Minnesota State Retirement System

State Employees Retirement Fund
GASB Statement Nos. 67 and 68
Accounting and Financial Reporting for Pensions
June 30, 2017

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December 1, 2017

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 statements.

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, 2017 for additional discussion of the nature of actuarial calculations and more information related to participant data, economic and demographic assumptions, and benefit provisions.

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

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SECTION A

EXECUTIVE SUMMARY

Executive Summary
as of June 30, 2017 (Dollars in Thousands)

	2017
Actuarial Valuation Date	June 30, 2017
Measurement Date of the Net Pension Liability	June 30, 2017
Membership	
Number of	
- Service Retirements	33,563
- Survivors	3,940
- Disability Retirements	1,830
- Deferred Retirements	17,006
- Terminated other non-vested	9,467
- Active Members	50,578
- Total	116,384
Covered-employee Payroll	$ 2,939,455 [1]
Net Pension Liability	
Total Pension Liability	$ 19,903,520
Plan Fiduciary Net Position	12,485,614
Net Pension Liability	$ 7,417,906
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	62.73%
Net Pension Liability as a Percentage of Covered-employee Payroll	252.36%
Development of the Single Discount Rate	
Single Discount Rate	5.42%
Long-Term Expected Rate of Investment Return	7.50%
Long-Term Municipal Bond Rate[2]	3.56%
Last year ending June 30 in the 2018 to 2117 projection period for which projected benefit payments are fully funded	2049
Total Pension Expense/ (Income)	$ 1,197,948

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	$ 52,452	$ 206,083
Changes in assumptions	5,946,791	4,048,427
Net difference between projected and actual earnings on pension plan investments	704,994	883,093
Totals	$ 6,704,237	$ 5,137,603

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

(2) *Fixed-income municipal bonds with 20 years to maturity that include only federally tax-exempt municipal bonds as reported in Fidelity Index's '20-Year Municipal GO AA Index' as of June 30, 2017. See Section G for additional detail.*

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, 2017.

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% on the actuarial value of assets), 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 decrease.
4. The plan may eventually become insolvent and unable to pay benefits.

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 actuarial 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 market value of assets were used instead of the actuarial value of assets, unless the market value of assets is used in the measurement.

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 Statements 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, 2017 and a measurement date of June 30, 2017.

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 3.56% (based on Fidelity Index's 20-Year Municipal GO AA Index as of June 30, 2017); and the resulting single discount rate is 5.42%. The long-term expected rate of return is based on reviews of inflation and investment assumptions, dated September 11, 2014 and September 11, 2017, and a recent asset liability study obtained by the Minnesota State Board of Investment.

SECTION B

FINANCIAL STATEMENTS

Statement of Pension Expense Under GASB Statement No. 68
Fiscal Year Ended June 30, 2017 (Dollars in Thousands)

A. Expense/(Income)		
1. Service Cost	$	619,666
2. Interest on the Total Pension Liability		982,066
3. Current-Period Benefit Changes		83,490
4. Employee Contributions (made negative for addition here)		(161,670)
5. Projected Earnings on Plan Investments (made negative for addition here)		(826,541)
6. Pension Plan Administrative Expense		10,165
7. Other Changes in Plan Fiduciary Net Position		(47,232)
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		9,932
9. Recognition of Outflow (Inflow) of Resources due to assumption changes		
Arising from Current Reporting Period		(938,242)
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		(168,204)
11. Increases/(Decreases) from Experience in the Current Reporting Period	**$**	**(436,570)**
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	$	(103,202)
13. Recognition of Outflow (Inflow) of Resources due to assumption changes		
Arising from Prior Reporting Periods		1,686,802
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		50,918
15. Total Pension Expense/ (Income)	**$**	**1,197,948**

Statement of Outflows and Inflows
Arising from Current Reporting Period
Fiscal Year Ended June 30, 2017 (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	$ 49,659
2. Assumption Changes (gains) or losses	(4,691,209)
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*	9,932
5. Outflow (Inflow) of Resources to be recognized in the current pension expense for Assumption Changes	(938,242)
6. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Liabilities	$ (928,310)
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	$ 39,727
8. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses for Assumption Changes	(3,752,967)
9. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Liabilities	$ (3,713,240)
B. Outflows (Inflows) of Resources due to Assets	
1. Net difference between projected and actual earnings on pension plan investments (gains) or losses	$ (841,021)
2. Recognition period for Assets {in years}	5
3. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Assets	(168,204)
4. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Assets	$ (672,817)

* *Includes impact of changes in expected timing of future COLA increases, if applicable.*

Statement of Outflows and Inflows
Arising from Current and Prior Reporting Periods
Fiscal Year Ended June 30, 2017 (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	$ 1,341,148	$ 655,290
2. Due to Assets	261,193	378,479	(117,286)
3. Total	$ 2,257,631	$ 1,719,627	$ 538,004

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	$ 107,444	$ (93,270)
2. Assumption Changes	1,982,264	1,233,704	748,560
3. Net Difference between projected and actual earnings on pension plan investments	261,193	378,479	(117,286)
4. Total	$ 2,257,631	$ 1,719,627	$ 538,004

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	$ 52,452	$ 206,083	$ (153,631)
2. Assumption Changes	5,946,791	4,048,427	1,898,364
3. Net Difference between projected and actual earnings on pension plan investments*	704,994	883,093	(178,099)
4. Total	$ 6,704,237	$ 5,137,603	$ 1,566,634

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
2018	$ 538,004
2019	1,052,546
2020	1,072,596
2021	(1,096,512)
2022	-
Thereafter	-
Total	$ 1,566,634

** 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, 2017 (Dollars in Thousands)

Assets		**June 30, 2017**
Cash & Short-term Investments	$	329,906
Receivables		23,944
Investment Pools (at fair value)		12,123,763
Securities Lending Collateral		1,284,498
Capital Assets		18,456
Total Assets	**$**	**13,780,567**
Total Deferred Outflows of Resources	**$**	**-**
Total Liabilities	**$**	**(1,294,953)**
Total Deferred Inflows of Resources	**$**	**-**
Net Position Restricted for Pensions	**$**	**12,485,614**

Statement of Changes in Fiduciary Net Position for Year Ended June 30, 2017 (Dollars in Thousands)

1.	**Net Position at market value at beginning of year**	**$ 11,223,065**
Additions		
2.	Contributions	
	a. Employee	$ 161,670
	b. Employer	158,352
	c. Other sources	-
	d. Total contributions	$ 320,022
3.	Investment income	
	a. Investment income/(loss)	$ 1,680,494
	b. Investment expenses	(12,932)
	c. Net investment income/(loss)	$ 1,667,562
4.	Other Additions	47,287
5.	**Total Additions (2.d.) + (3.c.) + (4.)**	**$ 2,034,871**
Deductions		
6.	Benefits Paid	
	a. Annuity benefits	$ (750,526)
	b. Refunds	(11,576)
	c. Total benefits paid	$ (762,102)
7.	Expenses	
	a. Other deductions	$ (55)
	b. Administrative	(10,165)
	c. Total expenses	$ (10,220)
8.	**Total deductions (6.c.) + (7.c.)**	**$ (772,322)**
9.	**Net increase/(decrease) in fiduciary net position (5.) + (8.)**	**$ 1,262,549**
10.	**Net position at market value at end of year (1.) + (9.)**	**$ 12,485,614**
11.	State Board of Investment calculated annual investment return for the State Employees Retirement Fund*	15.2%

** The fiscal year 2017 investment return for the Combined Funds is 15.1%.*

SECTION C

REQUIRED SUPPLEMENTARY INFORMATION

Schedule of Changes in Net Pension Liability and Related Ratios
Current Period
Fiscal Year Ended June 30, 2017 (Dollars in Thousands)

A. Total pension liability		
1. Service Cost	$	619,666
2. Interest on the Total Pension Liability		982,066
3. Changes of benefit terms		83,490
4. Difference between expected and actual experience of the Total Pension Liability[1]		49,659
5. Changes of assumptions		(4,691,209)
6. Benefit payments, including refunds of employee contributions		(762,102)
7. Net change in total pension liability	$	(3,718,430)
8. Total pension liability – beginning		23,621,950
9. Total pension liability – ending	**$**	**19,903,520**
B. Plan fiduciary net position		
1. Contributions – employer	$	158,352
2. Contributions – employee		161,670
3. Net investment income		1,667,562
4. Benefit payments, including refunds of employee contributions		(762,102)
5. Pension Plan Administrative Expense		(10,165)
6. Other changes		47,232
7. Net change in plan fiduciary net position	$	1,262,549
8. Plan fiduciary net position – beginning		11,223,065
9. Plan fiduciary net position – ending	**$**	**12,485,614**
C. Net pension liability, *A.9. - B.9.*	**$**	**7,417,906**
D. Plan fiduciary net position as a percentage of the total pension liability, *B.9. / A.9.*		**62.73%**
E. Covered-employee payroll	**$**	**2,939,455** [2]
F. Net pension liability as a percentage of covered-employee payroll, *C. / E.*		**252.36%**

(1) *Includes impact of changes in expected timing of future COLA increases, if applicable.*

(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,	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008
Total Pension Liability										
Service Cost	$ 619,666	$ 211,491	$ 210,545	$ 256,155						
Interest on the Total Pension Liability	982,066	1,020,925	1,018,035	922,181						
Benefit Changes	83,490	-	-	-						
Difference between Expected and Actual Experience	49,659	21,209	(493,197)	(44,023)						
Assumption Changes	(4,691,209)	9,911,319	-	(1,477,308)						
Benefit Payments	(750,526)	(707,361)	(665,821)	(623,942)						
Refunds	(11,576)	(13,345)	(12,026)	(11,986)						
Net Change in Total Pension Liability	$ (3,718,430)	$10,444,238	$ 57,536	$ (978,923)						
Total Pension Liability - Beginning	23,621,950	13,177,712	13,120,176	14,099,099						
Total Pension Liability - Ending (a)	**$19,903,520**	**$23,621,950**	**$13,177,712**	**$13,120,176**						
Plan Fiduciary Net Position										
Employer Contributions	$ 158,352	$ 151,168	$ 146,333	$ 128,037						
Employee Contributions	161,670	153,854	149,293	131,033						
Pension Plan Net Investment Income	1,667,562	(9,633)	501,185	1,829,621						
Benefit Payments	(750,526)	(707,361)	(665,821)	(623,942)						
Refunds	(11,576)	(13,345)	(12,026)	(11,986)						
Pension Plan Administrative Expense	(10,165)	(10,196)	(8,719)	(8,125)						
Other Changes	47,232	20,259	29,470	20,528						
Net Change in Plan Fiduciary Net Position	$ 1,262,549	$ (415,254)	$ 139,715	$ 1,465,166						
Plan Fiduciary Net Position - Beginning	11,223,065	11,638,319	11,498,604	10,033,438						
Plan Fiduciary Net Position - Ending (b)	**$12,485,614**	**$11,223,065**	**$11,638,319**	**$11,498,604**						
Net Pension Liability - Ending (a) - (b)	**$ 7,417,906**	**$12,398,885**	**$ 1,539,393**	**$ 1,621,572**						
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	**62.73 %**	**47.51 %**	**88.32 %**	**87.64 %**						
Covered-Employee Payroll [1]	**$ 2,939,455**	**$ 2,797,345**	**$ 2,714,418**	**$ 2,620,660**						
Net Pension Liability as a Percentage of Covered-Employee Payroll	**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)
2008						
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

Schedule of Contributions Multiyear (Dollars in Thousands)

Last 10 Fiscal Years

FY 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)
2008	$ 166,088	$ 96,746	$ 69,342	$ 2,256,528	4.29%
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	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

Notes to Schedule of Contributions

Methods and Assumptions Used to Determine Fiscal Year Ending June 30, 2017 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, 2016
Actuarial Cost Method	Entry Age Normal
Amortization Method	Level Percentage of Payroll, Closed
Remaining Amortization Period	26 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, 2016 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]
2008	
2009	
2010	
2011	
2012	
2013	
2014	18.67%
2015	4.45
2016	-0.08
2017	15.24

[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, 2017, the annual money-weighted rate of return for the State Employees Retirement Fund was 15.24%. 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 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, 2017, these best estimates are summarized in the following table:

Asset Allocation

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return (Geometric)
Domestic Stocks	39.00%	5.10%
International Stocks	19.00	5.30
Bonds	20.00	0.75
Alternative Assets	20.00	5.90
Unallocated Cash	2.00	0.00
Total	100.00%	

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 reviews of inflation and investment return assumptions dated September 11, 2014 and September 11, 2017, and a recent asset liability study obtained by the SBI.

Single Discount Rate

A Single Discount Rate of 5.42% 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% and a municipal bond rate of 3.56%. 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 and future contributions were sufficient to finance the benefit payments through the year ending June 30, 2049. As a result, the long-term expected rate of return on pension plan investments was applied to projected benefit payments through the year ending June 30, 2049, and the municipal bond rate was applied to all benefit payments after the point of asset depletion.

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 5.42%, 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 (4.42%) or 1-percentage-point higher (6.42%) than the current rate.

Sensitivity of Net Pension Liability

to the Single Discount Rate Assumption

(Dollars in Thousands)

	1% Decrease 4.42%	Current Single Discount Rate Assumption 5.42%	1% Increase 6.42%
Total Pension Liability	$ 22,878,995	$ 19,903,520	$ 17,472,141
Net Position Restricted for Pensions	12,485,614	12,485,614	12,485,614
Net Pension Liability	**$ 10,393,381**	**$ 7,417,906**	**$ 4,986,527**

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	**$ 23,621,950**	**$ 11,223,065**	**$ 12,398,885**	**$ 8,912,209**	**$ 1,325,000**	
Changes for the Year:						
Service Cost	$ 619,666		$ 619,666			$ 619,666
Interest on Total Pension Liability	982,066		982,066			982,066
Interest on Fiduciary Net Position [1]		$ 826,541	(826,541)			(826,541)
Changes in Benefit Terms	83,490		83,490			83,490
Liability Experience Gains and Losses	49,659		49,659	$ 39,727	$ -	9,932
Changes in Assumptions	(4,691,209)		(4,691,209)	-	3,752,967	(938,242)
Recognition of Deferred Outflows/(Inflows) of Resources Arising from Prior Reporting Periods						
Liability Experience Gains/(Losses)				(4,242)	(107,444)	(103,202)
Assumption Changes				(1,982,264)	(295,462)	1,686,802
Investment Gains/(Losses)				(261,193)	(210,275)	50,918
Contributions - Employer		158,352	(158,352)			
Contributions - Employees		161,670	(161,670)			(161,670)
Asset Gain/(Loss) [1]		841,021	(841,021)	-	672,817	(168,204)
Benefit Payments and Refunds	(762,102)	(762,102)	-			
Administrative Expenses		(10,165)	10,165			10,165
Other changes		47,232	(47,232)			(47,232)
Net Changes	**$ (3,718,430)**	**$ 1,262,549**	**$ (4,980,979)**	**$ (2,207,972)**	**$ 3,812,603**	**$ 1,197,948**
Balance End of Year	**$ 19,903,520**	**$ 12,485,614**	**$ 7,417,906**	**$ 6,704,237**	**$ 5,137,603**	

(1) The sum of these items in column (b) equals the net investment income of $1,667,562.

Summary of Population Statistics

		Terminated*		Recipients**			
	Actives	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	Total
Members on July 1, 2016	**49,472**	**17,019**	**7,571**	**32,241**	**1,843**	**3,868**	**112,014**
New members	5,845	0	0	0	0	0	**5,845**
Return to active	316	(168)	(148)	0	0	0	**0**
Terminated non-vested	(1,943)	0	1,943	0	0	0	**0**
Service retirements	(1,345)	(627)	0	1,972	0	0	**0**
Unclassified retirements	0	0	0	100	0	0	**100**
Terminated deferred	(978)	978	0	0	0	0	**0**
Terminated refund/transfer	(683)	(168)	(379)	0	0	0	**(1,230)**
Deaths	(68)	(27)	(12)	(820)	(76)	(186)	**(1,189)**
New beneficiary	0	0	0	0	0	273	**273**
Disabled	(36)	0	0	0	36	0	**0**
Data adjustments	(2)	(1)	493	70	27	(15)	**572**
Net change	1,106	(13)	1,897	1,322	(13)	72	**4,371**
Members on July 1, 2017	**50,578**	**17,006**	**9,468**	**33,563**	**1,830**	**3,940**	**116,385**

* *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: **Member** — 5.50% **Employer** — 5.50% Member contributions are "picked up" according to the provisions of Internal Revenue Code 414(h).
Allowable Service	Service during which member contributions were made. May also include certain leaves of absence, military service and periods while temporary Worker's Compensation is paid. Excludes lump sum vacation and severance pay at termination.
Average Salary	Average of the five highest successive years of Salary. Average Salary is based on all Allowable Service if less than five years.
Salary	Includes wages, allowances and fees. Excludes lump sum payments at separation, employer contributions to deferred compensation and tax-sheltered annuity plans and benevolent vacation and sick leave donation programs.
Retirement	
<u>**Normal retirement benefit**</u>	
Age/Service requirement	First hired before July 1, 1989: (a.) Age 65 and three years of Allowable Service. (b.) Proportionate Retirement Annuity is available at age 65 and one year of Allowable Service. First hired after June 30, 1989: (a.) The greater of age 65 or the age eligible for full Social Security retirement benefits (but not higher than age 66) and three years of Allowable Service (five years if hired after June 30, 2010). (b.) Proportionate Retirement Annuity is available at normal retirement age and one year of Allowable Service.
Amount	1.70% of Average Salary for each year of Allowable Service.

Summary of Plan Provisions (Continued)

Retirement (Continued)

Early retirement

Age/Service requirement	First hired before July 1, 1989: (a.) Age 55 and three years of Allowable Service. (b.) Any age with 30 years of Allowable Service. (c.) Rule of 90: Age plus Allowable Service totals 90. First hired after June 30, 1989: (a.) Age 55 and three years (five years if hired after June 30, 2010) of Allowable Service.
Amount	First hired before July 1, 1989: The greater of (a) or (b): (a.) 1.20% of Average Salary for each of the first ten years of Allowable Service and 1.70% of Average Salary for each subsequent year with reduction of 0.25% for each month the member is under age 65 at time of retirement or under age 62 if 30 or more years of Allowable Service. No reduction if age plus years of Allowable Service totals 90. (b.) 1.70% of Average Salary for each year of Allowable Service assuming augmentation to age 65 at 3.00% per year and actuarial reduction for each month the member is under age 65. 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.
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	Since 2011, benefit recipients have received annual 2.00% benefit increases. When the accrued liability funding ratio reaches or exceeds 90% (determined on a market value of assets basis) for two consecutive years, the benefit increase will revert to 2.50%. If, after reverting to a 2.50% increase, the accrued liability funding ratio (determined on a market value of assets basis) declines to 80% or less for the most recent actuarial valuation year or 85% or less for two consecutive years, the benefit increase will decrease to 2.00%.

Summary of Plan Provisions (Continued)

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

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.
Benefit increases	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%. 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 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.

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.

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. 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. Amount is payable as a normal or early retirement; and (e.) 2.00% from January 1, 2012, 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 8.00% pre-retirement interest. Based upon statutory requirements, joint and survivor factors are based on an interest assumption of 6.50%.
Contribution Stabilizer	The following is a summary of the contribution stabilizer provisions in Minnesota Statute 352.045: If a contribution sufficiency of at least 1.00% of covered payroll exists, member and employer contributions may be adjusted by the MSRS Board of Directors to a level necessary to maintain a 1.00% sufficiency. Member and employer contributions may not be less than the sum of normal cost and administrative expenses. If a contribution deficiency of at least 0.50% of covered payroll exists, the member and employer contribution rates may be increased equally by the MSRS Board of Directors to eliminate the deficiency. Any adjustment to the contribution rates must be reported to the Legislative Commission on Pensions and Retirement (LCPR) by January 15 following the most recent valuation report. If the LCPR does not recommend against or alter the change in rates, the adjustment becomes effective on the first day of the first full payroll period of the fiscal year following receipt of the actuarial valuation that gave rise to the adjustment.
Changes in Plan Provisions	Actuarial equivalent factors were updated to reflect current mortality and interest assumptions, effective January 1, 2017.

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;

(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 2.00% post-retirement benefit increase. If the funding ratio (determined on a market value of assets basis) reaches 90% (based on a 2.50% post-retirement benefit increase assumption) for two consecutive years, the benefit increase will revert to 2.50%. If, after reverting to a 2.50% benefit increase, the funding ratio declines to less than 80% for one year or less than 85% for two consecutive years, the benefit increase will decrease to 2.00%.

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 8.00%
  - Statutory salary increases (rate of 14.00% at year 1 declining to 3.50% at years 25 and later)
- Open group; stable active population (new member profile based on average new members hired in recent years)
- The postretirement benefit increase rate is assumed to be 2.00% per year until the funding ratio threshold required to pay a 2.50% postretirement benefit increase is reached
- Current statutory contributions (i.e., not including potential contribution increases under the contribution stabilizer statutes) as directed by MSRS

Based on these assumptions and methods, the projection indicates that this plan is not expected to attain the funding ratio threshold required to pay a 2.50% postretirement benefit increase. 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 June 30, 2015, reviews of inflation and investment return assumptions, dated September 11, 2014 and September 11, 2017, and a recent asset liability study obtained by the SBI.

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	5.42% per annum.
Benefit increases after retirement	2.00% 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. 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	Service-related rates based on experience; see table of sample rates.
Disability	Age-related rates based on experience; see table of sample rates.

Summary of Actuarial Assumptions (Continued)

Allowance for Combined Service Annuity	Liabilities for former, vested members are increased by 4.00%, and liabilities for former, non-vested members are increased by 5.00% to account for the effect of some participants having eligibility for a Combined Service Annuity.
Administrative expenses	In the valuation year, equal to prior year administrative expenses expressed as 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 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.
Unclassified Plan Reversion	Liabilities for active members are increased by 0.16% (0.26% as of July 1, 2016) to account for the effect of Unclassified members who elect coverage under the State Employees Retirement Fund.

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 were applied: <u>Data for active members:</u> There were 146 members reported with zero or invalid salary (<$100). We used prior year salary (73 members), if available, otherwise, high five salary with a 10% load to account for salary increases (67 members). If neither pay or high five salary was available, we assumed a value of $35,000 (6 members). There were 8 members reported with 0 or negative service. Due to the small number of members with 0 service, and based on direction from MSRS, we used service of 0 years for these members. There were also 108 members reported without a gender and 47 members reported with an invalid date of birth. We assumed the member was hired at age 37 and female gender. <u>Data for terminated members:</u> There were 462 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 (446 members), we assumed a value of $30,000. If termination date was not reported (11 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 (12 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 5 members reported without a benefit. Due to the small number of members with missing benefits, we made no adjustment to the reported data for members receiving benefits.

Summary of Actuarial Assumptions (Continued)

Unknown data for certain members	Data for members receiving benefits: There were 8 survivor members reported with a certain end date prior to the valuation date. These members were excluded from the valuation. There were 110 retirees reported with a survivor option and a survivor date of death. We assumed no benefit was payable to the survivor, and the member benefit already reflected the increase to the life annuity (i.e., "bounce back"), if applicable. There were 122 retirees reported with a bounce back annuity but were not reported with a reasonable reduction factor. A factor of 0.80, 0.85 and 0.90 was assumed for the 100%, 75% and 50% joint and survivor annuity, respectively. There were retired members reported with a survivor option and an invalid or missing survivor gender (4,276 members) and/or survivor date of birth (3,765 members). We used the valuation assumptions if the survivor gender or date of birth was missing or invalid.
Changes in actuarial assumptions	The Combined Service Annuity (CSA) loads were 1.20% for active member liability and 40% for vested and non-vested deferred member liability. The revised CSA loads are now 0.00% for active member liability, 4.00% for vested deferred member liability, and 5.00% for non-vested deferred member liability. The Single Discount Rate was changed from 4.17% per annum to 5.42% per annum.

Summary of Actuarial Assumptions (Continued)

	Percent of Members Dying Each Year*					
	Healthy Post-Retirement Mortality**		Healthy Pre-Retirement Mortality**		Disability Mortality**	
Age in 2017	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	0.28	0.18
30	0.06	0.05	0.03	0.02	0.59	0.38
35	0.09	0.08	0.04	0.02	0.97	0.61
40	0.14	0.11	0.04	0.03	1.34	0.84
45	0.20	0.15	0.07	0.05	1.68	1.07
50	0.29	0.20	0.12	0.09	1.99	1.33
55	0.42	0.27	0.21	0.14	2.35	1.63
60	0.59	0.38	0.36	0.20	2.78	1.96
65	0.89	0.63	0.63	0.30	3.37	2.53
70	1.47	1.00	1.10	0.52	4.32	3.60

* *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)

	Percent Retiring Each Year		
Age	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)

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

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

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 “risk-free” 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 3.56% (based on Fidelity Index’s 20-Year Municipal GO AA Index as of June 30, 2017). **The resulting single discount rate as of July 1, 2017 is 5.42%.** 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.

Benefit payments projected to occur up through June 30, 2049 were fully funded and benefit payments projected to occur in the year ended June 30, 2050 were partially funded. Assets were projected to be fully depleted by the fiscal year ending June 30, 2050. Benefit payments were discounted using 7.50%, the long-term expected rate of return on pension plan investments, as long as assets were sufficient to fund the benefit payments. Beginning in the July 1, 2049 to June 30, 2050 fiscal year, when benefit payments exceed the Plan’s Fiduciary Net Position, benefit payments were discounted at 3.56%, the municipal bond rate. An equivalent single discount rate was determined that produced approximately the same present value of projected benefits when applied to all years of projected benefits as the present value of projected benefits using 7.50% through the point of asset depletion and 3.56% after. For more information on the calculation of the equivalent present value of projected benefits, see pages 39 through 40 of this report.

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) * 5.5%	(e) = (a) * 5.5%	(f)	(g) = (d) + (e) + (f)
2017	$ 2,939,455		$ 2,939,455				
2018	3,016,278		3,016,278	$ 165,895	$ 165,895		$ 331,790
2019	2,852,008	$ 262,299	3,114,307	156,860	156,860	$ 4,538	318,258
2020	2,696,846	518,676	3,215,522	148,327	148,327	8,973	305,627
2021	2,564,661	755,365	3,320,026	141,056	141,056	13,068	295,180
2022	2,443,143	984,784	3,427,927	134,373	134,373	17,037	285,783
2023	2,330,888	1,208,447	3,539,335	128,199	128,199	20,906	277,304
2024	2,227,064	1,427,299	3,654,363	122,489	122,489	24,692	269,670
2025	2,129,960	1,643,170	3,773,130	117,148	117,148	28,427	262,723
2026	2,038,424	1,857,333	3,895,757	112,113	112,113	32,132	256,358
2027	1,951,924	2,070,445	4,022,369	107,356	107,356	35,819	250,531
2028	1,870,372	2,282,724	4,153,096	102,870	102,870	39,491	245,231
2029	1,793,219	2,494,852	4,288,071	98,627	98,627	43,161	240,415
2030	1,718,955	2,708,479	4,427,434	94,543	94,543	46,857	235,943
2031	1,646,749	2,924,576	4,571,325	90,571	90,571	50,595	231,737
2032	1,576,412	3,143,481	4,719,893	86,703	86,703	54,382	227,788
2033	1,507,775	3,365,515	4,873,290	82,928	82,928	58,223	224,079
2034	1,440,379	3,591,293	5,031,672	79,221	79,221	62,129	220,571
2035	1,373,991	3,821,210	5,195,201	75,570	75,570	66,107	217,247
2036	1,308,485	4,055,560	5,364,045	71,967	71,967	70,161	214,095
2037	1,243,975	4,294,402	5,538,377	68,419	68,419	74,293	211,131
2038	1,180,624	4,537,750	5,718,374	64,934	64,934	78,503	208,371
2039	1,117,843	4,786,378	5,904,221	61,481	61,481	82,804	205,766
2040	1,054,631	5,041,477	6,096,108	58,005	58,005	87,218	203,228
2041	990,127	5,304,105	6,294,232	54,457	54,457	91,761	200,675
2042	924,736	5,574,058	6,498,794	50,860	50,860	96,431	198,151
2043	859,428	5,850,577	6,710,005	47,269	47,269	101,215	195,753
2044	793,994	6,134,086	6,928,080	43,670	43,670	106,120	193,460
2045	727,979	6,425,264	7,153,243	40,039	40,039	111,157	191,235
2046	661,436	6,724,287	7,385,723	36,379	36,379	116,330	189,088
2047	595,107	7,030,652	7,625,759	32,731	32,731	121,630	187,092
2048	530,201	7,343,395	7,873,596	29,161	29,161	127,041	185,363
2049	466,989	7,662,499	8,129,488	25,684	25,684	132,561	183,929
2050	405,676	7,988,020	8,393,696	22,312	22,312	138,193	182,817
2051	347,204	8,319,288	8,666,492	19,096	19,096	143,924	182,116
2052	292,644	8,655,509	8,948,153	16,095	16,095	149,740	181,930
2053	242,686	8,996,282	9,238,968	13,348	13,348	155,636	182,332
2054	197,836	9,341,398	9,539,234	10,881	10,881	161,606	183,368
2055	158,027	9,691,232	9,849,259	8,691	8,691	167,658	185,040
2056	123,202	10,046,158	10,169,360	6,776	6,776	173,799	187,351
2057	93,749	10,406,115	10,499,864	5,156	5,156	180,026	190,338
2058	69,718	10,771,392	10,841,110	3,835	3,835	186,345	194,015
2059	50,515	11,142,931	11,193,446	2,778	2,778	192,773	198,329
2060	35,373	11,521,860	11,557,233	1,946	1,946	199,328	203,220
2061	23,735	11,909,108	11,932,843	1,305	1,305	206,028	208,638
2062	15,157	12,305,503	12,320,660	834	834	212,885	214,553
2063	9,236	12,711,846	12,721,082	508	508	219,915	220,931
2064	5,309	13,129,208	13,134,517	292	292	227,135	227,719
2065	2,683	13,558,706	13,561,389	148	148	234,566	234,862
2066	1,119	14,001,015	14,002,134	62	62	242,218	242,342
2067	459	14,456,744	14,457,203	25	25	250,102	250,152

**Contributions related to future employees in excess of normal cost and expenses of 9.27% of pay.*

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) * 5.5%	(e) = (a) * 5.5%	(f)	(g) = (d) + (e) + (f)
2068	$ 195	$ 14,926,867	$ 14,927,062	$ 11	$ 11	$ 258,235	$ 258,257
2069	75	15,412,117	15,412,192	4	4	266,630	266,638
2070	31	15,913,057	15,913,088	2	2	275,296	275,300
2071	8	16,430,255	16,430,263	-	-	284,243	284,243
2072	-	16,964,247	16,964,247	-	-	293,481	293,481
2073	-	17,515,585	17,515,585	-	-	303,020	303,020
2074	-	18,084,842	18,084,842	-	-	312,868	312,868
2075	-	18,672,599	18,672,599	-	-	323,036	323,036
2076	-	19,279,458	19,279,458	-	-	333,535	333,535
2077	-	19,906,041	19,906,041	-	-	344,375	344,375
2078	-	20,552,987	20,552,987	-	-	355,567	355,567
2079	-	21,220,959	21,220,959	-	-	367,123	367,123
2080	-	21,910,640	21,910,640	-	-	379,054	379,054
2081	-	22,622,736	22,622,736	-	-	391,373	391,373
2082	-	23,357,975	23,357,975	-	-	404,093	404,093
2083	-	24,117,109	24,117,109	-	-	417,226	417,226
2084	-	24,900,915	24,900,915	-	-	430,786	430,786
2085	-	25,710,195	25,710,195	-	-	444,786	444,786
2086	-	26,545,776	26,545,776	-	-	459,242	459,242
2087	-	27,408,514	27,408,514	-	-	474,167	474,167
2088	-	28,299,291	28,299,291	-	-	489,578	489,578
2089	-	29,219,018	29,219,018	-	-	505,489	505,489
2090	-	30,168,636	30,168,636	-	-	521,917	521,917
2091	-	31,149,117	31,149,117	-	-	538,880	538,880
2092	-	32,161,463	32,161,463	-	-	556,393	556,393
2093	-	33,206,710	33,206,710	-	-	574,476	574,476
2094	-	34,285,928	34,285,928	-	-	593,147	593,147
2095	-	35,400,221	35,400,221	-	-	612,424	612,424
2096	-	36,550,728	36,550,728	-	-	632,328	632,328
2097	-	37,738,627	37,738,627	-	-	652,878	652,878
2098	-	38,965,132	38,965,132	-	-	674,097	674,097
2099	-	40,231,499	40,231,499	-	-	696,005	696,005
2100	-	41,539,023	41,539,023	-	-	718,625	718,625
2101	-	42,889,041	42,889,041	-	-	741,980	741,980
2102	-	44,282,935	44,282,935	-	-	766,095	766,095
2103	-	45,722,130	45,722,130	-	-	790,993	790,993
2104	-	47,208,100	47,208,100	-	-	816,700	816,700
2105	-	48,742,363	48,742,363	-	-	843,243	843,243
2106	-	50,326,490	50,326,490	-	-	870,648	870,648
2107	-	51,962,101	51,962,101	-	-	898,944	898,944
2108	-	53,650,869	53,650,869	-	-	928,160	928,160
2109	-	55,394,522	55,394,522	-	-	958,325	958,325
2110	-	57,194,844	57,194,844	-	-	989,471	989,471
2111	-	59,053,676	59,053,676	-	-	1,021,629	1,021,629
2112	-	60,972,921	60,972,921	-	-	1,054,832	1,054,832
2113	-	62,954,541	62,954,541	-	-	1,089,114	1,089,114
2114	-	65,000,563	65,000,563	-	-	1,124,510	1,124,510
2115	-	67,113,082	67,113,082	-	-	1,161,056	1,161,056
2116	-	69,294,257	69,294,257	-	-	1,198,791	1,198,791
2117	-	71,546,320	71,546,320	-	-	1,237,751	1,237,751

**Contributions related to future employees in excess of normal cost and expenses of 9.27% 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)
2018	$ 12,485,614	$ 331,790	$ 816,593	$ 10,557	$ 918,181	$ 12,908,435
2019	12,908,435	318,258	872,085	9,982	947,372	13,291,998
2020	13,291,998	305,627	929,158	9,439	973,593	13,632,621
2021	13,632,621	295,180	980,336	8,976	996,887	13,935,377
2022	13,935,377	285,783	1,032,175	8,551	1,017,355	14,197,788
2023	14,197,788	277,304	1,083,752	8,158	1,034,839	14,418,021
2024	14,418,021	269,670	1,135,203	7,795	1,049,194	14,593,886
2025	14,593,886	262,723	1,184,002	7,455	1,060,344	14,725,495
2026	14,725,495	256,358	1,231,388	7,134	1,068,247	14,811,578
2027	14,811,578	250,531	1,276,059	6,832	1,072,855	14,852,072
2028	14,852,072	245,231	1,318,436	6,546	1,074,147	14,846,469
2029	14,846,469	240,415	1,358,297	6,276	1,072,091	14,794,403
2030	14,794,403	235,943	1,396,401	6,016	1,066,628	14,694,555
2031	14,694,555	231,737	1,431,589	5,764	1,057,698	14,546,638
2032	14,546,638	227,788	1,465,459	5,517	1,045,221	14,348,670
2033	14,348,670	224,079	1,496,733	5,277	1,029,094	14,099,833
2034	14,099,833	220,571	1,526,420	5,041	1,009,218	13,798,161
2035	13,798,161	217,247	1,554,556	4,809	985,442	13,441,484
2036	13,441,484	214,095	1,581,251	4,580	957,601	13,027,349
2037	13,027,349	211,131	1,605,658	4,354	925,541	12,554,009
2038	12,554,009	208,371	1,627,257	4,132	889,152	12,020,144
2039	12,020,144	205,766	1,645,461	3,912	848,354	11,424,892
2040	11,424,892	203,228	1,661,176	3,691	803,046	10,766,298
2041	10,766,298	200,675	1,675,565	3,465	753,036	10,040,979
2042	10,040,979	198,151	1,688,408	3,237	698,080	9,245,566
2043	9,245,566	195,753	1,698,909	3,008	637,957	8,377,359
2044	8,377,359	193,460	1,707,135	2,779	572,463	7,433,367
2045	7,433,367	191,235	1,714,107	2,548	501,333	6,409,280
2046	6,409,280	189,088	1,719,923	2,315	424,242	5,300,372
2047	5,300,372	187,092	1,724,668	2,083	340,834	4,101,548
2048	4,101,548	185,363	1,726,981	1,856	250,782	2,808,856
2049	2,808,856	183,929	1,727,127	1,634	153,780	1,417,804
2050	1,417,804	182,817	1,725,497	1,420	49,478	-
2051	-	182,116	1,721,272	1,215	-	-
2052	-	181,930	1,714,487	1,024	-	-
2053	-	182,332	1,704,285	849	-	-
2054	-	183,368	1,690,293	692	-	-
2055	-	185,040	1,673,141	553	-	-
2056	-	187,351	1,652,834	431	-	-
2057	-	190,338	1,629,023	328	-	-
2058	-	194,015	1,601,139	244	-	-
2059	-	198,329	1,569,225	177	-	-
2060	-	203,220	1,533,874	124	-	-
2061	-	208,638	1,495,189	83	-	-
2062	-	214,553	1,453,270	53	-	-
2063	-	220,931	1,409,133	32	-	-
2064	-	227,719	1,363,640	19	-	-
2065	-	234,862	1,317,280	9	-	-
2066	-	242,342	1,270,237	4	-	-
2067	-	250,152	1,222,557	2	-	-

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)
2068	$ -	$ 258,257	$ 1,174,512	$ 1	$ -	$ -
2069	-	266,638	1,126,224	-	-	-
2070	-	275,300	1,077,679	-	-	-
2071	-	284,243	1,028,864	-	-	-
2072	-	293,481	979,750	-	-	-
2073	-	303,020	930,329	-	-	-
2074	-	312,868	880,624	-	-	-
2075	-	323,036	830,679	-	-	-
2076	-	333,535	780,573	-	-	-
2077	-	344,375	730,418	-	-	-
2078	-	355,567	680,362	-	-	-
2079	-	367,123	630,588	-	-	-
2080	-	379,054	581,314	-	-	-
2081	-	391,373	532,781	-	-	-
2082	-	404,093	485,254	-	-	-
2083	-	417,226	439,011	-	-	-
2084	-	430,786	394,336	-	-	-
2085	-	444,786	351,505	-	-	-
2086	-	459,242	310,776	-	-	-
2087	-	474,167	272,382	-	-	-
2088	-	489,578	236,522	-	-	-
2089	-	505,489	203,356	-	-	-
2090	-	521,917	173,001	-	-	-
2091	-	538,880	145,523	-	-	-
2092	-	556,393	120,944	-	-	-
2093	-	574,476	99,237	-	-	-
2094	-	593,147	80,326	-	-	-
2095	-	612,424	64,089	-	-	-
2096	-	632,328	50,360	-	-	-
2097	-	652,878	38,938	-	-	-
2098	-	674,097	29,597	-	-	-
2099	-	696,005	22,096	-	-	-
2100	-	718,625	16,186	-	-	-
2101	-	741,980	11,622	-	-	-
2102	-	766,095	8,172	-	-	-
2103	-	790,993	5,622	-	-	-
2104	-	816,700	3,780	-	-	-
2105	-	843,243	2,482	-	-	-
2106	-	870,648	1,590	-	-	-
2107	-	898,944	992	-	-	-
2108	-	928,160	604	-	-	-
2109	-	958,325	357	-	-	-
2110	-	989,471	206	-	-	-
2111	-	1,021,629	115	-	-	-
2112	-	1,054,832	62	-	-	-
2113	-	1,089,114	33	-	-	-
2114	-	1,124,510	16	-	-	-
2115	-	1,161,056	8	-	-	-
2116	-	1,198,791	4	-	-	-
2117	-	1,237,751	3	-	-	-

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	$ 12,485,614	$ 816,593	$ 816,593	$ -	$ 787,592	$ -	$ 795,309
2019	12,908,435	872,085	872,085	-	782,431	-	805,654
2020	13,291,998	929,158	929,158	-	775,476	-	814,214
2021	13,632,621	980,336	980,336	-	761,106	-	814,862
2022	13,935,377	1,032,175	1,032,175	-	745,444	-	813,809
2023	14,197,788	1,083,752	1,083,752	-	728,087	-	810,510
2024	14,418,021	1,135,203	1,135,203	-	709,445	-	805,308
2025	14,593,886	1,184,002	1,184,002	-	688,318	-	796,711
2026	14,725,495	1,231,388	1,231,388	-	665,921	-	785,965
2027	14,811,578	1,276,059	1,276,059	-	641,934	-	772,572
2028	14,852,072	1,318,436	1,318,436	-	616,979	-	757,158
2029	14,846,469	1,358,297	1,358,297	-	591,286	-	739,915
2030	14,794,403	1,396,401	1,396,401	-	565,463	-	721,535
2031	14,694,555	1,431,589	1,431,589	-	539,267	-	701,658
2032	14,546,638	1,465,459	1,465,459	-	513,512	-	681,303
2033	14,348,670	1,496,733	1,496,733	-	487,880	-	660,041
2034	14,099,833	1,526,420	1,526,420	-	462,844	-	638,499
2035	13,798,161	1,554,556	1,554,556	-	438,489	-	616,812
2036	13,441,484	1,581,251	1,581,251	-	414,901	-	595,123
2037	13,027,349	1,605,658	1,605,658	-	391,912	-	573,217
2038	12,554,009	1,627,257	1,627,257	-	369,473	-	551,038
2039	12,020,144	1,645,461	1,645,461	-	347,541	-	528,534
2040	11,424,892	1,661,176	1,661,176	-	326,381	-	506,128
2041	10,766,298	1,675,565	1,675,565	-	306,240	-	484,246
2042	10,040,979	1,688,408	1,688,408	-	287,058	-	462,852
2043	9,245,566	1,698,909	1,698,909	-	268,692	-	441,768
2044	8,377,359	1,707,135	1,707,135	-	251,156	-	421,068
2045	7,433,367	1,714,107	1,714,107	-	234,588	-	401,035
2046	6,409,280	1,719,923	1,719,923	-	218,962	-	381,692
2047	5,300,372	1,724,668	1,724,668	-	204,247	-	363,052
2048	4,101,548	1,726,981	1,726,981	-	190,252	-	344,835
2049	2,808,856	1,727,127	1,727,127	-	176,994	-	327,120
2050	1,417,804	1,725,497	1,417,804	307,693	135,158	98,713	309,997
2051	-	1,721,272	-	1,721,272	-	533,232	293,327
2052	-	1,714,487	-	1,714,487	-	512,872	277,138
2053	-	1,704,285	-	1,704,285	-	492,294	261,315
2054	-	1,690,293	-	1,690,293	-	471,468	245,835
2055	-	1,673,141	-	1,673,141	-	450,641	230,820
2056	-	1,652,834	-	1,652,834	-	429,869	216,287
2057	-	1,629,023	-	1,629,023	-	409,111	202,203
2058	-	1,601,139	-	1,601,139	-	388,286	188,517
2059	-	1,569,225	-	1,569,225	-	367,465	175,253
2060	-	1,533,874	-	1,533,874	-	346,839	162,491
2061	-	1,495,189	-	1,495,189	-	326,469	150,244
2062	-	1,453,270	-	1,453,270	-	306,408	138,518
2063	-	1,409,133	-	1,409,133	-	286,889	127,401
2064	-	1,363,640	-	1,363,640	-	268,083	116,944
2065	-	1,317,280	-	1,317,280	-	250,067	107,156
2066	-	1,270,237	-	1,270,237	-	232,847	98,013
2067	-	1,222,557	-	1,222,557	-	216,403	89,481

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)
2068	$ -	$ 1,174,512	$ -	$ 1,174,512	$ -	$ 200,752	$ 81,541
2069	-	1,126,224	-	1,126,224	-	185,881	74,166
2070	-	1,077,679	-	1,077,679	-	171,754	67,317
2071	-	1,028,864	-	1,028,864	-	158,337	60,962
2072	-	979,750	-	979,750	-	145,596	55,065
2073	-	930,329	-	930,329	-	133,499	49,597
2074	-	880,624	-	880,624	-	122,023	44,532
2075	-	830,679	-	830,679	-	111,145	39,845
2076	-	780,573	-	780,573	-	100,851	35,515
2077	-	730,418	-	730,418	-	91,127	31,523
2078	-	680,362	-	680,362	-	81,964	27,852
2079	-	630,588	-	630,588	-	73,356	24,486
2080	-	581,314	-	581,314	-	65,299	21,411
2081	-	532,781	-	532,781	-	57,790	18,614
2082	-	485,254	-	485,254	-	50,826	16,081
2083	-	439,011	-	439,011	-	44,401	13,800
2084	-	394,336	-	394,336	-	38,512	11,758
2085	-	351,505	-	351,505	-	33,149	9,942
2086	-	310,776	-	310,776	-	28,300	8,338
2087	-	272,382	-	272,382	-	23,951	6,932
2088	-	236,522	-	236,522	-	20,083	5,709
2089	-	203,356	-	203,356	-	16,673	4,656
2090	-	173,001	-	173,001	-	13,697	3,757
2091	-	145,523	-	145,523	-	11,125	2,998
2092	-	120,944	-	120,944	-	8,928	2,363
2093	-	99,237	-	99,237	-	7,074	1,839
2094	-	80,326	-	80,326	-	5,529	1,412
2095	-	64,089	-	64,089	-	4,260	1,069
2096	-	50,360	-	50,360	-	3,232	797
2097	-	38,938	-	38,938	-	2,413	584
2098	-	29,597	-	29,597	-	1,771	421
2099	-	22,096	-	22,096	-	1,277	298
2100	-	16,186	-	16,186	-	903	207
2101	-	11,622	-	11,622	-	626	141
2102	-	8,172	-	8,172	-	425	94
2103	-	5,622	-	5,622	-	282	61
2104	-	3,780	-	3,780	-	183	39
2105	-	2,482	-	2,482	-	116	24
2106	-	1,590	-	1,590	-	72	15
2107	-	992	-	992	-	43	9
2108	-	604	-	604	-	25	5
2109	-	357	-	357	-	15	3
2110	-	206	-	206	-	8	2
2111	-	115	-	115	-	4	1
2112	-	62	-	62	-	2	-
2113	-	33	-	33	-	1	-
2114	-	16	-	16	-	1	-
2115	-	8	-	8	-	-	-
2116	-	4	-	4	-	-	-
2117	-	3	-	3	-	-	-
				Totals	$ 15,625,027	$ 8,405,243	$ 24,030,270

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, 2017

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

December 1, 2017

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 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 statements.

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 Statement 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, 2017 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:bd

Table of Contents

SECTION A

EXECUTIVE SUMMARY

Executive Summary
as of June 30, 2017 (Dollars in Thousands)

		2017
Actuarial Valuation Date		June 30, 2017
Measurement Date of the Net Pension Liability		June 30, 2017
Membership		
Number of		
- Service Retirements		2,576
- Survivors		216
- Disability Retirements		292
- Deferred Retirements		1,310
- Terminated other non-vested		818
- Active Members		4,579
- Total		9,791
Covered-employee Payroll [1]	$	248,879
Net Pension Liability		
Total Pension Liability	$	2,151,931
Plan Fiduciary Net Position		1,023,817
Net Pension Liability	$	1,128,114
Plan Fiduciary Net Position as a Percentage of Total Pension Liability		47.58%
Net Pension Liability as a Percentage of Covered-Employee Payroll		453.28%
Development of the Single Discount Rate		
Single Discount Rate		5.02%
Long-Term Expected Rate of Investment Return		7.50%
Long-Term Municipal Bond Rate [2]		3.56%
Last year ending June 30 in the 2018 to 2117 projection period for which projected benefit payments are fully funded		2048
Total Pension Expense/ (Income)	$	163,904

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

	Deferred Outflows of Resources	Deferred Inflows of Resources
Difference between expected and actual experience in the measurement of the Total Pension Liability	$ 10,177	$ 458
Changes in assumptions	405,132	219,550
Net difference between projected and actual earnings on pension plan investments	55,146	70,405
Total	$ 470,455	$ 290,413

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

(2) *Fixed-income municipal bonds with 20 years to maturity that include only federally tax-exempt municpal bonds as reported in Fidelity Index's '20-Year Municipal GO AA Index' as of June 30, 2017. See Section G for additional detail.*

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, 2017.

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% on the actuarial value of assets), 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 decrease.
4. The plan may eventually become insolvent and unable to pay benefits.

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 actuarial 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 market value of assets were used instead of the actuarial value of assets, unless the market value of assets is used in the measurement.

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, 2017 and a measurement date of June 30, 2017.

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 3.56% (based on Fidelity Index's 20-Year Municipal GO AA Index as of June 30, 2017); and the resulting single discount rate is 5.02%. The long-term expected rate of return is based on reviews of inflation and investment assumptions, dated September 11, 2014 and September 11, 2017, and a recent asset liability study obtained by the Minnesota State Board of Investment.

SECTION B

FINANCIAL STATEMENTS

Statement of Pension Expense Under GASB Statement No. 68 Fiscal Year Ended June 30, 2017 (Dollars in Thousands)

A. Expense

1.	Service Cost	$	95,522
2.	Interest on the Total Pension Liability		95,307
3.	Current-Period Benefit Changes		-
4.	Employee Contributions (made negative for addition here)		(22,648)
5.	Projected Earnings on Plan Investments (made negative for addition here)		(67,052)
6.	Pension Plan Administrative Expense		856
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		1,313
9.	Recognition of Outflow (Inflow) of Resources due to assumption changes		
	Arising from Current Reporting Period		(42,632)
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		(13,661)
11.	**Increases/(Decreases) from Experience in the Current Reporting Period**	**$**	**47,007**
12.	Recognition of Outflow (Inflow) of Resources due to differences between expected and actual experience in the measurement of the Total Pension Liability		
	Arising from Prior Reporting Periods		1,717
13.	Recognition of Outflow (Inflow) of Resources due to assumption changes		
	Arising from Prior Reporting Periods		110,532
14.	Recognition of Outflow (Inflow) of Resources due to the difference between projected and actual earnings on Pension Plan Investments		
	Arising from Prior Reporting Periods		4,648
15.	**Total Pension Expense / (Income)**	**$**	**163,904**

Statement of Outflows and Inflows
Arising from Current Reporting Period
Fiscal Year Ended June 30, 2017 (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	$	6,566
2. Assumption Changes (gains) or losses		(213,159)
3. Recognition period for Liabilities: Average of the expected remaining service lives of all employees {in years}		5
4. Outflow (Inflow) of Resources to be recognized in the current pension expense for the difference between expected and actual experience of the Total Pension Liability*		1,313
5. Outflow (Inflow) of Resources to be recognized in the current pension expense for Assumption Changes		(42,632)
6. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Liabilities	$	(41,319)
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	$	5,253
8. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses for Assumption Changes		(170,527)
9. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Liabilities	$	(165,274)
B. Outflows (Inflows) of Resources due to Assets		
1. Net difference between projected and actual earnings on pension plan investments (gains) or losses	$	(68,307)
2. Recognition period for Assets {in years}		5
3. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Assets		(13,661)
4. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Assets	$	(54,646)

* *Includes impact of changes in expected timing of future post-retirement benefit increases, if applicable.*

Statement of Outflows and Inflows
Arising from Current and Prior Reporting Periods
Fiscal Year Ended June 30, 2017 (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	$ 67,296	$ 70,930
2. Due to Assets	20,408	29,421	(9,013)
3. Totals	$ 158,634	$ 96,717	$ 61,917

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	$ 153	$ 3,030
2. Assumption Changes	135,043	67,143	67,900
3. Net Difference between projected and actual earnings on pension plan investments	20,408	29,421	(9,013)
4. Totals	$ 158,634	$ 96,717	$ 61,917

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

	Deferred Outflows of Resources	Deferred Inflows of Resources	Net Deferred Outflows/ (Inflows) of Resources
1. Differences between expected and actual experience	$ 10,177	$ 458	$ 9,719
2. Assumption Changes	405,132	219,550	185,582
3. Net Difference between projected and actual earnings on pension plan investments*	55,146	70,405	(15,259)
4. Total	$ 470,455	$ 290,413	$ 180,042

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
2018	$ 61,918
2019	77,675
2020	95,429
2021	(54,980)
2022	-
Thereafter	-
Total	$ 180,042

** 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, 2017 (Dollars in Thousands)

Assets		**June 30, 2017**
Cash & Short-term Investments	$	30,093
Receivables		2,780
Investment Pools (at fair value)		992,464
Securities Lending Collateral		105,151
Capital Assets		-
Total Assets	**$**	**1,130,488**
Total Deferred Outflows of Resources	**$**	**-**
Total Liabilities	**$**	**(106,671)**
Total Deferred Inflows of Resources	**$**	**-**
Net Position Restricted for Pensions	**$**	**1,023,817**

Statement of Changes in Fiduciary Net Position for Year Ended June 30, 2017 (Dollars in Thousands)

1. Net position at market value at beginning of year	**$**	**899,592**
Additions		
2. Contributions		
a. Employee	$	22,648
b. Employer		31,763
c. Other sources		-
d. Total contributions	$	54,411
3. Investment income		
a. Investment income/(loss)	$	136,409
b. Investment expenses		(1,050)
c. Net investment income/(loss)	$	135,359
4. Other Additions		-
5. Total Additions *(2.d.) + (3.c.) + (4.)*	**$**	**189,770**
Deductions		
6. Benefits Paid		
a. Annuity benefits	$	(63,221)
b. Refunds		(1,466)
c. Total benefits paid	$	(64,687)
7. Expenses		
a. Other deductions	$	(2)
b. Administrative		(856)
c. Total expenses	$	(858)
8. Total deductions *(6.c.) + (7.c.)*	**$**	**(65,545)**
9. Net increase/(decrease) in fiduciary net position *(5.) + (8.)*	**$**	**124,225**
10. Net position at market value at end of year *(1.) + (9.)*	**$**	**1,023,817**
11. State Board of Investment calculated annual investment return for the Correctional Employees Retirement Fund*		15.2%

** The fiscal year 2017 investment return for the Combined Funds is 15.1%.*

SECTION C

REQUIRED SUPPLEMENTARY INFORMATION

Schedule of Changes in Net Pension Liability and Related Ratios
Current Period
Fiscal Year Ended June 30, 2017 (Dollars in Thousands)

A. Total Pension Liability			
1. Service Cost	$	95,522	
2. Interest on the Total Pension Liability		95,307	
3. Changes of benefit terms		-	
4. Difference between expected and actual experience of the Total Pension Liability		6,566	
5. Changes of assumptions		(213,159)	(1)
6. Benefit payments, including refunds of employee contributions		(64,687)	
7. Net change in Total Pension Liability	$	(80,451)	
8. Total Pension Liability – Beginning		2,232,382	
9. Total Pension Liability – Ending	**$**	**2,151,931**	
B. Plan Fiduciary Net Position			
1. Contributions – Employer	$	31,763	
2. Contributions – Employee		22,648	
3. Net investment income		135,359	
4. Benefit payments, including refunds of employee contributions		(64,687)	
5. Pension Plan Administrative Expense		(856)	
6. Other changes		(2)	
7. Net change in Plan Fiduciary Net Position	$	124,225	
8. Plan Fiduciary Net Position – Beginning		899,592	
9. Plan Fiduciary Net Position – Ending	**$**	**1,023,817**	
C. Net Pension Liability, *A.9 - B.9.*	**$**	**1,128,114**	
D. Plan Fiduciary Net Position as a percentage of the Total Pension Liability, *B.9 / A.9.*		**47.58%**	
E. Covered-Employee payroll	**$**	**248,879**	(2)
F. Net Pension Liability as a percentage of Covered-Employee payroll, *C. / E.*		**453.28%**	

(1) *Assumption changes are summarized on page 32.*

(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,	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008
Total Pension Liability										
Service Cost	$ 95,522	$ 56,718	$ 48,805	$ 54,443						
Interest on the Total Pension Liability	95,307	97,571	92,039	85,702						
Benefit Changes	-	-	-	-						
Difference between Expected and Actual Experience	6,566	(764)	7,115	4,103						
Assumption Changes	(213,159) [1]	576,552	118,399	(147,067)						
Benefit Payments	(63,221)	(59,045)	(54,909)	(50,842)						
Refunds	(1,466)	(1,895)	(1,590)	(1,447)						
Net Change in Total Pension Liability	**$ (80,451)**	**$ 669,137**	**$ 209,859**	**$ (55,108)**						
Total Pension Liability - Beginning	**$ 2,232,382**	**$ 1,563,245**	**$ 1,353,386**	**$ 1,408,494**						
Total Pension Liability - Ending (a)	**$ 2,151,931**	**$ 2,232,382**	**$ 1,563,245**	**$ 1,353,386**						
Plan Fiduciary Net Position										
Employer Contributions	$ 31,763	$ 30,678	$ 29,480	$ 26,468						
Employee Contributions	22,648	21,953	21,061	18,855						
Pension Plan Net Investment Income	135,359	(195)	38,624	137,523						
Benefit Payments	(63,221)	(59,045)	(54,909)	(50,842)						
Refunds	(1,466)	(1,895)	(1,590)	(1,447)						
Pension Plan Administrative Expense	(856)	(906)	(720)	(657)						
Other Changes	(2)	-	-	(1)						
Net Change in Plan Fiduciary Net Position	**$ 124,225**	**$ (9,410)**	**$ 31,946**	**$ 129,899**						
Plan Fiduciary Net Position - Beginning	**$ 899,592**	**$ 909,002**	**$ 877,056**	**$ 747,157**						
Plan Fiduciary Net Position - Ending (b)	**$ 1,023,817**	**$ 899,592**	**$ 909,002**	**$ 877,056**						
Net Pension Liability - Ending (a) - (b)	**$ 1,128,114**	**$ 1,332,790**	**$ 654,243**	**$ 476,330**						
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	**47.58 %**	**40.30 %**	**58.15 %**	**64.80 %**						
Covered-Employee Payroll [2]	**$ 248,879**	**$ 241,242**	**$ 231,440**	**$ 219,244**						
Net Pension Liability as a Percentage of Covered-Employee Payroll	**453.28 %**	**552.47 %**	**282.68 %**	**217.26 %**						

Notes to Schedule:

(1) Assumption changes are summarized on page 32.

(2) 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 (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)
2008						
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

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)
2008	$ 34,734	$ 18,623	$ 16,111	$ 194,391	9.58%
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

Notes to Schedule of Contributions

Methods and Assumptions Used to Determine Fiscal Year Ending June 30, 2017 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, 2016
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 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 2012 valuation pursuant to an experience study of the period 2006 - 2011, prepared by a former actuary.
Healthy Post-Retirement Mortality	RP-2000 annuitant generational mortality table, projected with mortality improvement scale AA, white collar adjustment, set forward one year for males and set back one 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, 2016 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]
2008	
2009	
2010	
2011	
2012	
2013	
2014	18.62 %
2015	4.44
2016	(0.02)
2017	15.23

[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, 2017, the annual money-weighted rate of return for the Correctional Employees Retirement Fund was 15.23%. 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, 2017, these best estimates are summarized in the following table:

Asset Allocation

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return (Geometric)
Domestic Stocks	39.00%	5.10%
International Stocks	19.00	5.30
Bonds	20.00	0.75
Alternative Assets	20.00	5.90
Unallocated Cash	2.00	0.00
Total	100.00%	

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 reviews of inflation and investment return assumptions dated September 11, 2014 and September 11, 2017, and a recent asset liability study obtained by the SBI.

Sensitivity of Net Pension Liability to the Single Discount Rate Assumption

Single Discount Rate

A Single Discount Rate of 5.02% 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% and a municipal bond rate of 3.56%. 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 and future contributions were sufficient to finance the benefit payments through the year ending June 30, 2048. As a result, the long-term expected rate of return on pension plan investments was applied to projected benefit payments through the year ending June 30, 2048, and the municipal bond rate was applied to all benefit payments after the point of asset depletion.

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 5.02%, 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 (4.02%) or 1-percentage-point higher (6.02%) than the current rate.

Sensitivity of Net Pension Liability to the Single Discount Rate Assumption

(Dollars in Thousands)

	1% Decrease 4.02%	Current Single Discount Rate Assumption 5.02%	1% Increase 6.02%
Total Pension Liability	$ 2,537,552	$ 2,151,931	$ 1,846,878
Net Position Restricted for Pensions	1,023,817	1,023,817	1,023,817
Net Pension Liability	**$ 1,513,735**	**$ 1,128,114**	**$ 823,061**

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	**$ 2,232,382**	**$ 899,592**	**$ 1,332,790**	**$ 622,523**	**$ 105,664**	
Changes for the Year:						
Service Cost	$ 95,522		$ 95,522			$ 95,522
Interest on Total Pension Liability	95,307		95,307			95,307
Interest on Plan Fiduciary Net Position [(1)]		$ 67,052	(67,052)			(67,052)
Changes in Benefit Terms						
Liability Experience Gains and Losses	6,566		6,566	$ 5,253	$ -	1,313
Changes in Assumptions	(213,159)		(213,159)	-	170,527	(42,632)
Recognition of Deferred Outflows/(Inflows) of Resources Arising from Prior Reporting Periods						
Liability Experience Gains/(Losses)				(1,870)	(153)	1,717
Assumption Changes				(135,043)	(24,511)	110,532
Investment Gains/(Losses)				(20,408)	(15,760)	4,648
Contributions - Employer		31,763	(31,763)			
Contributions - Employees		22,648	(22,648)			(22,648)
Asset Gain/(Loss) [(1)]		68,307	(68,307)	-	54,646	(13,661)
Benefit Payment and Refunds	(64,687)	(64,687)				
Administrative Expenses		(856)	856			856
Other Changes		(2)	2			2
Net Changes	**$ (80,451)**	**$ 124,225**	**$ (204,676)**	**$ (152,068)**	**$ 184,749**	**$ 163,904**
Balance End of Year	**$ 2,151,931**	**$ 1,023,817**	**$ 1,128,114**	**$ 470,455**	**$ 290,413**	

[(1)] *The sum of these items in column (b) equals the net investment income of $135,359.*

Summary of Population Statistics

		Terminated		Recipients			
	Actives	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	Total
Members on 7/1/2016	**4,521**	**1,316**	**661**	**2,426**	**284**	**208**	**9,416**
New members	506	0	0	0	0	0	**506**
Return to active	30	(22)	(8)	0	0	0	**0**
Terminated non-vested	(161)	0	161	0	0	0	**0**
Service retirements	(126)	(54)	0	180	0	0	**0**
Terminated deferred	(83)	83	0	0	0	0	**0**
Terminated refund/transfer	(97)	(14)	(44)	0	0	0	**(155)**
Deaths	(4)	(2)	(3)	(32)	(5)	(4)	**(50)**
New beneficiary	0	0	0	0	0	12	**12**
Disabled	(7)	0	0	0	7	0	**0**
Unexpected status changes	0	3	51	2	6	0	**62**
Net change	58	(6)	157	150	8	8	**375**
Members on 6/30/2017	**4,579**	**1,310**	**818**	**2,576**	**292**	**216**	**9,791**

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: Member: 9.10% Employer: 12.85% 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.
Retirement	
<u>**Normal retirement benefit**</u>	
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.

Summary of Plan Provisions (Continued)

Retirement (Continued)

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

Since 2011, benefit recipients have received annual 2.00% benefit increases. If the accrued liability funding ratio reaches or exceeds 90% (determined on a Market Value of Assets basis) for two consecutive years, the benefit increase will revert to 2.50%. If, after reverting to a 2.50% increase, the accrued liability funding ratio declines to 80% or less for one year or 85% or less for two consecutive years, the benefit increase will decrease to 2.00%.

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).

Disability (Continued)	
Duty Disability Continued	
Amount (Continued)	Payment begins at disability and ends at age 55 (age 65 if disabled prior to July 1, 2009) or the five-year anniversary of the effective date of the disability benefit, whichever is later. Payments stop earlier if disability ceases or death occurs. Benefits may be paid upon re-employment but salary plus benefit cannot exceed current salary of position held at time of disability. Member is reclassified from disabled to retired at age 55 (age 65 if disabled prior to July 1, 2009). Optional amount continues. Otherwise, normal retirement benefit equal to the disability benefit paid, or an actuarially equivalent option.
Regular Disability	
Age/Service requirement	At least one year of covered Correctional service for employees hired before July 1, 2009, or a vested Correctional employee hired after June 30, 2009, and the employee is determined to have a regular disability not related to an incident while performing the duties of the job.
Amount	Normal retirement benefit based on covered Correctional Service (minimum of 15 years if hired prior to July 1, 2009) and Average Salary at disability. Payment begins at disability and ends at age 55 (age 65 if disabled prior to July 1, 2009) or the five-year anniversary of the effective date of the disability benefit, whichever is later. Payments stop earlier if disability ceases or death occurs. Benefits may be paid upon re-employment but salary plus benefit cannot exceed current salary of position held at time of disability. Member is reclassified from disabled to retired at age 55 (age 65 if disabled prior to July 1, 2009). Optional amount continues. Otherwise, normal retirement benefit equal to the disability benefit paid, or an actuarially equivalent option.
Benefit Increases	Same as for retirement.
Death	
Surviving spouse benefit	
Age/Service requirement	Member at any age or former member age 50 or older who dies before retirement or disability benefit commences and was vested. If a former member dies before age 55 and has less than 30 years of Allowable Service, benefits commence when the former member would have been age 55. If an active member dies, benefits may commence immediately, regardless of age.

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

Summary of Plan Provisions (Concluded)

Contribution stabilizer	The following is a summary of the contribution stabilizer provisions in Minnesota Statute 352.045: • If a contribution sufficiency of at least 1.00% exists, member and employer contributions may be adjusted by the MSRS Board of Directors to a level necessary to maintain a 1.00% sufficiency. Member and employer contributions may not be less than the sum of normal cost and administrative expenses. Employer contributions must be equal to 60% of the sum of member and employer contributions. • If a contribution deficiency of at least 0.50% exists, member and employer contribution rates may be increased by the MSRS Board of Directors to eliminate the deficiency. Employer contributions must be equal to 60% of the sum of member and employer contributions. • Any adjustment to the contribution rates must be reported to the Legislative Commission on Pensions and Retirement (LCPR) by January 15 following the most recent valuation report. If the LCPR does not recommend against or alter the change in rates, the adjustment becomes effective on the first day of the first full payroll period of the next fiscal year.
Changes in plan provisions	There have been no changes in plan provisions since the prior valuation.

SECTION F

ACTUARIAL COST METHOD AND ACTUARIAL ASSUMPTIONS

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

Actuarial Cost Method

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

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

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

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

Valuation of Future Post-Retirement Benefit Increases

Benefit recipients receive a future annual 2.00% post-retirement benefit increase. If the funding ratio (determined on a market value of assets basis) reaches 90% (based on a 2.50% post-retirement benefit increase assumption) for two consecutive years, the benefit increase will revert to 2.50%. If, after reverting to a 2.50% benefit increase, the funding ratio declines to less than 80% for one year or less than 85% for two consecutive years, the benefit increase will decrease to 2.00%.

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 8.00%
    - Statutory salary increases (rate of 12.50% at year 1 declining to 3.50% at years 24 and later)
- Open group; stable active population (new member profile based on average new members hired in recent years)
- The postretirement benefit increase rate is assumed to be 2.00% per year until the funding ratio threshold required to pay a 2.50% postretirement benefit increase is reached
- Current statutory contributions (i.e., not including potential contribution increases under the contribution stabilizer statutes) as directed by MSRS

Based on these assumptions and methods, the projection indicates that this plan is not expected to attain the funding ratio threshold required to pay a 2.50% postretirement benefit. This assumption is reflected in our calculations.

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, reviews of inflation and investment return assumptions, dated September 11, 2014 and September 11, 2017, and a recent asset liability study obtained by the SBI.

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	5.02% per annum.
Benefit increases after retirement	2.00% 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.
	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.

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: 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 were applied: <u>Data for active members</u>: There were 5 members reported without a gender and 2 members reported with an invalid date of birth. We assumed members were hired at age 33 and male gender. There were 3 members reported with zero or invalid salary. We used prior year salary (2 members), if available, otherwise, high five salary with a 10% load to account for salary increases (1 member). There were 2 members 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 these members. <u>Data for terminated members</u>: There were 47 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 (17 members), we assumed a value of $30,000. If Credited Service was not reported (0 members), we assumed a value of 7.5 years. There were no members reported without a Termination Date. There were 53 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. There were no members reported with missing or invalid gender or birth dates.

Summary of Actuarial Assumptions (Continued)

Unknown data for certain members	<u>Data for members receiving benefits</u>: There were 2 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 were 7 retired members 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 (368 members) and/or survivor date of birth (303 members). We used the valuation assumptions if the survivor gender or date of birth was missing or invalid.

Summary of Actuarial Assumptions (Continued)

Changes in actuarial assumptions	Assumed salary increase rates were changed as recommended in the June 30, 2016, experience study. The net effect is proposed rates that average 0.60% greater than the previous rates. Assumed rates of retirement were changed, resulting in fewer expected unreduced (normal) retirements. Assumed termination rates were decreased for the first two years of service and increased for the third year of service. For rates beyond the select period of three years, male rates for ages less than 43 were increased; female rates for ages less than 35 and ages 42-44 were increased. Rates of disability incidence were decreased for ages 39 and older. The base mortality table for healthy annuitants and employees was changed from the RP-2000 fully generational table to the RP-2014 fully generational table (with a base year of 2006), white collar adjustments, with age adjustments. The mortality improvement scale was changed from Scale AA to Scale MP-2015. The base mortality table for disabled annuitants was changed from the RP-2000 disabled mortality table (no projection for future mortality improvement) to the RP-2014 disabled annuitant mortality table (with future mortality improvement according to MP-2015). Assumed percentage of married members was changed from 85% to 75%. Assumed age difference for members and their spouse was lowered from 3 years to 2 years. The assumed percentage of members electing joint and survivor annuities were increased and the assumed percentage of members electing the single life annuity was decreased. The Combined Service Annuity (CSA) load was 30% for vested and non-vested deferred member liability. The CSA has been changed to 17% for vested deferred member liability and 6% for non-vested deferred member liability. The single discount rate changed from 4.24% per annum to 5.02% per annum.

Summary of Actuarial Assumptions (Continued)

	Percentage of Members Dying Each Year*					
	Healthy Post-Retirement Mortality**		Healthy Pre-Retirement Mortality**		Disability Mortality**	
Age in 2017	Male	Female	Male	Female	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	0.43	0.22
35	0.09	0.09	0.03	0.03	0.79	0.44
40	0.14	0.12	0.04	0.03	1.15	0.66
45	0.19	0.15	0.06	0.05	1.49	0.85
50	0.28	0.20	0.11	0.09	1.87	1.12
55	0.41	0.30	0.19	0.14	2.24	1.46
60	0.61	0.45	0.32	0.21	2.61	1.72
65	0.91	0.71	0.56	0.31	3.08	2.04
70	1.52	1.14	1.00	0.53	3.94	2.76

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

** *Rates are adjusted for mortality improvements using Scale MP-2015 from a base year of 2006.*

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

Summary of Actuarial Assumptions (Concluded)

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

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

SECTION G

CALCULATION OF THE SINGLE DISCOUNT RATE

Calculation of the Single Discount Rate

GASB Statement No. 67 includes a specific requirement for the discount rate that is used for the purpose of the measurement of the Total Pension Liability. This rate considers the ability of the fund to meet benefit obligations in the future. To make this determination, employer contributions, employee contributions, benefit payments, expenses and investment returns are projected into the future. The Plan Fiduciary Net Position (assets) in future years can then be determined and compared to its obligation to make benefit payments in those years. As long as assets are projected to be on hand in a future year, the long-term expected rate of return is used as the discount rate. In years where assets are not projected to be sufficient to meet benefit payments, the use of a “risk-free” 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 3.56% (based on Fidelity Index’s 20-Year Municipal GO AA Index as of June 30, 2017). **The resulting single discount rate as of July 1, 2017 is 5.02%**. 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.

Benefit payments projected to occur up through June 30, 2048 were fully funded and benefit payments projected to occur in the year ended June 30, 2049 were partially funded. Assets were projected to be fully depleted by the fiscal year ending June 30, 2049. Benefit payments were discounted using 7.50%, the long-term expected rate of return on pension plan investments, as long as assets were sufficient to fund the benefit payments. Beginning in the July 1, 2048 to June 30, 2049 fiscal year, when benefit payments exceed the Plan’s Fiduciary Net Position, benefit payments were discounted at 3.56%, the municipal bond rate. An equivalent single discount rate was determined that produced approximately the same present value of projected benefits when applied to all years of projected benefits as the present value of projected benefits using 7.50% through the point of asset depletion and 3.56% after. For more information on the calculation of the equivalent present value of projected benefits, see pages 40 and 41 of this report.

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) x 9.10%	(e) = (a) x 12.85%	(f)	(g) = (d) + (e) + (f)
2017	$ 248,879		$ 248,879				
2018	257,392		257,392	$ 23,423	$ 33,075		$ 56,498
2019	247,351	$ 18,406	265,757	22,509	31,785	$ 631	54,925
2020	237,582	36,812	274,394	21,620	30,529	1,263	53,412
2021	227,945	55,367	283,312	20,743	29,291	1,899	51,933
2022	218,020	74,500	292,520	19,840	28,016	2,555	50,411
2023	208,136	93,891	302,027	18,940	26,745	3,220	48,905
2024	198,867	112,975	311,842	18,097	25,554	3,875	47,526
2025	190,093	131,884	321,977	17,298	24,427	4,524	46,249
2026	181,111	151,331	332,442	16,481	23,273	5,191	44,945
2027	172,138	171,108	343,246	15,665	22,120	5,869	43,654
2028	163,827	190,574	354,401	14,908	21,052	6,537	42,497
2029	155,883	210,036	365,919	14,185	20,031	7,204	41,420
2030	147,935	229,877	377,812	13,462	19,010	7,885	40,357
2031	140,097	249,994	390,091	12,749	18,002	8,575	39,326
2032	132,293	270,476	402,769	12,039	17,000	9,277	38,316
2033	124,492	291,367	415,859	11,329	15,997	9,994	37,320
2034	116,721	312,653	429,374	10,622	14,999	10,724	36,345
2035	108,872	334,457	443,329	9,907	13,990	11,472	35,369
2036	100,513	357,224	457,737	9,147	12,916	12,253	34,316
2037	91,768	380,845	472,613	8,351	11,792	13,063	33,206
2038	83,294	404,679	487,973	7,580	10,703	13,881	32,164
2039	75,252	428,580	503,832	6,848	9,670	14,700	31,218
2040	67,222	452,985	520,207	6,117	8,638	15,537	30,292
2041	59,275	477,839	537,114	5,394	7,617	16,390	29,401
2042	51,857	502,713	554,570	4,719	6,664	17,243	28,626
2043	45,031	527,562	572,593	4,098	5,786	18,095	27,979
2044	38,850	552,353	591,203	3,535	4,992	18,946	27,473
2045	33,096	577,321	610,417	3,012	4,253	19,802	27,067
2046	27,681	602,574	630,255	2,519	3,557	20,668	26,744
2047	22,825	627,914	650,739	2,077	2,933	21,537	26,547
2048	18,634	653,254	671,888	1,696	2,394	22,407	26,497
2049	15,054	678,670	693,724	1,370	1,934	23,278	26,582
2050	12,038	704,232	716,270	1,095	1,547	24,155	26,797
2051	9,558	729,991	739,549	870	1,228	25,039	27,137
2052	7,505	756,079	763,584	683	964	25,934	27,581
2053	5,828	782,572	788,400	530	749	26,842	28,121
2054	4,464	809,559	814,023	406	574	27,768	28,748
2055	3,355	837,124	840,479	305	431	28,713	29,449
2056	2,460	865,335	867,795	224	316	29,681	30,221
2057	1,764	894,234	895,998	161	227	30,672	31,060
2058	1,240	923,878	925,118	113	159	31,689	31,961
2059	855	954,329	955,184	78	110	32,734	32,922
2060	566	985,662	986,228	52	73	33,808	33,933
2061	353	1,017,927	1,018,280	32	45	34,915	34,992
2062	209	1,051,165	1,051,374	19	27	36,055	36,101
2063	117	1,085,427	1,085,544	11	15	37,230	37,256
2064	60	1,120,764	1,120,824	5	8	38,442	38,455
2065	28	1,157,223	1,157,251	3	4	39,693	39,700
2066	12	1,194,850	1,194,862	1	2	40,983	40,986
2067	4	1,233,691	1,233,695	-	1	42,316	42,317

** Contributions related to future employees in excess of normal cost and expenses of 18.52% of pay.*

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 9.10%	(e) = (a) x 12.85%	(f)	(g) = (d) + (e) + (f)
2068	$ 1	$ 1,273,789	$ 1,273,790	$ -	$ -	$ 43,691	$ 43,691
2069	-	1,315,188	1,315,188	-	-	45,111	45,111
2070	-	1,357,932	1,357,932	-	-	46,577	46,577
2071	-	1,402,064	1,402,064	-	-	48,091	48,091
2072	-	1,447,632	1,447,632	-	-	49,654	49,654
2073	-	1,494,680	1,494,680	-	-	51,268	51,268
2074	-	1,543,257	1,543,257	-	-	52,934	52,934
2075	-	1,593,412	1,593,412	-	-	54,654	54,654
2076	-	1,645,198	1,645,198	-	-	56,430	56,430
2077	-	1,698,667	1,698,667	-	-	58,264	58,264
2078	-	1,753,874	1,753,874	-	-	60,158	60,158
2079	-	1,810,875	1,810,875	-	-	62,113	62,113
2080	-	1,869,728	1,869,728	-	-	64,132	64,132
2081	-	1,930,495	1,930,495	-	-	66,216	66,216
2082	-	1,993,236	1,993,236	-	-	68,368	68,368
2083	-	2,058,016	2,058,016	-	-	70,590	70,590
2084	-	2,124,901	2,124,901	-	-	72,884	72,884
2085	-	2,193,961	2,193,961	-	-	75,253	75,253
2086	-	2,265,264	2,265,264	-	-	77,699	77,699
2087	-	2,338,885	2,338,885	-	-	80,224	80,224
2088	-	2,414,899	2,414,899	-	-	82,831	82,831
2089	-	2,493,383	2,493,383	-	-	85,523	85,523
2090	-	2,574,418	2,574,418	-	-	88,303	88,303
2091	-	2,658,087	2,658,087	-	-	91,172	91,172
2092	-	2,744,475	2,744,475	-	-	94,135	94,135
2093	-	2,833,670	2,833,670	-	-	97,195	97,195
2094	-	2,925,764	2,925,764	-	-	100,354	100,354
2095	-	3,020,852	3,020,852	-	-	103,615	103,615
2096	-	3,119,029	3,119,029	-	-	106,983	106,983
2097	-	3,220,398	3,220,398	-	-	110,460	110,460
2098	-	3,325,061	3,325,061	-	-	114,050	114,050
2099	-	3,433,125	3,433,125	-	-	117,756	117,756
2100	-	3,544,702	3,544,702	-	-	121,583	121,583
2101	-	3,659,905	3,659,905	-	-	125,535	125,535
2102	-	3,778,852	3,778,852	-	-	129,615	129,615
2103	-	3,901,664	3,901,664	-	-	133,827	133,827
2104	-	4,028,468	4,028,468	-	-	138,176	138,176
2105	-	4,159,394	4,159,394	-	-	142,667	142,667
2106	-	4,294,574	4,294,574	-	-	147,304	147,304
2107	-	4,434,148	4,434,148	-	-	152,091	152,091
2108	-	4,578,257	4,578,257	-	-	157,034	157,034
2109	-	4,727,051	4,727,051	-	-	162,138	162,138
2110	-	4,880,680	4,880,680	-	-	167,407	167,407
2111	-	5,039,302	5,039,302	-	-	172,848	172,848
2112	-	5,203,079	5,203,079	-	-	178,466	178,466
2113	-	5,372,179	5,372,179	-	-	184,266	184,266
2114	-	5,546,775	5,546,775	-	-	190,254	190,254
2115	-	5,727,045	5,727,045	-	-	196,438	196,438
2116	-	5,913,174	5,913,174	-	-	202,822	202,822
2117	-	6,105,352	6,105,352	-	-	209,414	209,414

** Contributions related to future employees in excess of normal cost and expenses of 18.52% 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)
2018	$ 1,023,817	$ 56,498	$ 70,569	$ 927	$ 76,234	$ 1,085,053
2019	1,085,053	54,925	74,357	890	80,631	1,145,362
2020	1,145,362	53,412	78,006	855	84,965	1,204,878
2021	1,204,878	51,933	82,603	821	89,206	1,262,593
2022	1,262,593	50,411	87,743	785	93,291	1,317,767
2023	1,317,767	48,905	93,194	749	97,174	1,369,903
2024	1,369,903	47,526	98,657	716	100,834	1,418,890
2025	1,418,890	46,249	104,459	684	104,248	1,464,244
2026	1,464,244	44,945	110,570	652	107,378	1,505,345
2027	1,505,345	43,654	117,165	620	110,171	1,541,385
2028	1,541,385	42,497	123,795	590	112,589	1,572,086
2029	1,572,086	41,420	130,410	561	114,609	1,597,144
2030	1,597,144	40,357	137,200	533	116,200	1,615,968
2031	1,615,968	39,326	144,188	504	117,318	1,627,920
2032	1,627,920	38,316	151,118	476	117,923	1,632,565
2033	1,632,565	37,320	158,309	448	117,971	1,629,099
2034	1,629,099	36,345	165,464	420	117,413	1,616,973
2035	1,616,973	35,369	172,946	392	116,193	1,595,197
2036	1,595,197	34,316	180,906	362	114,229	1,562,474
2037	1,562,474	33,206	189,412	330	111,421	1,517,359
2038	1,517,359	32,164	197,688	300	107,696	1,459,231
2039	1,459,231	31,218	205,571	271	103,012	1,387,619
2040	1,387,619	30,292	213,437	242	97,319	1,301,551
2041	1,301,551	29,401	220,892	213	90,557	1,200,404
2042	1,200,404	28,626	227,521	187	82,699	1,084,021
2043	1,084,021	27,979	233,553	162	73,726	952,011
2044	952,011	27,473	238,775	140	63,615	804,184
2045	804,184	27,067	243,440	119	52,342	640,034
2046	640,034	26,744	247,653	100	39,864	458,889
2047	458,889	26,547	251,150	82	26,143	260,347
2048	260,347	26,497	253,682	67	11,158	44,253
2049	44,253	26,582	255,370	54	-	-
2050	-	26,797	256,204	43	-	-
2051	-	27,137	256,136	34	-	-
2052	-	27,581	255,322	27	-	-
2053	-	28,121	253,830	21	-	-
2054	-	28,748	251,728	16	-	-
2055	-	29,449	249,075	12	-	-
2056	-	30,221	245,930	9	-	-
2057	-	31,060	242,308	6	-	-
2058	-	31,961	238,241	4	-	-
2059	-	32,922	233,763	3	-	-
2060	-	33,933	228,915	2	-	-
2061	-	34,992	223,724	1	-	-
2062	-	36,101	218,205	1	-	-
2063	-	37,256	212,381	-	-	-
2064	-	38,455	206,274	-	-	-
2065	-	39,700	199,900	-	-	-
2066	-	40,986	193,274	-	-	-
2067	-	42,317	186,412	-	-	-

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)
2068	$ -	$ 43,691	$ 179,324	$ -	$ -	$ -
2069	-	45,111	172,023	-	-	-
2070	-	46,577	164,520	-	-	-
2071	-	48,091	156,832	-	-	-
2072	-	49,654	148,976	-	-	-
2073	-	51,268	140,975	-	-	-
2074	-	52,934	132,855	-	-	-
2075	-	54,654	124,650	-	-	-
2076	-	56,430	116,394	-	-	-
2077	-	58,264	108,127	-	-	-
2078	-	60,158	99,892	-	-	-
2079	-	62,113	91,736	-	-	-
2080	-	64,132	83,709	-	-	-
2081	-	66,216	75,864	-	-	-
2082	-	68,368	68,256	-	-	-
2083	-	70,590	60,939	-	-	-
2084	-	72,884	53,965	-	-	-
2085	-	75,253	47,381	-	-	-
2086	-	77,699	41,228	-	-	-
2087	-	80,224	35,536	-	-	-
2088	-	82,831	30,327	-	-	-
2089	-	85,523	25,610	-	-	-
2090	-	88,303	21,388	-	-	-
2091	-	91,172	17,654	-	-	-
2092	-	94,135	14,393	-	-	-
2093	-	97,195	11,581	-	-	-
2094	-	100,354	9,191	-	-	-
2095	-	103,615	7,189	-	-	-
2096	-	106,983	5,538	-	-	-
2097	-	110,460	4,199	-	-	-
2098	-	114,050	3,130	-	-	-
2099	-	117,756	2,293	-	-	-
2100	-	121,583	1,650	-	-	-
2101	-	125,535	1,166	-	-	-
2102	-	129,615	810	-	-	-
2103	-	133,827	552	-	-	-
2104	-	138,176	371	-	-	-
2105	-	142,667	246	-	-	-
2106	-	147,304	162	-	-	-
2107	-	152,091	106	-	-	-
2108	-	157,034	70	-	-	-
2109	-	162,138	46	-	-	-
2110	-	167,407	31	-	-	-
2111	-	172,848	22	-	-	-
2112	-	178,466	15	-	-	-
2113	-	184,266	11	-	-	-
2114	-	190,254	8	-	-	-
2115	-	196,438	6	-	-	-
2116	-	202,822	4	-	-	-
2117	-	209,414	3	-	-	-

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	$ 1,023,816	$ 70,569	$ 70,569	$ -	$ 68,063	$ -	$ 68,862
2019	1,085,053	74,357	74,357	-	66,713	-	69,091
2020	1,145,362	78,006	78,006	-	65,104	-	69,017
2021	1,204,878	82,603	82,603	-	64,131	-	69,592
2022	1,262,593	87,743	87,743	-	63,369	-	70,390
2023	1,317,767	93,194	93,194	-	62,610	-	71,190
2024	1,369,903	98,657	98,657	-	61,656	-	71,762
2025	1,418,890	104,459	104,459	-	60,727	-	72,350
2026	1,464,244	110,570	110,570	-	59,795	-	72,923
2027	1,505,345	117,165	117,165	-	58,941	-	73,580
2028	1,541,385	123,795	123,795	-	57,931	-	74,028
2029	1,572,086	130,410	130,410	-	56,769	-	74,257
2030	1,597,144	137,200	137,200	-	55,558	-	74,390
2031	1,615,968	144,188	144,188	-	54,314	-	74,442
2032	1,627,920	151,118	151,118	-	52,953	-	74,292
2033	1,632,565	158,309	158,309	-	51,603	-	74,108
2034	1,629,099	165,464	165,464	-	50,172	-	73,756
2035	1,616,973	172,946	172,946	-	48,782	-	73,407
2036	1,595,197	180,906	180,906	-	47,468	-	73,116
2037	1,562,474	189,412	189,412	-	46,232	-	72,895
2038	1,517,359	197,688	197,688	-	44,886	-	72,444
2039	1,459,231	205,571	205,571	-	43,419	-	71,733
2040	1,387,619	213,437	213,437	-	41,935	-	70,918
2041	1,301,551	220,892	220,892	-	40,372	-	69,888
2042	1,200,404	227,521	227,521	-	38,683	-	68,545
2043	1,084,021	233,553	233,553	-	36,938	-	67,000
2044	952,011	238,775	238,775	-	35,129	-	65,224
2045	804,184	243,440	243,440	-	33,316	-	63,321
2046	640,034	247,653	247,653	-	31,528	-	61,338
2047	458,889	251,150	251,150	-	29,743	-	59,231
2048	260,347	253,682	253,682	-	27,947	-	56,969
2049	44,253	255,370	44,253	211,117	4,535	70,142	54,608
2050	-	256,204	-	256,204	-	82,195	52,168
2051	-	256,136	-	256,136	-	79,348	49,662
2052	-	255,322	-	255,322	-	76,377	47,138
2053	-	253,830	-	253,830	-	73,320	44,623
2054	-	251,728	-	251,728	-	70,214	42,139
2055	-	249,075	-	249,075	-	67,086	39,702
2056	-	245,930	-	245,930	-	63,961	37,327
2057	-	242,308	-	242,308	-	60,853	35,020
2058	-	238,241	-	238,241	-	57,775	32,787
2059	-	233,763	-	233,763	-	54,740	30,633
2060	-	228,915	-	228,915	-	51,762	28,564
2061	-	223,724	-	223,724	-	48,849	26,582
2062	-	218,205	-	218,205	-	46,007	24,687
2063	-	212,381	-	212,381	-	43,239	22,880
2064	-	206,274	-	206,274	-	40,552	21,160
2065	-	199,900	-	199,900	-	37,948	19,526
2066	-	193,274	-	193,274	-	35,429	17,977
2067	-	186,412	-	186,412	-	32,996	16,510

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	$ -	$ 179,324	$ -	$ 179,324	$ -	$ 30,651	$ 15,123
2069	-	172,023	-	172,023	-	28,392	13,814
2070	-	164,520	-	164,520	-	26,220	12,580
2071	-	156,832	-	156,832	-	24,136	11,419
2072	-	148,976	-	148,976	-	22,139	10,329
2073	-	140,975	-	140,975	-	20,229	9,307
2074	-	132,855	-	132,855	-	18,409	8,352
2075	-	124,650	-	124,650	-	16,678	7,462
2076	-	116,394	-	116,394	-	15,038	6,634
2077	-	108,127	-	108,127	-	13,490	5,869
2078	-	99,892	-	99,892	-	12,034	5,163
2079	-	91,736	-	91,736	-	10,672	4,514
2080	-	83,709	-	83,709	-	9,403	3,923
2081	-	75,864	-	75,864	-	8,229	3,385
2082	-	68,256	-	68,256	-	7,149	2,900
2083	-	60,939	-	60,939	-	6,163	2,465
2084	-	53,965	-	53,965	-	5,270	2,079
2085	-	47,381	-	47,381	-	4,468	1,738
2086	-	41,228	-	41,228	-	3,754	1,440
2087	-	35,536	-	35,536	-	3,125	1,182
2088	-	30,327	-	30,327	-	2,575	960
2089	-	25,610	-	25,610	-	2,100	772
2090	-	21,388	-	21,388	-	1,693	614
2091	-	17,654	-	17,654	-	1,350	483
2092	-	14,393	-	14,393	-	1,063	375
2093	-	11,581	-	11,581	-	826	287
2094	-	9,191	-	9,191	-	633	217
2095	-	7,189	-	7,189	-	478	162
2096	-	5,538	-	5,538	-	355	119
2097	-	4,199	-	4,199	-	260	86
2098	-	3,130	-	3,130	-	187	61
2099	-	2,293	-	2,293	-	133	42
2100	-	1,650	-	1,650	-	92	29
2101	-	1,166	-	1,166	-	63	20
2102	-	810	-	810	-	42	13
2103	-	552	-	552	-	28	8
2104	-	371	-	371	-	18	5
2105	-	246	-	246	-	12	3
2106	-	162	-	162	-	7	2
2107	-	106	-	106	-	5	1
2108	-	70	-	70	-	3	1
2109	-	46	-	46	-	2	1
2110	-	31	-	31	-	1	-
2111	-	22	-	22	-	1	-
2112	-	15	-	15	-	1	-
2113	-	11	-	11	-	-	-
2114	-	8	-	8	-	-	-
2115	-	6	-	6	-	-	-
2116	-	4	-	4	-	-	-
2117	-	3	-	3	-	-	-
				Totals	$ 1,561,321	$ 1,390,371	$ 2,951,693

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, 2017

GRS

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

December 1, 2017

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 statements.

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 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.

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, 2017 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:ah

Table of Contents

SECTION A

EXECUTIVE SUMMARY

Executive Summary
as of June 30, 2017 (Dollars in Thousands)

	2017
Actuarial Valuation Date	June 30, 2017
Measurement Date of the Net Pension Liability	June 30, 2017
Membership	
Number of	
- Service Retirements	847
- Survivors	148
- Disability Retirements	57
- Deferred Retirements	59
- Terminated other non-vested	28
- Active Members	902
- Total	2,041
Covered-employee Payroll [1]	$ 73,056
Net Pension Liability	
Total Pension Liability	$ 1,037,916
Plan Fiduciary Net Position	691,599
Net Pension Liability	$ 346,317
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	66.63%
Net Pension Liability as a Percentage of Covered-employee Payroll	474.04%
Development of the Single Discount Rate	
Single Discount Rate	6.38%
Long-Term Expected Rate of Investment Return	7.50%
Long-Term Municipal Bond Rate[2]	3.56%
Last year ending June 30 in the 2018 to 2117 projection period for which projected benefit payments are fully funded	2062
Total Pension Expense / (Income)	$ 51,695

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	$ -	$ 25,178
Changes in assumptions	199,074	93,912
Net difference between projected and actual earnings on pension plan investments	40,187	49,932
Totals	$ 239,261	$ 169,022

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

(2) *Fixed-income municipal bonds with 20-years to maturity that include only federally tax-exempt municipal bonds as reported in Fidelity Index's "20-Year Municipal GO AA Index" as of June 30, 2017. See Section G for additional detail.*

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, 2017.

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% on the actuarial value of assets), 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 decrease.
4. The plan may eventually become insolvent and unable to pay benefits.

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 actuarial 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 market value of assets were used instead of the actuarial value of assets, unless the market value of assets is used in the measurement.

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 Statements 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, 2017 and a measurement date of June 30, 2017.

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 3.56% (based on Fidelity Index's 20-Year Municipal GO AA Index as of June 30, 2017); and the resulting Single Discount Rate is 6.38%. The long-term expected rate of return is based on reviews of inflation and investment assumptions, dated September 11, 2014 and September 11, 2017, and a recent asset liability study obtained by the Minnesota State Board of Investment.

SECTION B

FINANCIAL STATEMENTS

Statement of Pension Expense Under GASB Statement No. 68
Fiscal Year Ended June 30, 2017 (Dollars in Thousands)

A. Expense		
1. Service Cost	$	29,758
2. Interest on the Total Pension Liability		58,865
3. Current-Period Benefit Changes		-
4. Employee Contributions (made negative for addition here)		(10,520)
5. Projected Earnings on Plan Investments (made negative for addition here)		(46,069)
6. Pension Plan Administrative Expense		208
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		(403)
9. Recognition of Outflow (Inflow) of Resources due to assumption changes		
Arising from Current Reporting Period		(18,782)
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		(9,402)
11. Increases/(Decreases) from Experience in the Current Reporting Period	**$**	**3,655**
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	$	(6,809)
13. Recognition of Outflow (Inflow) of Resources due to assumption changes		
Arising from Prior Reporting Periods		52,274
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		2,575
15. Total Pension Expense / (Income)	**$**	**51,695**

Statement of Outflows and Inflows
Arising from Current Reporting Period
Fiscal Year Ended June 30, 2017 (Dollars in Thousands)

A. Outflows (Inflows) of Resources due to Liabilities		
1. Difference between expected and actual experience of the Total Pension Liability (gains) or losses	$	(2,418)
2. Assumption Changes (gains) or losses		(112,694)
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		(403)
5. Outflow (Inflow) of Resources to be recognized in the current pension expense for Assumption Changes		(18,782)
6. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Liabilities	$	(19,185)
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	$	(2,015)
8. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses for Assumption Changes		(93,912)
9. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Liabilities	$	(95,927)
B. Outflows (Inflows) of Resources due to Assets		
1. Net difference between projected and actual earnings on pension plan investments (gains) or losses	$	(47,008)
2. Recognition period for Assets {in years}		5
3. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Assets		(9,402)
4. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Assets	$	(37,606)

Statement of Outflows and Inflows
Arising from Current and Prior Reporting Periods
Fiscal Year Ended June 30, 2017 (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	$ 25,994	$ 26,280
2. Due to Assets	14,901	21,728	(6,827)
3. Total	$ 67,175	$ 47,722	$ 19,453

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	$ -	$ 7,212	$ (7,212)
2. Assumption Changes	52,274	18,782	33,492
3. Net Difference between projected and actual earnings on pension plan investments	14,901	21,728	(6,827)
4. Total	$ 67,175	$ 47,722	$ 19,453

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	$ -	$ 25,178	$ (25,178)
2. Assumption Changes	199,074	93,912	105,162
3. Net Difference between projected and actual earnings on pension plan investments*	40,187	49,932	(9,745)
4. Total	$ 239,261	$ 169,022	$ 70,239

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
2018	$ 19,453
2019	31,777
2020	23,221
2021	14,973
2022	(19,185)
Thereafter	-
Total	$ 70,239

** 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, 2017 (Dollars in Thousands)

Assets		**June 30, 2017**
Cash & Short-term Investments	$	18,849
Receivables		1,391
Investment Pools (at fair value)		671,734
Securities Lending Collateral		71,169
Capital Assets		-
Total Assets	**$**	**763,143**
Total Deferred Outflows of Resources	**$**	**-**
Total Liabilities	**$**	**(71,544)**
Total Deferred Inflows of Resources	**$**	**-**
Net Position Restricted for Pensions	**$**	**691,599**

Statement of Changes in Fiduciary Net Position for Year Ended June 30, 2017 (Dollars in Thousands)

1.	**Net Position at market value at beginning of year**	**$**	**629,992**
Additions			
2.	Contributions		
	a. Employee	$	10,520
	b. Employer		15,783
	c. Other sources - Supplemental State Aid		1,000
	d. Total contributions	$	27,303
3.	Investment income		
	a. Investment income/(loss)	$	93,798
	b. Investment expenses		(721)
	c. Net investment income/(loss)	$	93,077
4.	Other Additions	$	-
5.	**Total Additions** *(2.d.) + (3.c.) + (4.)*	**$**	**120,380**
Deductions			
6.	Benefits Paid		
	a. Annuity benefits	$	(58,560)
	b. Refunds		(5)
	c. Total benefits paid	$	(58,565)
7.	Expenses		
	a. Other deductions	$	-
	b. Administrative		(208)
	c. Total expenses	$	(208)
8.	**Total Deductions** *(6.c.) + (7.c.)*	**$**	**(58,773)**
9.	**Net increase/(decrease) in fiduciary net position** *(5.) + (8.)*	**$**	**61,607**
10.	**Net position at market value at end of year** *(1.) + (9.)*	**$**	**691,599**
11.	State Board of Investment calculated annual investment return for the State Patrol Retirement Fund*		15.2%

** The fiscal year 2017 investment return for the Combined Funds is 15.1%.*

SECTION C

REQUIRED SUPPLEMENTARY INFORMATION

Schedule of Changes in Net Pension Liability and Related Ratios
Current Period
Fiscal Year Ended June 30, 2017 (Dollars in Thousands)

A. Total pension liability		
1. Service Cost	$	29,758
2. Interest on the Total Pension Liability		58,865
3. Changes of benefit terms		-
4. Difference between expected and actual experience of the Total Pension Liability (1)		(2,418)
5. Changes of assumptions		(112,694)
6. Benefit payments, including refunds of employee contributions		(58,565)
7. Net change in total pension liability	$	(85,054)
8. Total pension liability – beginning		1,122,970
9. Total pension liability – ending	**$**	**1,037,916**
B. Plan fiduciary net position		
1. Contributions – employer (2)	$	16,783
2. Contributions – employee		10,520
3. Net investment income		93,077
4. Benefit payments, including refunds of employee contributions		(58,565)
5. Pension Plan Administrative Expense		(208)
6. Other changes		-
7. Net change in plan fiduciary net position	$	61,607
8. Plan fiduciary net position – beginning		629,992
9. Plan fiduciary net position – ending	**$**	**691,599**
C. Net pension liability, *A.9. - B.9.*	**$**	**346,317**
D. Plan fiduciary net position as a percentage of the total pension liability, *B.9. / A.9.*		**66.63%**
E. Covered-employee payroll (3)	**$**	**73,056**
F. Net pension liability as a percentage of covered-employee payroll, *C. / E.*		**474.04%**

(1) Includes impact of changes in expected timing of future post-retirement benefit increases.
(2) Includes $1 million supplemental state aid.
(3) 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,	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008
Total Pension Liability										
Service Cost	$ 29,758	$ 16,555	$ 16,144	$ 14,514						
Interest on the Total Pension Liability	58,865	64,592	63,753	60,183						
Benefit Changes	-	-	-	-						
Difference between Expected and Actual Experience	(2,418)	(22,222)	(12,855)	(5,771)						
Assumption Changes	(112,694)	283,584	-	30,058						
Benefit Payments	(58,560)	(57,695)	(55,465)	(53,697)						
Refunds	(5)	(79)	(15)	(25)						
Net Change in Total Pension Liability	$ (85,054)	$ 284,735	$ 11,562	$ 45,262						
Total Pension Liability - Beginning	1,122,970	838,235	826,673	781,411						
Total Pension Liability - Ending (a)	**$ 1,037,916**	**$ 1,122,970**	**$ 838,235**	**$ 826,673**						
Plan Fiduciary Net Position										
Employer Contributions [1]	$ 16,783	$ 14,938	$ 14,763	$ 12,894						
Employee Contributions	10,520	9,292	9,174	7,930						
Pension Plan Net Investment Income	93,077	(774)	28,903	107,187						
Benefit Payments	(58,560)	(57,695)	(55,465)	(53,697)						
Refunds	(5)	(79)	(15)	(25)						
Pension Plan Administrative Expense	(208)	(220)	(170)	(150)						
Other	-	-	-	-						
Net Change in Plan Fiduciary Net Position	**$ 61,607**	**$ (34,538)**	**$ (2,810)**	**$ 74,139**						
Plan Fiduciary Net Position - Beginning	**629,992**	**664,530**	**667,340**	**593,201**						
Plan Fiduciary Net Position - Ending (b)	**$ 691,599**	**$ 629,992**	**$ 664,530**	**$ 667,340**						
Net Pension Liability - Ending (a) - (b)	**$ 346,317**	**$ 492,978**	**$ 173,705**	**$ 159,333**						
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	**66.63 %**	**56.10 %**	**79.28 %**	**80.73 %**						
Covered-Employee Payroll [2]	**$ 73,056**	**$ 69,343**	**$ 68,463**	**$ 63,952**						
Net Pension Liability as a Percentage of Covered-Employee Payroll	**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)
2008						
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

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)
2008	$ 12,355	$ 8,279	$ 4,076	$ 60,029	13.79%
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

Notes to Schedule of Contributions

Methods and Assumptions Used to Determine Fiscal Year Ending June 30, 2017 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, 2016
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 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 2012 valuation pursuant to an experience study of the period 2006 - 2011, prepared by a former actuary.
Healthy Post-retirement Mortality	RP-2000 annuitant generational mortality table, projected with mortality improvement scale AA, white collar adjustment, set back two years for males and set forward one year for females.

Other Information:

Benefit Increases After Retirement	The post-retirement benefit increase is assumed to be 1.00% through 2044, 1.50% from 2045 through 2061 and 2.50% thereafter. See separate funding actuarial valuation report as of July 1, 2016 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]
2008	
2009	
2010	
2011	
2012	
2013	
2014	18.69 %
2015	4.46
2016	(0.12)
2017	15.24

[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, 2017, the annual money-weighted rate of return for the State Patrol Retirement Fund was 15.24%. 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 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, 2017, these best estimates are summarized in the following table:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return (Geometric)
Domestic Stocks	39.00%	5.10%
International Stocks	19.00	5.30
Bonds	20.00	0.75
Alternative Assets	20.00	5.90
Unallocated Cash	2.00	0.00
Total	100.00%	

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 reviews of inflation and investment return assumptions dated September 11, 2014 and September 11, 2017, and a recent asset liability study obtained by the SBI.

Single Discount Rate

A Single Discount Rate of 6.38% 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% and a municipal bond rate of 3.56%. 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 and future contributions were sufficient to finance the benefit payments through the year ending June 30, 2062. As a result, the long-term expected rate of return on pension plan investments was applied to projected benefit payments through the year ending June 30, 2062, and the municipal bond rate was applied to all benefit payments after the point of asset depletion.

Regarding the sensitivity of the net pension liability to changes in the Single Discount Rate, the following presents the plan's net pension liability, calculated using a Single Discount Rate of 6.38%, as well as what the plan's net pension liability would be if it were calculated using a Single Discount Rate that is one percent lower (5.38%) or one percent higher (7.38%):

Sensitivity of Net Pension Liability
to the Single Discount Rate Assumption

(Dollars in Thousands)

	1% Decrease 5.38%	Current Single Discount Rate Assumption 6.38%	1% Increase 7.38%
Total Pension Liability	$1,175,469	$1,037,916	$925,291
Net Position Restricted for Pensions	691,599	691,599	691,599
Net Pension Liability	**$ 483,870**	**$ 346,317**	**$233,692**

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	**$ 1,122,970**	**$ 629,992**	**$ 492,978**	**$ 306,436**	**$ 54,624**	
Changes for the Year:						
Service Cost	$ 29,758		$ 29,758			$ 29,758
Interest on Total Pension Liability	58,865		58,865			58,865
Interest on Fiduciary Net Position [1]		$ 46,069	(46,069)			(46,069)
Changes in Benefit Terms						
Liability Experience Gains and Losses	(2,418)		(2,418)	$ -	$ 2,015	(403)
Changes in Assumptions	(112,694)		(112,694)	-	93,912	(18,782)
Recognition of Deferred Outflows/(Inflows) of Resources Arising from Prior Reporting Periods						
Liability Experience Gains/(Losses)				-	(6,809)	(6,809)
Assumption Changes				(52,274)	-	52,274
Investment Gains/(Losses)				(14,901)	(12,326)	2,575
Contributions - Employer [2]		16,783	(16,783)			
Contributions - Employees		10,520	(10,520)			(10,520)
Asset Gain/(Loss)[1]		47,008	(47,008)	-	37,606	(9,402)
Benefit Payments and Refunds	(58,565)	(58,565)	-			
Administrative Expenses		(208)	208			208
Other changes		-	-			-
Net Changes	**$ (85,054)**	**$ 61,607**	**$ (146,661)**	**$ (67,175)**	**$ 114,398**	**$ 51,695**
Balance End of Year	**$ 1,037,916**	**$ 691,599**	**$ 346,317**	**$ 239,261**	**$ 169,022**	

[1] *The sum of these items in column (b) equals the net investment income of $93,077.*

[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 7/1/2016	**892**	**55**	**20**	**844**	**53**	**151**	**2,015**
New Members	54	0	0	0	0	0	**54**
Return to active	1	(1)	0	0	0	0	**0**
Terminated non-vested	(8)	0	8	0	0	0	**0**
Service retirements	(24)	(1)	0	25	0	0	**0**
Terminated deferred	(6)	6	0	0	0	0	**0**
Terminated refund/transfer	(1)	0	(1)	0	0	0	**(2)**
Deaths	0	0	0	(23)	(2)	(14)	**(39)**
New beneficiary	0	0	0	0	0	12	**12**
Disabled	(6)	0	0	0	6	0	**0**
Unexpected status change	0	0	1	1	0	(1)	**1**
Net change	10	4	8	3	4	(3)	**26**
Members on 6/30/2017	**902**	**59**	**28**	**847**	**57**	**148**	**2,041**

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 Date / Member / Employer July 1, 2016 and later / 14.40% / 21.60% 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 both the Public Employees Retirement Association Police and Fire Plan and the State Patrol Retirement Fund become 90% funded (on a Market Value of Assets basis).
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.
Retirement	
<u>**Normal retirement benefit**</u>	
Age/Service requirement	Age 55 and three years (ten years if first hired after June 30, 2013) of Allowable Service.
Amount	3.00% of Average Salary for each year of Allowable Service up to 33 years. Members with at least 28 years of service as of July 1, 2013, are not subject to this service limit. Member contributions made after the service cap will be refunded at retirement.

Contribution rates:

Effective Date	Member	Employer
July 1, 2016 and later	14.40%	21.60%

Summary of Plan Provisions (Continued)

Retirement (Continued)	
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	Since January 1, 2014, benefit recipients receive annual 1.00% benefit increases. When the accrued liability funding ratio (determined on a market value of assets basis) reaches or exceeds 85% for two consecutive years, the benefit increase will increase to 1.50%; the benefit will revert to 2.50% when the accrued liability funding ratio (determined on a market value of assets basis) reaches or exceeds 90% for two consecutive years. If, after reverting to a 1.50% increase, the accrued liability funding ratio declines to 75% or less for the most recent valuation year or 80% or less for two consecutive years, the benefit increase will decrease to 1.00%. 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)

Occupational disability benefit (Continued)

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

Non-duty disability benefit

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

Retirement after disability

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

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

Summary of Plan Provisions (Continued)

Death	
<u>Surviving spouse benefit</u>	
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.
<u>Surviving dependent children's benefit</u>	
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.
<u>Refund of contributions</u>	
Age/Service requirement	Member dies before receiving any retirement benefits and survivor benefits are not payable.
Amount	Member contributions with 6.00% interest compounded daily until June 30, 2011, and 4.00% thereafter.
Termination	
<u>Refund of contributions</u>	
Age/service requirement	Termination of state service.
Amount	Member contributions with 6.00% interest compounded daily to June 30, 2011, and 4.00% thereafter. 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; and (d.) 2.00% after December 31, 2011, until the annuity begins. 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, and 6.50% post-retirement interest.
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)

Contribution stabilizer	The following is a summary of the contribution stabilizer provisions in Minnesota Statute 352.045: ▪ If a contribution sufficiency of at least 2.00% exists, member and employer contributions may be adjusted by the MSRS Board of Directors to a level necessary to maintain a 2.00% sufficiency. Member and employer contributions may not be less than the sum of normal cost and administrative expenses. Employer contributions must be equal to 60% of the sum of member and employer contributions. ▪ If a contribution deficiency of at least 0.50% exists, member and employer contribution rates may be increased by the MSRS Board of Directors to eliminate the deficiency. Employer contributions must be equal to 60% of the sum of member and employer contributions. ▪ Any adjustment to the contribution rates must be reported to the Legislative Commission on Pensions and Retirement (LCPR) by January 15 following the most recent valuation report. If the LCPR does not recommend against or alter the change in rates, the adjustment becomes effective on the first day of the first full payroll period of the next fiscal year.
Changes in plan provisions	There have been no changes in plan provisions since the prior valuation.

SECTION F

ACTUARIAL COST METHOD AND ACTUARIAL ASSUMPTIONS

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

Actuarial Cost Method

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

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

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

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

Valuation of Future Post-Retirement Benefit Increases

Benefit recipients receive a future annual 1.00% post-retirement benefit increase. If the funding ratio (based on the market value of assets) reaches 85% (based on a 1.50% post-retirement benefit increase assumption) for two consecutive years, the benefit increase will increase to 1.50%; if the funding ratio reaches 90% (based on a 2.50% post-retirement benefit increase assumption) for two consecutive years, the benefit increase revert to 2.50%. If, after reverting to a 1.50% benefit increase, the funding ratio declines to less than 75% for one year or less than 80% for two consecutive years, the benefit increase will decrease to 1.00%.

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 8.00%
    - Statutory salary increases (rate of 15.50% at year 1 declining to 3.50% at years 25 and later)
- Open group; stable active population (new member profile based on average new members hired in recent years).
- The postretirement benefit increase rate is assumed to be 1.00% per year until the funding ratio threshold required to pay a 1.50% postretirement benefit increase is reached and is then assumed to be 1.50% until the threshold required to pay a 2.50% post-retirement increase is reached.
- Current statutory contributions (i.e., not including potential contribution increases under the contribution stabilizer statutes) as directed by MSRS.

Based on these assumptions and methods, the projection indicates that this plan expected to attain the funding ratio threshold required to pay 1.50% postretirement benefit increases in the year 2064 and is not expected to attain the funding ratio threshold required to pay 2.50% postretirement benefit increases. The assumption that the plan will begin paying 1.50% benefit increases on January 1, 2065 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, reviews of inflation and investment return assumptions, dated September 11, 2014 and September 11, 2017, and a recent asset liability study obtained by the SBI.

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	6.38% per annum.
Benefit increases after retirement	1.00% per annum through 2064, 1.50% per annum thereafter.
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.
	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.

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. There are no members reported with missing gender or birth dates. In cases where submitted data was missing or incomplete, the following assumptions were applied: **Data for active members:** There was 1 member reported with missing salary and no members reported with missing service. Prior year salary was not reported, so high five salary with a 10% load to account for salary increases was used. **Data for terminated members:** There was 1 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 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 (199 members) and/or the survivor gender was missing or invalid (215 members).

Summary of Actuarial Assumptions (Continued)

Changes in actuarial assumptions	Assumed salary increase rates were changed as recommended in the July 26, 2016, experience study. The net effect is proposed rates that average 0.26% greater than the previous rates. Assumed rates of retirement were changed; new rates result in slightly more unreduced (normal) retirements, and fewer early reduced retirements. Assumed rates of termination were changed. The new rates were decreased for the first three years of employment. Disability rates for ages 35 to 51 were increased. The base mortality table for healthy and disabled annuitants and employees was changed from the RP-2000 fully generational table to the RP-2014 fully generational table (with a base year of 2006), white collar adjustments. The mortality improvement scale was changed from Scale AA to Scale MP-2015. The assumed percentage of members electing joint and survivor annuities was increased. The form of payment assumptions are the same for males and females. The Combined Service Annuity (CSA) load was 30% for vested and non-vested deferred member liability. The CSA has been changed to 13% for vested deferred member liability and 0.00% for non-vested deferred member liability. The assumed post-retirement benefit increase rate was changed from 1.00% per year for all years to 1.00% per year through 2064, and 1.50% per year thereafter. For accounting purposes, this change was treated as a difference between expected and actual experience. The Single Discount Rate changed from 5.31% per annum to 6.38% per annum.

Summary of Actuarial Assumptions (Continued)

Age in 2017	Percentage of Members Dying each Year* — Healthy Post-Retirement Mortality** Male	Healthy Post-Retirement Mortality** Female	Healthy Pre-Retirement Mortality** Male	Healthy Pre-Retirement Mortality** Female	Disability Mortality** Male	Disability Mortality** Female
20	0.02%	0.01%	0.02%	0.01%	0.02%	0.01%
25	0.04	0.02	0.03	0.01	0.04	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	0.17	0.15	0.06	0.05	0.17	0.15
50	0.25	0.20	0.11	0.09	0.25	0.20
55	0.38	0.27	0.19	0.14	0.38	0.27
60	0.51	0.39	0.32	0.21	0.51	0.39
65	0.74	0.64	0.56	0.31	0.74	0.64
70	1.21	1.03	1.00	0.53	1.21	1.03

* *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	Termination (Withdrawal) Rates After Third Year Female	Disability Retirement Male	Disability Retirement 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 “risk-free” 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 long-term expected rate of return on pension plan investments is 7.50%; the municipal bond rate is 3.56% (based on Fidelity Index’s 20-Year Municipal GO AA Index as of June 30, 2017). **The resulting single discount rate as of June 30, 2017 is 6.38%.** 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.

Benefit payments projected to occur up through June 30, 2062 were fully funded and benefit payments projected to occur in the year ended June 30, 2063 were partially funded. Assets were projected to be fully depleted by the fiscal year ending June 30, 2063. Benefit payments were discounted using 7.50%, the long-term expected rate of return on pension plan investments, as long as assets were sufficient to fund the benefit payments. Beginning in the July 1, 2062 to June 30, 2063 fiscal year, when benefit payments exceed the Plan’s Fiduciary Net Position, benefit payments were discounted at 3.56%, the municipal bond rate. An equivalent single discount rate was determined that produced approximately the same present value of projected benefits when applied to all years of projected benefits as the present value of projected benefits using 7.50% through the point of asset depletion and 3.56% after. For more information on the calculation of the equivalent present value of projected benefits, see pages 38 through 39 of this report.

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)	(h) = (d) + (e) + (f) + (g)
2017	$ 73,056		$ 73,056					
2018	76,351		76,351	$ 10,995	$ 16,492		$ 1,000	$ 28,487
2019	76,456	$ 2,376	78,832	11,010	16,515	$ 254	1,000	28,779
2020	76,509	4,885	81,394	11,017	16,526	523	1,000	29,066
2021	76,558	7,482	84,040	11,024	16,537	801	1,000	29,362
2022	76,663	10,108	86,771	11,040	16,559	1,083	1,000	29,682
2023	76,465	13,126	89,591	11,011	16,516	1,406	1,000	29,933
2024	75,640	16,863	92,503	10,892	16,338	1,806	1,000	30,036
2025	74,203	21,306	95,509	10,685	16,028	2,282	1,000	29,995
2026	72,479	26,134	98,613	10,437	15,656	2,799	1,000	29,892
2027	70,648	31,170	101,818	10,173	15,260	3,338	1,000	29,771
2028	68,430	36,697	105,127	9,854	14,781	3,930	1,000	29,565
2029	65,863	42,681	108,544	9,484	14,226	4,571	1,000	29,281
2030	63,051	49,020	112,071	9,079	13,619	5,250	1,000	28,948
2031	60,130	55,584	115,714	8,659	12,988	5,953	1,000	28,600
2032	57,072	62,402	119,474	8,218	12,328	6,683	1,000	28,229
2033	53,900	69,457	123,357	7,762	11,642	7,439	1,000	27,843
2034	50,888	76,478	127,366	7,328	10,992	8,191	1,000	27,511
2035	47,822	83,684	131,506	6,886	10,330	8,962	1,000	27,178
2036	44,628	91,152	135,780	6,426	9,640	9,762	1,000	26,828
2037	41,286	98,907	140,193	5,945	8,918	10,593	1,000	26,456
2038	38,099	106,650	144,749	5,486	8,229	11,422	1,000	26,137
2039	34,979	114,474	149,453	5,037	7,556	12,260	1,000	25,853
2040	31,474	122,836	154,310	4,532	6,798	13,156	1,000	25,486
2041	28,090	131,235	159,325	4,045	6,067	14,055	1,000	25,167
2042	24,480	140,024	164,504	3,525	5,288	14,996	1,000	24,809
2043	20,684	149,166	169,850	2,978	4,468	15,976	1,000	24,422
2044	17,388	157,982	175,370	2,504	3,756	16,920	1,000	24,180
2045	14,159	166,911	181,070	2,039	3,058	17,876	1,000	23,973
2046	10,899	176,055	186,954	1,569	2,354	18,856	1,000	23,779
2047	7,855	185,175	193,030	1,131	1,697	19,832	1,000	23,660
2048	5,115	194,189	199,304	737	1,105	20,798	1,000	23,640
2049	3,080	202,701	205,781	444	665	21,709	1,000	23,818
2050	1,819	210,650	212,469	262	393	22,561	1,000	24,216
2051	1,003	218,371	219,374	144	217	23,388	1,000	24,749
2052	549	225,955	226,504	79	118	24,200	1,000	25,397
2053	261	233,604	233,865	38	56	25,019	1,000	26,113
2054	98	241,368	241,466	14	21	25,850	1,000	26,885
2055	31	249,283	249,314	5	7	26,698	1,000	27,710
2056	3	257,413	257,416	-	1	27,569	1,000	28,570
2057	-	265,782	265,782	-	-	28,465	1,000	29,465
2058	-	274,420	274,420	-	-	29,390	1,000	30,390
2059	-	283,339	283,339	-	-	30,346	1,000	31,346
2060	-	292,547	292,547	-	-	31,332	1,000	32,332
2061	-	302,055	302,055	-	-	32,350	1,000	33,350
2062	-	311,872	311,872	-	-	33,401	1,000	34,401
2063	-	322,008	322,008	-	-	34,487	1,000	35,487
2064	-	332,473	332,473	-	-	35,608	1,000	36,608
2065	-	343,278	343,278	-	-	36,765	1,000	37,765
2066	-	354,435	354,435	-	-	37,960	1,000	38,960
2067	-	365,954	365,954	-	-	39,194	1,000	40,194

**Contributions related to future employees in excess of normal cost and expenses of 25.29% of pay.*

Single Discount Rate Development
Projection of Contributions (Concluded, 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)	(h) = (d) + (e) + (f) + (g)
2068	$ -	$ 377,848	$ 377,848	$ -	$ -	$ 40,467	$ 1,000	$ 41,467
2069	-	390,128	390,128	-	-	41,783	1,000	42,783
2070	-	402,807	402,807	-	-	43,141	1,000	44,141
2071	-	415,898	415,898	-	-	44,543	1,000	45,543
2072	-	429,415	429,415	-	-	45,990	1,000	46,990
2073	-	443,371	443,371	-	-	47,485	1,000	48,485
2074	-	457,780	457,780	-	-	49,028	1,000	50,028
2075	-	472,658	472,658	-	-	50,622	1,000	51,622
2076	-	488,020	488,020	-	-	52,267	1,000	53,267
2077	-	503,880	503,880	-	-	53,966	1,000	54,966
2078	-	520,256	520,256	-	-	55,719	1,000	56,719
2079	-	537,165	537,165	-	-	57,530	1,000	58,530
2080	-	554,622	554,622	-	-	59,400	1,000	60,400
2081	-	572,648	572,648	-	-	61,331	1,000	62,331
2082	-	591,259	591,259	-	-	63,324	1,000	64,324
2083	-	610,475	610,475	-	-	65,382	1,000	66,382
2084	-	630,315	630,315	-	-	67,507	1,000	68,507
2085	-	650,800	650,800	-	-	69,701	1,000	70,701
2086	-	671,951	671,951	-	-	71,966	1,000	72,966
2087	-	693,790	693,790	-	-	74,305	1,000	75,305
2088	-	716,338	716,338	-	-	76,720	1,000	77,720
2089	-	739,619	739,619	-	-	79,213	1,000	80,213
2090	-	763,657	763,657	-	-	81,788	1,000	82,788
2091	-	788,475	788,475	-	-	84,446	1,000	85,446
2092	-	814,101	814,101	-	-	87,190	1,000	88,190
2093	-	840,559	840,559	-	-	90,024	1,000	91,024
2094	-	867,877	867,877	-	-	92,950	1,000	93,950
2095	-	896,083	896,083	-	-	95,971	1,000	96,971
2096	-	925,206	925,206	-	-	99,090	1,000	100,090
2097	-	955,275	955,275	-	-	102,310	1,000	103,310
2098	-	986,322	986,322	-	-	105,635	1,000	106,635
2099	-	1,018,377	1,018,377	-	-	109,068	1,000	110,068
2100	-	1,051,474	1,051,474	-	-	112,613	1,000	113,613
2101	-	1,085,647	1,085,647	-	-	116,273	1,000	117,273
2102	-	1,120,931	1,120,931	-	-	120,052	1,000	121,052
2103	-	1,157,361	1,157,361	-	-	123,953	1,000	124,953
2104	-	1,194,975	1,194,975	-	-	127,982	1,000	128,982
2105	-	1,233,812	1,233,812	-	-	132,141	1,000	133,141
2106	-	1,273,911	1,273,911	-	-	136,436	1,000	137,436
2107	-	1,315,313	1,315,313	-	-	140,870	1,000	141,870
2108	-	1,358,061	1,358,061	-	-	145,448	1,000	146,448
2109	-	1,402,198	1,402,198	-	-	150,175	1,000	151,175
2110	-	1,447,769	1,447,769	-	-	155,056	1,000	156,056
2111	-	1,494,822	1,494,822	-	-	160,095	1,000	161,095
2112	-	1,543,403	1,543,403	-	-	165,298	1,000	166,298
2113	-	1,593,564	1,593,564	-	-	170,671	1,000	171,671
2114	-	1,645,355	1,645,355	-	-	176,217	1,000	177,217
2115	-	1,698,829	1,698,829	-	-	181,945	1,000	182,945
2116	-	1,754,041	1,754,041	-	-	187,858	1,000	188,858
2117	-	1,811,047	1,811,047	-	-	193,963	1,000	194,963

**Contributions related to future employees in excess of normal cost and expenses of 25.29% 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)
2018	$ 691,599	$ 28,487	$ 59,618	$ 221	$ 50,715	$ 710,962
2019	710,962	28,779	60,991	222	52,128	730,656
2020	730,656	29,066	62,428	222	53,562	750,634
2021	750,634	29,362	63,867	222	55,019	770,926
2022	770,926	29,682	65,195	222	56,504	791,695
2023	791,695	29,933	66,726	222	58,014	812,694
2024	812,694	30,036	68,400	219	59,531	833,642
2025	833,642	29,995	70,303	215	61,031	854,150
2026	854,150	29,892	72,317	210	62,491	874,006
2027	874,006	29,771	74,376	205	63,900	893,096
2028	893,096	29,565	76,685	198	65,240	911,018
2029	911,018	29,281	79,072	191	66,486	927,522
2030	927,522	28,948	81,556	183	67,620	942,351
2031	942,351	28,600	84,044	174	68,628	955,361
2032	955,361	28,229	86,791	166	69,490	966,123
2033	966,123	27,843	89,346	156	70,189	974,653
2034	974,653	27,511	91,696	148	70,730	981,050
2035	981,050	27,178	93,957	139	71,115	985,247
2036	985,247	26,828	96,235	129	71,333	987,044
2037	987,044	26,456	98,473	120	71,372	986,279
2038	986,279	26,137	100,508	110	71,229	983,027
2039	983,027	25,853	102,422	101	70,904	977,261
2040	977,261	25,486	104,543	91	70,380	968,493
2041	968,493	25,167	106,634	81	69,634	956,579
2042	956,579	24,809	108,863	71	68,646	941,100
2043	941,100	24,422	111,094	60	67,389	921,757
2044	921,757	24,180	112,878	50	65,864	898,873
2045	898,873	23,973	114,617	41	64,076	872,264
2046	872,264	23,779	116,346	32	62,010	841,675
2047	841,675	23,660	117,858	23	59,657	807,111
2048	807,111	23,640	119,051	15	57,020	768,705
2049	768,705	23,818	119,578	9	54,127	727,063
2050	727,063	24,216	119,404	5	51,025	682,895
2051	682,895	24,749	118,712	3	47,757	636,686
2052	636,686	25,397	117,589	2	44,357	588,849
2053	588,849	26,113	116,253	1	40,845	539,553
2054	539,553	26,885	114,680	-	37,234	488,992
2055	488,992	27,710	113,009	-	33,534	437,227
2056	437,227	28,570	111,215	-	29,749	384,331
2057	384,331	29,465	109,349	-	25,883	330,330
2058	330,330	30,390	107,404	-	21,939	275,255
2059	275,255	31,346	105,378	-	17,918	219,141
2060	219,141	32,332	103,268	-	13,824	162,029
2061	162,029	33,350	101,074	-	9,659	103,964
2062	103,964	34,401	98,793	-	5,426	44,998
2063	44,998	35,487	96,423	-	1,131	-
2064	-	36,608	93,962	-	-	-
2065	-	37,765	91,634	-	-	-
2066	-	38,960	89,422	-	-	-
2067	-	40,194	87,090	-	-	-

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)
2068	$ -	$ 41,467	$ 84,639	$ -	$ -	$ -
2069	-	42,783	82,069	-	-	-
2070	-	44,141	79,382	-	-	-
2071	-	45,543	76,582	-	-	-
2072	-	46,990	73,674	-	-	-
2073	-	48,485	70,668	-	-	-
2074	-	50,028	67,571	-	-	-
2075	-	51,622	64,394	-	-	-
2076	-	53,267	61,150	-	-	-
2077	-	54,966	57,852	-	-	-
2078	-	56,719	54,513	-	-	-
2079	-	58,530	51,147	-	-	-
2080	-	60,400	47,769	-	-	-
2081	-	62,331	44,395	-	-	-
2082	-	64,324	41,041	-	-	-
2083	-	66,382	37,720	-	-	-
2084	-	68,507	34,450	-	-	-
2085	-	70,701	31,246	-	-	-
2086	-	72,966	28,125	-	-	-
2087	-	75,305	25,105	-	-	-
2088	-	77,720	22,204	-	-	-
2089	-	80,213	19,439	-	-	-
2090	-	82,788	16,829	-	-	-
2091	-	85,446	14,389	-	-	-
2092	-	88,190	12,138	-	-	-
2093	-	91,024	10,089	-	-	-
2094	-	93,950	8,254	-	-	-
2095	-	96,971	6,639	-	-	-
2096	-	100,090	5,244	-	-	-
2097	-	103,310	4,062	-	-	-
2098	-	106,635	3,082	-	-	-
2099	-	110,068	2,288	-	-	-
2100	-	113,613	1,660	-	-	-
2101	-	117,273	1,175	-	-	-
2102	-	121,052	811	-	-	-
2103	-	124,953	545	-	-	-
2104	-	128,982	356	-	-	-
2105	-	133,141	227	-	-	-
2106	-	137,436	140	-	-	-
2107	-	141,870	84	-	-	-
2108	-	146,448	49	-	-	-
2109	-	151,175	28	-	-	-
2110	-	156,056	15	-	-	-
2111	-	161,095	8	-	-	-
2112	-	166,298	4	-	-	-
2113	-	171,671	2	-	-	-
2114	-	177,217	1	-	-	-
2115	-	182,945	-	-	-	-
2116	-	188,858	-	-	-	-
2117	-	194,963	-	-	-	-

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	$ 691,599	$ 59,618	$ 59,618	$ 0	$ 57,501	$ 0	$ 57,801
2019	710,962	60,991	60,991	0	54,721	0	55,583
2020	730,656	62,428	62,428	0	52,103	0	53,478
2021	750,634	63,867	63,867	0	49,584	0	51,426
2022	770,926	65,195	65,195	0	47,084	0	49,344
2023	791,695	66,726	66,726	0	44,828	0	47,472
2024	812,694	68,400	68,400	0	42,746	0	45,742
2025	833,642	70,303	70,303	0	40,870	0	44,192
2026	854,150	72,317	72,317	0	39,108	0	42,730
2027	874,006	74,376	74,376	0	37,416	0	41,309
2028	893,096	76,685	76,685	0	35,886	0	40,035
2029	911,018	79,072	79,072	0	34,421	0	38,803
2030	927,522	81,556	81,556	0	33,025	0	37,619
2031	942,351	84,044	84,044	0	31,659	0	36,440
2032	955,361	86,791	86,791	0	30,412	0	35,372
2033	966,123	89,346	89,346	0	29,123	0	34,228
2034	974,653	91,696	91,696	0	27,804	0	33,019
2035	981,050	93,957	93,957	0	26,502	0	31,803
2036	985,247	96,235	96,235	0	25,251	0	30,619
2037	987,044	98,473	98,473	0	24,035	0	29,450
2038	986,279	100,508	100,508	0	22,821	0	28,255
2039	983,027	102,422	102,422	0	21,633	0	27,064
2040	977,261	104,543	104,543	0	20,540	0	25,967
2041	968,493	106,634	106,634	0	19,489	0	24,896
2042	956,579	108,863	108,863	0	18,509	0	23,891
2043	941,100	111,094	111,094	0	17,570	0	22,917
2044	921,757	112,878	112,878	0	16,607	0	21,887
2045	898,873	114,617	114,617	0	15,686	0	20,891
2046	872,264	116,346	116,346	0	14,812	0	19,933
2047	841,675	117,858	117,858	0	13,958	0	18,980
2048	807,111	119,051	119,051	0	13,115	0	18,021
2049	768,705	119,578	119,578	0	12,254	0	17,015
2050	727,063	119,404	119,404	0	11,383	0	15,970
2051	682,895	118,712	118,712	0	10,527	0	14,924
2052	636,686	117,589	117,589	0	9,700	0	13,896
2053	588,849	116,253	116,253	0	8,921	0	12,913
2054	539,553	114,680	114,680	0	8,186	0	11,974
2055	488,992	113,009	113,009	0	7,504	0	11,091
2056	437,227	111,215	111,215	0	6,870	0	10,260
2057	384,331	109,349	109,349	0	6,283	0	9,482
2058	330,330	107,404	107,404	0	5,741	0	8,755
2059	275,255	105,378	105,378	0	5,240	0	8,074
2060	219,141	103,268	103,268	0	4,776	0	7,437
2061	162,029	101,074	101,074	0	4,349	0	6,842
2062	103,964	98,793	98,793	0	3,954	0	6,287
2063	44,998	96,423	44,998	51,421	1,675	10,469	5,767
2064	-	93,962	-	93,962	-	18,472	5,283
2065	-	91,634	-	91,634	-	17,395	4,843
2066	-	89,422	-	89,422	-	16,392	4,442
2067	-	87,090	-	87,090	-	15,416	4,067

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	$ -	$ 84,639	$ -	$ 84,639	$ -	$ 14,467	$ 3,715
2069	-	82,069	-	82,069	-	13,545	3,386
2070	-	79,382	-	79,382	-	12,651	3,078
2071	-	76,582	-	76,582	-	11,786	2,792
2072	-	73,674	-	73,674	-	10,948	2,524
2073	-	70,668	-	70,668	-	10,141	2,276
2074	-	67,571	-	67,571	-	9,363	2,046
2075	-	64,394	-	64,394	-	8,616	1,833
2076	-	61,150	-	61,150	-	7,901	1,636
2077	-	57,852	-	57,852	-	7,218	1,455
2078	-	54,513	-	54,513	-	6,567	1,288
2079	-	51,147	-	51,147	-	5,950	1,136
2080	-	47,769	-	47,769	-	5,366	998
2081	-	44,395	-	44,395	-	4,816	871
2082	-	41,041	-	41,041	-	4,299	757
2083	-	37,720	-	37,720	-	3,815	654
2084	-	34,450	-	34,450	-	3,364	562
2085	-	31,246	-	31,246	-	2,947	479
2086	-	28,125	-	28,125	-	2,561	405
2087	-	25,105	-	25,105	-	2,208	340
2088	-	22,204	-	22,204	-	1,885	283
2089	-	19,439	-	19,439	-	1,594	233
2090	-	16,829	-	16,829	-	1,332	189
2091	-	14,389	-	14,389	-	1,100	152
2092	-	12,138	-	12,138	-	896	121
2093	-	10,089	-	10,089	-	719	94
2094	-	8,254	-	8,254	-	568	72
2095	-	6,639	-	6,639	-	441	55
2096	-	5,244	-	5,244	-	337	41
2097	-	4,062	-	4,062	-	252	30
2098	-	3,082	-	3,082	-	184	21
2099	-	2,288	-	2,288	-	132	15
2100	-	1,660	-	1,660	-	93	10
2101	-	1,175	-	1,175	-	63	7
2102	-	811	-	811	-	42	4
2103	-	545	-	545	-	27	3
2104	-	356	-	356	-	17	2
2105	-	227	-	227	-	11	1
2106	-	140	-	140	-	6	1
2107	-	84	-	84	-	3	-
2108	-	49	-	49	-	2	-
2109	-	28	-	28	-	1	-
2110	-	15	-	15	-	1	-
2111	-	8	-	8	-	-	-
2112	-	4	-	4	-	-	-
2113	-	2	-	2	-	-	-
2114	-	1	-	1	-	-	-
2115	-	-	-	-	-	-	-
2116	-	-	-	-	-	-	-
2117	-	-	-	-	-	-	-
				Totals	$ 1,066,184	$ 236,380	$ 1,302,052

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, 2017

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

December 1, 2017

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 statements.

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 obligations. 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 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) 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, 2017 for additional discussion of the nature of actuarial calculations and more information related to participant date, 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:bd

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SECTION A

EXECUTIVE SUMMARY

Executive Summary
as of June 30, 2017 (Dollars in Thousands)

	2017
Actuarial Valuation Date	June 30, 2017
Measurement Date of the Net Pension Liability	June 30, 2017
Membership	
Number of	
- Service Retirements	255
- Survivors	80
- Disability Retirements	16
- Deferred Retirements	15
- Terminated other non-vested	0
- Active Members	317
- Total	683
Covered-Employee Payroll	$ 47,813 [1]
Net Pension Liability	
Total Pension Liability	$ 363,483
Plan Fiduciary Net Position	185,141
Net Pension Liability	$ 178,342
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	50.94%
Net Pension Liability as a Percentage of Covered-Employee Payroll	373.00%
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]	3.56%
Last year ending June 30 in the 2018 to 2117 projection period for which projected benefit payments are fully funded	2117
Total Pension Expense/(Income)	$ 5,396

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	$ 5,297	$ 5,713
Changes in assumptions	18,001	53,138
Net difference between projected and actual earnings on pension plan investments	10,569	13,204
Total	$ 33,867	$ 72,055

(1) *Assumed equal to actual employer contributions divided by employer contribution rate.*

(2) *Fixed-income municipal bonds with 20 years to maturity that include only federally tax-exempt municipal bonds as reported in Fidelity Index's '20-Year Municipal GO AA Index' as of June 30, 2017. See Section G for additional detail.*

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, 2017.

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% on the actuarial value of assets), 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 unfunded liability is expected to be paid off in approximately 40 years.
3. The funded status of the plan is expected to reach a 100% funded ratio in approximately 40 years.

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 actuarial 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 market value of assets were used instead of the actuarial value of assets, unless the market value of assets is used in the measurement.

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, 2017 and a measurement date of June 30, 2017.

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 3.56% (based on Fidelity Index's 20-Year Municipal GO AA Index as of June 30, 2017); and the resulting single discount rate is 7.50%. The long-term expected rate of return is based on reviews of inflation and investment assumptions, dated September 11, 2014 and September 11, 2017, and a recent asset liability study obtained by the Minnesota State Board of Investment.

SECTION B

FINANCIAL STATEMENTS

Statement of Pension Expense Under GASB Statement No. 68
Fiscal Year Ended June 30, 2017 (Dollars in Thousands)

A. Expense

1.	Service Cost	$	9,483
2.	Interest on the Total Pension Liability		25,367
3.	Current-Period Benefit Changes		-
4.	Employee Contributions (made negative for addition here)		(3,932)
5.	Projected Earnings on Plan Investments (made negative for addition here)		(12,237)
6.	Pension Plan Administrative Expense		89
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		(992)
9.	Recognition of Outflow (Inflow) of Resources due to assumption changes		
	Arising from Current Reporting Period		2,330
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		(2,498)
11.	**Increases/(Decreases) from Experience in the Current Reporting Period**	**$**	**17,610**
12.	Recognition of Outflow (Inflow) of Resources due to differences between expected and actual experience in the measurement of the Total Pension Liability		
	Arising from Prior Reporting Periods	$	1,570
13.	Recognition of Outflow (Inflow) of Resources due to assumption changes		
	Arising from Prior Reporting Periods		(14,495)
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		711
15.	**Total Pension Expense / (Income)**	**$**	**5,396**

Statement of Outflows and Inflows
Arising from Current Reporting Period
Fiscal Year Ended June 30, 2017 (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	$	(4,958)
2. Assumption Changes (gains) or losses		11,652
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		(992)
5. Outflow (Inflow) of Resources to be recognized in the current pension expense for Assumption Changes		2,330
6. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Liabilities	$	1,338
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	$	(3,966)
8. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses for Assumption Changes		9,322
9. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Liabilities	$	5,356
B. Outflows (Inflows) of Resources due to Assets		
1. Net difference between projected and actual earnings on pension plan investments (gains) or losses	$	(12,492)
2. Recognition period for Assets {in years}		5
3. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Assets		(2,498)
4. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Assets	$	(9,994)

Statement of Outflows and Inflows
Arising from Current and Prior Reporting Periods
Fiscal Year Ended June 30, 2017 (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	$ 9,112	$ 20,699	$ (11,587)
2. Due to Assets	3,920	5,707	(1,787)
3. Total	$ 13,032	$ 26,406	$ (13,374)

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	$ 2,443	$ 1,865	$ 578
2. Assumption Changes	6,669	18,834	(12,165)
3. Net Difference between projected and actual earnings on pension plan investments	3,920	5,707	(1,787)
4. Total	**$ 13,032**	**$ 26,406**	**$ (13,374)**

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	$ 5,297	$ 5,713	$ (416)
2. Assumption Changes	18,001	53,138	(35,137)
3. Net Difference between projected and actual earnings on pension plan investments*	10,569	13,204	(2,635)
4. Total	**$ 33,867**	**$ 72,055**	**$ (38,188)**

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
2018	$ (13,375)
2019	(9,499)
2020	(14,156)
2021	(1,158)
2022	-
Thereafter	-
Total	**$ (38,188)**

** 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, 2017 (Dollars in Thousands)

Assets		June 30, 2017
Cash & Short-term Investments	$	6,245
Receivables		236
Investment Pools (at fair value)		178,793
Securities Lending Collateral		18,943
Capital Assets		-
Total Assets	**$**	**204,217**
Total Deferred Outflows of Resources	**$**	**-**
Total Liabilities	**$**	**(19,076)**
Total Deferred Inflows of Resources	**$**	**-**
Net Position Restricted for Pensions	**$**	**185,141**

Statement of Changes in Fiduciary Net Position for the Fiscal Year Ended June 30, 2017 (Dollars in Thousands)

1. Net position at market value at beginning of year	**$**	**165,905**
Additions		
2. Contributions		
a. Employee	$	3,932
b. Employer		10,758
c. Other sources		3,000
d. Total contributions	$	17,690
3. Investment income		
a. Investment income/(loss)	$	24,921
b. Investment expenses		(192)
c. Net investment income/(loss)	$	24,729
4. Other Additions		-
5. Total Additions *(2.d.) + (3.c.) + (4.)*	**$**	**42,419**
Deductions		
6. Benefits Paid		
a. Annuity benefits	$	(22,785)
b. Refunds		(309)
c. Total benefits paid	$	(23,094)
7. Expenses		
a. Other deductions	$	-
b. Administrative		(89)
c. Total expenses	$	(89)
8. Total deductions *(6.c.) + (7.c.)*	**$**	**(23,183)**
9. Net increase/(decrease) in fiduciary net position *(5.) + (8.)*	**$**	**19,236**
10. Net position at market value at end of year *(1.) + (9.)*	**$**	**185,141**
11. State Board of Investment calculated annual investment return for the Judges Retirement Fund*		15.2%

** The fiscal year 2017 investment return for the Combined Funds is 15.1%.*

SECTION C

REQUIRED SUPPLEMENTARY INFORMATION

Schedule of Changes in Net Pension Liability and Related Ratios
Current Period
Fiscal Year Ended June 30, 2017 (Dollars in Thousands)

A. Total pension liability			
1. Service Cost	$	9,483	
2. Interest on the Total Pension Liability		25,367	
3. Changes of benefit terms		-	
4. Difference between expected and actual experience of the Total Pension Liability		(4,958)	(1)
5. Changes of assumptions		11,652	(2)
6. Benefit payments, including refunds of employee contributions		(23,094)	
7. Net change in total pension liability	$	18,450	
8. Total pension liability – beginning		345,033	
9. Total pension liability – ending	**$**	**363,483**	
B. Plan fiduciary net position			
1. Contributions – employer	$	13,758	(3)
2. Contributions – employee		3,932	
3. Net investment income		24,729	
4. Benefit payments, including refunds of employee contributions		(23,094)	
5. Pension Plan Administrative Expense		(89)	
6. Other changes		-	
7. Net change in plan fiduciary net position	$	19,236	
8. Plan fiduciary net position – beginning		165,905	
9. Plan fiduciary net position – ending	**$**	**185,141**	
C. Net pension liability, *A.9 - B.9.*	**$**	**178,342**	
D. Plan fiduciary net position as a percentage of the total pension liability, *B.9 / A.9.*		**50.94%**	
E. Covered-employee payroll	**$**	**47,813**	(4)
F. Net pension liability as a percentage of covered-employee payroll, *C. / E.*		**373.00%**	

(1) Includes impact of changes in expected timing of future post-retirement benefit increases.
(2) Assumption changes are summarized on page 27.
(3) Includes $3 million supplemental state aid.
(4) 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,	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008
Total Pension Liability										
Service Cost	$ 9,483	$ 13,711	$ 12,251	$ 12,075						
Interest on the Total Pension Liability	25,367	21,349	21,773	20,535						
Benefit Changes	-	-	-	-						
Difference between Expected and Actual Experience	(4,958) [1]	7,135	(4,366)	5,080						
Assumption Changes	11,652 [2]	(85,756)	21,696	(8,416)						
Benefit Payments	(22,785)	(22,378)	(21,893)	(20,802)						
Refunds	(309)	-	-	-						
Net Change in Total Pension Liability	$ 18,450	$ (65,939)	$ 29,461	$ 8,472						
Total Pension Liability - Beginning	345,033	410,972	381,511	373,039						
Total Pension Liability - Ending (a)	**$ 363,483**	**$ 345,033**	**$ 410,972**	**$ 381,511**						
Plan Fiduciary Net Position										
Employer Contributions	$ 13,758 [3]	$ 10,219	$ 9,776	$ 9,426						
Employee Contributions	3,932	3,763	3,629	3,578						
Pension Plan Net Investment Income	24,729	(186)	7,572	28,011						
Benefit Payments	(22,785)	(22,378)	(21,893)	(20,802)						
Refunds	(309)	-	-	-						
Pension Plan Administrative Expense	(89)	(93)	(60)	(55)						
Other Changes	-	-	-	0						
Net Change in Plan Fiduciary Net Position	**$ 19,236**	**$ (8,675)**	**$ (976)**	**$ 20,158**						
Plan Fiduciary Net Position - Beginning	**$ 165,905**	**$ 174,580**	**$ 175,556**	**$ 155,398**						
Plan Fiduciary Net Position - Ending (b)	**$ 185,141**	**$ 165,905**	**$ 174,580**	**$ 175,556**						
Net Pension Liability - Ending (a) - (b)	**$ 178,342**	**$ 179,128**	**$ 236,392**	**$ 205,955**						
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	**50.94 %**	**48.08 %**	**42.48 %**	**46.02 %**						
Covered-Employee Payroll[4]	**$ 47,813**	**$ 45,418**	**$ 43,449**	**$ 41,893**						
Net Pension Liability as a Percentage of Covered-Employee Payroll	**373.00 %**	**394.40 %**	**544.07 %**	**491.62 %**						

[1] *Includes impact of changes in expected timing of future post-retirement benefit increases.*
[2] *Assumption changes are summarized on page 27.*
[3] *Includes $3 million supplemental state aid.*
[4] *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)
2008						
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

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)
2008	$ 10,045	$ 7,936	$ 2,109	$ 38,296	20.72%
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	3,032	47,813 [2]	28.77

Notes to Schedule of Contributions

Methods and Assumptions Used to Determine Fiscal Year Ending June 30, 2017 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.
Valuation Date:	June 30, 2016
Actuarial Cost Method	Entry Age Normal
Amortization Method	Level Percentage of Payroll, Closed
Remaining Amortization Period	23 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 2012 valuation pursuant to an experience study of the period 2007 - 2011, prepared by a former actuary.
Healthy Post-Retirement Mortality	RP-2000 annuitant generational mortality table, projected with mortality improvement scale AA, white collar adustment, set back one year for males and set back two years for females.
Other Information:	
Benefit Increases After Retirement	The post-retirement increase is assumed to be 1.75% per year through 2034, 2% per year from 2035 through 2045, and 2.5% per year thereafter.
	See separate funding actuarial valuation report as of July 1, 2016 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]
2008	
2009	
2010	
2011	
2012	
2013	
2014	18.66 %
2015	0.04
2016	(0.11)
2017	15.18

[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, 2017, the annual money-weighted rate of return for the Judges Retirement Fund was 15.18%. 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 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, 2017, these best estimates are summarized in the following table:

Asset Allocation

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return (Geometric)
Domestic Stocks	39.00%	5.10%
International Stocks	19.00	5.30
Bonds	20.00	0.75
Alternative Assets	20.00	5.90
Unallocated Cash	2.00	0.00
Total	100.00%	

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 reviews of inflation and investment return assumptions dated September 11, 2014 and September 11, 2017, and a recent asset liability study obtained by the SBI.

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, due to the additional state contributions reflected in the projection, 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. 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 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 single discount 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	$400,629	$363,483	$331,658
Net Position Restricted for Pensions	185,141	185,141	185,141
Net Pension Liabitliy	**$215,488**	**$178,342**	**$146,517**

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

In interpreting the above results, users should be aware that we do not consider 8.5% to be a reasonable assumption.

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	**$ 345,033**	**$ 165,905**	**$ 179,128**	**$ 35,247**	**$ 81,011**	
Changes for the Year:						
Service Cost	$ 9,483		$ 9,483			$ 9,483
Interest on Total Pension Liability	25,367		25,367			25,367
Interest on Plan Fiduciary Net Position [1]		$ 12,237	(12,237)			(12,237)
Changes in Benefit Terms						
Liability Experience Gains and Losses	(4,958)		(4,958)		$ 3,966	(992)
Changes in Assumptions	11,652		11,652	$ 9,322		2,330
Recognition of Deferred Outflows/(Inflows) of Resources Arising from Prior Reporting Periods						
Liability Experience Gains/(Losses)				(2,443)	(873)	1,570
Assumption Changes				(4,339)	(18,834)	(14,495)
Investment Gains/(Losses)				(3,920)	(3,209)	711
Contributions - Employer		13,758	(13,758)			
Contributions - Employees		3,932	(3,932)			(3,932)
Asset Gain/(Loss) [1]		12,492	(12,492)		9,994	(2,498)
Benefit Payments and Refunds	(23,094)	(23,094)	-			
Administrative Expenses		(89)	89			89
Other Changes						
Net Changes	**$ 18,450**	**$ 19,236**	**$ (786)**	**$ (1,380)**	**$ (8,956)**	**$ 5,396**
Balance End of Year	**$ 363,483**	**$ 185,141**	**$ 178,342**	**$ 33,867**	**$ 72,055**	

(1) The sum of these items in column (b) equals the net investment income of $24,729.

Summary of Population Statistics

		Terminated		Recipients			
	Actives*	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	Total
Members on 7/1/2016	**311**	**17**	**0**	**250**	**20**	**80**	**678**
New members	19	0	0	0	0	0	**19**
Return to active	0	0	0	0	0	0	**0**
Terminated non-vested	0	0	0	0	0	0	**0**
Service retirements	(12)	(2)	0	14	0	0	**0**
Terminated deferred	0	0	0	0	0	0	**0**
Terminated refund/transfer	(1)	0	0	0	0	0	**(1)**
Deaths	0	0	0	(9)	(4)	(3)	**(16)**
New beneficiary	0	0	0	0	0	3	**3**
Disabled	0	0	0	0	0	0	**0**
Unexpected status changes	0	0	0	0	0	0	**0**
Net change	6	(2)	0	5	(4)	0	**5**
Members on 6/30/2017	**317**	**15**	**0**	**255**	**16**	**80**	**683**

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

SECTION E

SUMMARY OF BENEFITS

Summary of Plan Provisions

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

Plan year	July 1 through June 30.
Eligibility	A judge or justice of any court. If the member was active prior to January 1, 1974, benefits may be computed according to provisions of the prior plan.
Tier 1 / Tier 2 Member	Tier 1 includes judges or justices first appointed or elected before July 1, 2013, and Tier 2 includes judges or justices first appointed or elected after June 30, 2013. A judge or justice with less than five years of service as of December 30, 2013, may make a one-time irrevocable election into Tier 2. For the purpose of this valuation, we have assumed no Tier 1 members elected Tier 2 benefits as of the valuation date.
Contributions	
Member	9.00% of salary for Tier 1 members, 7.00% of salary for Tier 2 members. Tier 1 member contributions after maximum benefit is reached are redirected to the Unclassified Employees Retirement Plan.
Employer	22.50% of salary.
	Member contributions are "picked up" according to the provisions of Internal Revenue Code 414(h).
State Contributions	$3,000,000 for the year ending June 30, 2017, and $6,000,000 per year thereafter until the plan is fully funded.
Allowable service	Service as a judge. Credit may also be earned for uncredited judicial service if the appropriate employee contributions, with interest, are made.
Salary	Salary set by law.
Average salary	Average of the five highest years of salary of the last 10 years prior to termination of judicial service.

Summary of Plan Provisions (Continued)

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

Summary of Plan Provisions (Continued)

Early retirement	
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 contributions with 6.00% annual interest compounded daily until June 30, 2011, and 4.00% thereafter.

Summary of Plan Provisions (Concluded)

Termination	
Refund of contributions	
Age/Service requirement	Termination of service as a judge.
Amount	Member contributions with 6.00% annual interest compounded daily until June 30, 2011, and 4.00% thereafter. If a member is vested, a deferred annuity may be elected in lieu of a refund.
Deferred benefit	
Age/service requirement	Five years of Allowable Service.
Amount	Benefit computed under law in effect at termination. Amount is payable at normal or early retirement. If a member terminated employment prior to July 1, 1997 but was not eligible to commence their pension before July 1, 1997, an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.
Form of payment	Same as for retirement.
Optional form conversion factors	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.
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	None.

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 revert 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 8.00%
  - Statutory salary increases of 2.75%
- 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 (i.e., not including potential contribution increases under the contribution stabilizer statutes) 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 2038, 2.00% per annum for the years 2039 through 2053, 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 25, 2016, reviews of inflation and investment return assumptions, dated September 11, 2014 and September 11, 2017, and a recent asset liability study obtained by the SBI.

Investment return	7.50% per annum.
Single discount rate	7.50% per annum.
Benefit increases after retirement	1.75% per annum through 2038, 2.00% per annum from 2039 to 2053, 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. 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 were applied: <u>Data for active members</u>: There were 16 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 $149,605 for the July 1, 2016 to June 30, 2017 plan year. There were no members reported with missing service. <u>Data for terminated members</u>: There was 1 member reported without a benefit. We calculated the benefit for this member using the reported Average Salary, Credited Service and Termination Date provided.

Summary of Actuarial Assumptions (Continued)

Unknown data for certain members	Data for members receiving benefits: There were no members reported without a benefit. There were 2 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 (44 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 base mortality table for healthy and disabled annuitants and employees was changed from the RP-2000 fully generational table to the RP-2014 fully generational table (with a base year of 2006), with white collar adjustments. The mortality improvement scale was changed from Scale AA to Scale MP-2015. Assumed rates of retirement were changed as recommended in the July 25, 2016, experience study. The changes result in more unreduced (Normal) retirements and slightly less reduced (Early) retirements. Male disability incidence rates were decreased to equal female disability incidence rates. The assumed post-retirement benefit increase rate was changed from 1.75% through 2041, 2.00% for 2042 through 2054, and 2.50% thereafter to 1.75% through 2038, 2.00% for 2039 through 2053, and 2.50% thereafter. For accounting purposes, this change was treated as a difference between expected and actual experience.

Summary of Actuarial Assumptions (Concluded)

Age in 2017	Percentage of Members Dying each Year*					
	Healthy Post-Retirement Mortality**		Healthy Pre-Retirement Mortality**		Disability Mortality**	
	Male	Female	Male	Female	Male	Female
20	0.02%	0.01%	0.02%	0.01%	0.02%	0.01%
25	0.04	0.02	0.03	0.01	0.04	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	0.17	0.15	0.06	0.05	0.17	0.15
50	0.25	0.20	0.11	0.09	0.25	0.20
55	0.38	0.27	0.19	0.14	0.38	0.27
60	0.51	0.39	0.32	0.21	0.51	0.39
65	0.74	0.64	0.56	0.31	0.74	0.64
70	1.21	1.03	1.00	0.53	1.21	1.03

* *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 "risk-free" 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 3.56% (based on Fidelity Index's 20-Year Municipal GO AA Index as of June 30, 2017). 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. The Plan's Fiduciary Net Position was projected to be available to meet all projected future benefit payments of current active and inactive employees. 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. **The resulting single discount rate as of July 1, 2017 is 7.50%.**

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)
2017	$ 47,813		$ 47,813					
2018	48,825		48,825	$ 3,984	$ 10,986		$ 6,000	$ 20,970
2019	46,299	$ 3,746	50,045	3,759	10,417	$ 387	6,000	20,563
2020	43,381	7,916	51,297	3,505	9,761	821	6,000	20,087
2021	41,404	11,175	52,579	3,329	9,316	1,163	6,000	19,808
2022	39,268	14,625	53,893	3,141	8,835	1,529	6,000	19,505
2023	37,001	18,240	55,241	2,945	8,325	1,914	6,000	19,184
2024	34,836	21,786	56,622	2,759	7,838	2,296	6,000	18,893
2025	32,664	25,373	58,037	2,574	7,349	2,685	6,000	18,608
2026	30,609	28,879	59,488	2,400	6,887	3,068	6,000	18,355
2027	28,669	32,306	60,975	2,236	6,450	3,446	6,000	18,132
2028	26,736	35,764	62,500	2,075	6,015	3,831	6,000	17,921
2029	24,614	39,448	64,062	1,900	5,538	4,242	6,000	17,680
2030	22,278	43,386	65,664	1,711	5,012	4,685	6,000	17,408
2031	20,061	47,244	67,305	1,533	4,514	5,121	6,000	17,168
2032	18,060	50,928	68,988	1,373	4,063	5,543	6,000	16,979
2033	16,064	54,649	70,713	1,214	3,614	5,971	6,000	16,799
2034	14,148	58,333	72,481	1,064	3,183	6,399	6,000	16,646
2035	12,442	61,851	74,293	931	2,800	6,811	6,000	16,542
2036	10,735	65,415	76,150	799	2,415	7,232	6,000	16,446
2037	9,005	69,049	78,054	666	2,026	7,664	6,000	16,356
2038	7,498	72,507	80,005	552	1,687	8,079	6,000	16,318
2039	6,239	75,766	82,005	457	1,404	8,475	6,000	16,336
2040	5,193	78,862	84,055	378	1,168	8,855	6,000	16,401
2041	4,175	81,982	86,157	302	939	9,240	6,000	16,481
2042	3,284	85,027	88,311	236	739	9,620	6,000	16,595
2043	2,564	87,954	90,518	184	577	9,989	6,000	16,750
2044	1,967	90,814	92,781	140	442	10,354	6,000	16,936
2045	1,438	93,663	95,101	102	324	10,719	6,000	17,145
2046	903	96,575	97,478	64	203	11,093	6,000	17,360
2047	579	99,336	99,915	41	130	11,454	6,000	17,625
2048	409	102,004	102,413	29	92	11,761	6,000	17,882
2049	244	104,730	104,974	17	55	12,075	6,000	18,147
2050	77	107,521	107,598	5	17	12,397	6,000	18,419
2051	-	110,288	110,288	-	-	12,716	6,000	18,716
2052	-	113,045	113,045	-	-	13,034	6,000	19,034
2053	-	115,871	115,871	-	-	13,360	6,000	19,360
2054	-	118,768	118,768	-	-	13,694	6,000	19,694
2055	-	121,737	121,737	-	-	14,036	6,000	20,036
2056	-	124,781	124,781	-	-	14,387	6,000	20,387
2057	-	127,900	127,900	-	-	14,747	-	14,747
2058	-	131,098	131,098	-	-	15,116	-	15,116
2059	-	134,375	134,375	-	-	15,493	-	15,493
2060	-	137,734	137,734	-	-	15,881	-	15,881
2061	-	141,178	141,178	-	-	16,278	-	16,278
2062	-	144,707	144,707	-	-	16,685	-	16,685
2063	-	148,325	148,325	-	-	17,102	-	17,102
2064	-	152,033	152,033	-	-	17,529	-	17,529
2065	-	155,834	155,834	-	-	17,968	-	17,968
2066	-	159,730	159,730	-	-	18,417	-	18,417
2067	-	163,723	163,723	-	-	18,877	-	18,877

** Contributions related to future employees in excess of normal cost and expenses. Normal cost and expenses initially total 20.37% 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 (Concluded, 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)
2068	$ -	$ 167,816	$ 167,816	$ -	$ -	$ 19,349	$ -	$ 19,349
2069	-	172,011	172,011	-	-	19,833	-	19,833
2070	-	176,312	176,312	-	-	20,329	-	20,329
2071	-	180,719	180,719	-	-	20,837	-	20,837
2072	-	185,237	185,237	-	-	21,358	-	21,358
2073	-	189,868	189,868	-	-	21,892	-	21,892
2074	-	194,615	194,615	-	-	22,439	-	22,439
2075	-	199,481	199,481	-	-	23,000	-	23,000
2076	-	204,468	204,468	-	-	23,575	-	23,575
2077	-	209,579	209,579	-	-	24,164	-	24,164
2078	-	214,819	214,819	-	-	24,769	-	24,769
2079	-	220,189	220,189	-	-	25,388	-	25,388
2080	-	225,694	225,694	-	-	26,023	-	26,023
2081	-	231,336	231,336	-	-	26,673	-	26,673
2082	-	237,120	237,120	-	-	27,340	-	27,340
2083	-	243,048	243,048	-	-	28,023	-	28,023
2084	-	249,124	249,124	-	-	28,724	-	28,724
2085	-	255,352	255,352	-	-	29,442	-	29,442
2086	-	261,736	261,736	-	-	30,178	-	30,178
2087	-	268,279	268,279	-	-	30,933	-	30,933
2088	-	274,986	274,986	-	-	31,706	-	31,706
2089	-	281,861	281,861	-	-	32,499	-	32,499
2090	-	288,907	288,907	-	-	33,311	-	33,311
2091	-	296,130	296,130	-	-	34,144	-	34,144
2092	-	303,533	303,533	-	-	34,997	-	34,997
2093	-	311,122	311,122	-	-	35,872	-	35,872
2094	-	318,900	318,900	-	-	36,769	-	36,769
2095	-	326,872	326,872	-	-	37,688	-	37,688
2096	-	335,044	335,044	-	-	38,631	-	38,631
2097	-	343,420	343,420	-	-	39,596	-	39,596
2098	-	352,005	352,005	-	-	40,586	-	40,586
2099	-	360,806	360,806	-	-	41,601	-	41,601
2100	-	369,826	369,826	-	-	42,641	-	42,641
2101	-	379,071	379,071	-	-	43,707	-	43,707
2102	-	388,548	388,548	-	-	44,800	-	44,800
2103	-	398,262	398,262	-	-	45,920	-	45,920
2104	-	408,218	408,218	-	-	47,068	-	47,068
2105	-	418,424	418,424	-	-	48,244	-	48,244
2106	-	428,884	428,884	-	-	49,450	-	49,450
2107	-	439,607	439,607	-	-	50,687	-	50,687
2108	-	450,597	450,597	-	-	51,954	-	51,954
2109	-	461,862	461,862	-	-	53,253	-	53,253
2110	-	473,408	473,408	-	-	54,584	-	54,584
2111	-	485,243	485,243	-	-	55,949	-	55,949
2112	-	497,374	497,374	-	-	57,347	-	57,347
2113	-	509,809	509,809	-	-	58,781	-	58,781
2114	-	522,554	522,554	-	-	60,250	-	60,250
2115	-	535,618	535,618	-	-	61,757	-	61,757
2116	-	549,008	549,008	-	-	63,301	-	63,301
2117	-	562,734	562,734	-	-	65,502	-	65,502

** Contributions related to future employees in excess of normal cost and expenses. Normal cost and expenses initially total 20.37% 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)
2018	$ 185,141	$ 20,970	$ 23,143	$ 93	$ 13,802	$ 196,677
2019	196,677	20,563	24,635	88	14,598	207,115
2020	207,115	20,087	26,360	82	15,300	216,060
2021	216,060	19,808	27,519	79	15,917	224,187
2022	224,187	19,505	28,755	75	16,471	231,333
2023	231,333	19,184	30,058	70	16,947	237,336
2024	237,336	18,893	31,365	66	17,338	242,136
2025	242,136	18,608	32,582	62	17,643	245,743
2026	245,743	18,355	33,659	58	17,865	248,246
2027	248,246	18,132	34,689	54	18,007	249,642
2028	249,642	17,921	35,691	51	18,067	249,888
2029	249,888	17,680	36,643	47	18,042	248,920
2030	248,920	17,408	37,744	42	17,919	246,461
2031	246,461	17,168	38,657	38	17,692	242,626
2032	242,626	16,979	39,436	34	17,369	237,504
2033	237,504	16,799	40,094	31	16,954	231,132
2034	231,132	16,646	40,610	27	16,452	223,593
2035	223,593	16,542	40,914	24	15,871	215,068
2036	215,068	16,446	41,142	20	15,220	205,572
2037	205,572	16,356	41,295	17	14,499	195,115
2038	195,115	16,318	41,196	14	13,717	183,940
2039	183,940	16,336	40,900	12	12,891	172,255
2040	172,255	16,401	40,435	10	12,034	160,245
2041	160,245	16,481	39,845	8	11,158	148,031
2042	148,031	16,595	39,069	6	10,275	135,826
2043	135,826	16,750	38,116	5	9,400	123,855
2044	123,855	16,936	37,027	4	8,550	112,310
2045	112,310	17,145	35,834	3	7,735	101,353
2046	101,353	17,360	34,594	2	6,967	91,084
2047	91,084	17,625	33,202	1	6,258	81,764
2048	81,764	17,882	31,706	1	5,624	73,563
2049	73,563	18,147	30,202	-	5,074	66,582
2050	66,582	18,419	28,703	-	4,615	60,913
2051	60,913	18,716	27,166	-	4,258	56,721
2052	56,721	19,034	25,607	-	4,012	54,160
2053	54,160	19,360	24,072	-	3,889	53,337
2054	53,337	19,694	22,623	-	3,893	54,301
2055	54,301	20,036	21,252	-	4,028	57,113
2056	57,113	20,387	19,904	-	4,302	61,898
2057	61,898	14,747	18,580	-	4,502	62,567
2058	62,567	15,116	17,282	-	4,613	65,014
2059	65,014	15,493	16,012	-	4,857	69,352
2060	69,352	15,881	14,773	-	5,243	75,703
2061	75,703	16,278	13,569	-	5,778	84,190
2062	84,190	16,685	12,404	-	6,472	94,943
2063	94,943	17,102	11,279	-	7,335	108,101
2064	108,101	17,529	10,199	-	8,378	123,809
2065	123,809	17,968	9,166	-	9,610	142,221
2066	142,221	18,417	8,184	-	11,044	163,498
2067	163,498	18,877	7,258	-	12,690	187,807

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
(Concluded, 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)
2068	$ 187,807	$ 19,349	$ 6,389	$ -	$ 14,563	$ 215,330
2069	215,330	19,833	5,582	-	16,675	246,256
2070	246,256	20,329	4,837	-	19,040	280,788
2071	280,788	20,837	4,157	-	21,673	319,141
2072	319,141	21,358	3,542	-	24,592	361,549
2073	361,549	21,892	2,989	-	27,812	408,264
2074	408,264	22,439	2,498	-	31,354	459,559
2075	459,559	23,000	2,067	-	35,238	515,730
2076	515,730	23,575	1,691	-	39,486	577,100
2077	577,100	24,164	1,368	-	44,122	644,018
2078	644,018	24,769	1,093	-	49,173	716,867
2079	716,867	25,388	861	-	54,668	796,062
2080	796,062	26,023	668	-	60,638	882,055
2081	882,055	26,673	511	-	67,118	975,335
2082	975,335	27,340	384	-	74,143	1,076,434
2083	1,076,434	28,023	283	-	81,754	1,185,928
2084	1,185,928	28,724	205	-	89,995	1,304,442
2085	1,304,442	29,442	145	-	98,912	1,432,651
2086	1,432,651	30,178	100	-	108,556	1,571,285
2087	1,571,285	30,933	68	-	118,983	1,721,133
2088	1,721,133	31,706	44	-	130,251	1,883,046
2089	1,883,046	32,499	28	-	142,424	2,057,941
2090	2,057,941	33,311	17	-	155,572	2,246,807
2091	2,246,807	34,144	10	-	169,767	2,450,708
2092	2,450,708	34,997	6	-	185,092	2,670,791
2093	2,670,791	35,872	3	-	201,630	2,908,290
2094	2,908,290	36,769	2	-	219,476	3,164,533
2095	3,164,533	37,688	1	-	238,728	3,440,948
2096	3,440,948	38,631	-	-	259,494	3,739,073
2097	3,739,073	39,596	-	-	281,888	4,060,557
2098	4,060,557	40,586	-	-	306,036	4,407,179
2099	4,407,179	41,601	-	-	332,070	4,780,850
2100	4,780,850	42,641	-	-	360,134	5,183,625
2101	5,183,625	43,707	-	-	390,381	5,617,713
2102	5,617,713	44,800	-	-	422,978	6,085,491
2103	6,085,491	45,920	-	-	458,103	6,589,514
2104	6,589,514	47,068	-	-	495,947	7,132,529
2105	7,132,529	48,244	-	-	536,716	7,717,489
2106	7,717,489	49,450	-	-	580,632	8,347,571
2107	8,347,571	50,687	-	-	627,934	9,026,192
2108	9,026,192	51,954	-	-	678,877	9,757,023
2109	9,757,023	53,253	-	-	733,737	10,544,013
2110	10,544,013	54,584	-	-	792,811	11,391,408
2111	11,391,408	55,949	-	-	856,416	12,303,773
2112	12,303,773	57,347	-	-	924,894	13,286,014
2113	13,286,014	58,781	-	-	998,615	14,343,410
2114	14,343,410	60,250	-	-	1,077,974	15,481,634
2115	15,481,634	61,757	-	-	1,163,396	16,706,787
2116	16,706,787	63,301	-	-	1,255,340	18,025,428
2117	18,025,428	65,502	-	-	1,354,319	19,445,249

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)
2017	$ 185,141	$ 23,143	$ 23,143	$ -	$ 22,321	$ -	$ 22,321
2018	196,677	24,635	24,635	-	22,103	-	22,103
2019	207,115	26,360	26,360	-	22,000	-	22,000
2020	216,060	27,519	27,519	-	21,365	-	21,365
2021	224,187	28,755	28,755	-	20,767	-	20,767
2022	231,333	30,058	30,058	-	20,194	-	20,194
2023	237,336	31,365	31,365	-	19,601	-	19,601
2024	242,136	32,582	32,582	-	18,941	-	18,941
2025	245,743	33,659	33,659	-	18,202	-	18,202
2026	248,246	34,689	34,689	-	17,450	-	17,450
2027	249,642	35,691	35,691	-	16,702	-	16,702
2028	249,888	36,643	36,643	-	15,951	-	15,951
2029	248,920	37,744	37,744	-	15,284	-	15,284
2030	246,461	38,657	38,657	-	14,562	-	14,562
2031	242,626	39,436	39,436	-	13,819	-	13,819
2032	237,504	40,094	40,094	-	13,069	-	13,069
2033	231,132	40,610	40,610	-	12,314	-	12,314
2034	223,593	40,914	40,914	-	11,540	-	11,540
2035	215,068	41,142	41,142	-	10,795	-	10,795
2036	205,572	41,295	41,295	-	10,079	-	10,079
2037	195,115	41,196	41,196	-	9,354	-	9,354
2038	183,940	40,900	40,900	-	8,638	-	8,638
2039	172,255	40,435	40,435	-	7,944	-	7,944
2040	160,245	39,845	39,845	-	7,282	-	7,282
2041	148,031	39,069	39,069	-	6,642	-	6,642
2042	135,826	38,116	38,116	-	6,028	-	6,028
2043	123,855	37,027	37,027	-	5,447	-	5,447
2044	112,310	35,834	35,834	-	4,904	-	4,904
2045	101,353	34,594	34,594	-	4,404	-	4,404
2046	91,084	33,202	33,202	-	3,932	-	3,932
2047	81,764	31,706	31,706	-	3,493	-	3,493
2048	73,563	30,202	30,202	-	3,095	-	3,095
2049	66,582	28,703	28,703	-	2,736	-	2,736
2050	60,913	27,166	27,166	-	2,409	-	2,409
2051	56,721	25,607	25,607	-	2,112	-	2,112
2052	54,160	24,072	24,072	-	1,847	-	1,847
2053	53,337	22,623	22,623	-	1,615	-	1,615
2054	54,301	21,252	21,252	-	1,411	-	1,411
2055	57,113	19,904	19,904	-	1,229	-	1,229
2056	61,898	18,580	18,580	-	1,068	-	1,068
2057	62,567	17,282	17,282	-	924	-	924
2058	65,014	16,012	16,012	-	796	-	796
2059	69,352	14,773	14,773	-	683	-	683
2060	75,703	13,569	13,569	-	584	-	584
2061	84,190	12,404	12,404	-	496	-	496
2062	94,943	11,279	11,279	-	420	-	420
2063	108,101	10,199	10,199	-	353	-	353
2064	123,809	9,166	9,166	-	295	-	295
2065	142,221	8,184	8,184	-	245	-	245
2066	163,498	7,258	7,258	-	202	-	202

Single Discount Rate Development
Present Values of Projected Benefits
(Concluded, 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)
2067	$ 187,807	$ 6,389	$ 6,389	$ -	$ 22,321	$ -	$ 166
2068	215,330	5,582	5,582	-	22,103	-	135
2069	246,256	4,837	4,837	-	22,000	-	109
2070	280,788	4,157	4,157	-	21,365	-	87
2071	319,141	3,542	3,542	-	20,767	-	69
2072	361,549	2,989	2,989	-	20,194	-	54
2073	408,264	2,498	2,498	-	19,601	-	42
2074	459,559	2,067	2,067	-	18,941	-	32
2075	515,730	1,691	1,691	-	18,202	-	25
2076	577,100	1,368	1,368	-	17,450	-	19
2077	644,018	1,093	1,093	-	16,702	-	14
2078	716,867	861	861	-	15,951	-	10
2079	796,062	668	668	-	15,284	-	7
2080	882,055	511	511	-	14,562	-	5
2081	975,335	384	384	-	13,819	-	4
2082	1,076,434	283	283	-	13,069	-	2
2083	1,185,928	205	205	-	12,314	-	2
2084	1,304,442	145	145	-	11,540	-	1
2085	1,432,651	100	100	-	10,795	-	1
2086	1,571,285	68	68	-	10,079	-	0
2087	1,721,133	44	44	-	9,354	-	0
2088	1,883,046	28	28	-	8,638	-	0
2089	2,057,941	17	17	-	7,944	-	0
2090	2,246,807	10	10	-	7,282	-	0
2091	2,450,708	6	6	-	6,642	-	0
2092	2,670,791	3	3	-	6,028	-	0
2093	2,908,290	2	2	-	5,447	-	0
2094	3,164,533	1	1	-	4,904	-	0
2095	3,440,948	-	-	-	4,404	-	0
2096	3,739,073	-	-	-	3,932	-	0
2097	4,060,557	-	-	-	3,493	-	0
2098	4,407,179	-	-	-	3,095	-	0
2099	4,780,850	-	-	-	2,736	-	0
2100	5,183,625	-	-	-	2,409	-	-
2101	5,617,713	-	-	-	2,112	-	-
2102	6,085,491	-	-	-	1,847	-	-
2103	6,589,514	-	-	-	1,615	-	-
2104	7,132,529	-	-	-	1,411	-	-
2105	7,717,489	-	-	-	1,229	-	-
2106	8,347,571	-	-	-	1,068	-	-
2107	9,026,192	-	-	-	924	-	-
2108	9,757,023	-	-	-	796	-	-
2109	10,544,013	-	-	-	683	-	-
2110	11,391,408	-	-	-	584	-	-
2111	12,303,773	-	-	-	496	-	-
2112	13,286,014	-	-	-	420	-	-
2113	14,343,410	-	-	-	353	-	-
2114	15,481,634	-	-	-	295	-	-
2115	16,706,787	-	-	-	245	-	-
2116	18,025,428	-	-	-	202	-	-
				Totals	$ 428,437	$ -	$ 428,437

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, 2017

GRS Retirement Consulting

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

December 1, 2017

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 statements.

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 determining 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 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, 2017 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:dj

Table of Contents

SECTION A

EXECUTIVE SUMMARY

Executive Summary
as of June 30, 2017 (Dollars in Thousands)

	2017
Actuarial Valuation Date	June 30, 2017
Measurement Date of the Net Pension Liability	June 30, 2017
Membership	
Number of	
- Service Retirements	301
- Survivors	74
- Disability Retirements	0
- Deferred Retirements	44
- Terminated other non-vested	0
- Active Members	19
- Total	438
Covered-employee Payroll (1)	$ 889
Net Pension Liability	
Total Pension Liability	$ 147,324
Plan Fiduciary Net Position	-
Net Pension Liability	$ 147,324
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	0.00%
Net Pension Liability as a Percentage of Covered-employee Payroll	16,571.88% *
Development of the Single Discount Rate	
Single Discount Rate	3.56%
Long-Term Expected Rate of Investment Return	7.50%
Long-Term Municipal Bond Rate (2)	3.56%
Last year ending June 30 in the 2018 to 2117 projection period for which projected benefit payments are fully funded	2018
Total Pension Expense/(Income)	$ 1,206

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	193	207
Totals	**$ 193**	**$ 207**

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

(2) *Fixed-income municipal bonds with 20 years to maturity that include only federally tax-exempt municipal bonds as reported in Fidelity Index's "20-Year Municipal GO AA Index" as of June 30, 2017. See Section G for additional detail.*

** Report originally had a typo for this value; corrected December 7, 2017.*

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, 2017.

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% on the actuarial value of assets), 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 actuarial 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 market value of assets were used instead of the actuarial value of assets, unless the market value of assets is used in the measurement.

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, 2017 and a measurement date of June 30, 2017.

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 3.56% was used to measure the total pension liability. This single discount rate was based on a municipal bond rate of 3.56% (based on Fidelity Index's 20-Year Municipal GO AA Index as of June 30, 2017) 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.

SECTION B

FINANCIAL STATEMENTS

Pension Expense Under GASB Statement No. 68
Fiscal Year Ended June 30, 2017 (Dollars in Thousands)

A. Expense			
1.	Service Cost	$	546
2.	Interest on the Total Pension Liability		4,293
3.	Current-Period Benefit Changes		-
4.	Employee Contributions (made negative for addition here)		(80)
5.	Projected Earnings on Plan Investments (made negative for addition here)		-
6.	Pension Plan Administrative Expense		39
7.	Other Changes in Plan Fiduciary Net Position		41
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		1,517
9.	Recognition of Outflow (Inflow) of Resources due to assumption changes		
	Arising from Current Reporting Period		(5,017)
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**	**$**	**1,339**
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		(133)
15.	**Total Pension Expense / (Income)**	**$**	**1,206**

Statement of Outflows and Inflows
Arising from Current Reporting Period
Fiscal Year Ended June 30, 2017 (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	$	1,517 [1]
2. Assumption Changes (gains) or losses		(5,017) [2]
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		1,517
5. Outflow (Inflow) of Resources to be recognized in the current pension expense for Assumption Changes		(5,017)
6. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Liabilities	$	(3,500)
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	$	-

[1] *Includes impact of changes in expected timing of future post-retirement benefit increases, if applicable.*

[2] *Assumption changes are summarized on page 33.*

Statement of Outflows and Inflows
Arising from Current and Prior Reporting Periods
Fiscal Year Ended June 30, 2017 (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	$ 1,517	$ 5,017	$ (3,500)
2. Due to Assets	75	208	(133)
3. Total	$ 1,592	$ 5,225	$ (3,633)

B. Outflows and Inflows of Resources by Source to be Recognized in Current Pension Expense

	Outflows of Resources	Inflows of Resources	Net Outflows/(Inflows) of Resources
1. Differences between expected and actual experience	$ 1,517	$ -	$ 1,517
2. Assumption Changes	-	5,017	(5,017)
3. Net Difference between projected and actual earnings on pension plan investments	75	208	(133)
4. Total	$ 1,592	$ 5,225	$ (3,633)

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*	193	207	(14)
4. Total	$ 193	$ 207	$ (14)

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
2018	$ (132)
2019	75
2020	43
2021	-
2022	-
Thereafter	-
Total	$ (14)

** 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, 2017 (Dollars in Thousands)

Assets	June 30, 2017	
Cash & Short-term Investments	$	259
Receivables		-
Investment Pools (at fair value)		-
Securities Lending Collateral		-
Capital Assets		-
Total Assets	**$**	**259**
Total Deferred Outflows of Resources	**$**	**-**
Total Liabilities	**$**	**(259)**
Total Deferred Inflows of Resources	**$**	**-**
Net Position Restricted for Pensions	**$**	**-**

Statement of Changes in Fiduciary Net Position for the Fiscal Year Ended June 30, 2017 (Dollars in Thousands)

1.	**Net position at market value at beginning of year**	**$**	**-**
Additions			
2.	Contributions		
	a. Employee	$	80
	b. Employer		-
	c. State General Fund Appropriations		8,716
	d. Total contributions	$	8,796
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.)*	**$**	**8,796**
Deductions			
6.	Benefits Paid		
	a. Annuity benefits	$	(8,716)
	b. Refunds		-
	c. Total benefits paid	$	(8,716)
7.	Expenses		
	a. Other deductions[1]	$	(41)
	b. Administrative		(39)
	c. Total expenses	$	(80)
8.	**Total deductions** *(6.c.) + (7.c.)*	**$**	**(8,796)**
9.	**Net increase/(decrease) in fiduciary net position** *(5.) + (8.)*	**$**	**-**
10.	**Net position at market value at end of year** *(1.) + (9.)*	$	-
11.	State Board of Investment calculated annual investment return[2]		N/A

[1] *Adjustment to June 30, 2016 net position.*
[2] *The fiscal year 2017 investment return for the Combined Funds is 15.1%.*

SECTION C

REQUIRED SUPPLEMENTARY INFORMATION

Schedule of Changes in Net Pension Liability and Related Ratios
Current Period
Fiscal Year Ended June 30, 2017 (Dollars in Thousands)

A. Total Pension Liability			
1. Service Cost	$	546	
2. Interest on the Total Pension Liability		4,293	
3. Changes of benefit terms		-	
4. Difference between expected and actual experience of the Total Pension Liability		1,517	(1)
5. Changes of assumptions		(5,017)	(2)
6. Benefit payments, including refunds of employee contributions		(8,716)	
7. Net change in Total Pension Liability	$	(7,377)	
8. Total Pension Liability – Beginning		154,701	
9. Total Pension Liability – Ending	**$**	**147,324**	
B. Plan Fiduciary Net Position			
1. Contributions – State General Fund Appropriations	$	8,716	
2. Contributions – Employee		80	
3. Net investment income		-	
4. Benefit payments, including refunds of employee contributions		(8,716)	
5. Pension Plan Administrative Expense		(39)	
6. Other changes[3]		(41)	
7. Net change in Plan Fiduciary Net Position	$	-	
8. Plan Fiduciary Net Position – Beginning		-	
9. Plan Fiduciary Net Position – Ending	**$**	**-**	
C. Net Pension Liability, *A.9.-B.9.*	**$**	**147,324**	
D. Plan Fiduciary Net Position as a percentage of the Total Pension Liability, *B.9./A.9.*		**0.00%**	
E. Covered-Employee Payroll	**$**	**889**	**(4)**
F. Net Pension Liability as a percentage of Covered-Employee Payroll, *C./E.*		**16,571.88%**	*****

(1) *Includes impact of changes in expected timing of future post-retirement benefit increases, if applicable.*

(2) *Assumption changes are summarized on page 33.*

(3) *Adjustment to June 30, 2016 net position.*

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

* *Report originally had a typo for this value; corrected December 7, 2017.*

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,	2017	2016	2015	2014	2013	2012	2011	2010	2009
Total Pension Liability									
Service Cost	$ 546	$ 495	$ 428	$ 398					
Interest on the Total Pension Liability	4,293	5,333	6,113	6,177					
Benefit Changes	-	-	-	-					
Difference between Expected and Actual Experience	1,517	(1,597)	(7,303)	(237)					
Assumption Changes	(5,017) (1)	14,653 (1)	7,057 (1)	11,201					
Benefit Payments	(8,716)	(8,496)	(8,441)	(8,407)					
Refunds	-	(40)	-	(79)					
Net Change in Total Pension Liability	$ (7,377)	$ 10,348	$ (2,146)	$ 9,053					
Total Pension Liability - Beginning	154,701	144,353	146,499	137,446					
Total Pension Liability - Ending (a)	**$ 147,324**	**$ 154,701**	**$ 144,353**	**$ 146,499**					
Plan Fiduciary Net Position									
State General Fund Appropriation	$ 8,716	$ 5,087	$ 3,216	$ 3,436					
Employee Contributions	80	89	153	101					
Pension Plan Net Investment Income	-	(69)	281	1,750					
Benefit Payments	(8,716)	(8,496)	(8,441)	(8,407)					
Refunds	-	(40)	-	(79)					
Pension Plan Administrative Expense	(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)	**$ 147,324**	**$ 154,701**	**$ 140,923**	**$ 138,241**					
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	**0.00 %**	**0.00 %**	**2.38 %**	**5.64 %**					
Covered-Employee Payroll (2)	**$ 889**	**$ 989**	**$ 1,700**	**$ 1,122**					
Net Pension Liability as a Percentage of Covered-Employee Payroll	**16,571.88 % ***	**15,642.16 %**	**8,289.59 %**	**12,320.94 %**					

Notes to Schedule:

(1) Assumption changes are summarized on page 33.
(2) Assumed equal to plan member contributions divided by employee contribution rate.

* *Report originally had a typo for this value; corrected December 7, 2017.*

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)
2008						
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

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)
2008	$ 3,736	$ 2,652	$ 1,084	$ 1,993	133.07%
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	21,082	3,436	17,646	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

** 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.*

Notes to Schedule of Contributions

Methods and Assumptions Used to Determine Fiscal Year Ending June 30, 2017 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, 2016
Actuarial Cost Method	Entry Age Normal
Amortization Method	Level Dollar, Closed
Remaining Amortization Period	10 years
Asset Valuation Method	Market value of assets
Salary Increases	5.00% including inflation
Investment Rate of Return	0.00% 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-2000 annuitant generational mortality table, projected with mortalilty improvement scale AA, white collar adjustment.

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, 2016 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]
2008	
2009	
2010	
2011	
2012	
2013	
2014	19.30 %
2015	5.00
2016	NA
2017	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

For the years ended June 30, 2016 and June 30, 2017, 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.

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 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, 2017, these best estimates are summarized in the following table:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return (Geometric)
Domestic Stocks	39.00%	5.10%
International Stocks	19.00	5.30
Bonds	20.00	0.75
Alternative Assets	20.00	5.90
Unallocated Cash	2.00	0.00
Total	100.00%	

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 reviews of inflation and investment return assumptions dated September 11, 2014 and September 11, 2017, and a recent asset liability study obtained by the SBI. 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 3.56% was used to measure the total pension liability as of July 1, 2017.

Single Discount Rate

A single discount rate of 3.56% was used to measure the total pension liability. This single discount rate was based on a municipal bond rate of 3.56% 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 3.56%, 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 (2.56%) or 1-percentage-point higher (4.56%) than the current rate:

Sensitivity of Net Pension Liability
to the Single Discount Rate Assumption

(Dollars in Thousands)

	1% Decrease 2.56%	Current Single Discount Rate Assumption 3.56%	1% Increase 4.56%
Total Pension Liability	$ 164,518	$ 147,324	$ 132,985
Net Position Restricted for Pensions	-	-	-
Net Pension Liability	$ 164,518	$ 147,324	$ 132,985

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	**$ 154,701**	**$ -**	**$ 154,701**	**$ 268**	**$ 415**	
Changes for the Year:						
Service Cost	$ 546		$ 546			$ 546
Interest on Total Pension Liability	4,293		4,293			4,293
Interest on Plan Fiduciary Net Position (1)		$ -	-			-
Changes in Benefit Terms						
Liability Experience Gains and Losses	1,517		1,517	$ -	$ -	1,517
Changes in Assumptions	(5,017)		(5,017)	-	-	(5,017)
Recognition of Deferred Outflows/(Inflows) of Resources Arising from Prior Reporting Periods						
Liability Experience Gains/(Losses)				-	-	-
Assumption Changes				-	-	-
Investment Gains/(Losses)				(75)	(208)	(133)
State General Fund Appropriations		8,716	(8,716)			
Contributions - Employees		80	(80)			(80)
Asset Gain/(Loss) (1)		-	-	-	-	-
Benefit Payouts	(8,716)	(8,716)				
Administrative Expenses		(39)	39			39
Other Changes		(41)	41			41
Net Changes	**$ (7,377)**	**$ -**	**$ (7,377)**	**$ (75)**	**$ (208)**	**$ 1,206**
Balance End of Year	**$ 147,324**	**$ -**	**$ 147,324**	**$ 193**	**$ 207**	

(1) The sum of these items in column (b) equals the net investment income of $0.

Summary of Population Statistics

		Terminated		Recipients			
	Actives	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	Total
Members on 7/1/2016	**23**	**52**	**0**	**302**	**0**	**70**	**447**
Additions	0	0	0	0	0	0	**0**
Return to active	0	0	0	0	0	0	**0**
Terminated non-vested	0	0	0	0	0	0	**0**
Service retirements	(2)	(9)	0	11	0	0	**0**
Terminated deferred	(1)	1	0	0	0	0	**0**
Terminated refund/transfer	0	0	0	0	0	0	**0**
Deaths	(1)	0	0	(11)	0	(4)	**(16)**
New beneficiary	0	0	0	0	0	9	**9**
Disabled	0	0	0	0	0	0	**0**
Unexpected status changes	0	0	0	(1)	0	(1)	**(2)**
Net change	(4)	(8)	0	(1)	0	4	**(9)**
Members on 6/30/2017	**19**	**44**	**0**	**301**	**0**	**74**	**438**

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).
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	
Normal retirement benefit	
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%.
Early retirement benefit	
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 (Continued)	
<u>Early retirement benefit (Continued)</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>	Since 2011, benefit recipients have received annual 2.00% benefit increases. When the accrued liability funding ratio (determined on a market value of assets basis) of the State Employees Retirement Fund (SERF) reaches or exceeds 90% for two consecutive years, the benefit increase will revert to 2.50%. If, after reverting to a 2.50% increase, the SERF accrued liability funding ratio declines to 80% or less for the most recent valuation year or 85% or less for two consecutive years, the benefit increase will decrease to 2.00%. 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.

Death (Continued)

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 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% annual interest compounded daily until June 30, 2011, and 4.00% thereafter.

Termination

Refund of contributions

Age/Service requirement	Termination of service.
Amount	Member's contributions with 6.00% annual interest compounded daily until June 30, 2011, and 4.00% thereafter. 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, forward. 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%.

Summary of Plan Provisions – Legislators Retirement Plan (Concluded)

Adjustments for benefits not in pay status	Benefits are adjusted on an actuarial equivalent basis to reflect the 1997 change in post-retirement interest rate assumption from 5.00% to 6.00%.
Actuarial equivalent factors	Actuarially equivalent factors based on RP-2014 mortality for healthy annuitants, white collar adjustment, male rates set forward two years, projected to 2019 using Scale MP-2015, blended 50% males, 5.88% post-retirement interest, and 8.00% pre-retirement interest. Based upon statutory requirements, joint and survivor factors are based on an interest assumption of 6.50%.
Combined service annuity	Members are eligible for combined service benefits if they: (a.) Have sufficient allowable service in total that equals or exceeds the applicable service credit vesting requirement of the retirement plan with the longest applicable service credit vesting requirement; (b.) Have at least six months of allowable service credit in each plan worked under; and (c.) Are not in receipt of a benefit from another plan, or have applied for benefits with an effective date within one year. Members who meet the above requirements must have their benefit based on the following: (a.) Allowable service in all covered plans are combined in order to determine eligibility for early retirement. (b.) Average salary is based on the high five consecutive years during their entire service in all covered plans.
Changes in Plan Provisions	Actuarial equivalent factors were updated to reflect current mortality and interest assumptions, effective January 1, 2017. This change did not have a material impact on the liabilities.

Summary of Plan Provisions – Elective State Officers Retirement Plan

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

Plan year	July 1 through June 30
Eligibility	Must be employed as a "Constitutional Officer" first elected prior to July 1, 1997, and must elect to retain coverage under this plan (i.e., does not elect Social Security coverage). Plan is closed to new members since July 1, 1997.
Contributions	Plan is funded by annual appropriations from the State's General Fund.
Allowable service	Service while in an eligible position as a constitution officer.
Salary	Salary upon which Elective State Officers Retirement Fund contributions have been made.
Average salary	Average of the five highest successive years of Salary.
Retirement	
<u>**Normal retirement benefit**</u>	
Age/Service requirements	Age 62 and eight years of Allowable Service.
Amount	2.50% of Average Salary for each year of Allowable Service. For members who terminated service after June 30, 1997, an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.
<u>**Early retirement benefit**</u>	
Age/Service requirement	Age 60 and eight years of Allowable Service.
Amount	Normal retirement benefit based on Allowable Service and Average Salary at retirement date with reduction of 0.50% for each month the member is under age 62 at the time of retirement.
<u>**Form of Payment**</u>	Life annuity.
<u>**Benefit increases**</u>	Since 2011, benefit recipients have received annual 2.00% benefit increases. When the accrued liability funding ratio (determined on a market value of assets basis) of the State Employees Retirement Fund (SERF) reaches or exceeds 90% for two consecutive years, the benefit increase will revert to 2.50%. If, after reverting to a 2.50% increase, the SERF accrued liability funding ratio declines to 80% or less for the most recent valuation year or 85% or less for two consecutive years, the benefit increase will decrease to 2.00%.

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.
<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.
Termination	
<u>**Refund of contributions**</u>	
Age/Service requirement	Termination of service.

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

Termination (Concluded)	
<u>Refund of contributions (Concluded)</u>	
Amount	Member's contributions with 6.00% interest compounded daily to July 1, 2011, and 4.00% compounded daily thereafter. If a member is vested, a deferred annuity may be elected in lieu of a refund.
<u>Deferred benefit</u>	
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; and (e.) 2.00% from January 1, 2012, 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 (Continued)	Members who meet the above requirements must have their benefit based on the following: (a.) Allowable service in all covered plans are combined in order to determine eligibility for early retirement. (b.) Average salary is based on the high five consecutive years during their entire service in all covered plans.
Actuarial Equivalent Factors	Actuarially equivalent factors based on RP-2014 mortality for healthy annuitants, white collar adjustment, male rates set forward two years, projected to 2019 using Scale MP-2015, blended 50% males, 5.88% post-retirement interest, and 8.00% pre-retirement interest. Based upon statutory requirements, joint and survivor factors are based on an interest assumption of 6.50%.
Changes in Plan Provisions	Actuarial equivalent factors were updated to reflect current mortality and interest assumptions, effective January 1, 2017. This change did not have a material impact on the liabilities.

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;

(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 2.00% post-retirement benefit increase. If the funding ratio (on a market value of assets basis) of the State Employees Retirement Fund (SERF) reaches 90% (based on a 2.50% post-retirement benefit increase assumption) for two consecutive years, the benefit increase in the Legislators Retirement Fund will revert to 2.50%.

To determine an assumption regarding a future change in the post-retirement benefit increase, we performed a projection of the SERF liabilities and assets. For additional detail, see the 2017 GASB Statements No. 67 and 68 valuation report for the SERF which can be found online at www.msrs.state.mn.us/actuarial-reports. The projection indicates that this plan is expected to pay a 2.00% benefit increase indefinitely. This assumption is reflected in our calculations.

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 reviews of inflation and investment return assumptions, dated September 11, 2014 and September 11, 2017, and a recent asset liability study obtained by the SBI. 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	3.56% per annum.
Benefit increases after retirement	2.00% 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. 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 were applied:

Legislators Retirement Plan

<u>Data for active members:</u>
There were no members reported with zero or invalid salary.

There were no members reported with missing service.

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

<u>Data for terminated members:</u>
There were 10 members 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 (9 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.

<u>Data for members receiving benefits:</u>
There was one member reported with missing gender. We assumed female gender. There were no members reported with missing or invalid birth dates or benefits.

There were 292 retired members reported:

- 111 members were reported with the 75% or 100% joint and survivor option. These members were valued as indicated by the option elected.
- 180 members were reported with a life annuity and one member was reported with the 50% joint and survivor option. All of these members were valued as a 50% joint and survivor annuity per MSRS' direction.

Of the 292 retired members, 147 members had an invalid or missing survivor gender and 139 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 gender, birth dates or benefit amounts. <u>Data for members receiving benefits:</u> All retired and deferred 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 (6 members) or date of birth (6 members) were missing or invalid.
Changes in actuarial assumptions	The Allowance for Combined Service Annuity was changed from 30% for terminated members to 0% for all members. The base mortality table for healthy annuitants and employees was changed from the RP-2000 fully generational table to the RP-2014 fully generational table (with a base year of 2014), white collar adjustments, with age adjustments. The mortality improvement scale was changed from Scale AA to Scale MP-2015. The Single Discount Rate changed from 2.85% to 3.56%.

Summary of Actuarial Assumptions (Concluded)

Age in 2017	Percent of Members Dying Each Year*			
	Healthy Post-Retirement Mortality**		Healthy Pre-Retirement Mortality**	
	Male	Female	Male	Female
20	0.03%	0.01%	0.03%	0.01%
25	0.04	0.02	0.03	0.01
30	0.06	0.05	0.03	0.02
35	0.09	0.08	0.04	0.02
40	0.14	0.11	0.04	0.03
45	0.20	0.15	0.07	0.05
50	0.29	0.20	0.12	0.09
55	0.42	0.27	0.21	0.14
60	0.59	0.38	0.36	0.20
65	0.89	0.63	0.63	0.30
70	1.47	1.00	1.10	0.52

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

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

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

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

SECTION G

CALCULATION OF THE SINGLE DISCOUNT RATE

Calculation of the Single Discount Rate

GASB Statement No. 67 includes a specific requirement for the discount rate that is used for the purpose of the measurement of the Total Pension Liability. This rate considers the ability of the fund to meet benefit obligations in the future. To make this determination, employer contributions, employee contributions, benefit payments, expenses and investment returns are projected into the future. The Plan Fiduciary Net Position (assets) in future years can then be determined and compared to its obligation to make benefit payments in those years. As long as assets are projected to be on hand in a future year, the long-term expected rate of return is used as the discount rate. In years where assets are not projected to be sufficient to meet benefit payments, the use of a “risk-free” 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, 2017, total contributions (plan member contributions and state General Fund appropriations) were $8.8 million and total benefit payments were $8.7 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 3.56% (based on Fidelity Index’s 20-Year Municipal GO AA Index as of June 30, 2017); and the resulting single discount rate is 3.56%. 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.