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, 2015

GRS
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November 30, 2015

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"). 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.

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.

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 otherwise audited.

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. 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, MAAA

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

OTHER OBSERVATIONS

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 a 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.

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SECTION A

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY
AS OF JUNE 30, 2015 (DOLLARS IN THOUSANDS)

	2015
Actuarial Valuation Date	June 30, 2015
Measurement Date of the Net Pension Liability	June 30, 2015
Membership	
Number of	
- Service Retirements	30,871
- Survivors	3,786
- Disability Retirements	1,819
- Deferred Retirements	16,787
- Terminated other non-vested	6,941
- Active Members	49,037
- Total	109,241
Covered-employee Payroll	$ 2,714,418 [(1)]
Net Pension Liability	
Total Pension Liability	$ 13,177,712
Plan Fiduciary Net Position	11,638,319
Net Pension Liability	$ 1,539,393
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	88.32%
Net Pension Liability as a Percentage of Covered-employee Payroll	56.71%
Development of the Single Discount Rate	
Single Discount Rate	7.90%
Long-Term Expected Rate of Investment Return	7.90%
Long-Term Municipal Bond Rate[(2)]	3.80%
Last year ending June 30 in the 2016 to 2115 projection period for which projected benefit payments are fully funded	2115
Total Pension Expense/ (Income)	$ (370,172)

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	$ -	$ 420,971
Changes in assumptions	-	886,384
Net difference between projected and actual earnings on pension plan investments	314,342	630,826
Totals	$ 314,342	$ 1,938,181

(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 25, 2015 (i.e., the weekly rate closest to but not later than the Measurement Date).*

The covered-employee payroll figure shown represents the annual compensation for active employees on which contributions to the pension plan are based and does not necessarily represent Covered-Employee Payroll as defined in GASB Statement Nos. 67 and 68. If a different payroll figure should be used in this schedule, please let us know.

DISCUSSION

Accounting Standard

For pension plans that are administered through trusts or equivalent arrangements, Governmental Accounting Standards Board (GASB) Statement No. 67, *Financial Reporting for Pension Plans,* establishes standards of financial reporting for separately issued financial reports and specifies the required approach for measuring the pension liability. Similarly, GASB Statement No. 68, *Accounting and Financial Reporting for Pensions*, establishes standards for state and local government employers (as well as non-employer contributing entities) to account for and disclose the net pension liability, pension expense, and other information associated with providing retirement benefits to their employees (and former employees) on their basic financial statements.

The following discussion provides a summary of the information that is required to be disclosed under these accounting standards. A number of these disclosure items are provided in this report. However, certain information, such as notes regarding accounting policies and investments, is not included in this report and the retirement system and/or plan sponsor will be responsible for preparing and disclosing that information to comply with these accounting standards.

Financial Statements

GASB Statement No. 68 requires state and local governmental employers to recognize the net pension liability and the pension expense on their financial statements. The net pension liability is the difference between the total pension liability and the plan's fiduciary net position. In traditional actuarial terms, this is analogous to the accrued liability less the market value of assets (not the smoothed actuarial value of assets that is often encountered in actuarial valuations performed to determine the employer's contribution requirement).

Paragraph 57 of GASB Statement No. 68 states, "Contributions to the pension plan from the employer subsequent to the measurement date of the collective net pension liability and before the end of the employer's reporting period should be reported as a deferred outflow of resources related to pensions." The information contained in this report does not incorporate any contributions made to SERF subsequent to the measurement date of June 30, 2015.

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.

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, 2015 and a measurement date of June 30, 2015.

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 7.90%; the municipal bond rate is 3.80% (based on the weekly rate closest to but not later than the measurement date of the 20-Year Bond Buyer Index as published by the Federal Reserve Board); and the resulting single discount rate is 7.90%.

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, 2015 (DOLLARS IN THOUSANDS)

A. Expense/(Income)

1.	Service Cost	$ 210,545
2.	Interest on the Total Pension Liability	1,018,035
3.	Current-Period Benefit Changes	-
4.	Employee Contributions (made negative for addition here)	(149,293)
5.	Projected Earnings on Plan Investments (made negative for addition here)	(894,112)
6.	Pension Plan Administrative Expense	8,719
7.	Other Changes in Plan Fiduciary Net Position	(29,470)
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	(98,639)
9.	Recognition of Outflow (Inflow) of Resources due to assumption changes	
	Arising from Current Reporting Period	-
10.	Recognition of Outflow (Inflow) of Resources due to the difference between projected (7.90%) and actual earnings on Pension Plan Investments	
	Arising from Current Reporting Period	78,585
11.	**Increases/(Decreases) from Experience in the Current Reporting Period**	**$ 144,370**
12.	Recognition of Outflow (Inflow) of Resources due to differences between expected and actual experience in the measurement of the Total Pension Liability	
	Arising from Prior Reporting Periods	(8,805)
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	(210,275)
15.	**Total Pension Expense/ (Income)[(1)]**	**$ (370,172)**

(1) Service cost and interest on Total Pension Liability were offset by decreases in Net Pension Liability, primarily due to recognition of prior year inflows in the current period due to assumption changes and better than expected return on the market value of assets.

STATEMENT OF OUTFLOWS AND INFLOWS ARISING FROM CURRENT REPORTING PERIOD
FISCAL YEAR ENDED JUNE 30, 2015 (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	$	(493,197)
2. Assumption Changes (gains) or losses		-
3. Recognition period for Liabilities: Average of the expected remaining service lives of all employees {in years, rounded to the nearest whole number}		5.0000
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*	$	(98,639)
5. Outflow (Inflow) of Resources to be recognized in the current pension expense for Assumption Changes		-
6. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Liabilities	$	(98,639)
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	$	(394,558)
8. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses for Assumption Changes		-
9. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Liabilities	$	(394,558)
B. Outflows (Inflows) of Resources due to Assets		
1. Net difference between projected and actual earnings on pension plan investments (gains) or losses	$	392,927
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	$	78,585
4. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Assets	$	314,342

* *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, 2015 (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	$ -	$ 402,906	$ (402,906)
2. Due to Assets	78,585	210,275	(131,690)
3. Total	$ 78,585	$ 613,181	$ (534,596)

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	$ -	$ 107,444	$ (107,444)
2. Assumption Changes	-	295,462	(295,462)
3. Net Difference between projected and actual earnings on pension plan investments	78,585	210,275	(131,690)
4. Total	$ 78,585	$ 613,181	$ (534,596)

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	$ -	$ 420,971	$ (420,971)
2. Assumption Changes	-	886,384	(886,384)
3. Net Difference between projected and actual earnings on pension plan investments	314,342	630,826	(316,484)
4. Total	$ 314,342	$ 1,938,181	$ (1,623,839)

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
2016	$ (534,596)
2017	(534,596)
2018	(534,593)
2019	(20,054)
2020	-
Thereafter	-
Total	$ (1,623,839)

STATEMENT OF FIDUCIARY NET POSITION AS OF JUNE 30, 2015 (DOLLARS IN THOUSANDS)

Assets		**June 30, 2015**
Cash & Short-term Investments	$	214,452
Receivables		17,980
Investment Pools (at fair value)		11,398,405
Securities Lending Collateral		1,185,073
Capital Assets		19,694
Total Assets	**$**	**12,835,604**
Total Deferred Outflows of Resources	**$**	**-**
Total Liabilities	**$**	**(1,197,285)**
Total Deferred Inflows of Resources	**$**	**-**
Net Position Restricted for Pensions	**$**	**11,638,319**

STATEMENT OF CHANGES IN FIDUCIARY NET POSITION FOR YEAR ENDED JUNE 30, 2015 (DOLLARS IN THOUSANDS)

1.	**Net Position at market value at beginning of year**	**$**	**11,498,604**
Additions			
2.	Contributions		
	a. Employee	$	149,293
	b. Employer		146,333
	c. Other sources		-
	d. Total contributions	$	295,626
3.	Investment income		
	a. Investment income/(loss)	$	517,368
	b. Investment expenses		(16,183)
	c. Net investment income/(loss)	$	501,185
4.	Other Additions		29,493
5.	**Total Additions (2.d.) + (3.c.) + (4.)**	**$**	**826,304**
Deductions			
6.	Benefits Paid		
	a. Annuity benefits	$	(665,821)
	b. Refunds		(12,026)
	c. Total benefits paid	$	(677,847)
7.	Expenses		
	a. Other deductions	$	(23)
	b. Administrative		(8,719)
	c. Total expenses	$	(8,742)
8.	**Total deductions (6.c.) + (7.c.)**	**$**	**(686,589)**
9.	**Net increase/(decrease) in fiduciary net position (5.) + (8.)**	**$**	**139,715**
10.	**Net position at market value at end of year (1.) + (9.)**	**$**	**11,638,319**
11.	State Board of Investment calculated annual investment return		4.4%

SECTION C

REQUIRED SUPPLEMENTARY INFORMATION

SCHEDULE OF CHANGES IN NET PENSION LIABILITY AND RELATED RATIOS CURRENT PERIOD

FISCAL YEAR ENDED JUNE 30, 2015 (DOLLARS IN THOUSANDS)

A. Total pension liability		
1. Service Cost	$	210,545
2. Interest on the Total Pension Liability		1,018,035
3. Changes of benefit terms		-
4. Difference between expected and actual experience of the Total Pension Liability*		(493,197)
5. Changes of assumptions		-
6. Benefit payments, including refunds of employee contributions		(677,847)
7. Net change in total pension liability	$	57,536
8. Total pension liability – beginning		13,120,176
9. Total pension liability – ending	**$**	**13,177,712**
B. Plan fiduciary net position		
1. Contributions – employer	$	146,333
2. Contributions – employee		149,293
3. Net investment income		501,185
4. Benefit payments, including refunds of employee contributions		(677,847)
5. Pension Plan Administrative Expense		(8,719)
6. Other changes		29,470
7. Net change in plan fiduciary net position	$	139,715
8. Plan fiduciary net position – beginning, as restated		11,498,604
9. Plan fiduciary net position – ending	**$**	**11,638,319**
C. Net pension liability, *A.9. - B.9.*	**$**	**1,539,393**
D. Plan fiduciary net position as a percentage of the total pension liability, *B.9. / A.9.*		**88.32%**
E. Covered-employee payroll	**$**	**2,714,418** (1)
F. Net pension liability as a percentage of covered-employee payroll, *C. / E.*		**56.71%**

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

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

The covered-employee payroll figure shown represents the annual compensation for active employees on which contributions to the pension plan are based and does not necessarily represent Covered-Employee Payroll as defined in GASB Statement Nos. 67 and 68. If a different payroll figure should be used in this schedule, please let us know.

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,	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006
Total Pension Liability										
Service Cost	$ 210,545	$ 256,155								
Interest on the Total Pension Liability	1,018,035	922,181								
Benefit Changes	-	-								
Difference between Expected and Actual Experience	(493,197)	(44,023)								
Assumption Changes	-	(1,477,308)								
Benefit Payments	(665,821)	(623,942)								
Refunds	(12,026)	(11,986)								
Net Change in Total Pension Liability	$ 57,536	$ (978,923)								
Total Pension Liability - Beginning	13,120,176	14,099,099								
Total Pension Liability - Ending (a)	**$13,177,712**	**$13,120,176**								
Plan Fiduciary Net Position										
Employer Contributions	$ 146,333	$ 128,037								
Employee Contributions	149,293	131,033								
Pension Plan Net Investment Income	501,185	1,829,621								
Benefit Payments	(665,821)	(623,942)								
Refunds	(12,026)	(11,986)								
Pension Plan Administrative Expense	(8,719)	(8,125)								
Other Changes	29,470	20,528								
Net Change in Plan Fiduciary Net Position	$ 139,715	$ 1,465,166								
Plan Fiduciary Net Position - Beginning	11,498,604	10,033,438								
Plan Fiduciary Net Position - Ending (b)	**$11,638,319**	**$11,498,604**								
Net Pension Liability - Ending (a) - (b)	**$ 1,539,393**	**$ 1,621,572**								
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	**88.32 %**	**87.64 %**								
Covered-Employee Payroll (1)	**$ 2,714,418**	**$ 2,620,660**								
Net Pension Liability as a Percentage of Covered-Employee Payroll	**56.71 %**	**61.88 %**								

Notes to Schedule:

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

The covered-employee payroll figure shown represents the annual compensation for active employees on which contributions to the pension plan are based and does not necessarily represent Covered-Employee Payroll as defined in GASB Statement Nos. 67 and 68. If a different payroll figure should be used in this schedule, please let us know.

SCHEDULES OF REQUIRED SUPPLEMENTARY INFORMATION
SCHEDULE OF THE 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)
2006						
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%

The covered-employee payroll figure shown represents the annual compensation for active employees on which contributions to the pension plan are based and does not necessarily represent Covered-Employee Payroll as defined in GASB Statement Nos. 67 and 68. If a different payroll figure should be used in this schedule, please let us know.

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)
2006	$ 127,371	$ 82,645	$ 44,726	$ 2,016,588	4.10%
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 [2]	4.86
2013	181,756	121,673	60,083	2,483,000 [2]	4.90
2014	195,239	128,037	67,202	2,620,660 [2]	4.89
2015	198,695	146,333	52,362	2,714,418 [2]	5.39

NOTES TO SCHEDULE OF CONTRIBUTIONS

Valuation Date:	June 30, 2015
Notes	(1) Actuarially determined contribution rates are calculated as of each July 1 and apply to the fiscal year beginning on 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%
Salary Increases	Service based table of rates ranging from 10.25% with one year of service to 3.25% with 17 or more years of service, including inflation
Investment Rate of Return	8.00%
Retirement Age	Experience-based table of rates that are specific to the type of eligibility condition. Last updated for the 2010 valuation pursuant to an experience study of the period 2004 - 2008, prepared by a former actuary.
Healthy Post-retirement Mortality	RP-2000 annuitant generational mortality table, projected with mortality improvement scale AA, white collar adjustment.

Other Information:

Benefit Increases After Retirement	The post-retirement increase is assumed to increase from 2.0% to 2.5% beginning January 1, 2036. See separate funding actuarial valuation report as of July 1, 2015 for additional detail. To obtain this report, contact MSRS as noted on page 3. The report is also available online at www.msrs.state.mn.us/actuarial-reports.

SCHEDULE OF INVESTMENT RETURNS MULTIYEAR

Last 10 Fiscal Years

Fiscal Year Ending June 30,	Annual Return[1]
2006	
2007	
2008	
2009	
2010	
2011	
2012	
2013	
2014	18.67 %
2015	4.45 %

[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, 2015, the annual money-weighted rate of return for the State Employees Retirement Fund was 4.45%. 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, 2015, 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 7.90%. This assumption is based on a review of inflation and investment return assumptions dated September 11, 2014.

Single Discount Rate

A Single Discount Rate of 7.90% was used to measure the total pension liability. This Single Discount Rate was based on the expected rate of return on pension plan investments of 7.90%. The projection of cash flows used to determine this Single Discount Rate assumed that employee and employer contributions will be made at the current statutory contribution rates. Based on these assumptions, the pension plan's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

Regarding the sensitivity of the net pension liability to changes in the Single Discount Rate, the following presents the plan's net pension liability, calculated using a Single Discount Rate of 7.90%, as well as what the plan's net pension liability would be if it were calculated using a Single Discount Rate that is one percent lower (6.9%) or one percent higher (8.9%):

Sensitivity of Net Pension Liability
to the Single Discount Rate Assumption
(Dollars in Thousands)

	1% Decrease 6.90%	Current Single Discount Rate Assumption 7.90%	1% Increase 8.90%
Total Pension Liability	$ 14,789,450	$ 13,177,712	$ 11,836,449
Net Position Restricted for Pensions	11,638,319	11,638,319	11,638,319
Net Pension Liability	**$ 3,151,131**	**$ 1,539,393**	**$ 198,130**

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	**$ 13,120,176**	**$ 11,498,604**	**$ 1,621,572**	**$ -**	**$ 2,058,165**	
Changes for the Year:						
Service Cost	$ 210,545		$ 210,545			$ 210,545
Interest on Total Pension Liability	1,018,035		1,018,035			1,018,035
Interest on Fiduciary Net Position [1]		$ 894,112	(894,112)			(894,112)
Changes in Benefit Terms	-		-			-
Liability Experience Gains and Losses	(493,197)		(493,197)	$ -	$ 394,558	(98,639)
Changes in Assumptions	-		-	-	-	-
Recognition of Deferred Outflows/(Inflows) of Resources Arising from Prior Reporting Periods						
Liability Experience Gains/(Losses)					(8,805)	(8,805)
Assumption Changes					(295,462)	(295,462)
Investment Gains/(Losses)					(210,275)	(210,275)
Contributions - Employer		146,333	(146,333)			
Contributions - Employees		149,293	(149,293)			(149,293)
Asset Gain/(Loss) [1]		(392,927)	392,927	314,342	-	78,585
Benefit Payments and Refunds	(677,847)	(677,847)	-			
Administrative Expenses		(8,719)	8,719			8,719
Other changes		29,470	(29,470)			(29,470)
Net Changes	**$ 57,536**	**$ 139,715**	**$ (82,179)**	**$ 314,342**	**$ (119,984)**	**$ (370,172)**
Balance End of Year	**$ 13,177,712**	**$ 11,638,319**	**$ 1,539,393**	**$ 314,342**	**$ 1,938,181**	

[1] *The sum of these items equals the net investment income of $501,185.*

SUMMARY OF POPULATION STATISTICS

		Terminated*		Recipients**			
	Actives	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	Total
Members on 7/1/2014	**49,663**	**16,472**	**5,818**	**29,225**	**1,818**	**3,686**	**106,682**
New Members	4,755		0	0	0	0	**4,755**
Return to active	296	(165)	(131)	0	0	0	**0**
Terminated non-vested	(1,809)	0	1,809	0	0	0	**0**
Service retirements	(1,598)	(711)	0	2,309	0	0	**0**
Unclassified retirements				70			**70**
Terminated deferred	(1,268)	1,268	0	0	0	0	**0**
Terminated refund/transfer	(849)	(169)	(934)	0	0	0	**(1,952)**
Deaths	(62)	(30)	(9)	(841)	(69)	(190)	**(1,201)**
New beneficiary	0		0	0	0	303	**303**
Disabled	(58)		0	0	58	0	**0**
Unexpected status change	(33)	122	388	108	12	(13)	**584**
Net change	(626)	315	1,123	1,646	1	100	**2,559**
Members on 6/30/2015	**49,037**	**16,787**	**6,941**	**30,871**	**1,819**	**3,786**	**109,241**

* *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 2.0% 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 2.5%. If, after reverting to a 2.5% 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 2.0%. 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, 8.5% pre-retirement interest, and 6.5% post-retirement interest.

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 1.0% of covered payroll exists, member and employer contributions may be adjusted by the MSRS Board of Directors to a level necessary to maintain a 1.0% 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	The Contribution Stabilizer statutes were revised to make changes to contribution rates less prescriptive and more flexible. Effective July 1, 2015, a provision was added so that if the 2.5% post-retirement benefit increase is triggered and the funding ratio (determined on a market value of assets basis) subsequently drops below 80% for the most recent valuation year or 85% for two consecutive years, the post-retirement benefit increase will change to 2.0% until the plan again reaches a 90% funding ratio for two consecutive years.

SECTION F

ACTUARIAL COST METHOD AND ACTUARIAL ASSUMPTIONS

ACTUARIAL METHODS

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 2.0% post-retirement benefit increase. If the funding ratio (determined on a market value of assets basis) reaches 90% (based on a 2.5% post-retirement benefit increase assumption) for two consecutive years, the benefit increase will revert to 2.5%. If, after reverting to a 2.5% 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 2.0%.

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 7.90%
- Liabilities and normal cost based on statutory funding assumptions
  - Discount rate of 8.00%
  - Statutory salary increases (rate of 10.25% at year 1 declining to 3.25% at years 17 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 2.0% per year until the funding ratio threshold required to pay a 2.5% 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 expected to attain the funding ratio threshold required to pay a 2.5% postretirement benefit increase in the year 2043, and that the plan would begin paying 2.5% benefit increases on January 1, 2044. This assumption is reflected in our calculations.

Decrement Timing

All decrements are assumed to occur mid-year.

Asset Valuation Method

Fair value of assets.

SUMMARY OF ACTUARIAL ASSUMPTIONS

The following assumptions were used in valuing the liabilities and benefits under the plan. The demographic assumptions are based on the experience study, dated August 2009, prepared by a former actuary. The economic assumptions are based on a review of inflation and investment return assumptions dated September 11, 2014.

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.

Investment return	7.90%
Single discount rate	7.90%
Benefit increases after retirement	2.00% per annum through 2043 and 2.5% per annum thereafter
Salary increases	Reported salary at valuation date increased according to the rate table, to current fiscal year and annually for each future year. Prior fiscal year salary is annualized for members with less than one year of service.
Inflation	2.75% per year.
Payroll growth	3.50% per year.
Mortality rates	
Healthy Pre-retirement	RP-2000 employee generational mortality table projected with mortality improvement scale AA, white collar adjustment, set forward three years for males and set back one year for females.
Healthy Post-retirement	RP-2000 annuitant generational mortality table projected with mortality improvement scale AA, white collar adjustment. The RP-2000 employee mortality table as published by the Society of Actuaries (SOA) contains mortality rates for ages 15 to 70 and the annuitant mortality table contains mortality rates for ages 50 to 95. We have applied the annuitant mortality table for active members beyond age 70 until the assumed retirement age and the employee mortality table for annuitants younger than age 50.
Disabled	RP-2000 disabled mortality table, white collar adjustment, with no setback for males and set forward five 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	Select and Ultimate rates based on actual experience. Ultimate rates after the third year are shown in rate table. Select rates in the first three years are: **First Year** / **Second Year** / **Third Year** Male: 0.45 / 0.14 / 0.09 Female: 0.48 / 0.15 / 0.10
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	For purposes of the Projection of Plan Fiduciary Net Position, total prior year administrative expenses expressed as a percentage of prior year projected payroll are assumed to increase 3.50% per year and are allocated to the closed group based on the ratio of closed group payroll to total payroll.
Refund of contributions	Account balances accumulate interest until normal retirement date and are discounted back to the valuation date. All employees withdrawing after becoming eligible for a deferred benefit 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	85% of active male members and 70% 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 10% elect 75% Joint & Survivor option 50% elect 100% Joint & Survivor option Females: 15% elect 50% Joint & Survivor option 0% elect 75% Joint & Survivor option 25% 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.
Service credit accruals	It is assumed that members accrue one year of service credit per year.
Unclassified Plan Reversion	Liabilities for active members are increased by 0.21% (0.18% as of July 1, 2014) 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 MSRS. Although GRS has reviewed the data in accordance with Actuarial Standards of Practice No. 23, GRS has not verified or audited any of the data or information provided. In cases where submitted data was missing or incomplete, the following assumptions were applied: <u>Data for active members:</u> There were 109 members reported with zero or invalid salary. We used prior year salary (68 members), if available, otherwise, high five salary with a 10% load to account for salary increases (33 members). If neither pay nor high five salary was available, we assumed a value of $35,000 (8 members). There were 24 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 31 members reported without a gender and 16 members reported with an invalid date of birth. We assumed the member was hired at age 37 and female gender. <u>Data for terminated members:</u> There were 575 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 (552 members), we assumed a value of $30,000. If termination date was not reported (14 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 (9 members), we assumed a value of 7.5 years. There were no members with an invalid gender or date of birth. <u>Data for members receiving benefits:</u> There were 4 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 3 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 3 survivor members reported with a certain end date prior to the valuation date. These members were excluded from the valuation. There were 390 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.

SUMMARY OF ACTUARIAL ASSUMPTIONS (CONTINUED)

Unknown data for certain members	Data for members receiving benefits: There were 287 retirees reported with a bounce back annuity but were not reported with a reasonable reduction factor. A factor of 0.80, 0.85 and 0.90 was assumed for the 100%, 75% and 50% joint and survivor annuity, respectively. There were retired members reported with a survivor option and an invalid or missing survivor gender (4,614 members) and/or survivor date of birth (4,134 members). We used the valuation assumptions if the survivor gender or date of birth was missing or invalid.
Changes in actuarial assumptions	The assumed post-retirement benefit increase rate was changed from 2.0% per year through 2015 and 2.5% per year thereafter to 2.0% per year through 2043 and 2.5% thereafter. For accounting purposes, this change was treated as a difference between expected and actual experience.

SUMMARY OF ACTUARIAL ASSUMPTIONS (CONTINUED)

	Rate (%)*					
	Healthy Post-Retirement Mortality**		Healthy Pre-Retirement Mortality**		Disability Mortality	
Age	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
20	0.03%	0.02%	0.04%	0.02%	2.26%	0.75%
25	0.04	0.02	0.04	0.02	2.26	0.75
30	0.04	0.03	0.05	0.02	2.26	0.75
35	0.06	0.05	0.08	0.04	2.26	0.75
40	0.09	0.06	0.11	0.06	2.26	0.75
45	0.13	0.10	0.17	0.09	2.26	1.15
50	0.60	0.24	0.24	0.15	2.90	1.65
55	0.54	0.35	0.35	0.22	3.54	2.18
60	0.66	0.56	0.56	0.34	4.20	2.80
65	1.16	0.91	0.85	0.54	5.02	3.76
70	1.93	1.52	2.67	0.82	6.26	5.22

* *Generally, mortality rates are expected to increase as age increases. Due to the combination of pre-retirement rates, post-retirement rates, the white collar adjustment, and Projection Scale AA, the prescribed mortality tables have a few ages where assumed mortality decreases slightly instead of increases. We have used the rates as prescribed, but note that the prescribed assumption may not be reasonable at every age. If the rates were reasonably adjusted so that they decreased at all ages, we would not expect the valuation results to be materially different.*

** *These rates were adjusted for mortality improvements using projection scale AA.*

	Withdrawal Rates After Third Year		Disability Retirement	
Age	**Male**	**Female**	**Male**	**Female**
20	6.90%	8.55%	0.01%	0.01%
25	5.90	7.80	0.01	0.01
30	4.90	7.05	0.01	0.01
35	3.90	5.10	0.03	0.03
40	3.20	4.38	0.08	0.08
45	2.70	3.75	0.13	0.13
50	2.20	3.05	0.29	0.29
55	0.00	0.00	0.50	0.43
60	0.00	0.00	0.78	0.62
65	0.00	0.00	0.00	0.00

SUMMARY OF ACTUARIAL ASSUMPTIONS (CONCLUDED)

Retirement		
Age	**Rule of 90 Eligible**	**All Others**
55	20%	5%
56	15	5
57	15	5
58	15	5
59	20	6
60	20	7
61	22	12
62	40	22
63	30	16
64	30	18
65	40	40
66	30	30
67	25	25
68	25	25
69	25	25
70	30	30
71+	100	100

Salary Scale	
Year	**Increase**
1	10.25%
2	7.85
3	6.65
4	5.95
5	5.45
6	5.05
7	4.75
8	4.45
9	4.25
10	4.15
11	3.95
12	3.85
13	3.75
14	3.55
15	3.45
16	3.35
17+	3.25

SECTION G

CALCULATION OF THE SINGLE DISCOUNT RATE

CALCULATION OF THE SINGLE DISCOUNT RATE

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

The Single Discount Rate (SDR) is equivalent to applying these two rates to the benefits that are projected to be paid during the different time periods. The SDR reflects (1) the long-term expected rate of return on pension plan investments (during the period in which the plan fiduciary net position is projected to be sufficient to pay benefits) and (2) tax-exempt municipal bond rate based on an index of 20-year general obligation bonds with an average AA credit rating (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 long-term expected rate of return on pension plan investments is 7.90% and the municipal bond rate is 3.80% (based on the FRB rate as of June 25, 2015). The Plan’s Fiduciary Net Position was projected to be available to meet all projected future benefit payments of current active and inactive employees. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the Total Pension Liability. **The resulting single discount rate as of July 1, 2015 is 7.90%.**

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			
Year	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)
0	$ 2,714,418		$ 2,714,418				
1	2,727,526		2,727,526	$ 150,014	$ 150,014		$ 300,028
2	2,567,640	$ 255,349	2,822,989	141,220	141,220	$ 7,456	289,896
3	2,431,966	489,828	2,921,794	133,758	133,758	14,303	281,819
4	2,310,749	713,307	3,024,056	127,091	127,091	20,829	275,011
5	2,192,256	937,642	3,129,898	120,574	120,574	27,379	268,527
6	2,076,140	1,163,305	3,239,445	114,188	114,188	33,969	262,345
7	1,965,220	1,387,605	3,352,825	108,087	108,087	40,518	256,692
8	1,860,467	1,609,707	3,470,174	102,326	102,326	47,003	251,655
9	1,761,005	1,830,625	3,591,630	96,855	96,855	53,454	247,164
10	1,666,517	2,050,820	3,717,337	91,658	91,658	59,884	243,200
11	1,576,783	2,270,661	3,847,444	86,723	86,723	66,303	239,749
12	1,491,060	2,491,045	3,982,105	82,008	82,008	72,738	236,754
13	1,409,050	2,712,428	4,121,478	77,498	77,498	79,203	234,199
14	1,330,465	2,935,265	4,265,730	73,176	73,176	85,710	232,062
15	1,254,341	3,160,690	4,415,031	68,989	68,989	92,292	230,270
16	1,180,634	3,388,923	4,569,557	64,935	64,935	98,957	228,827
17	1,109,616	3,619,875	4,729,491	61,029	61,029	105,700	227,758
18	1,040,908	3,854,116	4,895,024	57,250	57,250	112,540	227,040
19	974,464	4,091,885	5,066,349	53,596	53,596	119,483	226,675
20	910,215	4,333,457	5,243,672	50,062	50,062	126,537	226,661
21	848,091	4,579,109	5,427,200	46,645	46,645	133,710	227,000
22	788,133	4,829,019	5,617,152	43,347	43,347	141,007	227,701
23	730,273	5,083,479	5,813,752	40,165	40,165	148,438	228,768
24	674,128	5,343,106	6,017,234	37,077	37,077	156,019	230,173
25	618,930	5,608,907	6,227,837	34,041	34,041	163,780	231,862
26	564,220	5,881,591	6,445,811	31,032	31,032	171,742	233,806
27	510,611	6,160,804	6,671,415	28,084	28,084	179,895	236,063
28	458,477	6,446,437	6,904,914	25,216	25,216	188,236	238,668
29	407,863	6,738,723	7,146,586	22,432	22,432	196,771	241,635
30	359,015	7,037,702	7,396,717	19,746	19,746	205,501	244,993
31	312,055	7,343,547	7,655,602	17,163	17,163	214,432	248,758
32	267,463	7,656,085	7,923,548	14,710	14,710	223,558	252,978
33	226,129	7,974,743	8,200,872	12,437	12,437	232,862	257,736
34	188,144	8,299,758	8,487,902	10,348	10,348	242,353	263,049
35	153,592	8,631,387	8,784,979	8,448	8,448	252,036	268,932
36	122,797	8,969,656	9,092,453	6,754	6,754	261,914	275,422
37	95,989	9,314,700	9,410,689	5,279	5,279	271,989	282,547
38	73,291	9,666,772	9,740,063	4,031	4,031	282,270	290,332
39	54,559	10,026,407	10,080,966	3,001	3,001	292,771	298,773
40	39,530	10,394,269	10,433,799	2,174	2,174	303,513	307,861
41	27,842	10,771,140	10,798,982	1,531	1,531	314,517	317,579
42	18,988	11,157,959	11,176,947	1,044	1,044	325,812	327,900
43	12,566	11,555,574	11,568,140	691	691	337,423	338,805
44	8,093	11,964,932	11,973,025	445	445	349,376	350,266
45	4,980	12,387,101	12,392,081	274	274	361,703	362,251
46	2,862	12,822,941	12,825,803	157	157	374,430	374,744
47	1,499	13,273,207	13,274,706	82	82	387,578	387,742
48	670	13,738,651	13,739,321	37	37	401,169	401,243
49	259	14,219,938	14,220,197	14	14	415,222	415,250
50	104	14,717,800	14,717,904	6	6	429,760	429,772

**Contributions related to future employees in excess of normal cost and expenses of 8.28% of pay.*

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

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

	Projected Covered-Employee Payroll			Projected Contributions			
Year	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)
51	42	15,232,989	15,233,031	$ 2	$ 2	$ 444,803	$ 444,807
52	16	15,766,171	15,766,187	1	1	460,372	460,374
53	6	16,317,998	16,318,004	-	-	476,486	476,486
54	2	16,889,132	16,889,134	-	-	493,163	493,163
55	-	17,480,253	17,480,253	-	-	510,423	510,423
56	-	18,092,062	18,092,062	-	-	528,288	528,288
57	-	18,725,285	18,725,285	-	-	546,778	546,778
58	-	19,380,669	19,380,669	-	-	565,916	565,916
59	-	20,058,993	20,058,993	-	-	585,723	585,723
60	-	20,761,058	20,761,058	-	-	606,223	606,223
61	-	21,487,695	21,487,695	-	-	627,441	627,441
62	-	22,239,764	22,239,764	-	-	649,401	649,401
63	-	23,018,156	23,018,156	-	-	672,130	672,130
64	-	23,823,791	23,823,791	-	-	695,655	695,655
65	-	24,657,624	24,657,624	-	-	720,003	720,003
66	-	25,520,641	25,520,641	-	-	745,203	745,203
67	-	26,413,863	26,413,863	-	-	771,285	771,285
68	-	27,338,348	27,338,348	-	-	798,280	798,280
69	-	28,295,191	28,295,191	-	-	826,220	826,220
70	-	29,285,522	29,285,522	-	-	855,137	855,137
71	-	30,310,515	30,310,515	-	-	885,067	885,067
72	-	31,371,383	31,371,383	-	-	916,044	916,044
73	-	32,469,382	32,469,382	-	-	948,106	948,106
74	-	33,605,810	33,605,810	-	-	981,290	981,290
75	-	34,782,014	34,782,014	-	-	1,015,635	1,015,635
76	-	35,999,384	35,999,384	-	-	1,051,182	1,051,182
77	-	37,259,363	37,259,363	-	-	1,087,973	1,087,973
78	-	38,563,440	38,563,440	-	-	1,126,052	1,126,052
79	-	39,913,161	39,913,161	-	-	1,165,464	1,165,464
80	-	41,310,121	41,310,121	-	-	1,206,256	1,206,256
81	-	42,755,976	42,755,976	-	-	1,248,474	1,248,474
82	-	44,252,435	44,252,435	-	-	1,292,171	1,292,171
83	-	45,801,270	45,801,270	-	-	1,337,397	1,337,397
84	-	47,404,314	47,404,314	-	-	1,384,206	1,384,206
85	-	49,063,465	49,063,465	-	-	1,432,653	1,432,653
86	-	50,780,687	50,780,687	-	-	1,482,796	1,482,796
87	-	52,558,011	52,558,011	-	-	1,534,694	1,534,694
88	-	54,397,541	54,397,541	-	-	1,588,408	1,588,408
89	-	56,301,455	56,301,455	-	-	1,644,002	1,644,002
90	-	58,272,006	58,272,006	-	-	1,701,543	1,701,543
91	-	60,311,526	60,311,526	-	-	1,761,097	1,761,097
92	-	62,422,430	62,422,430	-	-	1,822,735	1,822,735
93	-	64,607,215	64,607,215	-	-	1,886,531	1,886,531
94	-	66,868,467	66,868,467	-	-	1,952,559	1,952,559
95	-	69,208,863	69,208,863	-	-	2,020,899	2,020,899
96	-	71,631,174	71,631,174	-	-	2,091,630	2,091,630
97	-	74,138,265	74,138,265	-	-	2,164,837	2,164,837
98	-	76,733,104	76,733,104	-	-	2,240,607	2,240,607
99	-	79,418,763	79,418,763	-	-	2,319,028	2,319,028
100	-	82,198,419	82,198,419	-	-	2,400,194	2,400,194

**Contributions related to future employees in excess of normal cost and expenses of 8.28% of pay.*

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

SINGLE DISCOUNT RATE DEVELOPMENT
PROJECTION OF PLAN FIDUCIARY NET POSITION (DOLLARS IN THOUSANDS)

Year	Projected Beginning Plan Net Fiduciary Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expenses	Projected Investment Earnings at 7.90%	Projected Ending Plan Fiduciary Net Position
	(a)	(b)	(c)	(d)	(e)	(f)=(a)+(b)-(c)-(d)+(e)
1	$ 11,638,319	$ 300,028	$ 730,367	$ 9,001	$ 902,403	$ 12,101,382
2	12,101,382	289,896	788,463	8,473	936,362	12,530,704
3	12,530,704	281,819	846,789	8,025	967,722	12,925,431
4	12,925,431	275,011	901,003	7,625	996,557	13,288,371
5	13,288,371	268,527	954,503	7,234	1,022,920	13,618,081
6	13,618,081	262,345	1,005,671	6,851	1,046,759	13,914,663
7	13,914,663	256,692	1,055,802	6,485	1,068,042	14,177,110
8	14,177,110	251,655	1,100,927	6,140	1,086,845	14,408,543
9	14,408,543	247,164	1,144,665	5,811	1,103,272	14,608,503
10	14,608,503	243,200	1,185,169	5,500	1,117,358	14,778,392
11	14,778,392	239,749	1,223,475	5,203	1,129,173	14,918,636
12	14,918,636	236,754	1,258,974	4,920	1,138,771	15,030,267
13	15,030,267	234,199	1,291,215	4,650	1,146,253	15,114,854
14	15,114,854	232,062	1,320,514	4,391	1,151,727	15,173,738
15	15,173,738	230,270	1,347,543	4,139	1,155,272	15,207,598
16	15,207,598	228,827	1,371,327	3,896	1,156,978	15,218,180
17	15,218,180	227,758	1,392,612	3,662	1,156,957	15,206,621
18	15,206,621	227,040	1,410,739	3,435	1,155,323	15,174,810
19	15,174,810	226,675	1,426,260	3,216	1,152,202	15,124,211
20	15,124,211	226,661	1,439,538	3,004	1,147,698	15,056,028
21	15,056,028	227,000	1,450,670	2,799	1,141,902	14,971,461
22	14,971,461	227,701	1,458,871	2,601	1,134,938	14,872,628
23	14,872,628	228,768	1,463,234	2,410	1,127,010	14,762,762
24	14,762,762	230,173	1,463,578	2,225	1,118,379	14,645,511
25	14,645,511	231,862	1,460,855	2,042	1,109,294	14,523,770
26	14,523,770	233,806	1,456,508	1,862	1,099,927	14,399,133
27	14,399,133	236,063	1,450,405	1,685	1,090,411	14,273,517
28	14,273,517	238,668	1,441,981	1,513	1,080,922	14,149,613
29	14,149,613	241,635	1,435,294	1,346	1,071,514	14,026,122
30	14,026,122	244,993	1,430,161	1,185	1,062,093	13,901,862
31	13,901,862	248,758	1,423,633	1,030	1,052,682	13,778,639
32	13,778,639	252,978	1,415,818	883	1,043,419	13,658,335
33	13,658,335	257,736	1,405,601	746	1,034,501	13,544,225
34	13,544,225	263,049	1,393,017	621	1,026,185	13,439,821
35	13,439,821	268,932	1,378,900	507	1,018,716	13,348,062
36	13,348,062	275,422	1,362,526	405	1,012,357	13,272,910
37	13,272,910	282,547	1,343,977	317	1,007,418	13,218,581
38	13,218,581	290,332	1,322,674	242	1,004,256	13,190,253
39	13,190,253	298,773	1,298,162	180	1,003,298	13,193,982
40	13,193,982	307,861	1,270,944	130	1,005,001	13,235,770
41	13,235,770	317,579	1,241,035	92	1,009,839	13,322,061
42	13,322,061	327,900	1,208,289	63	1,018,326	13,459,935
43	13,459,935	338,805	1,172,814	41	1,031,016	13,656,901
44	13,656,901	350,266	1,134,197	27	1,048,518	13,921,461
45	13,921,461	362,251	1,093,157	16	1,071,473	14,262,012
46	14,262,012	374,744	1,051,037	9	1,100,493	14,686,203
47	14,686,203	387,742	1,008,384	5	1,136,161	15,201,717
48	15,201,717	401,243	965,415	2	1,179,075	15,816,618
49	15,816,618	415,250	922,246	1	1,229,867	16,539,488
50	16,539,488	429,772	878,924	-	1,289,216	17,379,552

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

SINGLE DISCOUNT RATE DEVELOPMENT
PROJECTION OF PLAN FIDUCIARY NET POSITION (DOLLARS IN THOUSANDS)

Year	Projected Beginning Plan Net Fiduciary Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expenses	Projected Investment Earnings at 7.90%	Projected Ending Plan Fiduciary Net Position
	(a)	(b)	(c)	(d)	(e)	(f)=(a)+(b)-(c)-(d)+(e)
51	$ 17,379,552	$ 444,807	$ 835,483	$ -	$ 1,357,847	$ 18,346,723
52	18,346,723	460,374	791,917	-	1,436,544	19,451,724
53	19,451,724	476,486	748,191	-	1,526,158	20,706,177
54	20,706,177	493,163	704,290	-	1,627,607	22,122,657
55	22,122,657	510,423	660,240	-	1,741,885	23,714,725
56	23,714,725	528,288	616,107	-	1,870,061	25,496,967
57	25,496,967	546,778	571,997	-	2,013,284	27,485,032
58	27,485,032	565,916	528,057	-	2,172,785	29,695,676
59	29,695,676	585,723	484,491	-	2,349,882	32,146,790
60	32,146,790	606,223	441,543	-	2,545,978	34,857,448
61	34,857,448	627,441	399,491	-	2,762,572	37,847,970
62	37,847,970	649,401	358,624	-	3,001,258	41,140,005
63	41,140,005	672,130	319,245	-	3,263,735	44,756,625
64	44,756,625	695,655	281,665	-	3,551,816	48,722,431
65	48,722,431	720,003	246,181	-	3,867,433	53,063,686
66	53,063,686	745,203	213,047	-	4,212,652	57,808,494
67	57,808,494	771,285	182,472	-	4,589,688	62,986,995
68	62,986,995	798,280	154,614	-	5,000,915	68,631,576
69	68,631,576	826,220	129,564	-	5,448,890	74,777,122
70	74,777,122	855,137	107,331	-	5,936,370	81,461,298
71	81,461,298	885,067	87,867	-	6,466,334	88,724,832
72	88,724,832	916,044	71,069	-	7,042,004	96,611,811
73	96,611,811	948,106	56,783	-	7,666,872	105,170,006
74	105,170,006	981,290	44,807	-	8,344,719	114,451,208
75	114,451,208	1,015,635	34,916	-	9,079,648	124,511,575
76	124,511,575	1,051,182	26,872	-	9,876,106	135,411,991
77	135,411,991	1,087,973	20,428	-	10,738,914	147,218,450
78	147,218,450	1,126,052	15,338	-	11,673,297	160,002,461
79	160,002,461	1,165,464	11,371	-	12,684,915	173,841,469
80	173,841,469	1,206,256	8,324	-	13,779,896	188,819,297
81	188,819,297	1,248,474	6,017	-	14,964,869	205,026,623
82	205,026,623	1,292,171	4,294	-	16,247,008	222,561,508
83	222,561,508	1,337,397	3,024	-	17,634,066	241,529,947
84	241,529,947	1,384,206	2,100	-	19,134,422	262,046,475
85	262,046,475	1,432,653	1,439	-	20,757,131	284,234,820
86	284,234,820	1,482,796	971	-	22,511,971	308,228,616
87	308,228,616	1,534,694	646	-	24,409,504	334,172,168
88	334,172,168	1,588,408	424	-	26,461,135	362,221,287
89	362,221,287	1,644,002	274	-	28,679,175	392,544,190
90	392,544,190	1,701,543	174	-	31,076,918	425,322,477
91	425,322,477	1,761,097	109	-	33,668,713	460,752,178
92	460,752,178	1,822,735	67	-	36,470,050	499,044,896
93	499,044,896	1,886,531	41	-	39,497,647	540,429,033
94	540,429,033	1,952,559	24	-	42,769,553	585,151,121
95	585,151,121	2,020,899	14	-	46,305,247	633,477,253
96	633,477,253	2,091,630	8	-	50,125,752	685,694,627
97	685,694,627	2,164,837	4	-	54,253,762	742,113,222
98	742,113,222	2,240,607	2	-	58,713,767	803,067,594
99	803,067,594	2,319,028	1	-	63,532,201	868,918,822
100	868,918,822	2,400,194	1	-	68,737,593	940,056,608

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

SINGLE DISCOUNT RATE DEVELOPMENT
PRESENT VALUES OF PROJECTED BENEFITS (DOLLARS IN THOUSANDS)

Year	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)
1	$ 11,638,319	$ 730,367	$ 730,367	$ -	$ 703,122	$ -	$ 703,122
2	12,101,382	788,463	788,463	-	703,476	-	703,476
3	12,530,704	846,789	846,789	-	700,199	-	700,199
4	12,925,431	901,003	901,003	-	690,480	-	690,480
5	13,288,371	954,503	954,503	-	677,924	-	677,924
6	13,618,081	1,005,671	1,005,671	-	661,970	-	661,970
7	13,914,663	1,055,802	1,055,802	-	644,085	-	644,085
8	14,177,110	1,100,927	1,100,927	-	622,440	-	622,440
9	14,408,543	1,144,665	1,144,665	-	599,786	-	599,786
10	14,608,503	1,185,169	1,185,169	-	575,541	-	575,541
11	14,778,392	1,223,475	1,223,475	-	550,643	-	550,643
12	14,918,636	1,258,974	1,258,974	-	525,134	-	525,134
13	15,030,267	1,291,215	1,291,215	-	499,149	-	499,149
14	15,114,854	1,320,514	1,320,514	-	473,100	-	473,100
15	15,173,738	1,347,543	1,347,543	-	447,437	-	447,437
16	15,207,598	1,371,327	1,371,327	-	421,996	-	421,996
17	15,218,180	1,392,612	1,392,612	-	397,170	-	397,170
18	15,206,621	1,410,739	1,410,739	-	372,882	-	372,882
19	15,174,810	1,426,260	1,426,260	-	349,383	-	349,383
20	15,124,211	1,439,538	1,439,538	-	326,817	-	326,817
21	15,056,028	1,450,670	1,450,670	-	305,231	-	305,231
22	14,971,461	1,458,871	1,458,871	-	284,483	-	284,483
23	14,872,628	1,463,234	1,463,234	-	264,442	-	264,442
24	14,762,762	1,463,578	1,463,578	-	245,139	-	245,139
25	14,645,511	1,460,855	1,460,855	-	226,768	-	226,768
26	14,523,770	1,456,508	1,456,508	-	209,539	-	209,539
27	14,399,133	1,450,405	1,450,405	-	193,384	-	193,384
28	14,273,517	1,441,981	1,441,981	-	178,184	-	178,184
29	14,149,613	1,435,294	1,435,294	-	164,373	-	164,373
30	14,026,122	1,430,161	1,430,161	-	151,793	-	151,793
31	13,901,862	1,423,633	1,423,633	-	140,037	-	140,037
32	13,778,639	1,415,818	1,415,818	-	129,072	-	129,072
33	13,658,335	1,405,601	1,405,601	-	118,759	-	118,759
34	13,544,225	1,393,017	1,393,017	-	109,078	-	109,078
35	13,439,821	1,378,900	1,378,900	-	100,068	-	100,068
36	13,348,062	1,362,526	1,362,526	-	91,640	-	91,640
37	13,272,910	1,343,977	1,343,977	-	83,774	-	83,774
38	13,218,581	1,322,674	1,322,674	-	76,410	-	76,410
39	13,190,253	1,298,162	1,298,162	-	69,503	-	69,503
40	13,193,982	1,270,944	1,270,944	-	63,064	-	63,064
41	13,235,770	1,241,035	1,241,035	-	57,071	-	57,071
42	13,322,061	1,208,289	1,208,289	-	51,497	-	51,497
43	13,459,935	1,172,814	1,172,814	-	46,325	-	46,325
44	13,656,901	1,134,197	1,134,197	-	41,520	-	41,520
45	13,921,461	1,093,157	1,093,157	-	37,088	-	37,088
46	14,262,012	1,051,037	1,051,037	-	33,048	-	33,048
47	14,686,203	1,008,384	1,008,384	-	29,385	-	29,385
48	15,201,717	965,415	965,415	-	26,073	-	26,073
49	15,816,618	922,246	922,246	-	23,084	-	23,084
50	16,539,488	878,924	878,924	-	20,389	-	20,389

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

SINGLE DISCOUNT RATE DEVELOPMENT
PRESENT VALUES OF PROJECTED BENEFITS (CONTINUED)
(DOLLARS IN THOUSANDS)

Year	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)
51	$ 17,379,552	$ 835,483	$ 835,483	$ -	$ 17,962	$ -	$ 17,962
52	18,346,723	791,917	791,917	-	15,779	-	15,779
53	19,451,729	748,191	748,191	-	13,816	-	13,816
54	20,706,183	704,290	704,290	-	12,053	-	12,053
55	22,122,663	660,240	660,240	-	10,472	-	10,472
56	23,714,732	616,107	616,107	-	9,057	-	9,057
57	25,496,975	571,997	571,997	-	7,793	-	7,793
58	27,485,040	528,057	528,057	-	6,667	-	6,667
59	29,695,684	484,491	484,491	-	5,669	-	5,669
60	32,146,798	441,543	441,543	-	4,788	-	4,788
61	34,857,456	399,491	399,491	-	4,015	-	4,015
62	37,847,978	358,624	358,624	-	3,341	-	3,341
63	41,140,012	319,245	319,245	-	2,756	-	2,756
64	44,756,633	281,665	281,665	-	2,254	-	2,254
65	48,722,438	246,181	246,181	-	1,825	-	1,825
66	53,063,692	213,047	213,047	-	1,464	-	1,464
67	57,808,501	182,472	182,472	-	1,162	-	1,162
68	62,987,002	154,614	154,614	-	913	-	913
69	68,631,582	129,564	129,564	-	709	-	709
70	74,777,128	107,331	107,331	-	544	-	544
71	81,461,304	87,867	87,867	-	413	-	413
72	88,724,838	71,069	71,069	-	309	-	309
73	96,611,817	56,783	56,783	-	229	-	229
74	105,170,012	44,807	44,807	-	168	-	168
75	114,451,213	34,916	34,916	-	121	-	121
76	124,511,580	26,872	26,872	-	86	-	86
77	135,411,996	20,428	20,428	-	61	-	61
78	147,218,456	15,338	15,338	-	42	-	42
79	160,002,468	11,371	11,371	-	29	-	29
80	173,841,477	8,324	8,324	-	20	-	20
81	188,819,304	6,017	6,017	-	13	-	13
82	205,026,630	4,294	4,294	-	9	-	9
83	222,561,515	3,024	3,024	-	6	-	6
84	241,529,954	2,100	2,100	-	4	-	4
85	262,046,481	1,439	1,439	-	2	-	2
86	284,234,827	971	971	-	1	-	1
87	308,228,622	646	646	-	1	-	1
88	334,172,174	424	424	-	1	-	1
89	362,221,294	274	274	-	-	-	-
90	392,544,198	174	174	-	-	-	-
91	425,322,484	109	109	-	-	-	-
92	460,752,185	67	67	-	-	-	-
93	499,044,902	41	41	-	-	-	-
94	540,429,039	24	24	-	-	-	-
95	585,151,128	14	14	-	-	-	-
96	633,477,260	8	8	-	-	-	-
97	685,694,635	4	4	-	-	-	-
98	742,113,230	2	2	-	-	-	-
99	803,067,601	1	1	-	-	-	-
100	868,918,829	1	1	-	-	-	-
				Totals	$ 14,637,509	$ -	$ 14,637,509

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

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.