Gabriel Roeder Smith & Company
Consultants & Actuaries

MINNESOTA STATE RETIREMENT SYSTEM

STATE PATROL 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 Patrol Retirement Fund
St. Paul, Minnesota

Dear Board of Directors:

This report provides accounting and financial reporting information that is intended to comply with the Governmental Accounting Standards Board (GASB) Statements No. 67 and No. 68 for the State Patrol Retirement Fund ("SPRF"). 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 Patrol Retirement Fund as of the measurement date. All calculations have been made in conformity with generally accepted actuarial principles and practices as well as with the Actuarial Standards of Practice issued by the Actuarial Standards Board. 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,

Bonita J. Wurst

By ________________________________
Bonita J. Wurst
ASA, EA, MAAA

Brian B Murphy

By ________________________________
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	816
- Survivors	154
- Disability Retirements	57
- Deferred Retirements	52
- Terminated other non-vested	17
- Active Members	843
- Total	1,939
Covered-employee Payroll [1]	$ 68,463
Net Pension Liability	
Total Pension Liability	$ 838,235
Plan Fiduciary Net Position	664,530
Net Pension Liability	$ 173,705
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	79.28%
Net Pension Liability as a Percentage of Covered-employee Payroll	253.72%
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)	$ 13,518

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

	Deferred Outflows of Resources	Deferred Inflows of Resources
Difference between expected and actual experience in the measurement of Total Pension Liability	$ -	$ 14,559
Changes in assumptions	20,038	-
Net difference between projected and actual earnings on pension plan investments	18,051	36,978
Totals	$ 38,089	$ 51,537

[1] *Assumed equal to actual member contributions divided by employee contribution rate.*
[2] *Based on Bond Buyer 20-Bond Index of general obligation municipal bonds as of June 25, 2015.*

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 SPRF 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 Patrol Retirement Fund can be found online at www.msrs.state.mn.us/financial-information or obtained from MSRS at 60 Empire Drive, Suite 300, St. Paul, MN, 55103 or requested via email at info@msrs.us or telephone at 1-800-657-5757.

Required Supplementary Information

GASB Statement No. 67 requires a 10-year fiscal history of:

- sources of changes in the net pension liability;
- information about the components of the net pension liability and related ratios, including the pension plan's fiduciary net position as a percentage of the total pension liability, and the net pension liability as a percent of covered-employee payroll; and
- a comparison of the actual employer contributions to the actuarially determined contributions based on the plan's funding policy.

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 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 a published by the Federal Reserve Board); and the resulting Single Discount Rate is 7.90%.

Effective Date and Transition

GASB Statement Nos. 67 and 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

1.	Service Cost	$	16,144
2.	Interest on the Total Pension Liability		63,753
3.	Current-Period Benefit Changes		0
4.	Employee Contributions (made negative for addition here)		(9,174)
5.	Projected Earnings on Plan Investments (made negative for addition here)		(51,467)
6.	Pension Plan Administrative Expense		170
7.	Other Changes in Plan Fiduciary Net Position		0
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		(2,143)
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		4,513
11.	**Increases/(Decreases) from Experience in the Current Reporting Period**	**$**	**21,796**
12.	Recognition of Outflow (Inflow) of Resources due to differences between expected and actual experience in the measurement of the Total Pension Liability		
	Arising from Prior Reporting Periods		(962)
13.	Recognition of Outflow (Inflow) of Resources due to assumption changes		
	Arising from Prior Reporting Periods		5,010
14.	Recognition of Outflow (Inflow) of Resources due to the difference between projected (7.90%) and actual earnings on Pension Plan Investments		
	Arising from Prior Reporting Periods		(12,326)
15.	**Total Pension Expense / (Income)**	**$**	**13,518**

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	$	(12,855)
2. Assumption Changes (gains) or losses	$	-
3. Recognition period for Liabilities: Average of the expected remaining service lives of all employees {in years, rounded to the nearest whole number}		6.0000
4. Outflow (Inflow) of Resources to be recognized in the current pension expense for the difference between expected and actual experience of the Total Pension Liability	$	(2,143)
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	$	(2,143)
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	$	(10,712)
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	$	(10,712)
B. Outflows (Inflows) of Resources due to Assets		
1. Net difference between projected and actual earnings on pension plan investments (gains) or losses	$	22,564
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	$	4,513
4. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Assets	$	18,051

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	$ 5,010	$ 3,105	$ 1,905
2. Due to Assets	4,513	12,326	(7,813)
3. Total	$ 9,523	$ 15,431	$ (5,908)

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

	Outflows of Resources	Inflows of Resources	Net Outflows/(Inflows) of Resources
1. Differences between expected and actual experience	$ -	$ 3,105	$ (3,105)
2. Assumption Changes	5,010	-	5,010
3. Net Difference between projected and actual earnings on pension plan investments	$ 4,513	12,326	(7,813)
4. Total	$ 9,523	$ 15,431	$ (5,908)

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	$ -	$ 14,559	$ (14,559)
2. Assumption Changes	20,038	-	20,038
3. Net Difference between projected and actual earnings on pension plan investments	18,051	36,978	(18,927)
4. Total	$ 38,089	$ 51,537	$ (13,448)

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	$ (5,908)
2017	(5,908)
2018	(5,908)
2019	6,416
2020	(2,140)
Thereafter	-
Total	$ (13,448)

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

Assets		**June 30, 2015**
Cash & Short-term Investments	$	12,692
Receivables		876
Investment Pools (at fair value)		651,358
Securities Lending Collateral		67,725
Capital Assets		0
Total Assets	**$**	**732,651**
Total Deferred Outflows of Resources	**$**	**0**
Total Liabilities	**$**	**(68,121)**
Total Deferred Inflows of Resources	**$**	**0**
Net Position Restricted for Pensions	**$**	**664,530**

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**	**$**	**667,340**
Additions			
2.	Contributions		
	a. Employee	$	9,174
	b. Employer		13,763
	c. Other sources - Supplemental State Aid		1,000
	d. Total contributions	$	23,937
3.	Investment income		
	a. Investment income/(loss)	$	29,833
	b. Investment expenses		(930)
	c. Net investment income/(loss)	$	28,903
4.	Other Additions		-
5.	**Total Additions** *(2.d.) + (3.c.) + (4.)*	**$**	**52,840**
Deductions			
6.	Benefits Paid		
	a. Annuity benefits	$	(55,465)
	b. Refunds		(15)
	c. Total benefits paid	$	(55,480)
7.	Expenses		
	a. Other deductions	$	-
	b. Administrative		(170)
	c. Total expenses	$	(170)
8.	**Total Deductions** *(6.c.) + (7.c.)*	**$**	**(55,650)**
9.	**Net increase/(decrease) in fiduciary net position** *(5.) + (8.)*	**$**	**(2,810)**
10.	**Net Position at market value at end of year** *(1.) + (9.)*	**$**	**664,530**
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	$	16,144
2. Interest on the Total Pension Liability		63,753
3. Changes of benefit terms		
4. Difference between expected and actual experience of the Total Pension Liability (1)		(12,855)
5. Changes of assumptions		-
6. Benefit payments, including refunds of employee contributions		(55,480)
7. Net change in total pension liability	$	11,562
8. Total pension liability – beginning		826,673
9. Total pension liability – ending	**$**	**838,235**
B. Plan fiduciary net position		
1. Contributions – employer (2)	$	14,763
2. Contributions – employee		9,174
3. Net investment income		28,903
4. Benefit payments, including refunds of employee contributions		(55,480)
5. Pension Plan Administrative Expense		(170)
6. Other changes		-
7. Net change in plan fiduciary net position	$	(2,810)
8. Plan fiduciary net position – beginning		667,340
9. Plan fiduciary net position – ending	**$**	**664,530**
C. Net pension liability, *A.9. - B.9.*	**$**	**173,705**
D. Plan fiduciary net position as a percentage of the total pension liability, *B.9. / A.9.*		**79.28%**
E. Covered-employee payroll (3)	**$**	**68,463**
F. Net pension liability as a percentage of covered-employee payroll, *C. / E.*		**253.72%**

(1) Includes impact of changes in expected timing of future post-retirement benefit increases.
(2) Includes $1 million supplemental state aid.
(3) Assumed equal to actual member contributions divided by employee contribution rate.

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	$ 16,144	$ 14,514								
Interest on the Total Pension Liability	63,753	60,183								
Benefit Changes	0	0								
Difference between Expected and Actual Experience	(12,855)	(5,771)								
Assumption Changes	-	30,058								
Benefit Payments	(55,465)	(53,697)								
Refunds	(15)	(25)								
Net Change in Total Pension Liability	$ 11,562	$ 45,262								
Total Pension Liability - Beginning	826,673	781,411								
Total Pension Liability - Ending (a)	**$ 838,235**	**$ 826,673**								
Plan Fiduciary Net Position										
Employer Contributions [1]	$ 14,763	$ 12,894								
Employee Contributions	9,174	7,930								
Pension Plan Net Investment Income	28,903	107,187								
Benefit Payments	(55,465)	(53,697)								
Refunds	(15)	(25)								
Pension Plan Administrative Expense	(170)	(150)								
Other	0	0								
Net Change in Plan Fiduciary Net Position	**$ (2,810)**	**$ 74,139**								
Plan Fiduciary Net Position - Beginning	**667,340**	**593,201**								
Plan Fiduciary Net Position - Ending (b)	**$ 664,530**	**$ 667,340**								
Net Pension Liability - Ending (a) - (b)	**$ 173,705**	**$ 159,333**								
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	**79.28 %**	**80.73 %**								
Covered-Employee Payroll [2]	**$ 68,463**	**$ 63,952**								
Net Pension Liability as a Percentage of Covered-Employee Payroll	**253.72 %**	**249.15 %**								

Notes to Schedule:

(1) Includes $1 million supplemental state aid.
(2) Assumed equal to actual member contributions divided by employee contribution rate.

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) / (c)	(d)	(c) / (d)
2006						
2007						
2008						
2009						
2010						
2011						
2012						
2013						
2014	$ 826,673	$ 667,340	$ 159,333	80.73%	$ 63,952	249.14%
2015	838,235	664,530	173,705	79.28%	68,463	253.72%

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	$ 6,741	$ 7,055	$ (314)	$ 57,765	12.21%
2007	11,427	7,461	3,966	61,498	12.13
2008	12,355	8,279	4,076	60,029	13.79
2009	14,999	9,178	5,821	61,511	14.92
2010	17,410	10,104	7,306	63,250	15.97
2011	14,826	9,873	4,953	63,250	15.61
2012	14,912	11,620	3,292	62,524 (2)	18.58
2013	18,711	11,482	7,229	62,121 (2)	18.48
2014	18,444	12,894 (3)	5,550	63,952 (2)	20.16
2015	20,648	14,763 (3)	5,885	68,463 (2)	21.56

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.

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

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	22 years
Asset Valuation Method	5-Year smoothed market; no corridor
Inflation	2.75%
Salary Increases	Service based tables ranging from 7.75% with one year of service to 3.75% with 21 or more years of service, including inflation
Investment Rate of Return	8.00%
Retirement Age	Experience-based table of rates that are specific to the type of eligibility condition. Last updated for the 2012 valuation pursuant to an experience study of the period 2006 - 2011, prepared by a former actuary.
Healthy Post-retirement Mortality	RP-2000 annuitant generational mortality table, projected with mortality improvement scale AA, white collar adjustment, set back two years for males and set forward one year for females.

Other Information:

Benefit Increases After Retirement	The post-retirement benefit increase is assumed to increase from 1.0% to 1.5% beginning January 1, 2032 and from 1.5% to 2.5% beginning January 1, 2053.

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	18.69 %
2015	4.46 %

[1] *Annual money-weighted rate of return, net of investment expenses.*

The Minnesota State Board of Investment (SBI) compiled this data and the related investment notes and provided it to MSRS for GASB-compliance purposes. MSRS furnished this information to us for inclusion within this report. We did not audit this information. We are not responsible for its accuracy or completeness.

Rate of Return

For the fiscal year ended June 30, 2015, the annual money-weighted rate of return for the State Patrol Retirement Fund was 4.46%. The money-weighted rate of return is a method of calculating period-by-period returns on pension plan investments that adjusts for the changing amounts actually invested. For purposes of this schedule, the money-weighted rate of return is calculated as the internal rate of return on pension plan investments, net of pension plan investment expense.

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	$ 935,477	$ 838,235	$ 757,106
Net Position Restricted for Pensions	664,530	664,530	664,530
Net Pension Liability	**$270,947**	**$173,705**	**$ 92,576**

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	**$ 826,673**	**$ 667,340**	**$ 159,333**	**$ 25,048**	**$ 54,113**	
Changes for the Year:						
Service Cost	$ 16,144		$ 16,144			$ 16,144
Interest on Total Pension Liability	63,753		63,753			63,753
Interest on Fiduciary Net Position [1]		$ 51,467	(51,467)			(51,467)
Changes in Benefit Terms						
Liability Experience Gains and Losses	(12,855)		(12,855)		$ 10,712	(2,143)
Changes in Assumptions	-		-		-	-
Recognition of Deferred Outflows/(Inflows) of Resources Arising from Prior Reporting Periods						
Liability Experience Gains/(Losses)					(962)	(962)
Assumption Changes				$ (5,010)		5,010
Investment Gains/(Losses)					(12,326)	(12,326)
Contributions - Employer [2]		14,763	(14,763)			
Contributions - Employees		9,174	(9,174)			(9,174)
Asset Gain/(Loss) [1]		(22,564)	22,564	18,051		4,513
Benefit Payments and Refunds	(55,480)	(55,480)	-			
Administrative Expenses		(170)	170			170
Other changes		-	-			-
Net Changes	**$ 11,562**	**$ (2,810)**	**$ 14,372**	**$ 13,041**	**$ (2,576)**	**$ 13,518**
Balance End of Year	**$ 838,235**	**$ 664,530**	**$ 173,705**	**$ 38,089**	**$ 51,537**	

(1) *The sum of these items equals the net investment income of $28,903.*
(2) *Includes supplemental state aid of $1,000.*

SUMMARY OF POPULATION STATISTICS

		Terminated		Recipients			
	Actives	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	Total
Members on 7/1/2014	**858**	**44**	**17**	**776**	**54**	**155**	**1,904**
New Members	56	0	0	0	0	0	**56**
Return to active	0	0	0	0	0	0	**0**
Terminated non-vested	(5)	0	5	0	0	0	**0**
Service retirements	(51)	(2)	0	53	0	0	**0**
Terminated deferred	(8)	8	0	0	0	0	**0**
Terminated refund/transfer	(2)	0	(5)	0	0	0	**(7)**
Deaths	0	0	0	(15)	(2)	(9)	**(26)**
New beneficiary	0	0	0	0	0	8	**8**
Disabled	(5)	0	0	0	5	0	**0**
Unexpected status change	0	2	0	2	0	0	**4**
Net change	(15)	8	0	40	3	(1)	**35**
Members on 6/30/2015	**843**	**52**	**17**	**816**	**57**	**154**	**1,939**

SECTION E

SUMMARY OF BENEFITS

SUMMARY OF PLAN PROVISIONS

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

Plan year	July 1 through June 30
Eligibility	State troopers, conservation officers, certain crime bureau and gambling enforcement officers, and certain other persons listed in Minnesota Statutes 352B.011 subdivision 10.
Contributions	Percent of Salary **Effective Date** / **Member** / **Employer** July 1, 2014 – June 30, 2016: 13.40% / 20.10% July 1, 2016 and later: 14.40% / 21.60% Member contributions are "picked up" according to the provisions of Internal Revenue Code 414(h).
State Contributions	$1 million paid annually on October 1 until both the Public Employees Retirement Association Police and Fire Plan and the State Patrol Retirement Fund become 90% funded (on a Market Value of Assets basis).
Allowable service	Service during which member contributions were deducted. Includes period receiving temporary Worker's Compensation and reduced salary from employer. See Normal Retirement benefit definition below for information about service limits.
Salary	Salaries excluding lump sum payments at separation.
Average salary	Average of the five highest years of Salary. Average Salary is based on all Allowable Service if less than five years. Average Salary is based on all years without regard to any service limits.
Retirement	
Normal retirement benefit	
Age/Service requirement	Age 55 and three years (ten years if first hired after June 30, 2013) of Allowable Service.
Amount	3.00% of Average Salary for each year of Allowable Service up to 33 years. Members with at least 28 years of service as of July 1, 2013 are not subject to this service limit. Member contributions made after the service cap will be refunded at retirement.
Early retirement benefit	
Age/Service requirement	Age 50 and three years (ten years if first hired after June 30, 2013) of Allowable Service.
Amount	Normal Retirement Benefit based on Allowable Service and Average Salary at retirement reduced by 1/10% for each month that the member is under age 55. If the effective date of retirement is after June 30, 2015, the reduction is 0.34% for each month that the member is under age 55 at the time of retirement.

SUMMARY OF PLAN PROVISIONS (CONTINUED)

Retirement (Concluded)	
Form of payment	Life annuity. Actuarially equivalent options are: 50%, 75%, or 100% Joint and Survivor, or 15-year certain. If a Joint and Survivor benefit is elected and the beneficiary predeceases the annuitant, the annuitant's benefit increases to the Life Annuity amount. This "bounce back" is subsidized by the plan.
Benefit increases	Since January 1, 2014, benefit recipients receive annual 1.0% benefit increases. When the funding ratio reaches 85% for two consecutive years, the benefit increase will increase to 1.5%; the benefit will revert to 2.5% when the funding ratio reaches 90% for two consecutive years (actuarial accrued liability funding ratio determined using Market Value of Assets). If, after reverting to a 1.5% increase, the funding ratio declines to less than 75% for one year or 80% for two consecutive years, the benefit increase will decrease to 1.0%. 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.
Disability	
Occupational disability benefit	
Age/Service requirement	Member who cannot perform his duties as a direct result of a disability relating to an act of duty.
Amount	60% of Average Salary plus 3.00% of Average Salary for each year in excess of 20 years of Allowable Service (pro rata for completed months). Payments cease at age 65 (age 55 if disabled after June 30, 2015) or earlier if disability ceases or death occurs. Benefits may be paid upon re-employment but salary plus benefit cannot exceed current salary of position held at time of disability.
Non-duty disability benefit	
Age/Service requirement	At least one year of Allowable Service and disability not related to covered employment.
Amount	Normal Retirement Benefit based on Allowable Service (minimum of 15 years) and Average Salary at disability without reduction for commencement before age 55. Payments cease at age 65 (age 55 if disabled after June 30, 2015) or earlier if disability ceases or death occurs. Benefits may be paid upon re-employment but salary plus benefit cannot exceed current salary of position held at time of disability.

SUMMARY OF PLAN PROVISIONS (CONTINUED)

Disability (continued)	
Retirement after disability	
Age/Service requirement	Age 65 (age 55 if disabled after June 30, 2015) with continued disability.
Amount	Optional annuity continues. Otherwise, normal retirement benefit equal to the disability benefit paid, or an actuarially equivalent option.
Form of payment	Same as for retirement.
Benefit increases	Same as for retirement.

Death	
Surviving spouse benefit	
Age/Service requirement	Member who is active or receiving a disability benefit or former member.
Amount	50% of Average Salary if member was active or occupational disability and either had less than three years (five years if first hired after June 30, 2013) of Allowable Service or was under age 55. Annuity is paid for life. Surviving spouse receives the 100% joint and survivor benefit commencing on the member's 55th birthday if member was active or a disability with three years (five years if first hired after June 30, 2013) of Allowable Service. A spouse who had been receiving the 50% benefit shall be entitled to the greater benefit. The surviving spouse of a former member receives the 100% joint and survivor benefit commencing on the member's 55th birthday if former member had three years (five years if first hired after June 30, 2013) of Allowable Service.
Benefit increases	Same as for retirement.
Surviving dependent children's benefit	
Age/Service requirement	Member who is active or receiving a disability benefit. Child must be unmarried, under age 18 (or 23 if full-time student) and dependent upon the member.
Amount	10% of Average Salary for each child and $20 per month prorated among all dependent children. Benefit must not be less than 50% nor exceed 70% of Average Salary.
Benefit increases	Same as for retirement.
Refund of contributions	
Age/Service requirement	Member dies before receiving any retirement benefits and survivor benefits are not payable.
Amount	Member contributions with 6.00% interest compounded daily until June 30, 2011 and 4.00% thereafter.

SUMMARY OF PLAN PROVISIONS (CONTINUED)

Termination	
Refund of contributions	
Age/service requirement	Termination of state service.
Amount	Member contributions with 6.00% interest compounded daily to June 30, 2011 and 4.00% thereafter. If a member is vested, a deferred annuity may be elected in lieu of a refund.
Deferred benefit	
Age/service requirement	Three years (ten years if first hired after June 30, 2013) of Allowable Service.
Amount	Benefit is computed under law in effect at termination and increased by the following annual augmentation percentage: (a.) 0.00% before July 1, 1971; (b.) 5.00% from July 1, 1971 to January 1, 1981; (c.) 3.00% thereafter (2.50% if hired after June 30, 2006) until January 1, 2012; and (d.) 2.00% after December 31, 2011 until the annuity begins. Amount is payable at normal or early retirement. If a member terminated employment prior to July 1, 1997 but was not eligible to commence their pension before July 1, 1997, an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.
Optional form conversion factors	Actuarially equivalent factors based on RP-2000 for healthy annuitants, white collar adjustment, projected to 2027 using scale AA, set back two years for males and set forward one year for females, blended 95% males, and 6.5% interest.
Combined service annuity	Members are eligible for combined service benefits if they: (a.) Have sufficient allowable service in total that equals or exceeds the applicable service credit vesting requirement of the retirement plan with the longest applicable service credit vesting requirement; and (b.) Have at least six months of allowable service credit in each plan worked under; and (c.) Are not in receipt of a benefit from another plan, or have applied for benefits with an effective date within one year. Members who meet the above requirements must have their benefit based on the following: (a.) Allowable service in all covered plans are combined in order to determine eligibility for early retirement. (b.) Average salary is based on the high five consecutive years during their entire service in all covered plans.

SUMMARY OF PLAN PROVISIONS (CONCLUDED)

Contribution stabilizer	The following is a summary of the contribution stabilizer provisions in Minnesota Statute 352.045: • If a contribution sufficiency of at least 2.0% exists, member and employer contributions may be adjusted by the Board of Directors to a level necessary to maintain a 2.0% sufficiency. Member and employer contributions may not be less than the sum of normal cost and administrative expenses. Employer contributions must be equal to 60% of the sum of member and employer contributions. • If a contribution deficiency of at least 0.5% exists, member and employer contribution rates may be increased by the Board of Directors to eliminate the deficiency. Employer contributions must be equal to 60% of the sum of member and employer contributions. • Any adjustment to the contribution rates must be reported to the Legislative Commission on Pensions and Retirement (LCPR) by January 15 following the most recent valuation report. If the LCPR does not recommend against or alter the change in rates, the adjustment becomes effective on the first day of the first full payroll period of the next fiscal year.
Changes in plan provisions	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 1.5% post-retirement benefit increase is triggered and the funding ratio (determined on a market value of assets basis) subsequently drops below 75% for one year or 80% for two consecutive years, the post-retirement benefit increase will change to 1.5% until the plan again reaches an 85% funding ratio for two consecutive years. The age that disabilitants change from disabled status to retired status changed from age 65 to age 55 for disabilities after June 30, 2015.

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 1.0% post-retirement benefit increase. If the funding ratio (based on the market value of assets) reaches 85% (based on a 1.5% post-retirement benefit increase assumption) for two consecutive years, the benefit increase will increase to 1.5%; if the funding ratio reaches 90% (based on a 2.5% post-retirement benefit increase assumption) for two consecutive years, the benefit increase revert to 2.5%. If, after reverting to a 1.5% benefit increase, the funding ratio declines to less than 75% for one year or less than 80% for two consecutive years, the benefit increase will decrease to 1.0%.

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 7.75% at year 1 declining to 3.75% at years 21 and later)
- Open group; stable active population (new member profile based on average new members hired in recent years)
- The postretirement benefit increase rate is assumed to be 1.00% per year until the funding ratio threshold required to pay a 1.50% postretirement benefit increase is reached and is then assumed to be 1.50% until the threshold required to pay a 2.50% post-retirement increase is reached.
- Current statutory contributions (i.e. not including potential contribution increases under the contribution stabilizer statutes) as directed by MSRS.

Based on these assumptions and methods, the projection indicates that this plan is expected to attain the funding ratio threshold required to pay 1.50% postretirement benefit increase in the year 2031 and 2.5% in 2052, and that the plan would begin paying 1.50% benefit increases on January 1, 2032 and 2.50% on January 1, 2053. 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 last experience study, dated February 2012, 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% per annum
Single discount rate	7.90% per annum.
Benefit increases after retirement	1.00% per annum through 2031, 1.50% per annum from 2032 to 2052, 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.
Healthy Post-retirement	RP-2000 annuitant generational mortality table projected with mortality improvement scale AA, white collar adjustment, set back two years for males and set forward one year for females.
	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 annuitant generational mortality table projected with mortality improvement scale AA, white collar adjustment, set back two years for males and set forward one year for females.
Retirement	Members retiring from active status are assumed to retire according to the age related rates shown in the rate table. Members who have attained the highest assumed retirement age are assumed to retire in one year.

SUMMARY OF ACTUARIAL ASSUMPTIONS (CONTINUED)

Withdrawal	Select and Ultimate rates based on actual experience. Ultimate rates after the third year are shown in rate table. Select rates in the first three years are: Year / Select Withdrawal Rates 1 / 5% 2 / 2% 3 / 2%
Disability	Age-related rates based on experience; see table of sample rates. All incidences are assumed to be duty-related.
Allowance for combined service annuity	Liabilities for former members are increased by 30.00% 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	All employees withdrawing after becoming eligible for a deferred benefit take the larger of their contributions accumulated with interest or the value of their deferred benefit. Account balances for deferred members accumulate interest until normal retirement date and are discounted back to the valuation date.
Commencement of deferred benefits	Members receiving deferred annuities (including current terminated deferred members) are assumed to begin receiving benefits at age 55.
Percentage married	85% of active members are assumed to be married. Actual marital status is used for members in payment status.
Age of spouse	Females are assumed to be two years younger than their male spouses.
Eligible children	Each member may have two dependent children depending on member's age. Assumed first born child born at member's age 28 and second born child at member's age 31.
Form of payment	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 25% elect 75% Joint & Survivor option 35% elect 100% Joint & Survivor option Females: 25% elect 50% Joint & Survivor option 30% elect 75% Joint & Survivor option 5% elect 100% Joint & Survivor option Remaining married members and unmarried members are assumed to elect the Straight Life option.
Eligibility testing	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
Decrement operation	Withdrawal decrements do not operate during retirement eligibility.
Service credit accruals	It is assumed that members accrue one year of service credit per year.

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. There are no members reported with missing gender or birth dates. In cases where submitted data was missing or incomplete, the following assumptions were applied: <u>Data for active members</u>: There were no members reported with missing salary and no members reported with missing service. <u>Data for terminated members</u>: There was 1 member reported without a benefit. We calculated benefits for this member using the reported Credited Service and Termination Date. Average Salary was not reported, so we assumed a value of $35,000. <u>Data for members receiving benefits</u>: There were no members reported without a benefit. There were no survivors reported with an expired benefit. There were 5 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 10 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. For retirees that elected a survivor benefit option, we used the valuation assumptions if the survivor date of birth was missing or invalid (227 members) and/or the survivor gender was missing or invalid (211 members).
Changes in actuarial assumptions	The assumed post-retirement benefit increase rate was changed from 1.0% per year through 2018, 1.5% per year from 2019 to 2045, and 2.5% per year thereafter to 1.0% per year through 2031, 1.5% per year from 2032 to 2052, 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%	0.03%	0.02%	0.03%	0.02%
25	0.04	0.02	0.04	0.02	0.04	0.02
30	0.04	0.03	0.04	0.03	0.04	0.03
35	0.05	0.05	0.06	0.05	0.05	0.05
40	0.08	0.07	0.09	0.06	0.08	0.07
45	0.11	0.11	0.13	0.10	0.11	0.11
50	0.17	0.25	0.20	0.16	0.17	0.25
55	0.57	0.39	0.27	0.24	0.57	0.39
60	0.57	0.61	0.43	0.38	0.57	0.61
65	0.92	1.01	0.67	0.59	0.92	1.01
70	1.58	1.69	0.98	0.88	1.58	1.69

* *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	1.47%	1.47%	0.03%	0.03%
25	1.13	1.13	0.05	0.05
30	0.80	0.80	0.06	0.06
35	0.47	0.47	0.09	0.09
40	0.40	0.40	0.14	0.14
45	0.40	0.40	0.23	0.23
50	0.00	0.00	0.40	0.40
55	0.00	0.00	0.70	0.70
60	0.00	0.00	1.13	1.13
65	0.00	0.00	0.00	0.00

SUMMARY OF ACTUARIAL ASSUMPTIONS (CONCLUDED)

Age	Retirement	Salary Scale Year	Salary Scale Increase
50	7 %	1	7.75%
51	6	2	7.25
52	6	3	6.75
53	6	4	6.50
54	3	5	6.25
55	65	6	6.00
56	50	7	5.75
57	30	8	5.60
58	20	9	5.45
59	20	10	5.30
60+	100	11	5.15
		12	5.00
		13	4.85
		14	4.70
		15	4.55
		16	4.40
		17	4.25
		18	4.10
		19	3.95
		20	3.80
		21+	3.75

SECTION G

CALCULATION OF THE SINGLE DISCOUNT RATE

CALCULATION OF THE SINGLE DISCOUNT RATE

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

The *Single Discount Rate* (SDR) is equivalent to applying these two rates to the benefits that are projected to be paid during the different time periods. The SDR reflects (1) the long-term expected rate of return on pension plan investments (during the period in which the plan fiduciary net position is projected to be sufficient to pay benefits) and (2) tax-exempt municipal bond rate based on an index of 20-year general obligation bonds with an average AA credit rating (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%; 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*	Additional State Contributions	Total Contributions
	(a)	(b)	(c) = (a) + (b)	(d)	(e)	(f)	(g)	(h) = (d) + (e) + (f) + (g)
0	$ 68,463		$ 68,463					
1	69,856		69,856	$ 9,361	$ 14,041		$ 1,000	$ 24,402
2	69,189	$ 3,112	72,301	9,963	14,945	$ 375	1,000	25,283
3	68,406	6,426	74,832	9,851	14,776	774	1,000	25,401
4	67,948	9,503	77,451	9,785	14,677	1,145	1,000	25,607
5	67,434	12,728	80,162	9,710	14,566	1,534	1,000	25,810
6	66,820	16,147	82,967	9,622	14,433	1,946	1,000	26,001
7	66,373	19,498	85,871	9,558	14,337	2,350	1,000	26,245
8	65,560	23,317	88,877	9,441	14,161	2,810	1,000	26,412
9	64,086	27,901	91,987	9,228	13,843	3,362	1,000	26,433
10	62,091	33,116	95,207	8,941	13,412	3,991	1,000	26,344
11	59,711	38,828	98,539	8,598	12,898	4,679	1,000	26,175
12	57,304	44,684	101,988	8,252	12,378	5,384	1,000	26,014
13	54,567	50,991	105,558	7,858	11,786	6,144	1,000	25,788
14	51,447	57,805	109,252	7,408	11,113	6,966	1,000	25,487
15	48,232	64,844	113,076	6,945	10,418	7,814	1,000	25,177
16	44,950	72,084	117,034	6,473	9,709	8,686	1,000	24,868
17	41,580	79,550	121,130	5,988	8,981	9,586	1,000	24,555
18	38,150	87,219	125,369	5,494	8,240	10,510	1,000	24,244
19	34,926	94,831	129,757	5,029	7,544	11,427	1,000	24,000
20	31,743	102,556	134,299	4,571	6,856	12,358	1,000	23,785
21	28,562	110,437	138,999	4,113	6,169	13,308	1,000	23,590
22	25,584	118,280	143,864	3,684	5,526	14,253	1,000	23,463
23	22,912	125,988	148,900	3,299	4,949	15,182	1,000	23,430
24	20,341	133,770	154,111	2,929	4,394	16,119	1,000	23,442
25	17,497	142,008	159,505	2,520	3,779	17,112	1,000	23,411
26	14,592	150,496	165,088	2,101	3,152	18,135	1,000	23,388
27	11,712	159,154	170,866	1,687	2,530	19,178	1,000	23,395
28	9,124	167,722	176,846	1,314	1,971	20,210	1,000	23,495
29	7,054	175,982	183,036	1,016	1,524	21,206	1,000	23,746
30	5,211	184,231	189,442	750	1,126	22,200	1,000	24,076
31	3,443	192,629	196,072	496	744	23,212	1,000	24,452
32	2,024	200,911	202,935	291	437	24,210	1,000	24,938
33	1,154	208,884	210,038	166	249	25,170	1,000	25,585
34	655	216,734	217,389	94	141	26,116	1,000	26,351
35	375	224,623	224,998	54	81	27,067	1,000	27,202
36	184	232,688	232,872	27	40	28,039	1,000	28,106
37	70	240,953	241,023	10	15	29,035	1,000	29,060
38	23	249,436	249,459	3	5	30,057	1,000	30,065
39	3	258,187	258,190	-	1	31,111	0	31,112
40	0	267,226	267,226	0	0	32,201	0	32,201
41	0	276,579	276,579	0	0	33,328	0	33,328
42	0	286,260	286,260	0	0	34,494	0	34,494
43	0	296,279	296,279	0	0	35,702	0	35,702
44	0	306,649	306,649	0	0	36,951	0	36,951
45	0	317,381	317,381	0	0	38,244	0	38,244
46	0	328,490	328,490	0	0	39,583	0	39,583
47	0	339,987	339,987	0	0	40,968	0	40,968
48	0	351,886	351,886	0	0	42,402	0	42,402
49	0	364,202	364,202	0	0	43,886	0	43,886
50	0	376,949	376,949	0	0	45,422	0	45,422

**Contributions related to future employees in excess of normal cost and expenses of 23.95% 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 (CONTINUED) (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*	Additional State Contributions	Total Contributions
	(a)	(b)	(c) = (a) + (b)	(d)	(e)	(f)	(g)	(h) = (d) + (e) + (f) + (g)
51	$ 0	$ 390,143	$ 390,143	$ 0	$ 0	$ 47,012	$ 0	$ 47,012
52	0	403,798	403,798	0	0	48,658	0	48,658
53	0	417,930	417,930	0	0	50,361	0	50,361
54	0	432,558	432,558	0	0	52,123	0	52,123
55	0	447,698	447,698	0	0	53,948	0	53,948
56	0	463,367	463,367	0	0	55,836	0	55,836
57	0	479,585	479,585	0	0	57,790	0	57,790
58	0	496,370	496,370	0	0	59,813	0	59,813
59	0	513,743	513,743	0	0	61,906	0	61,906
60	0	531,724	531,724	0	0	64,073	0	64,073
61	0	550,335	550,335	0	0	66,315	0	66,315
62	0	569,596	569,596	0	0	68,636	0	68,636
63	0	589,532	589,532	0	0	71,039	0	71,039
64	0	610,166	610,166	0	0	73,525	0	73,525
65	0	631,522	631,522	0	0	76,098	0	76,098
66	0	653,625	653,625	0	0	78,762	0	78,762
67	0	676,502	676,502	0	0	81,518	0	81,518
68	0	700,179	700,179	0	0	84,372	0	84,372
69	0	724,686	724,686	0	0	87,325	0	87,325
70	0	750,050	750,050	0	0	90,381	0	90,381
71	0	776,301	776,301	0	0	93,544	0	93,544
72	0	803,472	803,472	0	0	96,818	0	96,818
73	0	831,593	831,593	0	0	100,207	0	100,207
74	0	860,699	860,699	0	0	103,714	0	103,714
75	0	890,824	890,824	0	0	107,344	0	107,344
76	0	922,002	922,002	0	0	111,101	0	111,101
77	0	954,273	954,273	0	0	114,990	0	114,990
78	0	987,672	987,672	0	0	119,014	0	119,014
79	0	1,022,241	1,022,241	0	0	123,180	0	123,180
80	0	1,058,019	1,058,019	0	0	127,491	0	127,491
81	0	1,095,050	1,095,050	0	0	131,953	0	131,953
82	0	1,133,376	1,133,376	0	0	136,572	0	136,572
83	0	1,173,045	1,173,045	0	0	141,352	0	141,352
84	0	1,214,101	1,214,101	0	0	146,299	0	146,299
85	0	1,256,595	1,256,595	0	0	151,420	0	151,420
86	0	1,300,576	1,300,576	0	0	156,719	0	156,719
87	0	1,346,096	1,346,096	0	0	162,205	0	162,205
88	0	1,393,209	1,393,209	0	0	167,882	0	167,882
89	0	1,441,971	1,441,971	0	0	173,758	0	173,758
90	0	1,492,440	1,492,440	0	0	179,839	0	179,839
91	0	1,544,676	1,544,676	0	0	186,133	0	186,133
92	0	1,598,739	1,598,739	0	0	192,648	0	192,648
93	0	1,654,695	1,654,695	0	0	199,391	0	199,391
94	0	1,712,610	1,712,610	0	0	206,369	0	206,369
95	0	1,772,551	1,772,551	0	0	213,592	0	213,592
96	0	1,834,590	1,834,590	0	0	221,068	0	221,068
97	0	1,898,801	1,898,801	0	0	228,806	0	228,806
98	0	1,965,259	1,965,259	0	0	236,814	0	236,814
99	0	2,034,043	2,034,043	0	0	245,102	0	245,102
100	0	2,105,234	2,105,234	0	0	253,681	0	253,681

**Contributions related to future employees in excess of normal cost and expenses of 23.95% 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 Fiduciary Net Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expenses	Projected Investment Earnings at 7.90%	Projected Ending Plan Net Position
	(a)	(b)	(c)	(d)	(e)	(f)=(a)+(b)-(c)-(d)+(e)
1	$ 664,530	$ 24,402	$ 57,225	$ 175	$ 51,219	$ 682,751
2	682,751	25,283	58,817	173	52,670	701,714
3	701,714	25,401	60,206	171	54,198	720,936
4	720,936	25,607	61,480	170	55,754	740,647
5	740,647	25,810	62,923	169	57,342	760,707
6	760,707	26,001	64,336	167	58,959	781,164
7	781,164	26,245	65,637	166	60,613	802,219
8	802,219	26,412	67,067	164	62,306	823,706
9	823,706	26,433	68,724	160	64,020	845,275
10	845,275	26,344	70,599	155	65,727	866,592
11	866,592	26,175	72,596	149	67,406	887,428
12	887,428	26,014	74,639	143	69,046	907,706
13	907,706	25,788	76,896	136	70,631	927,093
14	927,093	25,487	79,221	129	72,140	945,370
15	945,370	25,177	81,628	121	73,558	962,356
16	962,356	24,868	84,011	112	74,874	977,975
17	977,975	24,555	86,811	104	76,067	991,682
18	991,682	24,244	89,587	95	77,110	1,003,354
19	1,003,354	24,000	92,102	87	78,004	1,013,169
20	1,013,169	23,785	94,511	79	78,757	1,021,121
21	1,021,121	23,590	96,802	71	79,368	1,027,206
22	1,027,206	23,463	98,914	64	79,841	1,031,532
23	1,031,532	23,430	100,705	57	80,192	1,034,392
24	1,034,392	23,442	102,312	51	80,435	1,035,906
25	1,035,906	23,411	104,058	44	80,565	1,035,780
26	1,035,780	23,388	105,831	36	80,565	1,033,866
27	1,033,866	23,395	107,579	29	80,425	1,030,078
28	1,030,078	23,495	108,954	23	80,156	1,024,752
29	1,024,752	23,746	109,825	18	79,790	1,018,445
30	1,018,445	24,076	110,477	13	79,359	1,011,390
31	1,011,390	24,452	110,989	9	78,875	1,003,719
32	1,003,719	24,938	111,091	5	78,363	995,924
33	995,924	25,585	110,628	3	77,870	988,748
34	988,748	26,351	109,732	2	77,446	982,811
35	982,811	27,202	108,560	1	77,135	978,587
36	978,587	28,106	107,196	0	76,968	976,465
37	976,465	29,060	105,623	0	76,977	976,879
38	976,879	30,065	104,438	0	77,174	979,680
39	979,680	31,112	103,600	0	77,509	984,701
40	984,701	32,201	102,628	0	77,985	992,259
41	992,259	33,328	101,517	0	78,669	1,002,739
42	1,002,739	34,494	100,256	0	79,591	1,016,568
43	1,016,568	35,702	98,838	0	80,785	1,034,217
44	1,034,217	36,951	97,259	0	82,289	1,056,198
45	1,056,198	38,244	95,508	0	84,143	1,083,077
46	1,083,077	39,583	93,573	0	86,394	1,115,481
47	1,115,481	40,968	91,450	0	89,089	1,154,088
48	1,154,088	42,402	89,130	0	92,285	1,199,645
49	1,199,645	43,886	86,603	0	96,039	1,252,967
50	1,252,967	45,422	83,867	0	100,417	1,314,939

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 (CONTINUED)
(DOLLARS IN THOUSANDS)

Year	Projected Beginning Plan Fiduciary Net Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expenses	Projected Investment Earnings at 7.90%	Projected Ending Plan Net Position
	(a)	(b)	(c)	(d)	(e)	(f)=(a)+(b)-(c)-(d)+(e)
51	$ 1,314,939	$ 47,012	$ 80,925	$ 0	$ 105,489	$ 1,386,515
52	1,386,515	48,658	77,783	0	111,329	1,468,719
53	1,468,719	50,361	74,452	0	118,018	1,562,646
54	1,562,646	52,123	70,948	0	125,642	1,669,463
55	1,669,463	53,948	67,295	0	134,293	1,790,409
56	1,790,409	55,836	63,523	0	144,067	1,926,789
57	1,926,789	57,790	59,657	0	155,066	2,079,988
58	2,079,988	59,813	55,728	0	167,400	2,251,473
59	2,251,473	61,906	51,770	0	181,182	2,442,791
60	2,442,791	64,073	47,808	0	196,533	2,655,589
61	2,655,589	66,315	43,864	0	213,584	2,891,624
62	2,891,624	68,636	39,965	0	232,472	3,152,767
63	3,152,767	71,039	36,137	0	253,343	3,441,012
64	3,441,012	73,525	32,400	0	276,356	3,758,493
65	3,758,493	76,098	28,779	0	301,677	4,107,489
66	4,107,489	78,762	25,307	0	329,485	4,490,429
67	4,490,429	81,518	22,012	0	359,972	4,909,907
68	4,909,907	84,372	18,916	0	393,341	5,368,704
69	5,368,704	87,325	16,047	0	429,812	5,869,794
70	5,869,794	90,381	13,429	0	469,618	6,416,364
71	6,416,364	93,544	11,074	0	513,011	7,011,845
72	7,011,845	96,818	8,993	0	560,261	7,659,931
73	7,659,931	100,207	7,189	0	611,661	8,364,610
74	8,364,610	103,714	5,655	0	667,526	9,130,195
75	9,130,195	107,344	4,375	0	728,198	9,961,362
76	9,961,362	111,101	3,330	0	794,046	10,863,179
77	10,863,179	114,990	2,496	0	865,473	11,841,146
78	11,841,146	119,014	1,842	0	942,913	12,901,231
79	12,901,231	123,180	1,340	0	1,026,841	14,049,912
80	14,049,912	127,491	961	0	1,117,769	15,294,211
81	15,294,211	131,953	679	0	1,216,252	16,641,737
82	16,641,737	136,572	474	0	1,322,894	18,100,729
83	18,100,729	141,352	327	0	1,438,345	19,680,099
84	19,680,099	146,299	223	0	1,563,311	21,389,486
85	21,389,486	151,420	150	0	1,698,554	23,239,310
86	23,239,310	156,719	100	0	1,844,897	25,240,826
87	25,240,826	162,205	65	0	2,003,231	27,406,197
88	27,406,197	167,882	42	0	2,174,516	29,748,553
89	29,748,553	173,758	27	0	2,359,790	32,282,074
90	32,282,074	179,839	17	0	2,560,174	35,022,070
91	35,022,070	186,133	11	0	2,776,878	37,985,070
92	37,985,070	192,648	7	0	3,011,208	41,188,919
93	41,188,919	199,391	4	0	3,264,573	44,652,879
94	44,652,879	206,369	2	0	3,538,497	48,397,743
95	48,397,743	213,592	1	0	3,834,621	52,445,955
96	52,445,955	221,068	1	0	4,154,719	56,821,741
97	56,821,741	228,806	0	0	4,500,706	61,551,253
98	61,551,253	236,814	0	0	4,874,648	66,662,715
99	66,662,715	245,102	0	0	5,278,775	72,186,592
100	72,186,592	253,681	0	0	5,715,493	78,155,766

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	$ 664,530	$ 57,225	$ 57,225	$ 0	$ 55,090	$ 0	$ 55,090
2	682,751	58,817	58,817	0	52,477	0	52,477
3	701,714	60,206	60,206	0	49,783	0	49,783
4	720,936	61,480	61,480	0	47,115	0	47,115
5	740,647	62,923	62,923	0	44,690	0	44,690
6	760,707	64,336	64,336	0	42,348	0	42,348
7	781,164	65,637	65,637	0	40,041	0	40,041
8	802,219	67,067	67,067	0	37,918	0	37,918
9	823,706	68,724	68,724	0	36,010	0	36,010
10	845,275	70,599	70,599	0	34,284	0	34,284
11	866,592	72,596	72,596	0	32,673	0	32,673
12	887,428	74,639	74,639	0	31,133	0	31,133
13	907,706	76,896	76,896	0	29,726	0	29,726
14	927,093	79,221	79,221	0	28,382	0	28,382
15	945,370	81,628	81,628	0	27,104	0	27,104
16	962,356	84,011	84,011	0	25,853	0	25,853
17	977,975	86,811	86,811	0	24,758	0	24,758
18	991,682	89,587	89,587	0	23,679	0	23,679
19	1,003,354	92,102	92,102	0	22,562	0	22,562
20	1,013,169	94,511	94,511	0	21,457	0	21,457
21	1,021,121	96,802	96,802	0	20,368	0	20,368
22	1,027,206	98,914	98,914	0	19,288	0	19,288
23	1,031,532	100,705	100,705	0	18,200	0	18,200
24	1,034,392	102,312	102,312	0	17,137	0	17,137
25	1,035,906	104,058	104,058	0	16,153	0	16,153
26	1,035,780	105,831	105,831	0	15,225	0	15,225
27	1,033,866	107,579	107,579	0	14,344	0	14,344
28	1,030,078	108,954	108,954	0	13,463	0	13,463
29	1,024,752	109,825	109,825	0	12,577	0	12,577
30	1,018,445	110,477	110,477	0	11,726	0	11,726
31	1,011,390	110,989	110,989	0	10,918	0	10,918
32	1,003,719	111,091	111,091	0	10,127	0	10,127
33	995,924	110,628	110,628	0	9,347	0	9,347
34	988,748	109,732	109,732	0	8,592	0	8,592
35	982,811	108,560	108,560	0	7,878	0	7,878
36	978,587	107,196	107,196	0	7,210	0	7,210
37	976,465	105,623	105,623	0	6,584	0	6,584
38	976,879	104,438	104,438	0	6,033	0	6,033
39	979,680	103,600	103,600	0	5,547	0	5,547
40	984,701	102,628	102,628	0	5,092	0	5,092
41	992,259	101,517	101,517	0	4,668	0	4,668
42	1,002,739	100,256	100,256	0	4,273	0	4,273
43	1,016,568	98,838	98,838	0	3,904	0	3,904
44	1,034,217	97,259	97,259	0	3,560	0	3,560
45	1,056,198	95,508	95,508	0	3,240	0	3,240
46	1,083,077	93,573	93,573	0	2,942	0	2,942
47	1,115,481	91,450	91,450	0	2,665	0	2,665
48	1,154,088	89,130	89,130	0	2,407	0	2,407
49	1,199,645	86,603	86,603	0	2,168	0	2,168
50	1,252,967	83,867	83,867	0	1,945	0	1,945

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	$ 1,314,939	$ 80,925	$ 80,925	$ 0	$ 1,740	$ 0	$ 1,740
52	1,386,515	77,783	77,783	0	1,550	0	1,550
53	1,468,719	74,452	74,452	0	1,375	0	1,375
54	1,562,646	70,948	70,948	0	1,214	0	1,214
55	1,669,463	67,295	67,295	0	1,067	0	1,067
56	1,790,409	63,523	63,523	0	934	0	934
57	1,926,789	59,657	59,657	0	813	0	813
58	2,079,988	55,728	55,728	0	704	0	704
59	2,251,473	51,770	51,770	0	606	0	606
60	2,442,791	47,808	47,808	0	518	0	518
61	2,655,589	43,864	43,864	0	441	0	441
62	2,891,624	39,965	39,965	0	372	0	372
63	3,152,767	36,137	36,137	0	312	0	312
64	3,441,012	32,400	32,400	0	259	0	259
65	3,758,493	28,779	28,779	0	213	0	213
66	4,107,489	25,307	25,307	0	174	0	174
67	4,490,429	22,012	22,012	0	140	0	140
68	4,909,907	18,916	18,916	0	112	0	112
69	5,368,704	16,047	16,047	0	88	0	88
70	5,869,794	13,429	13,429	0	68	0	68
71	6,416,364	11,074	11,074	0	52	0	52
72	7,011,845	8,993	8,993	0	39	0	39
73	7,659,931	7,189	7,189	0	29	0	29
74	8,364,610	5,655	5,655	0	21	0	21
75	9,130,195	4,375	4,375	0	15	0	15
76	9,961,362	3,330	3,330	0	11	0	11
77	10,863,179	2,496	2,496	0	7	0	7
78	11,841,146	1,842	1,842	0	5	0	5
79	12,901,231	1,340	1,340	0	3	0	3
80	14,049,912	961	961	0	2	0	2
81	15,294,211	679	679	0	1	0	1
82	16,641,737	474	474	0	1	0	1
83	18,100,729	327	327	0	1	0	1
84	19,680,099	223	223	0	0	0	0
85	21,389,486	150	150	0	0	0	0
86	23,239,310	100	100	0	0	0	0
87	25,240,826	65	65	0	0	0	0
88	27,406,197	42	42	0	0	0	0
89	29,748,553	27	27	0	0	0	0
90	32,282,074	17	17	0	0	0	0
91	35,022,070	11	11	0	0	0	0
92	37,985,070	7	7	0	0	0	0
93	41,188,919	4	4	0	0	0	0
94	44,652,879	2	2	0	0	0	0
95	48,397,743	1	1	0	0	0	0
96	52,445,955	1	1	0	0	0	0
97	56,821,741	0	0	0	0	0	0
98	61,551,253	0	0	0	0	0	0
99	66,662,715	0	0	0	0	0	0
100	72,186,592	0	0	0	0	0	0
				Totals	$ 987,557	$ 0	$ 987,557

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.

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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.

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

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

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

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

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

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