Gabriel Roeder Smith & Company
Consultants & Actuaries

MINNESOTA STATE RETIREMENT SYSTEM
STATE EMPLOYEES RETIREMENT FUND
GASB STATEMENT NOS. 67 AND 68 ACCOUNTING AND FINANCIAL REPORTING FOR PENSIONS

JUNE 30, 2016

GRS Gabriel Roeder Smith & Company
Consultants & Actuaries
277 Coon Rapids Blvd.
Suite 212
Coon Rapids, MN 55433
800.521.0498 phone
763.432.5842 fax
www.gabrielroeder.com

December 1, 2016

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 funding purposes of the plan. A calculation of the plan's liability for purposes other than satisfying the requirements of GASB Statement No. 67 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, 2016 for additional discussion of the nature of actuarial calculations and more information related to participant data, economic and demographic assumptions, and benefit provisions.

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

The signing actuaries are independent of the plan sponsor.

Brian B. Murphy and Bonita J. Wurst are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

Respectfully submitted,

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

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

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SECTION A

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY
AS OF JUNE 30, 2016 (DOLLARS IN THOUSANDS)

	2016
Actuarial Valuation Date	June 30, 2016
Measurement Date of the Net Pension Liability	June 30, 2016
Membership	
Number of	
- Service Retirements	32,241
- Survivors	3,868
- Disability Retirements	1,843
- Deferred Retirements	17,019
- Terminated other non-vested	7,571
- Active Members	49,472
- Total	112,014
Covered-employee Payroll	$ 2,797,345 (1)
Net Pension Liability	
Total Pension Liability	$ 23,621,950
Plan Fiduciary Net Position	11,223,065
Net Pension Liability	$ 12,398,885
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	47.51%
Net Pension Liability as a Percentage of Covered-employee Payroll	443.24%
Development of the Single Discount Rate	
Single Discount Rate	4.17%
Long-Term Expected Rate of Investment Return	7.50%
Long-Term Municipal Bond Rate(2)	2.85%
Last year ending June 30 in the 2017 to 2116 projection period for which projected benefit payments are fully funded	2042
Total Pension Expense/ (Income)	$ 1,799,612

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	$ 16,967	$ 313,527
Changes in assumptions	7,929,055	590,922
Net difference between projected and actual earnings on pension plan investments	966,187	420,551
Totals	$ 8,912,209	$ 1,325,000

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

(2) *Based on the Bond Buyer 20-Bond Index of general obligation municipal bonds as of June 30, 2016*

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. Governmental Accounting Standards Board (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, 2016.

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, 2016 and a measurement date of June 30, 2016.

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 (which is published by the Federal Reserve Board) 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 2.85% (based on the weekly rate closest to but not later than the measurement date of the "20-Bond GO Index"); and the resulting single discount rate is 4.17%. The long-term expected rate of return is based on a review of inflation and investment assumptions, dated September 11, 2014, and a recent asset liability study obtained by the Minnesota State Board of Investment.

Effective Date and Transition

GASB Statements No. 67 and No. 68 are effective for fiscal years beginning after June 15, 2013, and June 15, 2014 respectively. Earlier application is encouraged by the GASB. MSRS first implemented GASB Statement No. 67 for fiscal year 2014.

SECTION B

FINANCIAL STATEMENTS

PENSION EXPENSE UNDER GASB STATEMENT NO. 68
FISCAL YEAR ENDED JUNE 30, 2016 (DOLLARS IN THOUSANDS)

A. Expense/(Income)		
1.	Service Cost	$ 211,491
2.	Interest on the Total Pension Liability	1,020,925
3.	Current-Period Benefit Changes	-
4.	Employee Contributions (made negative for addition here)	(153,854)
5.	Projected Earnings on Plan Investments (made negative for addition here)	(903,405)
6.	Pension Plan Administrative Expense	10,196
7.	Other Changes in Plan Fiduciary Net Position	(20,259)
8.	Recognition of Outflow (Inflow) of Resources due to differences between expected and actual experience in the measurement of the Total Pension Liability	
	Arising from Current Reporting Period	4,242
9.	Recognition of Outflow (Inflow) of Resources due to assumption changes	
	Arising from Current Reporting Period	1,982,264
10.	Recognition of Outflow (Inflow) of Resources due to the difference between projected (7.90%) and actual earnings on Pension Plan Investments	
	Arising from Current Reporting Period	182,608
11.	**Increases/(Decreases) from Experience in the Current Reporting Period**	**$ 2,334,208**
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	(107,444)
13.	Recognition of Outflow (Inflow) of Resources due to assumption changes	
	Arising from Prior Reporting Periods	(295,462)
14.	Recognition of Outflow (Inflow) of Resources due to the difference between projected (7.90%) and actual earnings on Pension Plan Investments	
	Arising from Prior Reporting Periods	(131,690)
15.	**Total Pension Expense/ (Income)**	**$ 1,799,612**

Statement of Outflows and Inflows Arising from Current Reporting Period

Fiscal Year Ended June 30, 2016 (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	$	21,209
2. Assumption Changes (gains) or losses		9,911,319
3. Recognition period for Liabilities: Average of the expected remaining service lives of all employees {in years, rounded to the nearest whole number}		5.0000
4. Outflow (Inflow) of Resources to be recognized in the current pension expense for the difference between expected and actual experience in the measurement of the Total Pension Liability*	$	4,242
5. Outflow (Inflow) of Resources to be recognized in the current pension expense for Assumption Changes		1,982,264
6. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Liabilities	$	1,986,506
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	$	16,967
8. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses for Assumption Changes		7,929,055
9. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Liabilities	$	7,946,022
B. Outflows (Inflows) of Resources due to Assets		
1. Net difference between projected and actual earnings on pension plan investments (gains) or losses	$	913,038
2. Recognition period for Assets {in years}		5.0000
3. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Assets	$	182,608
4. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Assets	$	730,430

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

STATEMENT OF OUTFLOWS AND INFLOWS ARISING FROM CURRENT AND PRIOR REPORTING PERIODS

FISCAL YEAR ENDED JUNE 30, 2016 (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	$ 1,986,506	$ 402,906	$ 1,583,600
2. Due to Assets	261,193	210,275	50,918
3. Total	$ 2,247,699	$ 613,181	$ 1,634,518

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

	Outflows of Resources	Inflows of Resources	Net Outflows/(Inflows) of Resources
1. Differences between expected and actual experience	$ 4,242	$ 107,444	$ (103,202)
2. Assumption Changes	1,982,264	295,462	1,686,802
3. Net Difference between projected and actual earnings on pension plan investments	261,193	210,275	50,918
4. Total	$ 2,247,699	$ 613,181	$ 1,634,518

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	$ 16,967	$ 313,527	$ (296,560)
2. Assumption Changes	7,929,055	590,922	7,338,133
3. Net Difference between projected and actual earnings on pension plan investments	966,187	420,551	545,636
4. Total	$ 8,912,209	$ 1,325,000	$ 7,587,209

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
2017	$ 1,634,518
2018	1,634,521
2019	2,149,060
2020	2,169,110
2021	-
Thereafter	-
Total	$ 7,587,209

STATEMENT OF FIDUCIARY NET POSITION AS OF JUNE 30, 2016 (DOLLARS IN THOUSANDS)

Assets		**June 30, 2016**
Cash & Short-term Investments	$	252,758
Receivables		22,232
Investment Pools (at fair value)		10,939,870
Securities Lending Collateral		1,586,006
Capital Assets		19,604
Total Assets	**$**	**12,820,470**
Total Deferred Outflows of Resources	**$**	**-**
Total Liabilities	**$**	**(1,597,405)**
Total Deferred Inflows of Resources	**$**	**-**
Net Position Restricted for Pensions	**$**	**11,223,065**

STATEMENT OF CHANGES IN FIDUCIARY NET POSITION FOR YEAR ENDED JUNE 30, 2016 (DOLLARS IN THOUSANDS)

1.	**Net Position at market value at beginning of year**	**$**	**11,638,319**
Additions			
2.	Contributions		
	a. Employee	$	153,854
	b. Employer		151,168
	c. Other sources		-
	d. Total contributions	$	305,022
3.	Investment income		
	a. Investment income/(loss)	$	5,356
	b. Investment expenses		(14,989)
	c. Net investment income/(loss)	$	(9,633)
4.	Other Additions		20,281
5.	**Total Additions (2.d.) + (3.c.) + (4.)**	**$**	**315,670**
Deductions			
6.	Benefits Paid		
	a. Annuity benefits	$	(707,361)
	b. Refunds		(13,345)
	c. Total benefits paid	$	(720,706)
7.	Expenses		
	a. Other deductions	$	(22)
	b. Administrative		(10,196)
	c. Total expenses	$	(10,218)
8.	**Total deductions (6.c.) + (7.c.)**	**$**	**(730,924)**
9.	**Net increase/(decrease) in fiduciary net position (5.) + (8.)**	**$**	**(415,254)**
10.	**Net position at market value at end of year (1.) + (9.)**	**$**	**11,223,065**
11.	State Board of Investment calculated annual investment return		-0.1%

SECTION C

REQUIRED SUPPLEMENTARY INFORMATION

SCHEDULE OF CHANGES IN NET PENSION LIABILITY AND RELATED RATIOS
CURRENT PERIOD
FISCAL YEAR ENDED JUNE 30, 2016 (DOLLARS IN THOUSANDS)

A. Total pension liability		
1. Service Cost	$	211,491
2. Interest on the Total Pension Liability		1,020,925
3. Changes of benefit terms		-
4. Difference between expected and actual experience of the Total Pension Liability[1]		21,209
5. Changes of assumptions		9,911,319
6. Benefit payments, including refunds of employee contributions		(720,706)
7. Net change in total pension liability	$	10,444,238
8. Total pension liability – beginning		13,177,712
9. Total pension liability – ending	**$**	**23,621,950**
B. Plan fiduciary net position		
1. Contributions – employer	$	151,168
2. Contributions – employee		153,854
3. Net investment income		(9,633)
4. Benefit payments, including refunds of employee contributions		(720,706)
5. Pension Plan Administrative Expense		(10,196)
6. Other changes		20,259
7. Net change in plan fiduciary net position	$	(415,254)
8. Plan fiduciary net position – beginning		11,638,319
9. Plan fiduciary net position – ending	**$**	**11,223,065**
C. Net pension liability, *A.9. - B.9.*	**$**	**12,398,885**
D. Plan fiduciary net position as a percentage of the total pension liability, *B.9. / A.9.*		**47.51%**
E. Covered-employee payroll	**$**	**2,797,345** [2]
F. Net pension liability as a percentage of covered-employee payroll, *C. / E.*		**443.24%**

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

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

SCHEDULES OF REQUIRED SUPPLEMENTARY INFORMATION

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,	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007
Total Pension Liability										
Service Cost	$ 211,491	$ 210,545	$ 256,155							
Interest on the Total Pension Liability	1,020,925	1,018,035	922,181							
Benefit Changes	-	-	-							
Difference between Expected and Actual Experience	21,209	(493,197)	(44,023)							
Assumption Changes	9,911,319	-	(1,477,308)							
Benefit Payments	(707,361)	(665,821)	(623,942)							
Refunds	(13,345)	(12,026)	(11,986)							
Net Change in Total Pension Liability	$ 10,444,238	$ 57,536	(978,923)							
Total Pension Liability - Beginning	13,177,712	13,120,176	14,099,099							
Total Pension Liability - Ending (a)	**$23,621,950**	**$13,177,712**	**$13,120,176**							
Plan Fiduciary Net Position										
Employer Contributions	$ 151,168	$ 146,333	$ 128,037							
Employee Contributions	153,854	149,293	131,033							
Pension Plan Net Investment Income	(9,633)	501,185	1,829,621							
Benefit Payments	(707,361)	(665,821)	(623,942)							
Refunds	(13,345)	(12,026)	(11,986)							
Pension Plan Administrative Expense	(10,196)	(8,719)	(8,125)							
Other Changes	20,259	29,470	20,528							
Net Change in Plan Fiduciary Net Position	$ (415,254)	$ 139,715	1,465,166							
Plan Fiduciary Net Position - Beginning	11,638,319	11,498,604	10,033,438							
Plan Fiduciary Net Position - Ending (b)	**$11,223,065**	**$11,638,319**	**$11,498,604**							
Net Pension Liability - Ending (a) - (b)	**$12,398,885**	**$ 1,539,393**	**$ 1,621,572**							
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	**47.51 %**	**88.32 %**	**87.64 %**							
Covered-Employee Payroll [(1)]	**$ 2,797,345**	**$ 2,714,418**	**$ 2,620,660**							
Net Pension Liability as a Percentage of Covered-Employee Payroll	**443.24 %**	**56.71 %**	**61.88 %**							

Notes to Schedule:

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

SCHEDULES OF REQUIRED SUPPLEMENTARY INFORMATION
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)
2007						
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%

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)
2007	$ 122,389	$ 86,492	$ 35,897	$ 2,095,310	4.13%
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

NOTES TO SCHEDULE OF CONTRIBUTIONS

Valuation Date:	June 30, 2016
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.

Methods and Assumptions Used to Determine Contribution Rates Reported in this Schedule:

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]
2007	
2008	
2009	
2010	
2011	
2012	
2013	
2014	18.67 %
2015	4.45
2016	(0.08)

[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, 2016, the annual money-weighted rate of return for the State Employees Retirement Fund was (0.08)%. 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, 2016, these best estimates are summarized in the following table:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return (Geometric)
Domestic Stocks	45.00%	5.50%
International Stocks	15.00%	6.00%
Bonds	18.00%	1.45%
Alternative Assets	20.00%	6.40%
Unallocated Cash	2.00%	0.50%
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.

At MSRS' direction, for purposes of this valuation, the long-term expected rate of return assumption is 7.50%. This assumption is based on a review of inflation and investment return assumptions dated September 11, 2014, and a recent asset liability study obtained by the SBI.

Single Discount Rate

A Single Discount Rate of 4.17% 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 2.85%. 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, 2042. 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, 2042, 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 4.17%, 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 (3.17%) or 1-percentage-point higher (5.17%) than the current rate.

Sensitivity of Net Pension Liability to the Single Discount Rate Assumption

(Dollars in Thousands)

	1% Decrease 3.17%	Current Single Discount Rate Assumption 4.17%	1% Increase 5.17%
Total Pension Liability	$ 27,570,358	$ 23,621,950	$ 20,447,506
Net Position Restricted for Pensions	11,223,065	11,223,065	11,223,065
Net Pension Liability	**$ 16,347,293**	**$ 12,398,885**	**$ 9,224,441**

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	**$ 13,177,712**	**$ 11,638,319**	**$ 1,539,393**	**$ 314,342**	**$ 1,938,181**	
Changes for the Year:						
Service Cost	$ 211,491		$ 211,491			$ 211,491
Interest on Total Pension Liability	1,020,925		1,020,925			1,020,925
Interest on Fiduciary Net Position [1]		$ 903,405	(903,405)			(903,405)
Changes in Benefit Terms	-		-			-
Liability Experience Gains and Losses	21,209		21,209	$ 16,967	$ -	4,242
Changes in Assumptions	9,911,319		9,911,319	7,929,055	-	1,982,264
Recognition of Deferred Outflows/(Inflows) of Resources Arising from Prior Reporting Periods						
Liability Experience Gains/(Losses)				-	(107,444)	(107,444)
Assumption Changes				-	(295,462)	(295,462)
Investment Gains/(Losses)				(78,585)	(210,275)	(131,690)
Contributions - Employer		151,168	(151,168)			
Contributions - Employees		153,854	(153,854)			(153,854)
Asset Gain/(Loss) [1]		(913,038)	913,038	730,430	-	182,608
Benefit Payments and Refunds	(720,706)	(720,706)	-			
Administrative Expenses		(10,196)	10,196			10,196
Other changes		20,259	(20,259)			(20,259)
Net Changes	**$ 10,444,238**	**$ (415,254)**	**$ 10,859,492**	**$ 8,597,867**	**$ (613,181)**	**$ 1,799,612**
Balance End of Year	**$ 23,621,950**	**$ 11,223,065**	**$ 12,398,885**	**$ 8,912,209**	**$ 1,325,000**	

[1] *The sum of these items equals the net investment income of $(9,633).*

SUMMARY OF POPULATION STATISTICS

		Terminated*		Recipients**			
	Actives	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	Total
Members on July 1, 2015	**49,037**	**16,787**	**6,941**	**30,871**	**1,819**	**3,786**	**109,241**
New members	5,431	0	0	0	0	0	**5,431**
Return to active	348	(185)	(163)	0	0	0	**0**
Terminated non-vested	(1,772)	0	1,772	0	0	0	**0**
Service retirements	(1,426)	(648)	0	2,074	0	0	**0**
Terminated deferred	(1,132)	1,132	0	0	0	0	**0**
Terminated refund/transfer	(896)	(155)	(1,335)	0	0	0	**(2,386)**
Deaths	(67)	(26)	(9)	(835)	(49)	(165)	**(1,151)**
New beneficiary	0	0	0	0	0	270	**270**
Disabled	(51)	0	0	0	51	0	**0**
Data adjustments	0	114	365	131	22	(23)	**609**
Net change	435	232	630	1,370	24	82	**2,773**
Members on July 1, 2016	**49,472**	**17,019**	**7,571**	**32,241**	**1,843**	**3,868**	**112,014**

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

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

SECTION E

SUMMARY OF BENEFITS

SUMMARY OF PLAN PROVISIONS

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

Plan Year	July 1 through June 30	
Eligibility	State employees, non-academic staff of the University of Minnesota and employees of certain Metro level government units, unless excluded by law.	
Contributions	Shown as a percent of salary:	
Effective date	**Member**	**Employer**
July 1, 2014	5.50%	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		
Normal retirement benefit		
Age/Service requirement	First hired before July 1, 1989: (a.) Age 65 and three years of Allowable Service. (b.) Proportionate Retirement Annuity is available at age 65 and one year of Allowable Service. First hired after June 30, 1989: (a.) The greater of age 65 or the age eligible for full Social Security retirement benefits (but not higher than age 66) and three years of Allowable Service (five years if hired after June 30, 2010). (b.) Proportionate Retirement Annuity is available at normal retirement age and one year of Allowable Service.	
Amount	1.70% of Average Salary for each year of Allowable Service.	

SUMMARY OF PLAN PROVISIONS (CONTINUED)

Retirement (Continued)

Early retirement

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

SUMMARY OF PLAN PROVISIONS (CONTINUED)

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

SUMMARY OF PLAN PROVISIONS (CONTINUED)

Death (Continued)	
Amount (Continued)	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.
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.
Age/Service requirement	Retired or disabled annuitant who did not select an optional annuity dies, or the remaining recipient of an option dies.
Amount	The excess of the member's contributions over all benefits paid.
Unclassified Plan Provision	Eligible members credited with employee shares in the Unclassified Plan may elect to terminate participation in the Unclassified Plan and be covered by the State Employees Retirement Fund prior to termination of covered employment assuming that the member has acquired at least 10 years of allowable state service (no more than seven years of service if hired after June 30, 2010).
Termination	
Refund of contributions	
Age/Service requirement	Termination of state service.
Amount	Member's contributions with 6.00% interest through June 30, 2011 compounded daily. Beginning July 1, 2011 a member's contributions increase at 4.00% interest compounded daily. 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 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; (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%.
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; (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.
Actuarial Equivalent Factors	Actuarially equivalent factors based on RP-2000 mortality for healthy annuitants, white collar adjustment, projected to 2025 using scale AA, blended 55% males, 8.50% pre-retirement interest, and 6.50% post-retirement interest. Effective January 1, 2017, factors based on RP-2014 mortality will be used.

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% 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 0.5% 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	There have been no changes in plan provisions since the previous valuation.

SECTION F

ACTUARIAL COST METHOD AND ACTUARIAL ASSUMPTIONS

ACTUARIAL METHODS USED FOR THE DETERMINATION OF TOTAL PENSION LIABILITY AND RELATED VALUES

Actuarial Cost Method

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

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

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

The Allowance for Combined Service Annuity was also based on a recommendation by a former actuary. We are unable to judge the reasonableness of this assumption without performing a substantial amount of additional work beyond the scope of the assignment. We note that the LCPR actuary has recently completed a review of this assumption. This review recommended changes to this assumption, expected to be effective at a future date.

Investment return	7.50% per annum.
Single discount rate	4.17% per annum.
Benefit increases after retirement	2.00% per annum.
Salary increases	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.
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.
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	Service-related rates based on experience; see table of sample rates.
Disability	Age-related rates based on experience; see table of sample rates.
Allowance for Combined Service Annuity	Liabilities for active members are increased by 1.20% and liabilities for former members are increased by 40.00% to account for the effect of some participants having eligibility for a Combined Service Annuity.
Administrative expenses	In the valuation year, equal to prior year administrative expenses expressed as a percentage of prior year projected payroll. In each subsequent year, equal to the initial administrative expense percentage applied to payroll for the closed group.
Refund of contributions	Account balances accumulate interest until normal retirement date and are discounted back to the valuation date. All employees withdrawing after becoming eligible for a deferred benefit 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 0.26% (0.21% as of July 1, 2015) 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:

Data for active members:
There were 130 members reported with zero or invalid salary. We used prior year salary (70 members), if available, otherwise, high five salary with a 10% load to account for salary increases (54 members). If neither pay nor high five salary was available, we assumed a value of $35,000 (6 members).

There were 22 members reported with zero or negative service. Due to the small number of members with zero service, and based on direction from MSRS, we used service of 0 years for these members.

There were also 142 members reported without a gender and 82 members reported with an invalid date of birth. We assumed the member was hired at age 37 and female gender.

Data for terminated members:
There were 540 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 (521 members), we assumed a value of $30,000. If termination date was not reported (13 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 (15 members), we assumed a value of 7.5 years.
There was 1 member with an invalid gender, and no members with an invalid date of birth. We assumed the member was female.

Data for members receiving benefits:
There were 14 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 4 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 6 survivor members reported with a certain end date prior to the valuation date. These members were excluded from the valuation.

There were 377 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 257 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.

SUMMARY OF ACTUARIAL ASSUMPTIONS (CONTINUED)

Unknown data for certain members	Data for members receiving benefits: There were retired members reported with a survivor option and an invalid or missing survivor gender (4,500 members) and/or survivor date of birth (3,984 members). We used the valuation assumptions if the survivor gender or date of birth was missing or invalid.
Changes in actuarial assumptions	Assumed salary increase rates were changed as recommended in the June 30, 2015 experience study. The net effect is proposed rates that average 0.2% greater than the previous rates. These rates were decreased by 0.25% at all years for this valuation. Assumed rates of retirement were changed as recommended in the June 30, 2015 experience study. The changes result in fewer unreduced (Normal) retirements and fewer Rule of 90 retirements. In addition, distinct rates for reduced (Early) retirements were adopted for members hired prior to July 1, 1989, and members hired after June 30, 1989. Assumed rates of termination were changed as recommended in the June 30, 2015 experience study. The new rates are based on service and are generally greater than the previous rates for years 3 – 9 and less than the previous rates after 15 years. Assumed rates of disability were changed as recommended in the June 30, 2015 experience study. The new rates are 75% of previous rates for females and rates for male members were lowered by utilizing the same disability rates as for females. 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 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 Scale MP-2015), with age adjustments. The percent married assumption was changed from 85% of active male members and 70% of female members to 80% of active members and 65% of active female members. The assumed number of married male new retirees electing the 75% Joint & Survivor option changed from 10% to 15%. The assumed number of married female new retirees electing the 75% and 100% Joint & Survivor options changed from 0% to 10% and from 25% to 30%, respectively. The corresponding number of married new retirees electing the Life annuity option was adjusted accordingly. The assumed post-retirement benefit increase rate was changed from 2.00% per year through 2043 and 2.50% per year thereafter to 2.00% per year for all future years. The long-term expected rate of return on pension plan investments has been reduced from 7.90% to 7.50% as of July 1, 2016. The single discount rate changed from 7.90% as of July 1, 2015 to 4.17% as of July 1, 2016. The inflation assumption has been reduced from 2.75% to 2.50%, and the payroll growth assumption was reduced from 3.50% to 3.25%.

SUMMARY OF ACTUARIAL ASSUMPTIONS (CONTINUED)

	Percent of Members Dying Each Year*					
	Healthy Post-Retirement Mortality**		Healthy Pre-Retirement Mortality**		Disability Mortality**	
Age in 2014	Male	Female	Male	Female	Male	Female
20	0.03%	0.01%	0.03%	0.01%	0.09%	0.07%
25	0.05	0.03	0.03	0.01	0.30	0.20
30	0.07	0.05	0.03	0.02	0.63	0.38
35	0.10	0.08	0.04	0.02	1.02	0.61
40	0.15	0.11	0.05	0.03	1.44	0.87
45	0.22	0.16	0.08	0.06	1.83	1.14
50	0.32	0.21	0.13	0.09	2.16	1.40
55	0.44	0.27	0.22	0.14	2.46	1.64
60	0.60	0.39	0.37	0.21	2.83	1.99
65	0.91	0.65	0.65	0.31	3.46	2.63
70	1.54	1.06	1.15	0.54	4.52	3.80

* *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.*

** *These rates were adjusted for mortality improvements using projection 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)

Salary Scale	
Year	**Increase**
1	13.75%
2	11.25
3	6.00
4	5.25
5	5.00
6	4.90
7	4.75
8	4.50
9	4.25
10	4.00
11	3.95
12	3.90
13	3.85
14	3.80
15	3.75
16	3.70
17	3.65
18	3.60
19	3.55
20	3.50
21	3.45
22	3.40
23	3.35
24	3.30
25+	3.25

Percent of Members Terminating (Withdrawing) Each Year		
Year	**Males**	**Females**
1	20.00%	24.00%
2	15.00	18.00
3	11.00	13.00
4	8.50	11.00
5	7.75	9.00
6	6.50	8.50
7	5.75	7.50
8	5.00	5.75
9	4.00	5.00
10	3.25	4.50
11	3.00	4.00
12	2.75	4.00
13	2.50	3.00
14	2.50	2.75
15	2.50	2.50
16	2.00	2.25
17	2.00	2.25
18	2.00	2.25
19	2.00	2.25
20	1.50	2.25
21	1.50	2.00
22	1.50	2.00
23	1.00	1.50
24	1.00	1.50
25	1.00	1.50
26	1.00	1.50
27	1.00	1.25
28	1.00	1.25
29	1.00	1.25
30+	1.00	1.00

SECTION G

CALCULATION OF THE SINGLE DISCOUNT RATE

CALCULATION OF THE SINGLE DISCOUNT RATE

GASB Statement No. 67 includes a specific requirement for the discount rate that is used for the purpose of the measurement of the Total Pension Liability. This rate considers the ability of the fund to meet benefit obligations in the future. To make this determination, employer contributions, employee contributions, benefit payments, expenses and investment returns are projected into the future. The Plan Fiduciary Net Position (assets) in future years can then be determined and compared to its obligation to make benefit payments in those years. As long as assets are projected to be on hand in a future year, the long-term expected rate of return is used as the discount rate. In years where assets are not projected to be sufficient to meet benefit payments, the use of a "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 (which is published by the Federal Reserve Board (FRB)) 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 2.85% (based on the FRB rate as of June 30, June 30, 2016). **The resulting single discount rate as of July 1, 2016 is 4.17%.**

Benefit payments projected to occur up through June 30, 2041 were fully funded and benefit payments projected to occur in the year ended June 30, 2042 were partially funded. Assets were projected to be fully depleted by the fiscal year ending June 30, 2042. 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, 2041 to June 30, 2042 fiscal year, when benefit payments exceed the Plan's Fiduciary Net Position, benefit payments were discounted at 2.85%, 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 2.85% 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)

	Projected Covered-Employee Payroll			Projected Contributions			
Fiscal Year Ending	Payroll for Current Employees	Payroll for New Employees	Total Employee Payroll	Contributions from Current Employees	Employer Contributions for Current Employees	Contributions on Future Payroll toward current UAL*	Total Contributions
	(a)	(b)	(c) = (a) + (b)	(d) = (a) * 5.5%	(e) = (a) * 5.5%	(f)	(g) = (d) + (e) + (f)
2016	$ 2,797,345		$ 2,797,345				
2017	2,882,573		2,882,573	$ 158,542	$ 158,542		$ 317,084
2018	2,727,267	$ 248,990	2,976,257	150,000	150,000	$ 4,233	304,233
2019	2,580,816	492,169	3,072,985	141,945	141,945	8,367	292,257
2020	2,454,186	718,671	3,172,857	134,980	134,980	12,217	282,177
2021	2,336,774	939,201	3,275,975	128,523	128,523	15,966	273,012
2022	2,226,952	1,155,492	3,382,444	122,482	122,482	19,643	264,607
2023	2,124,641	1,367,732	3,492,373	116,855	116,855	23,251	256,961
2024	2,029,182	1,576,693	3,605,875	111,605	111,605	26,804	250,014
2025	1,938,982	1,784,084	3,723,066	106,644	106,644	30,329	243,617
2026	1,853,291	1,990,775	3,844,066	101,931	101,931	33,843	237,705
2027	1,772,036	2,196,962	3,968,998	97,462	97,462	37,348	232,272
2028	1,695,231	2,402,760	4,097,991	93,238	93,238	40,847	227,323
2029	1,622,206	2,608,969	4,231,175	89,221	89,221	44,352	222,794
2030	1,551,529	2,817,160	4,368,689	85,334	85,334	47,892	218,560
2031	1,482,671	3,028,000	4,510,671	81,547	81,547	51,476	214,570
2032	1,415,606	3,241,662	4,657,268	77,858	77,858	55,108	210,824
2033	1,350,147	3,458,482	4,808,629	74,258	74,258	58,794	207,310
2034	1,285,962	3,678,947	4,964,909	70,728	70,728	62,542	203,998
2035	1,222,962	3,903,307	5,126,269	67,263	67,263	66,356	200,882
2036	1,160,967	4,131,906	5,292,873	63,853	63,853	70,242	197,948
2037	1,100,004	4,364,887	5,464,891	60,500	60,500	74,203	195,203
2038	1,040,218	4,602,282	5,642,500	57,212	57,212	78,239	192,663
2039	980,983	4,844,898	5,825,881	53,954	53,954	82,363	190,271
2040	921,441	5,093,781	6,015,222	50,679	50,679	86,594	187,952
2041	860,899	5,349,818	6,210,717	47,349	47,349	90,947	185,645
2042	799,744	5,612,821	6,412,565	43,986	43,986	95,418	183,390
2043	738,856	5,882,118	6,620,974	40,637	40,637	99,996	181,270
2044	678,143	6,158,012	6,836,155	37,298	37,298	104,686	179,282
2045	617,397	6,440,934	7,058,331	33,957	33,957	109,496	177,410
2046	556,588	6,731,138	7,287,726	30,612	30,612	114,429	175,653
2047	496,220	7,028,357	7,524,577	27,292	27,292	119,482	174,066
2048	437,537	7,331,589	7,769,126	24,065	24,065	124,637	172,767
2049	380,932	7,640,691	8,021,623	20,951	20,951	129,892	171,794
2050	326,502	7,955,823	8,282,325	17,958	17,958	135,249	171,165
2051	275,129	8,276,372	8,551,501	15,132	15,132	140,698	170,962
2052	227,886	8,601,539	8,829,425	12,534	12,534	146,226	171,294
2053	185,363	8,931,018	9,116,381	10,195	10,195	151,827	172,217
2054	147,940	9,264,724	9,412,664	8,137	8,137	157,500	173,774
2055	115,349	9,603,226	9,718,575	6,344	6,344	163,255	175,943
2056	87,516	9,946,913	10,034,429	4,813	4,813	169,098	178,724
2057	64,656	10,295,892	10,360,548	3,556	3,556	175,030	182,142
2058	46,511	10,650,755	10,697,266	2,558	2,558	181,063	186,179
2059	32,516	11,012,411	11,044,927	1,788	1,788	187,211	190,787
2060	21,888	11,381,999	11,403,887	1,204	1,204	193,494	195,902
2061	13,985	11,760,528	11,774,513	769	769	199,929	201,467
2062	8,428	12,148,757	12,157,185	464	464	206,529	207,457
2063	4,756	12,547,537	12,552,293	262	262	213,308	213,832
2064	2,433	12,957,810	12,960,243	134	134	220,283	220,551
2065	1,119	13,380,332	13,381,451	62	62	227,466	227,590
2066	486	13,815,862	13,816,348	27	27	234,870	234,924

**Contributions related to future employees in excess of normal cost and expenses of 9.30% of pay.*

SINGLE DISCOUNT RATE DEVELOPMENT
PROJECTION OF CONTRIBUTIONS (DOLLARS IN THOUSANDS)

	Projected Covered-Employee Payroll			Projected Contributions			
Fiscal Year Ending	Payroll for Current Employees	Payroll for New Employees	Total Employee Payroll	Contributions from Current Employees	Employer Contributions for Current Employees	Contributions on Future Payroll toward current UAL*	Total Contributions
	(a)	(b)	(c) = (a) + (b)	(d) = (a) * 5.5%	(e) = (a) * 5.5%	(f)	(g) = (d) + (e) + (f)
2067	228	14,265,151	14,265,379	$ 13	$ 13	$ 242,508	$ 242,534
2068	106	14,728,898	14,729,004	6	6	250,391	250,403
2069	40	15,207,657	15,207,697	2	2	258,530	258,534
2070	15	15,701,932	15,701,947	1	1	266,933	266,935
2071	3	16,212,257	16,212,260	-	-	275,608	275,608
2072	-	16,739,158	16,739,158	-	-	284,566	284,566
2073	-	17,283,181	17,283,181	-	-	293,814	293,814
2074	-	17,844,885	17,844,885	-	-	303,363	303,363
2075	-	18,424,843	18,424,843	-	-	313,222	313,222
2076	-	19,023,651	19,023,651	-	-	323,402	323,402
2077	-	19,641,919	19,641,919	-	-	333,913	333,913
2078	-	20,280,282	20,280,282	-	-	344,765	344,765
2079	-	20,939,391	20,939,391	-	-	355,970	355,970
2080	-	21,619,921	21,619,921	-	-	367,539	367,539
2081	-	22,322,569	22,322,569	-	-	379,484	379,484
2082	-	23,048,052	23,048,052	-	-	391,817	391,817
2083	-	23,797,114	23,797,114	-	-	404,551	404,551
2084	-	24,570,520	24,570,520	-	-	417,699	417,699
2085	-	25,369,062	25,369,062	-	-	431,274	431,274
2086	-	26,193,556	26,193,556	-	-	445,290	445,290
2087	-	27,044,847	27,044,847	-	-	459,762	459,762
2088	-	27,923,804	27,923,804	-	-	474,705	474,705
2089	-	28,831,328	28,831,328	-	-	490,133	490,133
2090	-	29,768,346	29,768,346	-	-	506,062	506,062
2091	-	30,735,817	30,735,817	-	-	522,509	522,509
2092	-	31,734,731	31,734,731	-	-	539,490	539,490
2093	-	32,766,110	32,766,110	-	-	557,024	557,024
2094	-	33,831,009	33,831,009	-	-	575,127	575,127
2095	-	34,930,517	34,930,517	-	-	593,819	593,819
2096	-	36,065,758	36,065,758	-	-	613,118	613,118
2097	-	37,237,896	37,237,896	-	-	633,044	633,044
2098	-	38,448,127	38,448,127	-	-	653,618	653,618
2099	-	39,697,691	39,697,691	-	-	674,861	674,861
2100	-	40,987,866	40,987,866	-	-	696,794	696,794
2101	-	42,319,972	42,319,972	-	-	719,440	719,440
2102	-	43,695,371	43,695,371	-	-	742,821	742,821
2103	-	45,115,471	45,115,471	-	-	766,963	766,963
2104	-	46,581,723	46,581,723	-	-	791,889	791,889
2105	-	48,095,629	48,095,629	-	-	817,626	817,626
2106	-	49,658,737	49,658,737	-	-	844,199	844,199
2107	-	51,272,646	51,272,646	-	-	871,635	871,635
2108	-	52,939,007	52,939,007	-	-	899,963	899,963
2109	-	54,659,525	54,659,525	-	-	929,212	929,212
2110	-	56,435,960	56,435,960	-	-	959,411	959,411
2111	-	58,270,128	58,270,128	-	-	990,592	990,592
2112	-	60,163,907	60,163,907	-	-	1,022,786	1,022,786
2113	-	62,119,234	62,119,234	-	-	1,056,027	1,056,027
2114	-	64,138,110	64,138,110	-	-	1,090,348	1,090,348
2115	-	66,222,598	66,222,598	-	-	1,125,784	1,125,784
2116	-	68,374,833	68,374,833	-	-	1,162,372	1,162,372

**Contributions related to future employees in excess of normal cost and expenses of 9.30% 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)
2017	$ 11,223,065	$ 317,084	$ 774,408	$ 10,666	$ 824,497	$ 11,579,572
2018	11,579,572	304,233	831,564	10,091	848,679	11,890,828
2019	11,890,828	292,257	887,872	9,549	869,529	12,155,192
2020	12,155,192	282,177	943,123	9,080	886,968	12,372,134
2021	12,372,134	273,012	996,341	8,646	900,957	12,541,115
2022	12,541,115	264,607	1,052,627	8,240	911,264	12,656,120
2023	12,656,120	256,961	1,105,328	7,861	917,681	12,717,574
2024	12,717,574	250,014	1,157,959	7,508	920,109	12,722,229
2025	12,722,229	243,617	1,208,061	7,174	918,390	12,669,002
2026	12,669,002	237,705	1,256,662	6,857	912,403	12,555,590
2027	12,555,590	232,272	1,302,687	6,557	902,013	12,380,632
2028	12,380,632	227,323	1,346,122	6,272	887,120	12,142,680
2029	12,142,680	222,794	1,386,745	6,002	867,621	11,840,349
2030	11,840,349	218,560	1,425,815	5,741	843,361	11,470,714
2031	11,470,714	214,570	1,461,828	5,486	814,175	11,032,145
2032	11,032,145	210,824	1,496,017	5,238	779,895	10,521,610
2033	10,521,610	207,310	1,527,511	4,996	740,324	9,936,737
2034	9,936,737	203,998	1,557,296	4,758	695,249	9,273,930
2035	9,273,930	200,882	1,585,185	4,525	644,405	8,529,508
2036	8,529,508	197,948	1,611,382	4,296	587,509	7,699,289
2037	7,699,289	195,203	1,635,282	4,070	524,270	6,779,410
2038	6,779,410	192,663	1,655,916	3,849	454,434	5,766,742
2039	5,766,742	190,271	1,672,639	3,630	377,788	4,658,533
2040	4,658,533	187,952	1,686,496	3,409	294,085	3,450,666
2041	3,450,666	185,645	1,699,024	3,185	202,957	2,137,059
2042	2,137,059	183,390	1,709,477	2,959	103,977	711,989
2043	711,989	181,270	1,717,453	2,734	-	-
2044	-	179,282	1,722,986	2,509	-	-
2045	-	177,410	1,726,651	2,284	-	-
2046	-	175,653	1,728,768	2,059	-	-
2047	-	174,066	1,729,585	1,836	-	-
2048	-	172,767	1,727,497	1,619	-	-
2049	-	171,794	1,722,546	1,409	-	-
2050	-	171,165	1,715,639	1,208	-	-
2051	-	170,962	1,705,696	1,018	-	-
2052	-	171,294	1,692,810	843	-	-
2053	-	172,217	1,676,099	686	-	-
2054	-	173,774	1,655,113	547	-	-
2055	-	175,943	1,630,837	427	-	-
2056	-	178,724	1,603,290	324	-	-
2057	-	182,142	1,572,002	239	-	-
2058	-	186,179	1,537,010	172	-	-
2059	-	190,787	1,498,342	120	-	-
2060	-	195,902	1,456,252	81	-	-
2061	-	201,467	1,411,569	52	-	-
2062	-	207,457	1,365,088	31	-	-
2063	-	213,832	1,317,549	18	-	-
2064	-	220,551	1,269,421	9	-	-
2065	-	227,590	1,220,907	4	-	-
2066	-	234,924	1,172,237	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)
2067	$ -	$ 242,534	$ 1,123,559	$ 1	$ -	$ -
2068	-	250,403	1,074,986	-	-	-
2069	-	258,534	1,026,521	-	-	-
2070	-	266,935	978,120	-	-	-
2071	-	275,608	929,760	-	-	-
2072	-	284,566	881,414	-	-	-
2073	-	293,814	833,082	-	-	-
2074	-	303,363	784,784	-	-	-
2075	-	313,222	736,570	-	-	-
2076	-	323,402	688,517	-	-	-
2077	-	333,913	640,737	-	-	-
2078	-	344,765	593,373	-	-	-
2079	-	355,970	546,605	-	-	-
2080	-	367,539	500,639	-	-	-
2081	-	379,484	455,701	-	-	-
2082	-	391,817	412,036	-	-	-
2083	-	404,551	369,894	-	-	-
2084	-	417,699	329,524	-	-	-
2085	-	431,274	291,165	-	-	-
2086	-	445,290	255,032	-	-	-
2087	-	459,762	221,309	-	-	-
2088	-	474,705	190,145	-	-	-
2089	-	490,133	161,646	-	-	-
2090	-	506,062	135,875	-	-	-
2091	-	522,509	112,848	-	-	-
2092	-	539,490	92,534	-	-	-
2093	-	557,024	74,857	-	-	-
2094	-	575,127	59,697	-	-	-
2095	-	593,819	46,892	-	-	-
2096	-	613,118	36,249	-	-	-
2097	-	633,044	27,553	-	-	-
2098	-	653,618	20,574	-	-	-
2099	-	674,861	15,078	-	-	-
2100	-	696,794	10,835	-	-	-
2101	-	719,440	7,626	-	-	-
2102	-	742,821	5,253	-	-	-
2103	-	766,963	3,538	-	-	-
2104	-	791,889	2,327	-	-	-
2105	-	817,626	1,493	-	-	-
2106	-	844,199	934	-	-	-
2107	-	871,635	570	-	-	-
2108	-	899,963	338	-	-	-
2109	-	929,212	195	-	-	-
2110	-	959,411	110	-	-	-
2111	-	990,592	60	-	-	-
2112	-	1,022,786	32	-	-	-
2113	-	1,056,027	16	-	-	-
2114	-	1,090,348	8	-	-	-
2115	-	1,125,784	4	-	-	-
2116	-	1,162,372	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)
2017	$ 11,223,065	$ 774,408	$ 774,408	$ -	$ 746,906	$ -	$ 758,746
2018	11,579,572	831,564	831,564	-	746,076	-	782,122
2019	11,890,828	887,872	887,872	-	741,019	-	801,645
2020	12,155,192	943,123	943,123	-	732,216	-	817,434
2021	12,372,134	996,341	996,341	-	719,565	-	828,982
2022	12,541,115	1,052,627	1,052,627	-	707,177	-	840,745
2023	12,656,120	1,105,328	1,105,328	-	690,774	-	847,488
2024	12,717,574	1,157,959	1,157,959	-	673,178	-	852,291
2025	12,722,229	1,208,061	1,208,061	-	653,307	-	853,565
2026	12,669,002	1,256,662	1,256,662	-	632,176	-	852,351
2027	12,555,590	1,302,687	1,302,687	-	609,609	-	848,189
2028	12,380,632	1,346,122	1,346,122	-	585,986	-	841,376
2029	12,142,680	1,386,745	1,386,745	-	561,553	-	832,060
2030	11,840,349	1,425,815	1,425,815	-	537,092	-	821,247
2031	11,470,714	1,461,828	1,461,828	-	512,240	-	808,276
2032	11,032,145	1,496,017	1,496,017	-	487,647	-	794,058
2033	10,521,610	1,527,511	1,527,511	-	463,175	-	778,311
2034	9,936,737	1,557,296	1,557,296	-	439,261	-	761,715
2035	9,273,930	1,585,185	1,585,185	-	415,933	-	744,310
2036	8,529,508	1,611,382	1,611,382	-	393,309	-	726,315
2037	7,699,289	1,635,282	1,635,282	-	371,295	-	707,574
2038	6,779,410	1,655,916	1,655,916	-	349,749	-	687,813
2039	5,766,742	1,672,639	1,672,639	-	328,633	-	666,940
2040	4,658,533	1,686,496	1,686,496	-	308,238	-	645,539
2041	3,450,666	1,699,024	1,699,024	-	288,863	-	624,294
2042	2,137,059	1,709,477	1,709,477	-	270,363	-	602,984
2043	711,989	1,717,453	711,989	1,005,463	104,749	477,477	581,540
2044	-	1,722,986	-	1,722,986	-	795,543	560,053
2045	-	1,726,651	-	1,726,651	-	775,143	538,772
2046	-	1,728,768	-	1,728,768	-	754,588	517,833
2047	-	1,729,585	-	1,729,585	-	734,025	497,333
2048	-	1,727,497	-	1,727,497	-	712,823	476,843
2049	-	1,722,546	-	1,722,546	-	691,085	456,438
2050	-	1,715,639	-	1,715,639	-	669,240	436,405
2051	-	1,705,696	-	1,705,696	-	646,924	416,503
2052	-	1,692,810	-	1,692,810	-	624,246	396,805
2053	-	1,676,099	-	1,676,099	-	600,956	377,156
2054	-	1,655,113	-	1,655,113	-	576,988	357,521
2055	-	1,630,837	-	1,630,837	-	552,771	338,172
2056	-	1,603,290	-	1,603,290	-	528,375	319,148
2057	-	1,572,002	-	1,572,002	-	503,708	300,390
2058	-	1,537,010	-	1,537,010	-	478,849	281,943
2059	-	1,498,342	-	1,498,342	-	453,867	263,845
2060	-	1,456,252	-	1,456,252	-	428,894	246,165
2061	-	1,411,569	-	1,411,569	-	404,214	229,058
2062	-	1,365,088	-	1,365,088	-	380,071	212,645
2063	-	1,317,549	-	1,317,549	-	356,670	197,022
2064	-	1,269,421	-	1,269,421	-	334,119	182,224
2065	-	1,220,907	-	1,220,907	-	312,446	168,243
2066	-	1,172,237	-	1,172,237	-	291,677	155,068

SINGLE DISCOUNT RATE DEVELOPMENT
PRESENT VALUES OF PROJECTED BENEFITS (CONTINUED)
(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	$ -	$ 1,123,559	$ -	1,123,559	$ -	271,819	$ 142,677
2068	-	1,074,986	-	1,074,986	-	252,861	131,043
2069	-	1,026,521	-	1,026,521	-	234,770	120,125
2070	-	978,120	-	978,120	-	217,502	109,877
2071	-	929,760	-	929,760	-	201,019	100,263
2072	-	881,414	-	881,414	-	185,286	91,243
2073	-	833,082	-	833,082	-	170,273	82,787
2074	-	784,784	-	784,784	-	155,956	74,865
2075	-	736,570	-	736,570	-	142,319	67,452
2076	-	688,517	-	688,517	-	129,348	60,527
2077	-	640,737	-	640,737	-	117,036	54,071
2078	-	593,373	-	593,373	-	105,381	48,069
2079	-	546,605	-	546,605	-	94,385	42,507
2080	-	500,639	-	500,639	-	84,053	37,374
2081	-	455,701	-	455,701	-	74,388	32,657
2082	-	412,036	-	412,036	-	65,396	28,345
2083	-	369,894	-	369,894	-	57,081	24,427
2084	-	329,524	-	329,524	-	49,442	20,890
2085	-	291,165	-	291,165	-	42,476	17,719
2086	-	255,032	-	255,032	-	36,174	14,899
2087	-	221,309	-	221,309	-	30,521	12,411
2088	-	190,145	-	190,145	-	25,496	10,236
2089	-	161,646	-	161,646	-	21,074	8,354
2090	-	135,875	-	135,875	-	17,224	6,741
2091	-	112,848	-	112,848	-	13,908	5,374
2092	-	92,534	-	92,534	-	11,089	4,230
2093	-	74,857	-	74,857	-	8,722	3,285
2094	-	59,697	-	59,697	-	6,763	2,515
2095	-	46,892	-	46,892	-	5,165	1,896
2096	-	36,249	-	36,249	-	3,882	1,407
2097	-	27,553	-	27,553	-	2,869	1,027
2098	-	20,574	-	20,574	-	2,083	736
2099	-	15,078	-	15,078	-	1,484	518
2100	-	10,835	-	10,835	-	1,037	357
2101	-	7,626	-	7,626	-	710	241
2102	-	5,253	-	5,253	-	475	160
2103	-	3,538	-	3,538	-	311	103
2104	-	2,327	-	2,327	-	199	65
2105	-	1,493	-	1,493	-	124	40
2106	-	934	-	934	-	76	24
2107	-	570	-	570	-	45	14
2108	-	338	-	338	-	26	8
2109	-	195	-	195	-	15	4
2110	-	110	-	110	-	8	2
2111	-	60	-	60	-	4	1
2112	-	32	-	32	-	2	1
2113	-	16	-	16	-	1	-
2114	-	8	-	8	-	1	-
2115	-	4	-	4	-	-	-
2116	-	3	-	3	-	-	-
				Totals	$ 14,070,087	15,924,977	$ 29,995,064

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.