	19,250	33,591	46	19,246	268,547
2027	268,547	19,033	34,700	43	19,562	272,399
2028	272,399	18,826	35,773	41	19,804	275,215
2029	275,215	18,582	36,806	38	19,968	276,921
2030	276,921	18,299	37,997	35	20,042	277,230
2031	277,230	18,042	39,014	32	20,018	276,244
2032	276,244	17,818	39,930	29	19,903	274,006
2033	274,006	17,599	40,743	26	19,697	270,533
2034	270,533	17,404	41,420	23	19,405	265,899
2035	265,899	17,255	41,899	21	19,034	260,268
2036	260,268	17,113	42,312	18	18,591	253,642
2037	253,642	16,962	42,685	15	18,075	245,979
2038	245,979	16,867	42,846	13	17,491	237,478
2039	237,478	16,836	42,798	11	16,854	228,359
2040	228,359	16,847	42,585	9	16,179	218,791
2041	218,791	16,892	42,158	8	15,478	208,995
2042	208,995	16,970	41,542	6	14,769	199,186
2043	199,186	17,072	40,786	5	14,065	189,532
2044	189,532	17,209	39,878	4	13,380	180,239
2045	180,239	17,386	38,795	3	12,729	171,556
2046	171,556	17,577	37,633	2	12,128	163,626
2047	163,626	17,801	36,357	1	11,588	156,657
2048	156,657	12,032	34,925	1	10,906	144,669
2049	144,669	12,293	33,410	1	10,072	133,623
2050	133,623	12,558	31,899	-	9,309	123,591
2051	123,591	12,843	30,351	-	8,624	114,707
2052	114,707	13,156	28,819	-	8,026	107,070
2053	107,070	13,485	27,342	-	7,520	100,733
2054	100,733	13,822	25,874	-	7,111	95,792
2055	95,792	14,168	24,418	-	6,807	92,349
2056	92,349	14,522	22,979	-	6,615	90,507
2057	90,507	14,885	21,559	-	6,542	90,375
2058	90,375	15,257	20,160	-	6,597	92,069
2059	92,069	15,639	18,784	-	6,789	95,713
2060	95,713	16,030	17,435	-	7,126	101,434
2061	101,434	16,431	16,116	-	7,619	109,368
2062	109,368	16,841	14,832	-	8,276	119,653
2063	119,653	17,262	13,584	-	9,109	132,440
2064	132,440	17,694	12,377	-	10,128	147,885
2065	147,885	18,136	11,214	-	11,346	166,153
2066	166,153	18,590	10,099	-	12,774	187,418
2067	187,418	19,054	9,037	-	14,425	211,860
2068	211,860	19,531	8,032	-	16,313	239,672

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)
2069	$ 239,672	$ 20,019	$ 7,088	$ -	$ 18,451	$ 271,054
2070	271,054	20,520	6,208	-	20,856	306,222
2071	306,222	21,033	5,395	-	23,542	345,402
2072	345,402	21,558	4,649	-	26,527	388,838
2073	388,838	22,097	3,971	-	29,830	436,794
2074	436,794	22,650	3,361	-	33,470	489,553
2075	489,553	23,216	2,816	-	37,467	547,420
2076	547,420	23,796	2,334	-	41,846	610,728
2077	610,728	24,391	1,913	-	46,632	679,838
2078	679,838	25,001	1,549	-	51,851	755,141
2079	755,141	25,626	1,237	-	57,533	837,063
2080	837,063	26,267	974	-	63,711	926,067
2081	926,067	26,923	755	-	70,418	1,022,653
2082	1,022,653	27,597	575	-	77,694	1,127,369
2083	1,127,369	28,286	431	-	85,578	1,240,802
2084	1,240,802	28,994	316	-	94,116	1,363,596
2085	1,363,596	29,718	227	-	103,355	1,496,442
2086	1,496,442	30,461	160	-	113,349	1,640,092
2087	1,640,092	31,223	109	-	124,152	1,795,358
2088	1,795,358	32,004	73	-	135,827	1,963,116
2089	1,963,116	32,804	47	-	148,440	2,144,313
2090	2,144,313	33,624	30	-	162,060	2,339,967
2091	2,339,967	34,464	18	-	176,766	2,551,179
2092	2,551,179	35,326	11	-	192,639	2,779,133
2093	2,779,133	36,209	6	-	209,768	3,025,104
2094	3,025,104	37,114	3	-	228,249	3,290,464
2095	3,290,464	38,042	2	-	248,185	3,576,689
2096	3,576,689	38,993	1	-	269,687	3,885,368
2097	3,885,368	39,968	-	-	292,874	4,218,210
2098	4,218,210	40,967	-	-	317,874	4,577,051
2099	4,577,051	41,991	-	-	344,825	4,963,867
2100	4,963,867	43,041	-	-	373,875	5,380,783
2101	5,380,783	44,117	-	-	405,183	5,830,083
2102	5,830,083	45,220	-	-	438,921	6,314,224
2103	6,314,224	46,351	-	-	475,273	6,835,848
2104	6,835,848	47,509	-	-	514,438	7,397,795
2105	7,397,795	48,697	-	-	556,628	8,003,120
2106	8,003,120	49,915	-	-	602,072	8,655,107
2107	8,655,107	51,162	-	-	651,017	9,357,286
2108	9,357,286	52,441	-	-	703,727	10,113,454
2109	10,113,454	53,753	-	-	760,488	10,927,695
2110	10,927,695	55,096	-	-	821,606	11,804,397
2111	11,804,397	56,474	-	-	887,409	12,748,280
2112	12,748,280	57,886	-	-	958,252	13,764,418
2113	13,764,418	59,333	-	-	1,034,516	14,858,267
2114	14,858,267	60,816	-	-	1,116,609	16,035,692
2115	16,035,692	62,336	-	-	1,204,972	17,303,000
2116	17,303,000	63,895	-	-	1,300,077	18,666,972
2117	18,666,972	65,492	-	-	1,402,434	20,134,898
2118	20,134,898	67,761	-	-	1,512,612	21,715,271

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	$ 201,755	$ 24,630	$ 24,630	$ -	$ 23,755	$ -	$ 23,755
2019	213,264	25,904	25,904	-	23,241	-	23,241
2020	224,033	27,252	27,252	-	22,745	-	22,745
2021	233,885	28,491	28,491	-	22,120	-	22,120
2022	242,908	29,813	29,813	-	21,531	-	21,531
2023	250,931	31,187	31,187	-	20,952	-	20,952
2024	257,843	32,454	32,454	-	20,282	-	20,282
2025	263,688	33,591	33,591	-	19,528	-	19,528
2026	268,547	34,700	34,700	-	18,765	-	18,765
2027	272,399	35,773	35,773	-	17,996	-	17,996
2028	275,215	36,806	36,806	-	17,224	-	17,224
2029	276,921	37,997	37,997	-	16,541	-	16,541
2030	277,230	39,014	39,014	-	15,799	-	15,799
2031	276,244	39,930	39,930	-	15,041	-	15,041
2032	274,006	40,743	40,743	-	14,277	-	14,277
2033	270,533	41,420	41,420	-	13,501	-	13,501
2034	265,899	41,899	41,899	-	12,705	-	12,705
2035	260,268	42,312	42,312	-	11,935	-	11,935
2036	253,642	42,685	42,685	-	11,200	-	11,200
2037	245,979	42,846	42,846	-	10,458	-	10,458
2038	237,478	42,798	42,798	-	9,717	-	9,717
2039	228,359	42,585	42,585	-	8,994	-	8,994
2040	218,791	42,158	42,158	-	8,283	-	8,283
2041	208,995	41,542	41,542	-	7,593	-	7,593
2042	199,186	40,786	40,786	-	6,934	-	6,934
2043	189,532	39,878	39,878	-	6,307	-	6,307
2044	180,239	38,795	38,795	-	5,708	-	5,708
2045	171,556	37,633	37,633	-	5,150	-	5,150
2046	163,626	36,357	36,357	-	4,629	-	4,629
2047	156,657	34,925	34,925	-	4,136	-	4,136
2048	144,669	33,410	33,410	-	3,681	-	3,681
2049	133,623	31,899	31,899	-	3,269	-	3,269
2050	123,591	30,351	30,351	-	2,893	-	2,893
2051	114,707	28,819	28,819	-	2,556	-	2,556
2052	107,070	27,342	27,342	-	2,255	-	2,255
2053	100,733	25,874	25,874	-	1,985	-	1,985
2054	95,792	24,418	24,418	-	1,743	-	1,743
2055	92,349	22,979	22,979	-	1,526	-	1,526
2056	90,507	21,559	21,559	-	1,332	-	1,332
2057	90,375	20,160	20,160	-	1,158	-	1,158
2058	92,069	18,784	18,784	-	1,004	-	1,004
2059	95,713	17,435	17,435	-	867	-	867
2060	101,434	16,116	16,116	-	745	-	745
2061	109,368	14,832	14,832	-	638	-	638
2062	119,653	13,584	13,584	-	544	-	544
2063	132,440	12,377	12,377	-	461	-	461
2064	147,885	11,214	11,214	-	388	-	388
2065	166,153	10,099	10,099	-	325	-	325
2066	187,418	9,037	9,037	-	271	-	271
2067	211,860	8,032	8,032	-	224	-	224

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	$ 239,672	$ 7,088	$ 7,088	$ -	$ 23,755	$ -	$ 184
2069	271,054	6,208	6,208	-	23,241	-	150
2070	306,222	5,395	5,395	-	22,745	-	121
2071	345,402	4,649	4,649	-	22,120	-	97
2072	388,838	3,971	3,971	-	21,531	-	77
2073	436,794	3,361	3,361	-	20,952	-	61
2074	489,553	2,816	2,816	-	20,282	-	47
2075	547,420	2,334	2,334	-	19,528	-	36
2076	610,728	1,913	1,913	-	18,765	-	28
2077	679,838	1,549	1,549	-	17,996	-	21
2078	755,141	1,237	1,237	-	17,224	-	16
2079	837,063	974	974	-	16,541	-	11
2080	926,067	755	755	-	15,799	-	8
2081	1,022,653	575	575	-	15,041	-	6
2082	1,127,369	431	431	-	14,277	-	4
2083	1,240,802	316	316	-	13,501	-	3
2084	1,363,596	227	227	-	12,705	-	2
2085	1,496,442	160	160	-	11,935	-	1
2086	1,640,092	109	109	-	11,200	-	1
2087	1,795,358	73	73	-	10,458	-	0
2088	1,963,116	47	47	-	9,717	-	0
2089	2,144,313	30	30	-	8,994	-	0
2090	2,339,967	18	18	-	8,283	-	0
2091	2,551,179	11	11	-	7,593	-	0
2092	2,779,133	6	6	-	6,934	-	0
2093	3,025,104	3	3	-	6,307	-	0
2094	3,290,464	2	2	-	5,708	-	0
2095	3,576,689	1	1	-	5,150	-	0
2096	3,885,368	-	-	-	4,629	-	0
2097	4,218,210	-	-	-	4,136	-	0
2098	4,577,051	-	-	-	3,681	-	0
2099	4,963,867	-	-	-	3,269	-	0
2100	5,380,783	-	-	-	2,893	-	0
2101	5,830,083	-	-	-	2,556	-	-
2102	6,314,224	-	-	-	2,255	-	-
2103	6,835,848	-	-	-	1,985	-	-
2104	7,397,795	-	-	-	1,743	-	-
2105	8,003,120	-	-	-	1,526	-	-
2106	8,655,107	-	-	-	1,332	-	-
2107	9,357,286	-	-	-	1,158	-	-
2108	10,113,454	-	-	-	1,004	-	-
2109	10,927,695	-	-	-	867	-	-
2110	11,804,397	-	-	-	745	-	-
2111	12,748,280	-	-	-	638	-	-
2112	13,764,418	-	-	-	544	-	-
2113	14,858,267	-	-	-	461	-	-
2114	16,035,692	-	-	-	388	-	-
2115	17,303,000	-	-	-	325	-	-
2116	18,666,972	-	-	-	271	-	-
2117	20,134,898	-	-	-	224	-	-
				Totals	$ 445,788	$ -	$ 445,788

SECTION H

GLOSSARY OF TERMS

Glossary of Terms

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.
Accrued Service	Service credited under the system which was rendered before the date of the actuarial valuation.
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 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 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 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 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, 2018

GRS

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

November 29, 2018

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. 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, 2018 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

Bonita J. Wurst

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

BBM/BJW:rmn

Table of Contents

SECTION A

EXECUTIVE SUMMARY

Executive Summary
as of June 30, 2018 (Dollars in Thousands)

	2018
Actuarial Valuation Date	June 30, 2018
Measurement Date of the Net Pension Liability	June 30, 2018
Membership	
Number of	
- Service Retirements	293
- Survivors	79
- Disability Retirements	-
- Deferred Retirements	39
- Terminated other non-vested	-
- Active Members	19
- Total	430
Covered-employee Payroll [(1)]	$ 1,033
Net Pension Liability	
Total Pension Liability	$ 139,367
Plan Fiduciary Net Position	-
Net Pension Liability	$ 139,367
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	0.00%
Net Pension Liability as a Percentage of Covered-employee Payroll	13,491.48%
Development of the Single Discount Rate	
Single Discount Rate	3.62%
Long-Term Expected Rate of Investment Return	7.50%
Long-Term Municipal Bond Rate [(2)]	3.62%
Last year ending June 30 in the 2019 to 2118 projection period for which projected benefit payments are fully funded	N/A
Total Pension Expense/(Income)	$ 767

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	118	-
Totals	**$ 118**	**$ -**

[(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, 2018.

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, MN, 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, 2018 and a measurement date of June 30, 2018.

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 3.62% was used to measure the total pension liability. This single discount rate was based on a municipal bond rate of 3.62% (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 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, 2018 (Dollars in Thousands)

A. Expense		
1. Service Cost	$	437
2. Interest on the Total Pension Liability		5,094
3. Current-Period Benefit Changes		(9,839)
4. Employee Contributions (made negative for addition here)		(93)
5. Projected Earnings on Plan Investments (made negative for addition here)		-
6. Pension Plan Administrative Expense		37
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		6,119
9. Recognition of Outflow (Inflow) of Resources due to assumption changes		
Arising from Current Reporting Period		(856)
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	**$**	**899**
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		(132)
15. Total Pension Expense / (Income)	**$**	**767**

Benefit changes since the previous measurement date are described on page 24.

Statement of Outflows and Inflows
Arising from Current Reporting Period
Fiscal Year Ended June 30, 2018 (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	$	6,119
2. Assumption Changes (gains) or losses		(856)
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		6,119
5. Outflow (Inflow) of Resources to be recognized in the current pension expense for Assumption Changes		(856)
6. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Liabilities	$	5,263
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, 2018 (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	$ 6,119	$ 856	$ 5,263
2. Due to Assets	75	207	(132)
3. Total	$ 6,194	$ 1,063	$ 5,131

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	$ 6,119	$ -	$ 6,119
2. Assumption Changes	-	856	(856)
3. Net Difference between projected and actual earnings on pension plan investments	75	207	(132)
4. Total	$ 6,194	$ 1,063	$ 5,131

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*	118	-	118
4. Total	$ 118	$ -	$ 118

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
2019	$ 75
2020	43
2021	-
2022	-
2023	-
Thereafter	-
Total	$ 118

** 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.*

Statement of Fiduciary Net Position as of June 30, 2018 (Dollars in Thousands)

Assets	**June 30, 2018**	
Cash & Short-term Investments	$	235
Receivables		-
Investment Pools (at fair value)		-
Securities Lending Collateral		-
Capital Assets		-
Total Assets	**$**	**235**
Total Deferred Outflows of Resources	**$**	**-**
Total Liabilities	**$**	**(235)**
Total Deferred Inflows of Resources	**$**	**-**
Net Position Restricted for Pensions	**$**	**-**

Statement of Changes in Fiduciary Net Position for the Fiscal Year Ended June 30, 2018 (Dollars in Thousands)

1.	**Net position at market value at beginning of year**	**$**	**-**
Additions			
2.	Contributions		
	a. Employee	$	93
	b. Employer		-
	c. State General Fund Appropriations		8,856
	d. Total contributions	$	8,949
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.)*	**$**	**8,949**
Deductions			
6.	Benefits Paid		
	a. Annuity benefits	$	(8,912)
	b. Refunds		-
	c. Total benefits paid	$	(8,912)
7.	Expenses		
	a. Other deductions	$	-
	b. Administrative		(37)
	c. Total expenses	$	(37)
8.	**Total deductions** *(6.c.) + (7.c.)*	**$**	**(8,949)**
9.	**Net increase/(decrease) in fiduciary net position** *(5.) + (8.)*	**$**	**-**
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, 2018 (Dollars in Thousands)

A. Total Pension Liability		
1. Service Cost	$	437
2. Interest on the Total Pension Liability		5,094
3. Changes of benefit terms		(9,839)
4. Difference between expected and actual experience of the Total Pension Liability		6,119
5. Changes of assumptions		(856)
6. Benefit payments, including refunds of employee contributions		(8,912)
7. Net change in Total Pension Liability	$	(7,957)
8. Total Pension Liability – Beginning		147,324
9. Total Pension Liability – Ending	**$**	**139,367**
B. Plan Fiduciary Net Position		
1. Contributions – State General Fund Appropriations	$	8,856
2. Contributions – Employee		93
3. Net investment income		-
4. Benefit payments, including refunds of employee contributions		(8,912)
5. Pension Plan Administrative Expense		(37)
6. Other changes		-
7. Net change in Plan Fiduciary Net Position	$	-
8. Plan Fiduciary Net Position – Beginning		-
9. Plan Fiduciary Net Position – Ending	**$**	**-**
C. Net Pension Liability, *A.9.-B.9.*	**$**	**139,367**
D. Plan Fiduciary Net Position as a percentage of the Total Pension Liability, *B.9./A.9.*		**0.00%**
E. Covered-Employee Payroll	**$**	**1,033** [1]
F. Net Pension Liability as a percentage of Covered-Employee Payroll, *C./E.*		**13,491.48%**

[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,	2018	2017	2016	2015	2014	2013	2012	2011	2010
Total Pension Liability									
Service Cost	$ 437	$ 546	$ 495	$ 428	$ 398				
Interest on the Total Pension Liability	5,094	4,293	5,333	6,113	6,177				
Benefit Changes	(9,839)	-	-	-	-				
Difference between Expected and Actual Experience	6,119	1,517	(1,597)	(7,303)	(237)				
Assumption Changes	(856)	(5,017)	14,653	7,057	11,201				
Benefit Payments	(8,912)	(8,716)	(8,496)	(8,441)	(8,407)				
Refunds	-	-	(40)	-	(79)				
Net Change in Total Pension Liability	$ (7,957)	$ (7,377)	$ 10,348	$ (2,146)	9,053				
Total Pension Liability - Beginning	147,324	154,701	144,353	146,499	137,446				
Total Pension Liability - Ending (a)	**$ 139,367**	**$ 147,324**	**$ 154,701**	**$ 144,353**	$ 146,499				
Plan Fiduciary Net Position									
State General Fund Appropriation	$ 8,856	$ 8,716	$ 5,087	$ 3,216	$ 3,436				
Employee Contributions	93	80	89	153	101				
Pension Plan Net Investment Income	-	-	(69)	281	1,750				
Benefit Payments	(8,912)	(8,716)	(8,496)	(8,441)	(8,407)				
Refunds	-	-	(40)	-	(79)				
Pension Plan Administrative Expense	(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)	**$ 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 %**	**2.38 %**	**5.64 %**				
Covered-Employee Payroll [1]	**$ 1,033**	**$ 889**	**$ 989**	**$ 1,700**	**$ 1,122**				
Net Pension Liability as a Percentage of Covered-Employee Payroll	**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)
2009						
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

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)
2009	$ 5,084	$ 1,711	$ 3,373	$ 1,963		87.16%
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

** 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, 2018 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, 2017
Actuarial Cost Method	Entry Age Normal
Amortization Method	Level Dollar, Closed
Remaining Amortization Period	9 years
Asset Valuation Method	Market value of assets
Salary Increases	5.00% including inflation
Investment Rate of Return	0.00% per annum
Inflation:	2.75% 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 assumed to remain 2.00% for all future years.
	See separate funding actuarial valuation report as of July 1, 2017 for additional detail. To obtain this report, contact MSRS at 60 Empire Drive, Suite 300, St. Paul, MN, 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]
2009	
2010	
2011	
2012	
2013	
2014	19.30 %
2015	5.00
2016	NA
2017	NA
2018	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 (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. Best 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, 2018, these best estimates are summarized in the following table:

Asset Class	Transitional Target Allocation	Final Target Allocation	Long-Term Expected Real Rate of Return (Geometric Mean)
Domestic Equity[1]	33%	36%	5.10%
International Equity[2]	16%	17%	5.30%
Private Markets[3]	25%	25%	5.90%
Fixed Income	16%	20% [4]	0.75%
Treasuries	8%	0%	0.50%
Cash	2%	2%	0.00%
Total	100%	100%	

[1] Domestic Equity includes U.S. Stock Actively Managed and the U.S. Stock Index Fund.

[2] International Equity includes Broad International Stock Fund.

[3] Private Markets includes the Alternative Investment Pool. If a 25 percent allocation uncommitted allocation to Private Markets cannot be achieved, the uncommitted allocation is invested in Public Equities.

[4] The Final Target Allocation will combine Fixed Income investment options.

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 dated September 11, 2017. 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 3.62% was used to measure the total pension liability as of July 1, 2018.

Single Discount Rate

A single discount rate of 3.62% was used to measure the total pension liability. This single discount rate was based on a municipal bond rate of 3.62% 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 3.62%, 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 (2.62%) or 1-percentage-point higher (4.62%) than the current rate:

Sensitivity of Net Pension Liability
to the Single Discount Rate Assumption

(Dollars in Thousands)

	1% Decrease 2.62%	Current Single Discount Rate Assumption 3.62%	1% Increase 4.62%
Total Pension Liability	$ 154,902	$ 139,367	$ 126,340
Net Position Restricted for Pensions	-	-	-
Net Pension Liability	$ 154,902	$ 139,367	$ 126,340

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	**$ 147,324**	**$ -**	**$ 147,324**	**$ 193**	**$ 207**	
Changes for the Year:						
Service Cost	$ 437		$ 437			$ 437
Interest on Total Pension Liability	5,094		5,094			5,094
Interest on Plan Fiduciary Net Position		$ -	-			-
Changes in Benefit Terms	(9,839)		(9,839)			(9,839)
Liability Experience Gains and Losses	6,119		6,119	$ -	$ -	6,119
Changes in Assumptions	(856)		(856)	-	-	(856)
Recognition of Deferred Outflows/(Inflows) of Resources Arising from Prior Reporting Periods						
Liability Experience Gains/(Losses)				-	-	-
Assumption Changes				-	-	-
Investment Gains/(Losses)				(75)	(207)	(132)
State General Fund Appropriations		8,856	(8,856)			
Contributions - Employees		93	(93)			(93)
Asset Gain/(Loss)		-	-	-	-	-
Benefit Payouts	(8,912)	(8,912)				
Administrative Expenses		(37)	37			37
Other Changes			-			-
Net Changes	**$ (7,957)**	**$ -**	**$ (7,957)**	**$ (75)**	**$ (207)**	**$ 767**
Balance End of Year	**$ 139,367**	**$ -**	**$ 139,367**	**$ 118**	**$ 0**	

Summary of Population Statistics

		Terminated		Recipients			
	Actives	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	Total
Members on 7/1/2017	**19**	**44**	**0**	**301**	**0**	**74**	**438**
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	0	(5)	0	5	0	0	**0**
Terminated deferred	0	0	0	0	0	0	**0**
Terminated refund/transfer	0	0	0	0	0	0	**0**
Deaths	0	0	0	(13)	0	(3)	**(16)**
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	0	(5)	0	(8)	0	5	**(8)**
Members on 6/30/2018	**19**	**39**	**0**	**293**	**0**	**79**	**430**

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)	
<u>Early retirement benefit (Concluded)</u>	
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.
<u>Form of payment</u>	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.
<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). 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	
<u>Surviving spouse benefit</u>	
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)

Surviving dependent children's benefit

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.

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 at 4.00% interest compounded daily. Beginning July 1, 2018, a member's contributions increase at 3.00% interest compounded daily.

Termination

Refund of contributions

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.

Deferred benefit

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%. The actuarially equivalent factors are currently being updated to reflect changes adopted during the 2018 legislative session.
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	For retirements on or after January 1, 2024, the first benefit increase is delayed until the retiree reaches Normal Retirement Age. Interest credited on member contributions will decrease from 4.0% to 3.0%, beginning July 1, 2018. Deferred augmentation was changed to 0.00% for future accruing benefits, effective January 1, 2019. Augmentation that has already accrued for deferred members will still apply. Post-retirement benefit increases were changed from 2.0% per year, increasing to 2.5% per year upon achieving a 90% funding ratio to a fixed rate of 1.0% for five years (beginning January 1, 2019) and 1.5% per year thereafter.

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	
Normal retirement benefit	
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%.
Early retirement benefit	
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.
Form of payment	Life annuity.
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).

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%. The actuarially equivalent factors are currently being updated to reflect changes adopted during the 2018 legislative session.
Changes in plan provisions	All Elective State Officers members are receiving benefit payments. A number of provisions affecting benefits for active and deferred members were changed. See the Summary of Plan Provisions for the Legislators Retirement Plan for detail. Post-retirement benefit increases were changed from 2.0% per year, increasing to 2.5% per year upon achieving a 90% funding ratio to a fixed rate of 1.0% for five years (beginning January 1, 2019) and 1.5% per year thereafter.

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, dated September 11, 2017. The mortality assumption is based on the last 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	3.62% 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.

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

Data for active members:

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.

Data for terminated members:

Benefits were reported with full augmentation to Normal Retirement Age. Based on direction from MSRS, we adjusted benefits by removing augmentation on a prospective basis beginning January 1, 2019.

There was 1 member reported without a benefit. If available, we calculated benefits for these members using the reported Average Salary and credited service. If Average Salary was also not reported (0 members), 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.

Data for members receiving benefits:

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

There were 285 retired members reported:
- 110 members were reported with the 75% or 100% joint and survivor option. These members were valued as indicated by the option elected.
- 174 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 285 retired members, 141 members had an invalid or missing survivor gender and 138 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** 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 that 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 3.56% to 3.62%.

Summary of Actuarial Assumptions (Concluded)

Age in 2018	Healthy Post-Retirement Mortality** Male	Healthy Post-Retirement Mortality** Female	Healthy Pre-Retirement Mortality** Male	Healthy Pre-Retirement Mortality** Female
	Percent of Members Dying Each Year*			
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	0.04	0.02
40	0.13	0.11	0.04	0.03
45	0.20	0.15	0.07	0.05
50	0.29	0.19	0.12	0.09
55	0.41	0.27	0.20	0.14
60	0.58	0.38	0.36	0.20
65	0.88	0.62	0.63	0.30
70	1.45	0.99	1.09	0.51
75	2.50	1.65	1.92	0.89
80	4.47	2.89	3.48	1.57
85	8.29	5.21	7.29	4.12
90	14.99	9.53	13.53	9.22

* *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	Percent Terminating (Withdrawing) 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, 2018, 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 3.62% (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 3.62%. 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

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.
Accrued Service	Service credited under the system which was rendered before the date of the actuarial valuation.
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 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 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 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 fund. For purposes of the GASB Statement No. 67, the asset valuation method is equal to the market value of assets.