St. Paul Teachers' Retirement Fund Association

Actuarial Valuation as of July 1, 2018

GRS Retirement Consulting

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December 7, 2018

Ms. Jill E. Schurtz, Executive Director
St. Paul Teachers' Retirement Fund Association
1619 Dayton Avenue, Room 309
St. Paul, MN 55104-6206

Dear Ms. Schurtz:

We are pleased to present the report of the actuarial valuation of the St. Paul Teachers' Retirement Fund Association ("Fund") as of July 1, 2018. This report provides, among other things, the required annual contribution rate of the Fund for the Plan Year commencing July 1, 2018 and ending on June 30, 2019, according to prescribed assumptions.

The valuation was based upon data and information through June 30, 2018 furnished by the Fund staff, concerning Retirement Fund benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. Their efforts in furnishing the materials needed are gratefully acknowledged. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by the Fund.

The report has been prepared at the request of the Fund's Board of Trustees in accordance with Section 356.215 of the Minnesota Statutes as well as the Standards for Actuarial Work established by the State of Minnesota Legislative Commission on Pensions and Retirement. To the best of our knowledge, this report is complete and accurate, and has been prepared in accordance with prescribed assumptions and generally accepted actuarial principles and practices. This report is intended for use by the Fund and those determined or approved by the Fund's Board of Trustees. This report may be provided to parties other than the Fund only in its entirety and only with the permission of the Board. GRS is not responsible for unauthorized use of this report.

The contribution rate in this report is determined using the actuarial assumptions and methods disclosed in Section 4 of this report. This report includes risk metrics on page 11, but does not include a robust assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment.

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This valuation assumed the continuing ability of the plan sponsor to make the contributions necessary to fund this plan. A determination regarding whether or not the plan sponsor is actually able to do so is outside our scope of expertise and was not performed.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of such future measurements.

This report should not be relied on for any purpose other than the purpose described in this report. Determinations of financial results associated with the benefits described in this report in a manner other than the intended purpose may produce significantly different results.

Actuarial assumptions, including discount rates, mortality tables and others identified in this report, are prescribed by Minnesota Statutes Section 356.215, the Legislative Commission on Pensions and Retirement (LCPR), and the Board of Trustees. These parties are responsible for selecting the plan's funding policy, actuarial valuation methods, asset valuation methods, and assumptions. The policies, methods and assumptions used in this valuation are those that have been so prescribed and are described in the Actuarial Basis of this report. The Fund is solely responsible for communicating to GRS any changes required thereto.

This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. Bonita J. Wurst and James D. Anderson 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. The signing actuaries are independent of the plan sponsor. We are not aware of any relationship that would impair the objectivity of our work.

We will be pleased to review this report with you at your convenience.

Respectfully submitted,

Bonita J. Wurst James D. Anderson

Bonita J. Wurst, ASA, EA, FCA, MAAA James D. Anderson, FSA, EA, FCA, MAAA

BJW/JDA:bd

Other Observations

General Implications of Contribution Allocation Procedure or Funding Policy on Future Expected Plan Contributions and Funded Status

Given the plan's contribution allocation procedure, if there are no changes in benefits or contributions and all actuarial assumptions are met (including the assumption of the plan earning 7.5%), it is expected that:

(1) The normal cost of the plan is expected to remain approximately level as a percent of pay,
(2) The funded status of the plan is expected to gradually improve and is expected to be 100% funded within the next 30 years, and
(3) The unfunded liability will grow initially as a dollar amount before beginning to decline.

Limitations of Funded Status Measurements

Unless otherwise indicated, a funded status measurement presented in this report is based upon the actuarial accrued liability and the actuarial value of assets. Unless otherwise indicated, with regard to any funded status measurements presented in this report:

(1) The measurement is inappropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations; in other words, of transferring the obligations to an unrelated third party in an arm's length market value type transaction.

(2) The measurement is dependent upon the actuarial cost method which, in combination with the plan's amortization policy, affects the timing and amounts of future contributions. The amounts of future contributions will most certainly differ from those assumed in this report due to future actual experience differing from assumed experience based upon the actuarial assumptions. A funded status measurement in this report of 100% is not synonymous with no required future contributions. If the funded status were 100%, the plan would still require future normal cost contributions (i.e., contributions to cover the cost of the active membership accruing an additional year of service credit).

(3) The measurement would produce a different result if the market value of assets were used instead of the actuarial value of assets.

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Summary of Valuation Results

This report sets forth the results of the actuarial valuation of the St. Paul Teachers' Retirement Fund Association ("Fund") as of July 1, 2018. The purposes of this valuation are:

1. To develop the Actuarially Determined Contribution (ADC) rates.
2. To compare the ADC rates with the current funding policy in place.
3. To review the funding status of the Fund.

The funding status, in basic terms, is a comparison of the Fund's liabilities to assets expressed as either an unfunded liability (i.e., the difference between the assets and liabilities) or as a ratio of assets to liabilities. This comparison can be measured in various ways. Fund liabilities are dependent on the actuarial assumptions and actuarial cost method. Fund assets can be measured at market value, book value, or some variation to smooth the fluctuations that invariably occur from year to year. The Actuarial Value of Assets is determined from market value with investment gains and losses smoothed over a five-year period.

2018 Omnibus Pension and Retirement Bill

On May 31, 2018, the 2018 Omnibus Pension and Retirement Bill was signed into law. The new law implemented significant changes in benefits, contributions, and assumptions that are reflected in this report. The assumption changes were a result of the 2018 experience study for the period July 1, 2011 to June 30, 2016. As a result of this legislation, this fund is now expected to achieve full funding within the next 30 years if all assumptions are achieved.

Contribution Sufficiency/(Deficiency)

The required contribution rate (as defined in Section 356 of Minnesota Statutes) decreased slightly, from 22.16% of pay for the fiscal year ending June 30, 2018, to 21.54% of pay for the fiscal year ending June 30, 2019. The statutory contribution rate increased significantly, from 21.64% of payroll to 24.23% of payroll. The contribution sufficiency/ (deficiency) improved from a deficiency of (0.52%) of pay as of July 1, 2017 to a sufficiency of 2.69% of pay. On a market value of assets basis, statutory contributions are sufficient by 2.75% of pay.

The contribution sufficiency referenced above is based on a current snapshot of statutory contributions for the fiscal year ending June 30, 2019. Additional contribution increases will be phased in over the next five years, ultimately increasing the statutory contribution rate (and the contribution sufficiency) by an additional 1.91% of pay.

Assets and Liabilities

On an actuarial value of assets basis, the funding ratio decreased slightly, from 64.45% at July 1, 2017, to 63.70% at July 1, 2018. Total actuarial liabilities increased from $1,611.2 million to $1,676.2 million, primarily due to the initial impact of significant assumption changes (offset by savings due to benefit changes).

As shown in the table on the following page, on a market value of assets basis, the funding ratio dropped slightly, from 64.07% at July 1, 2017, to 63.87% at July 1, 2018.

Summary of Valuation Results

Market Value Compared to Actuarial Value of Assets

A 5-year smoothed value of assets (actuarial value of assets), used to determine both the funded status and required contribution level, reduces the volatility of the valuation results. As of July 1, 2018, the actuarial value of assets was 99.7% of market value.

The following table shows the July 1, 2018 valuation results, on both a market value and smoothed actuarial value basis:

Results as of July 1, 2018		
	Market Value of Assets	**Actuarial Value of Assets**
Actuarial Accrued Liability	$1,676.2 million	$1,676.2 million
Value of Assets	$1,070.6 million	$1,067.7 million
Unfunded Actuarial Accrued Liability	$ 605.6 million	$ 608.5 million
Funded Ratio	63.87%	63.70%
Statutory Contribution Rate	24.23% of pay	24.23% of pay
Required Contribution Rate	21.48% of pay	21.54% of pay
Sufficiency	2.75% of pay	2.69% of pay

Changes Reflected in the Valuation

Assumption and Method Changes

As a result of the 2018 Omnibus Pension and Retirement Bill, which implemented recommendations from the 2018 experience study for the period July 1, 2011 to June 30, 2016, the following assumption and method changes are reflected in this report:

- The assumed investment return was lowered from 8.0% to 7.5%.
- Assumed wage inflation decreased from 4.0% to 3.0%.
- Salary increase rates were updated from an age-based table with a service-based component during the first fifteen years, to a service-based table of rates.
- Retirement, withdrawal, and disability rates were adjusted to better fit observed experience.
- The mortality table was updated from the RP-2000 Mortality Table (with adjustments) projected with Scale AA to 2020, to the RP-2014 Mortality Table, with white collar adjustment, set back 2 years for females, projected with Scale MP-2017 from 2006.
- The statutory amortization period was changed from June 30, 2042 to June 30, 2048.

The net impact of the assumption and method changes described above was to increase the actuarial accrued liability $118.6 million and increase the required contribution by 1.96% of pay. The net required contribution increase resulted from an increase of 3.60% of pay attributable to assumption changes, which was partially offset by the decrease of 1.64% of pay attributable to the extension in the amortization date.

Summary of Valuation Results

Benefit Changes

The 2018 Omnibus Pension and Retirement Bill included a number of changes to benefits that are reflected in this report:

- Lower early retirement factors for most members that will be phased in over a sixty-month period starting July 1, 2019.
- The refund interest rate on member contributions decreased from 4.0% to 3.0% prospectively, beginning July 1, 2018.
- Deferred augmentation was prospectively changed to 0.00%, effective July 1, 2019.
- Post-retirement benefit increases were changed from 1.0% per year with a provision to increase to 2.0% if the funding ratio reaches 80% for two consecutive years or 2.5% if the funding ratio reaches 90% for two consecutive years, to 0.0% for January 1, 2019 and 2020 and 1.0% thereafter.
- For most retirements on or after July 1, 2024, the first benefit increase is delayed until the retiree reaches Normal Retirement Age.

The benefit changes described above decreased the actuarial accrued liability $74.4 million and decreased the required contribution by 2.55% of pay.

Contribution Changes

Many changes to contributions were included in the legislation and are also reflected in this report:

- Coordinated member contributions will increase from 7.50% of pay to 7.75% of pay, effective July 1, 2022.
- Coordinated employer regular contributions will increase from 6.50% of pay to 9.00% of pay over six years, beginning July 1, 2018.
- Basic member contributions will increase from 10.00% of pay to 10.25% of pay, effective July 1, 2022.
- Basic employer regular contributions will increase from 10.00% of pay to 12.50% of pay over six years, beginning July 1, 2018.
- Additional supplemental contributions of $5,000,000 will be made by the State of Minnesota annually beginning October 1, 2018.

The additional contributions increased the contribution sufficiency an additional 2.63% of pay. This is based on a current snapshot of statutory contributions for the fiscal year ending June 30, 2019. Additional contribution increases will be phased in after June 30, 2019, ultimately increasing the statutory contribution rate (and the contribution sufficiency) by an additional 1.91% of pay.

Summary of Valuation Results

Effects of Changes (Actuarial Value of Assets Basis)

The combined impact of the changes described above was to increase the accrued liability by $44.2 million, and decrease the contribution deficiency by 3.22% of pay, as follows:

	Benefit Changes	Contribution Changes	Assumption Changes	Amortization Period Extension
Contribution Deficiency (% of Pay)	(2.55)%	(2.63)%	3.60%	(1.64)%
Actuarial Accrued Liability ($millions)	$ (74.4)	$ -	$ 118.6	$ -

Additional detail regarding the impact of plan and assumption changes is summarized in the following table.

	Results as of July 1, 2018 ($000s)			
	Prior to Changes	Reflecting Plan Changes	Reflecting Plan and Assumption Changes	Reflecting Plan, Assumption and Amortization Changes
A. FUNDING RATIOS				
1. Accrued Liability Funding Ratio				
a. Current Assets	$ 1,067,675	$ 1,067,675	$ 1,067,675	$ 1,067,675
b. Actuarial Accrued Liability	1,632,008	1,557,632	1,676,193	1,676,193
c. Funding Ratio	65.42%	68.54%	63.70%	63.70%
2. Projected Benefit Funding Ratio				
a. Current and Expected Future Assets	$ 1,769,613	$ 2,002,512	$ 1,941,856	$ 2,004,176
b. Current and Expected Future Benefit Obligations	1,870,428	1,769,775	1,869,580	1,869,580
c. Funding Ratio	94.61%	113.15%	103.87%	107.20%
B. REQUIRED CONTRIBUTIONS - CHAPTER 356				
1. Normal Cost	8.95%	8.10%	8.26%	8.26%
2. Supplemental Contribution Amortization	12.90%	11.20%	14.64%	13.00%
3. Allowance for Administrative Expenses	0.28%	0.28%	0.28%	0.28%
4. Total	22.13%	19.58%	23.18%	21.54%

Participants

Active membership increased 0.8% during fiscal year 2018 from 3,550 to 3,577 (figures include members on leave of absence). Total participants receiving benefits under the Fund, including disabled retirees, beneficiaries, and alternate payees, increased 1.6% during fiscal year 2018 from 3,851 to 3,914. Total expenditures for these benefits increased from $112.8 million to $115.3 million during fiscal year 2018, or 2.2%.

Asset Valuation Method

The method used to develop the Fund's Actuarial Value of Assets, as set out in the LCPR Standards for Actuarial Work, is as follows: In years when Fund assets earn above the assumed rate (i.e., experience gain) or below the assumed rate (i.e., experience loss) the gain (or loss) will be recognized over five years. This approach both removes volatility of the Fund's level of required contributions and ensures the Fund's assets will track the market value of assets.

Summary of Valuation Results

Experience Analysis

The experience analysis provides a comparison of actual experience to projected experience based on the actuarial assumptions over the past year. Overall, the Fund had an experience gain of $19.4 million. In general, salary increases were significantly smaller than predicted under the valuation assumption and produced an actuarial gain of $15 million. Additionally, demographic experience resulted in an experience loss of $0.8 million.

The Fund also had an experience gain due to investments. The investment return on a market value of assets basis was 9.75% (net of fees) for the year ended June 30, 2018, greater than the 8.00% assumption. (Note that this assumption was changed to 7.50% for the year ending June 30, 2019.) However, only 20% of this asset gain was recognized in the actuarial value of assets. Investment gains from previous years were recognized this year and resulted in a gain of $5.2 million on the actuarial value of assets. The investment return on an actuarial value of assets basis was 8.5% for the year ended June 30, 2018.

The changes in unfunded actuarial accrued liabilities are shown in Table 10 in Section 3.

Summary of Valuation Results

Sensitivity Tests

During the 2017 legislative session, the Legislative Commission on Pensions and Retirement (LCPR) enacted a new sensitivity disclosure requirement for the Fund's valuations. Per the LCPR's requirement, we have calculated the liabilities associated with the following scenarios:

1) 6.5% interest rate assumption
2) 8.5% interest rate assumption

In each case, all other assumptions were unchanged from those used to develop the final valuation results in this report. Note that we believe the 8.5% interest rate assumption would not comply with Actuarial Standards of Practice.

	Final Valuation Assumptions	Final Valuation Assumptions	
		6.5% Interest	8.5% Interest
Normal Cost Rate, % of Pay	8.2%	10.1%	6.9%
Amortization of Unfunded Accrued Liability, % of Pay	13.0%	15.4%	10.5%
Expenses (% of Pay)	0.3%	0.3%	0.3%
Total Required Contribution, % of Pay	21.5%	25.8%	17.7%
Contribution Sufficiency/(Deficiency), % of Pay	2.7 %	(1.6)%	6.5 %
Accrued Liability Funding Ratio (AVA basis)	63.7%	56.9%	70.7%
Actuarial Accrued Liability (in millions)	$1,676.2	$1,875.7	$1,511.0
Unfunded Accrued Liability (in millions)	$ 608.5	$ 808.0	$ 443.3

Summary of Valuation Results

(Dollars in Thousands)

	July 1, 2017 Valuation	July 1, 2018 Valuation
A. CONTRIBUTIONS % OF PAYROLL (Table 11)		
1. Statutory Contributions - Chapter 354A	21.64%	24.23%
2. Required Contributions - Chapter 356	22.16%	21.54%
3. Sufficiency / (Deficiency)	(0.52%)	2.69%
B. FUNDING RATIOS		
1. Accrued Liability Funding Ratio		
a Current Assets (Table 1)	$ 1,038,467	$ 1,067,675
b. Actuarial Accrued Liability (Table 9)	1,611,208	1,676,193
c. Funding Ratio	64.45%	63.70%
2. Projected Benefit Funding Ratio (Table 8)		
a. Current and Expected Future Assets	$ 1,773,650	$ 2,004,176
b. Current and Expected Future Benefit Obligations	1,847,501	1,869,580
c. Funding Ratio	96.00%	107.20%
C. PLAN PARTICIPANTS		
1. Active Members		
a. Number (Table 3)	3,409	3,445
b. Projected Annual Earnings	$ 280,785	$ 281,782
c. Average Annual Earnings (Projected dollars)	$ 78,060	$ 77,704
d. Average Age	44.8	44.8
e. Average Service	12.7	12.7
f. Members on Leave of Absence	141	132
2. Others		
a. Service Retirements (Table 4)	3,478	3,547
b. Disability Retirements (Table 5)	30	25
c. Survivors (Table 6)	343	342
d. Deferred Retirements (Table 7)	2,034	2,031
e. Terminated Other Non-Vested (Table 7)	2,945	3,014
f. Total - Others	8,830	8,959
3. Grand Total (1.a + 1.f + 2.f)	12,380	12,536

Summary of Valuation Results

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

The determination of the accrued liability and the actuarially determined contribution requires the use of assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the actuarially determined contribution that result from the differences between actual experience and the actuarial assumptions.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions due to changing conditions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the Plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the plan's future financial condition include:

1. Investment risk – actual investment returns may differ from the expected returns;
2. Asset/Liability mismatch – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
3. Contribution risk – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. Salary and Payroll risk – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. Longevity risk – members may live longer or shorter than expected and receive pensions for a period of time other than assumed;
6. Other demographic risks – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

Summary of Valuation Results

The Required Contribution rate shown on page 7 may be considered as a minimum contribution rate that complies with Minnesota Statutes and the requirements of the Standards for Actuarial work published by the LCPR. The timely receipt of the actuarially determined contributions is critical to support the financial health of the plan. Users of this report should be aware that contributions made at the actuarially determined rate do not necessarily guarantee benefit security.

PLAN MATURITY MEASURES

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Generally accepted plan maturity measures include the following. Additional maturity measures are shown on page 11.

	2017	2018
Ratio of the market value of assets to total payroll	3.91	4.07
Ratio of actuarial accrued liability to payroll	6.10	6.37
Ratio of actives to retirees and beneficiaries	0.9	0.9
Ratio of non-investment cash flow to market value of assets*	-5.4%	-5.4%

**cash flow ratio does not reflect contribution increases to be phased in over the next five years*

RATIO OF MARKET VALUE OF ASSETS TO PAYROLL

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 2.0 times the payroll, a return on assets 5% different than assumed would equal 10% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.

RATIO OF ACTUARIAL ACCRUED LIABILITY TO PAYROLL

The relationship between actuarial accrued liability and payroll is a useful indicator of the potential volatility of contributions for a fully funded plan. A funding policy that targets a funded ratio of 100% is expected to result in the ratio of assets to payroll and the ratio of liability to payroll converging over time. The ratio of liability to payroll may also be used as a measure of sensitivity of the liability itself. For example, if the actuarial accrued liability is 2.5 times the payroll, a change in liability 2% other than assumed would equal 5% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

Summary of Valuation Results

RATIO OF ACTIVES TO RETIREES AND BENEFICIARIES

A young plan with many active members and few retirees will have a high ratio of active to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A very mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

RATIO OF NON-INVESTMENT CASH FLOW TO MARKET VALUE OF ASSETS

A positive non-investment cash flow means contributions exceed benefits and expenses. A negative non-investment cash flow means existing funds are being used to make payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a very mature plan or a need for additional contributions. The cash flow ratio for this fund will improve as future contribution increases are phased in over the next five years.

ADDITIONAL RISK ASSESSMENT

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability.

Summary of Valuation Results

Risk Measures Summary

Valuation Date (July 1)	(1) Accrued Liabilities (AAL)	(2) Market Value of Assets	(3) Market Value Unfunded AAL (1) - (2)	(4) Valuation Payroll	(5) Market Value Funded Ratio (2) / (1)	(6) Retiree Liabilities	(7) RetLiab/ AAL (6) / (1)	(8) AAL/ Payroll (1) / (4)	(9) Assets/ Payroll (2) / (4)
2010	$1,471,630	$815,307	$656,323	$239,996	55.4%	$950,858	64.6%	613.2%	339.7%
2011	1,389,875	950,121	439,754	239,738	68.4%	939,005	67.6%	579.7%	396.3%
2012	1,471,216	881,926	589,290	239,053	59.9%	979,866	66.6%	615.4%	368.9%
2013	1,467,350	933,082	534,268	247,432	63.6%	988,123	67.3%	593.0%	377.1%
2014	1,533,603	1,045,435	488,168	259,740	68.2%	1,015,617	66.2%	590.4%	402.5%
2015	1,596,770	1,014,969	581,801	263,844	63.6%	1,053,824	66.0%	605.2%	384.7%
2016	1,592,570	959,666	632,904	258,787	60.3%	1,052,827	66.1%	615.4%	370.8%
2017	1,611,208	1,032,249	578,959	264,342	64.1%	1,068,690	66.3%	609.5%	390.5%
2018	1,676,193	1,070,572	605,621	263,122	63.9%	1,129,864	67.4%	637.0%	406.9%

Valuation Date (July 1)	(10) Portfolio StdDev	(11) Std Dev % of Pay (9) x (10)	(12) Unfunded / Payroll (3) / (4)	(13) Non-Investment Cash Flow (NICF)	(14) NICF/ Assets (13) / (2)	(15) Market Rate of Return	(16) 5-Year Average
2010				$(58,006)		13.1%	
2011			183.4%	(60,117)	(6.3%)	25.0%	
2012			246.5%	(64,220)	(7.3%)	(0.2%)	
2013			215.9%	(63,553)	(6.8%)	13.5%	
2014			187.9%	(55,823)	(5.3%)	18.4%	13.7%
2015			220.5%	(56,223)	(5.5%)	2.7%	11.5%
2016	13.4%	49.7%	244.6%	(56,778)	(5.9%)	0.3%	6.7%
2017	13.4%	52.3%	219.0%	(56,136)	(5.4%)	13.9%	9.5%
2018	13.7%	55.7%	230.2%	(57,563)	(5.4%)	9.8%	8.8%

Notes pertaining to numbered columns:

(5) The Funded ratio is the most widely known measure of a plan's financial strength, but the trend in the funded ratio is much more important than the absolute ratio. The funded ratio should trend to 100%. As it approaches 100%, it is important to re-evaluate the level of investment risk in the portfolio and potentially to re-evaluate the assumed rate of return.

(6) and (7) The ratio of Retiree liabilities to total accrued liabilities gives an indication of the maturity of the system. As the ratio increases, cash flow needs increase, and the liquidity needs of the portfolio change. A ratio on the order of 50% indicates a maturing system.

(8) and (9) The ratios of liabilities and assets to payroll gives an indication of both maturity and volatility. Many systems have ratios between 500% and 700%. Ratios significantly above that range may indicate difficulty in supporting the benefit level as a level % of payroll.

(10) and (11) The portfolio standard deviation measures the volatility of investment return. When multiplied by the ratio of assets to payroll it gives the effect of a one standard deviation asset move as a percent of payroll. This figure helps users understand the difficulty of dealing with investment volatility and the challenges volatility brings to sustainability.

(12) The ratio of unfunded liability to payroll gives an indication of the plan sponsor's ability to actually pay off the unfunded liability. A ratio above approximately 300% or 400% may indicate difficulty in discharging the unfunded liability within a reasonable time frame.

(13) and (14) The ratio of non-investment cash flow to assets is an important measure of sustainability. Negative ratios are common and expected for a maturing system. In the longer term, this ratio should be on the order of approximately -4%. A ratio that is significantly more negative than that for an extended period could be a leading indicator of potential exhaustion of assets.

(15) and (16) Investment return is probably the largest single risk that most systems face. The year by year return and the 5-year geometric average give an indicator of the realism of the systems assumed return. Of course, past performance is not a guarantee of future results.

SECTION 1

ASSET INFORMATION

Assets of the Plan

The cost value of the plan assets decreased from $818.7 million as of June 30, 2017 to $816.5 million as of June 30, 2018. The market value of the plan assets increased from $1,032.2 million as of June 30, 2017 to $1,070.6 million as of June 30, 2018. The expected return on assets using the valuation investment return rate assumption of 8.0 percent was $80 million. (Note that this assumption was changed to 7.50% for the year ending June 30, 2019.) The actual plan experience showed a return on assets of $95.9 million. Twenty percent of the asset return above the expected $80 million is recognized as an actuarial gain in the development of the actuarial value of assets. The recognized gain from the current year, along with the portion of prior gains and losses recognized this year, results in an overall gain of $5.2 million on the actuarial value of assets.

The 2017 and 2018 asset gains as well as the 2015 and 2016 asset losses (investment returns that fell above (gain) or below (loss) the expected return - amounts shown on the next page) will be recognized incrementally over the next four years. As of July 1, 2018, there are slightly more unrecognized asset gains than losses, and the Actuarial Value of Assets (AVA) is only slightly lower than the Market Value of Assets (MVA).

Table 1 shows the composition of assets as of June 30, 2018 and the development of the actuarial value of assets as of June 30, 2018. Table 2 details the development of asset values during fiscal year 2018.

Table 1
Accounting Balance Sheet
as of June 30, 2018
(dollars in thousands)

		Market Value	Cost Value
A. ASSETS			
1. Cash, Equivalents, Short-Term Securities		$ 4,984	$ 4,984
2. Investments			
a. Fixed Income		172,947	166,023
b. Equity		666,356	455,622
c. Real Assets		70,887	47,402
d. Alternative		112,901	99,955
e. Cash and Cash Equivalents		40,953	40,962
3. Other Assets		2,766	2,766
B. TOTAL ASSETS		$ 1,071,794	$ 817,714
C. AMOUNTS CURRENTLY PAYABLE		$ 1,222	$ 1,222
D. ASSETS AVAILABLE FOR BENEFITS			
1. Member Reserves		$ 199,900	$ 199,911
2. Employer Reserves		870,672	616,581
3. Total Assets Available for Benefits		$ 1,070,572	$ 816,492
E. TOTAL AMOUNTS CURRENTLY PAYABLE AND ASSETS AVAILABLE FOR BENEFITS		$ 1,071,794	$ 817,714
F. DETERMINATION OF ACTUARIAL VALUE OF ASSETS			
1. Market Value of Assets Available for Benefits (D.3)		$ 1,070,572	
2. Unrecognized Asset Returns			
a. June 30, 2018	$ 15,610		
b. June 30, 2017	54,191		
c. June 30, 2016	(77,451)		
d. June 30, 2015	(55,629)		
3. UAR Adjustment: .80 * 2(a) + .60 * 2(b) + .40 * 2(c) + .20 * 2(d)		2,897	
4. Actuarial Value of Assets: (F.1 - F.3)		$ 1,067,675	

DERIVATION OF OTHER ASSETS *	Market Value
Accounts Receivable	
Employer Contribution	$ 458
Employee Contribution	287
Service Purchases Receivable	-
Pensions Receivable	31
State Contributions	838
Real Estate Income Receivable	85
Commission Recapture Receivable	2
Interest Receivable	67
Dividend Receivable	415
Misc. Receivable	-
Escrow Funds receivable	-
Sale of Securities	549
Total Accounts Receivable	$ 2,731
Fixed Assets	35
Total Other Assets	$ 2,766

**Numbers may not add due to rounding.*

Table 2
Change(s) in Assets Available for Benefits
as of June 30, 2018
(dollars in thousands)

	Market Value	Cost Value
A. ASSETS AVAILABLE AT BEGINNING OF PERIOD	$ 1,032,249	$ 818,711
B. OPERATING REVENUES		
1. Member Contributions	$ 20,112	$ 20,112
2. Employer Contributions	28,199	28,199
3. Supplemental Contributions	10,665	10,665
4. Reemployed Annuitant Employer Contributions	345	345
5. Investment Income	12,112	12,112
6. Investment Expenses	(4,356)	(4,356)
7. Net Realized Gain / (Loss)	47,588	47,588
8. Other	0	0
9. Net Change in Unrealized Gain / (Loss)	40,542	0
10. Total Operating Revenue	$ 155,207	$ 114,665
C. OPERATING EXPENSES		
1. Service Retirements	$ 103,244	$ 103,244
2. Disability Benefits	489	489
3. Survivor Benefits	11,565	11,565
4. Refunds	800	800
5. Administrative Expenses	786	786
6. Total Operating Expenses	$ 116,884	$ 116,884
D. OTHER CHANGES IN RESERVES	$ 0	$ 0
E. ASSETS AVAILABLE AT END OF PERIOD	$ 1,070,572	$ 816,492
F. DETERMINATION OF CURRENT YEAR UNRECOGNIZED ASSET RETURN		
1. Average Balance		
(a) Assets available at BOY		$ 1,032,249
(b) Assets available at EOY		1,070,572
(c) Average balance {[(a) + (b) - Net Investment Income] / 2}		$ 1,003,468
{Net investment income: B.5+B.6+B.7+B.9}		
2. Expected Return: .080 * F.1		80,277
3. Actual Return		95,887
4. Current Year Gross Asset Gain/(Loss): F.3 - F.2		$ 15,610

SECTION 2

TOTAL MEMBERSHIP DATA

Table 3
Active Members as of June 30, 2018*

Age	Years of Service <5	5-9	10-14	15-19	20-24	25-29	30-34	35+	ALL
< 25	33	0	0	0	0	0	0	0	33
25-29	227	44	0	0	0	0	0	0	271
30-34	190	192	20	0	0	0	0	0	402
35-39	172	170	136	22	1	0	0	0	501
40-44	118	90	127	184	27	0	0	0	546
45-49	101	70	67	133	190	17	0	0	578
50-54	56	35	44	101	156	86	16	1	495
55-59	47	26	32	63	97	98	75	3	441
60-64	22	10	29	35	55	50	29	18	248
65+	16	5	6	10	8	6	6	5	62
ALL	982	642	461	548	534	257	126	27	3,577

AVERAGE ANNUAL EARNINGS

Age	Years of Service <5	5-9	10-14	15-19	20-24	25-29	30-34	35+	ALL
< 25	37,121	0	0	0	0	0	0	0	37,121
25-29	44,959	61,582	0	0	0	0	0	0	47,658
30-34	49,737	67,670	76,359	0	0	0	0	0	59,627
35-39	53,418	72,706	80,282	84,657	81,440	0	0	0	68,683
40-44	50,852	73,610	82,368	82,987	88,531	0	0	0	74,627
45-49	58,749	78,554	79,958	87,360	91,944	96,512	0	0	82,212
50-54	50,792	76,232	82,166	85,102	91,910	95,282	88,856	129,371	84,457
55-59	40,320	78,033	72,439	87,656	90,322	96,057	99,777	100,203	85,540
60-64	37,530	59,788	73,947	79,034	88,488	91,084	93,627	108,316	82,339
65+	21,065	31,978	75,867	65,230	87,911	101,377	73,302	124,358	64,154
ALL	48,783	71,091	79,819	84,465	91,031	94,984	95,714	111,165	74,004

	Prior Fiscal Year Earnings (IN THOUSANDS) by Years of Service <5	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over	ALL
ALL	47,905	45,641	36,796	46,287	48,609	24,411	12,060	3,001	264,713

**Including those on leave of absence; pay annualized for new hires.*

Table 4
Service Retirements as of June 30, 2018

Age	Years Retired <5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
<45	0	0	0	1	0	0	0	0	0	1
45-49	0	0	0	1	0	0	0	0	0	1
50-54	1	0	0	0	0	0	0	0	0	1
55-59	85	1	0	0	0	0	0	0	0	86
60-64	294	124	0	0	0	0	0	0	0	418
65-69	363	351	195	1	0	0	0	0	0	910
70-74	71	287	360	173	5	0	0	0	0	896
75-79	16	37	146	261	105	1	0	0	0	566
80-84	4	5	12	101	190	53	0	0	0	365
85-89	0	3	2	5	90	67	36	0	0	203
90+	0	0	1	3	4	29	45	17	1	100
ALL	834	808	716	546	394	150	81	17	1	3,547

AVERAGE ANNUAL BENEFIT

Age	Years Retired <5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
<45	0	0	0	5,825	0	0	0	0	0	5,825
45-49	0	0	0	5,825	0	0	0	0	0	5,825
50-54	5,246	0	0	0	0	0	0	0	0	5,246
55-59	16,455	1,657	0	0	0	0	0	0	0	16,283
60-64	25,759	24,803	0	0	0	0	0	0	0	25,475
65-69	20,704	24,920	32,829	5,825	0	0	0	0	0	24,912
70-74	16,183	25,210	34,177	33,820	51,890	0	0	0	0	29,909
75-79	6,054	20,617	25,667	35,172	35,988	29,235	0	0	0	31,087
80-84	7,865	5,741	23,001	37,009	43,197	31,463	0	0	0	38,217
85-89	0	11,477	3,549	9,815	50,130	36,995	30,629	0	0	40,314
90+	0	0	496	32,408	36,804	40,038	25,328	29,128	35,097	30,761
ALL	21,307	24,611	31,755	34,675	42,905	35,578	27,684	29,128	35,097	29,416

Total Annual Benefit (IN THOUSANDS) by Years RETIRED

	<5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
ALL	17,770	19,886	22,738	18,932	16,906	5,337	2,242	495	35	104,339

Table 5
Disability Retirements as of June 30, 2018*

	Years Disabled									
Age	<5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
<45	0	1	0	0	0	0	0	0	0	1
45-49	0	1	0	0	0	0	0	0	0	1
50-54	1	4	0	0	0	0	0	0	0	5
55-59	1	3	1	1	1	0	0	0	0	7
60-64	2	5	0	1	0	0	0	0	0	8
65-69	2	0	1	0	0	0	0	0	0	3
70-74	0	0	0	0	0	0	0	0	0	0
75-79	0	0	0	0	0	0	0	0	0	0
80-84	0	0	0	0	0	0	0	0	0	0
85-89	0	0	0	0	0	0	0	0	0	0
90+	0	0	0	0	0	0	0	0	0	0
ALL	6	13	3	2	1	0	0	0	0	25

AVERAGE ANNUAL BENEFIT

	Years Disabled									
Age	<5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
<45	0	3,525	0	0	0	0	0	0	0	3,525
45-49	0	34,355	0	0	0	0	0	0	0	34,355
50-54	26,221	17,516	0	0	0	0	0	0	0	19,257
55-59	12,766	18,905	1,377	25,166	5,750	0	0	0	0	14,539
60-64	46,710	13,446	0	28,282	0	0	0	0	0	25,327
65-69	15,504	0	428	0	0	0	0	0	0	10,479
70-74	0	0	0	0	0	0	0	0	0	0
75-79	0	0	0	0	0	0	0	0	0	0
80-84	0	0	0	0	0	0	0	0	0	0
85-89	0	0	0	0	0	0	0	0	0	0
90+	0	0	0	0	0	0	0	0	0	0
ALL	27,236	17,838	5,162	26,724	5,750	0	0	0	0	18,800

	Total Annual Benefit (IN THOUSANDS) by Years DISABLED									
	<5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
ALL	163	232	15	53	6	0	0	0	0	470

** Disability benefits convert to normal retirement benefits at normal retirement age (which occurs between ages 65 and 66).*

Table 6
Survivors as of June 30, 2018

Age	Years Since Member Death <5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
<45	4	2	0	0	0	0	0	0	0	6
45-49	1	0	3	0	0	0	0	0	0	4
50-54	2	0	2	0	0	0	0	0	0	4
55-59	3	1	0	0	0	0	0	0	0	4
60-64	5	3	1	5	1	0	0	0	0	15
65-69	4	2	2	1	0	1	1	0	1	12
70-74	19	2	2	12	9	3	0	1	0	48
75-79	15	0	5	13	11	11	5	2	0	62
80-84	29	0	1	6	17	21	6	2	0	82
85-89	20	0	1	0	1	18	17	3	2	62
90+	6	0	0	0	1	3	19	10	4	43
ALL	108	10	17	37	40	57	48	18	7	342

AVERAGE ANNUAL BENEFIT

Age	Years Since Member Death <5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
<45	7,225	7,568	0	0	0	0	0	0	0	7,339
45-49	5,709	0	737	0	0	0	0	0	0	1,980
50-54	9,778	0	832	0	0	0	0	0	0	5,305
55-59	44,090	299	0	0	0	0	0	0	0	33,142
60-64	27,440	6,889	18,725	8,330	49,897	0	0	0	0	17,876
65-69	32,721	23,137	33,748	44,880	0	43,152	28,174	0	3,350	30,351
70-74	31,616	25,708	46,419	22,658	30,930	24,172	0	20,787	0	28,928
75-79	37,271	0	17,875	33,116	43,008	37,965	22,952	18,628	0	34,220
80-84	43,666	0	65,810	23,739	40,711	38,894	38,063	24,800	0	39,773
85-89	45,417	0	41,094	0	27,536	50,463	30,291	24,318	22,990	40,632
90+	21,341	0	0	0	55,293	54,556	35,519	28,528	33,524	33,517
ALL	36,269	13,379	22,307	25,173	39,407	42,492	32,523	25,882	26,203	33,831

	Total Annual Benefit (IN THOUSANDS) by Years Since Member Death <5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
ALL	3,917	134	379	931	1,576	2,422	1,561	466	183	11,570

Table 7
Reconciliation of Members
as of June 30, 2018

	Active Participants	Leave of Absence	Vested Terminated	Other Non-Vested	Retired Participants	Disableds	Survivors and Beneficiaries	Alternate Payees[2]	Total
A. Number as of June 30, 2017	3,409	141	2,034	2,945	3,436	29	342	44	12,380
B. Additions	297	4	107	142	138		22	5	715
C. Deletions									
1. Retirements	(78)	(3)	(53)	-	-	-	-	-	(134)
2. Disability	-	-	-	-	-	-	-	-	-
3. Died with Beneficiary	(1)	(1)	(1)	-	(19)	-	-	-	(22)
4. Died without Beneficiary	-	-	-	-	(56)	(1)	(20)	-	(77)
5. Terminated - Deferred	(91)	(16)	-	-	-	-	-	-	(107)
6. Terminated - Not Vested	(142)	-	-	-	-	-	-	-	(142)
7. Refunds	(8)	(4)	(34)	(77)	-	-	-	-	(123)
8. Rehired as Active	124	(55)	(21)	(48)	-	-	-	-	-
9. Leave of Absence	(65)	65	-	-	-	-	-	-	-
10. Repayment of Refund	-	-	-	-	-	-	-	-	-
11. Expired Benefits	-	-	-	-	-	-	(3)	-	(3)
12. Disability to Retirement	-	-	-	-	-	(4)	-	-	(4)
D. Data Adjustments[1]	-	1	(1)	52	1	-	(1)	1	53
E. Total on June 30, 2018	3,445	132	2,031	3,014	3,500	24	340	50	12,536

[1] *Includes members not valued in prior valuation who repaid refunds or otherwise restored prior service.*

[2] *Includes alternate payees of retired participants (47), disabled participants (1), and survivors (2).*

SECTION 3

FUNDING STATUS

Table 8
Actuarial Balance Sheet
as of July 1, 2018
(dollars in thousands)

A.	CURRENT ASSETS (TABLE 1; Line F.4)	$	1,067,675
B.	EXPECTED FUTURE ASSETS		
	1. Present Value of Expected Future Statutory Supplemental Contributions*	$	743,114
	2. Present Value of Future Normal Costs		193,387
	3. Total Expected Future Assets	$	936,501
C.	TOTAL CURRENT AND EXPECTED FUTURE ASSETS	$	2,004,176
D.	TOTAL CURRENT AND EXPECTED FUTURE BENEFIT OBLIGATIONS	$	1,869,580
E.	CURRENT AND FUTURE UNFUNDED ACTUARIAL LIABILITY (D - C)	$	(134,596)

* *Includes the effect of scheduled employee and employer contribution increases and supplemental state contributions.*

Table 9
Determination of Unfunded Actuarial Accrued Liability (UAAL) and Supplemental Contribution Rate as of July 1, 2018 (dollars in thousands)

	Actuarial Present Value of Projected Benefits	Actuarial Present Value of Future Normal Costs	Actuarial Accrued Liability
A. DETERMINATION OF ACTUARIAL ACCRUED LIABILITY (AAL)			
1. Active Members*			
a. Retirement Benefits	$ 592,898	$ 123,011	$ 469,887
b. Disability Benefits	$ 14,405	$ 4,551	$ 9,854
c. Surviving Spouse and Child Benefits	$ 5,964	$ 1,673	$ 4,291
d. Vested Withdrawals	$ 42,349	$ 47,745	$ (5,396)
e. Refund Liability Due to Death or Withdrawal	$ 2,250	$ 16,407	$ (14,157)
f. Total	$ 657,866	$ 193,387	$ 464,479
2. Deferred Retirements	$ 79,052	$ 0	$ 79,052
3. Former Members without Vested Rights	$ 2,798	$ 0	$ 2,798
4. Annuitants	$ 1,129,864	$ 0	$ 1,129,864
5. Total	$ 1,869,580	$ 193,387	$ 1,676,193
B. DETERMINATION OF UNFUNDED ACTUARIAL ACCRUED LIABILITY (UAAL)			
1. Actuarial Accrued Liability (A.5)			$ 1,676,193
2. Current Assets (Table 1; Line F.4)			$ 1,067,675
3. Unfunded Actuarial Accrued Liability (B.1 - B.2)			$ 608,518
C. DETERMINATION OF SUPPLEMENTAL CONTRIBUTION RATE**			
1. Present Value of Future Payrolls Through the Amortization Date of June 30, 2048***			$ 4,680,314
2. Supplemental Contribution Rate (B.3 / C.1)			13.00%

* *Includes members on leave of absence.*

** *The amortization of the unfunded actuarial accrued liability (UAAL) using the current amortization method results in initial payments less than the "interest only" payment on the UAAL. Payments less than the interest only amount will result in the UAAL increasing for an initial period of time.*

****Calculated using 7.5% annual investment return rate.*

Table 10
Changes in Unfunded Actuarial Accrued Liability (UAAL) as of July 1, 2018 (dollars in thousands)

A.	UAAL AT BEGINNING OF YEAR	$	572,741
B.	CHANGE DUE TO INTEREST REQUIREMENTS AND CURRENT RATE OF FUNDING		
	1. Normal Cost and Expenses	$	25,873
	2. Contributions	$	(59,321)
	3. Interest	$	44,481
	4. Total	$	11,033
C.	EXPECTED UAAL AT END OF YEAR (A + B.4)	$	583,774
D.	INCREASE / (DECREASE) DUE TO ACTUARIAL LOSSES / (GAINS) BECAUSE OF EXPERIENCE DEVIATIONS FROM EXPECTED		
	1. Age and Service Retirements	$	2,386
	2. Disability Retirements		(57)
	3. Death-in-Service Benefits		176
	4. Withdrawals		(3,835)
	5. Salary Increases		(14,984)
	6. Investment Income		(5,179)
	7. Mortality of Annuitants		(420)
	8. Other Items		2,472
	9. Total	$	(19,441)
E.	UAAL AT END OF YEAR BEFORE PLAN AMENDMENTS AND CHANGES IN ACTUARIAL ASSUMPTIONS (C + D.9)	$	564,333
F.	CHANGE IN UAAL DUE TO PLAN AMENDMENTS		(74,376)
G.	CHANGE IN UAAL DUE TO CHANGES IN ACTUARIAL ASSUMPTIONS		118,561
H.	UAAL AT END OF YEAR (E + F + G)	$	608,518

Table 11
Determination of Contribution Sufficiency
as of July 1, 2018
(dollars in thousands)

	Percent-of-Payroll		Dollar Amount
A. STATUTORY CONTRIBUTIONS - CHAPTER 354A			
1. Employee Contributions	7.50%	$	21,138
2. Employer Contributions			
a. Regular	7.34%		20,688
b. Additional	3.84%		10,820
3. Supplemental Contribution			
a. 1996 Legislation	0.30%		838
b. 1997 Legislation	1.00%		2,827
c. 2014 Legislation	2.48%		7,000
d. 2018 Legislation	1.77%		5,000
4. Total	24.23%	$	68,311
B. REQUIRED CONTRIBUTIONS - CHAPTER 356			
1. Normal Cost			
a. Retirement Benefits	5.44%	$	15,330
b. Disability Benefits	0.18%		508
c. Surviving Spouse and Child Benefits	0.07%		197
d. Vested Withdrawals	1.90%		5,355
e. Refund Liability Due to Death or Withdrawal	0.67%		1,889
f. Total	8.26%	$	23,279
2. Supplemental Contribution Amortization	13.00%		36,632
3. Allowance for Administrative Expenses	0.28%		789
4. Total	21.54%	$	60,700
C. CONTRIBUTION SUFFICIENCY / (DEFICIENCY) (A.4 - B.4)	2.69%		7,611

Projected Annual Payroll for Fiscal Year Beginning on the Valuation Date
(determined according to requirements of the LCPR Standards for Actuarial Work): $ 281,782

SECTION 4

ACTUARIAL METHODS AND ASSUMPTIONS

Table 12
Actuarial Methods and Assumptions
as of July 1, 2018

I. ACTUARIAL COST METHOD

An Actuarial Cost Method is a set of techniques used by the actuary to develop contribution levels under a retirement plan. The Actuarial Cost Method used in this valuation for all purposes is the Entry Age Actuarial Cost Method. Under this Method, a Normal Cost is developed by amortizing the actuarial value of benefits expected to be received by each active participant (as a level percentage of pay) over the total working lifetime of that participant, from hire to termination. Years of Service for valuation purposes was provided by the Retirement Fund. Age as of the valuation date was calculated based on the dates of birth provided by the Retirement Fund. Entry Age for valuation purposes was calculated as the age on the valuation date minus the years of service on the valuation date.

To the extent that current assets and future Normal Costs do not support participants' expected future benefits, an Unfunded Actuarial Accrued liability ("UAAL") develops. The UAAL is amortized over the closed statutory amortization period ending June 30, 2048 using level percent-of-payroll assuming payroll increases of 3.00% per annum. The total contribution developed under this method is the sum of the Normal Cost and the payment toward the UAAL.

II. CURRENT ACTUARIAL ASSUMPTIONS

Assumptions are based on an experience study for the five-year period of July 1, 2011 to June 30, 2016, as well as a legislated change to the investment return assumption effective July 1, 2018. Note that the significant plan changes reflected in this report may ultimately result in behavior changes not anticipated in the actuarial assumptions.

A. Demographic Assumptions

Mortality:

1. Healthy and Disabled Annuitant Mortality:
    a. Male: RP-2014 Healthy Annuitant Mortality Table for males adjusted for white collar and projected with Scale MP-2017 from 2006
    b. Female: RP-2014 Healthy Annuitant Mortality Table for females adjusted for white collar and projected with Scale MP-2017 from 2006, set back 2 years
2. Employee Mortality:
    a. Male: RP-2014 Employee Mortality Table for males adjusted for white collar and projected with Scale MP-2017 from 2006
    b. Female: RP-2014 Employee Mortality Table for females adjusted for white collar and projected with Scale MP-2017 from 2006

Table 12
Actuarial Methods and Assumptions
as of July 1, 2018

Deaths Expressed as the Number of Occurrences per 10,000:

Age in 2018	Post-Retirement Mortality Male	Female
55	40	25
56	42	27
57	45	29
58	48	31
59	51	33
60	55	35
61	59	38
62	64	41
63	69	46
64	74	51
65	81	56
66	88	62
67	96	67
68	105	74
69	116	81
70	128	89
71	142	98
72	158	108
73	176	120
74	197	133
75	220	148
76	246	165
77	275	184
78	309	205
79	347	230
80	390	258
81	440	289
82	497	325
83	563	367
84	638	414

Table 12
Actuarial Methods and Assumptions
as of July 1, 2018

Deaths Expressed as the Number of Occurrences per 10,000:

Age in 2018	Pre-Retirement Mortality Male	Female
30	4	2
31	4	2
32	4	2
33	4	2
34	4	3
35	4	3
36	4	3
37	4	3
38	5	3
39	5	4
40	5	4
41	5	4
42	5	4
43	6	5
44	6	5
45	7	6
46	8	6
47	9	7
48	10	8
49	11	8
50	12	9
51	13	10
52	15	11
53	16	12
54	18	14
55	20	15
56	22	16
57	25	18
58	27	20
59	31	21

Table 12
Actuarial Methods and Assumptions
as of July 1, 2018

Rates of Disability:

Disability Expressed as the Number of Occurrences per 10,000:

Age	Disability	Age	Disability
20	1	45	4
21	1	46	4
22	1	47	4
23	1	48	4
24	1	49	4
25	1	50	9
26	1	51	9
27	1	52	9
28	1	53	9
29	1	54	9
30	2	55	17
31	2	56	17
32	2	57	17
33	2	58	17
34	2	59	17
35	2	60	35
36	2	61	35
37	2	62	35
38	2	63	35
39	2	64	35
40	3		
41	3		
42	3		
43	3		
44	3		

Table 12
Actuarial Methods and Assumptions
as of July 1, 2018

Rates of Termination:

Year	Number of Terminations per 1,000 Active Members Male	Female
1	400	400
2	260	220
3	160	150
4	110	120
5	80	100
6	50	85
7	48	70
8	45	55
9	43	45
10	40	40
11	38	38
12	35	35
13	33	30
14	30	25
15 & Over	25	20

Rates of Retirement:

Retirements Expressed as the Number of Occurrences per 10,000:

Age	Basic Members Eligible for Rule of 90 Provision	Basic Members Not Eligible for Rule of 90 Provision	Male Coordinated Members Eligible for Rule of 90 Provision	Female Coordinated Members Eligible for Rule of 90 Provision	Male Coordinated Members Not Eligible for Rule of 90 Provision	Female Coordinated Members Not Eligible for Rule of 90 Provision
55	5,000	800	2,500	2,500	900	500
56	5,000	1,300	2,500	2,500	700	500
57	4,000	1,300	2,500	2,500	700	500
58	4,000	1,800	2,500	2,500	700	600
59	3,500	1,800	2,500	3,000	700	600
60	3,500	2,000	2,500	3,000	1,200	900
61	3,500	2,000	2,500	3,000	1,200	1,100
62	3,500	4,000	4,500	3,000	2,500	2,000
63	3,500	4,000	3,500	3,000	2,800	2,300
64	4,000	4,000	2,500	3,000	2,800	2,600
65	5,000	5,000	3,000	4,500	3,000*	4,500*
66	3,000	5,000	3,000	4,300	3,000	4,300
67	3,000	5,000	3,500	3,800	3,500	3,800
68	3,000	5,000	4,000	3,800	4,000	3,800
69	3,000	5,000	4,500	3,000	4,500	3,000
70 & Over	10,000	10,000	10,000	10,000	10,000	10,000

**2,800 for male members and 3,000 for female members hired after June 30, 1989 with a Normal Retirement Age equal to 66.*

Table 12
Actuarial Methods and Assumptions
as of July 1, 2018

B. Economic Assumptions

Investment Return Rate: 7.50%

Price Inflation: 2.50% per year

Wage Inflation: 3.00% per year

Future Salary Increases: Service-based rates shown below:

Annual Salary Increases

Year	Ultimate Rate of Annual Salary Increases	Year	Ultimate Rate of Annual Salary Increases
1	9.00%	21	3.40%
2	8.00	22	3.20
3	7.00	23 & Over	3.00
4	6.80		
5	6.60		
6	6.40		
7	6.20		
8	6.00		
9	5.75		
10	5.50		
11	5.25		
12	5.00		
13	4.75		
14	4.50		
15	4.25		
16	4.00		
17	3.90		
18	3.80		
19	3.70		
20	3.60		

Asset Value: The actuarial value of assets is smoothed by using a five-year average market value.

C. Other Assumptions

Marital Status: It is assumed that 75% of male members and 60% of female members have an eligible spouse. The male spouse is assumed to be two years older than the female spouse. Married members are assumed to have two dependent

Table 12
Actuarial Methods and Assumptions
as of July 1, 2018

	children.
Deferred Benefit Commencement:	Basic Plan members who terminate vested are assumed to commence benefits at age 61. Coordinated Plan members are assumed to commence benefits at age 62. If the member is already past the assumed deferral age, the member is assumed to commence benefits one year from the valuation date.
Administrative Expenses:	Prior year administrative expenses (excluding investment expenses) are expressed as a percentage-of-payroll and then applied to current projected 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 the assumed benefit commencement date and are discounted back to the valuation date.
Allowance for Combined Service Annuity:	20.0% load on liabilities for former, vested members. 9.0% load on liabilities for former, non-vested members.
Missing Salary and Salary Minimums:	Active members with reported salaries of $100 or less were assumed to have the average non-zero active salary. Active members with salaries less than those reported at the prior valuation date are valued using their prior salary amount. Active members who have been hired within one year of the valuation date have had their pay annualized by dividing by months of service credited, not to exceed the average non-zero active salary. For members on leave of absence at valuation date who were not on leave at the prior valuation date, the prior year's valuation pay was used.
Missing Data for Deferred Vested Members:	Deferred vested members without a reported benefit and without salary information were assumed to have a final average salary of $40,000.
Decrement Timing:	Retirement and Termination: end of valuation year – consistent with retirements and terminations occurring at the end of the school year. Death and Disability: middle of valuation year.
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.
Service Credit Accruals:	It is assumed that members accrue one year of service credit per year. Exact fractional service is used to determine the amount of benefit payable.

Table 12
Actuarial Methods and Assumptions
as of July 1, 2018

Supplemental Contributions:	1996 legislation provides for a variable amortization aid contribution paid annually on July 15. We assumed the annual amortization aid contribution will equal $838,000, which was the actual contribution for the most recent fiscal year. Additionally, annual supplemental contributions equal to $14,827,000 are scheduled to be paid each October 1. The contributions described herein will continue until the plan is 100% funded or until June 30, 2048, whichever occurs earlier.
Projected Annual Payroll Calculation:	The census data as of July 1, 2018 reflects retirements and terminations occurring during the months of May and June; however, it does not necessarily reflect the replacements hired to fill their positions who may have hire dates in August and September. We assumed that May and June retirements are replaced by members coming in at the B.A. entry salary level of $45,659; and the Projected Annual Payroll for the fiscal year ending June 30, 2019 includes this replacement salary amount.
Changes in Actuarial Methods and Assumptions Since the Prior Valuation:	The assumed investment return was lowered from 8.0% to 7.5%. Assumed wage inflation decreased from 4.0% to 3.0%. Salary increase rates were updated from an age-based table with a service-based component during the first fifteen years, to a service based table of rates. Retirement, withdrawal, and disability rates were adjusted to better fit observed experience. The mortality table was updated from the RP-2000 Mortality Table (with adjustments) projected with Scale AA to 2020, to the RP-2014 Mortality Table, with white collar adjustment, set back 2 years for females, projected with Scale MP-2017 from 2006. The statutory amortization period was changed from June 30, 2042 to June 30, 2048.

SECTION 5

BASIC PLAN

Table 3A
Basic Active Members as of June 30, 2018

	Years of Service								
Age	**<5**	**5-9**	**10-14**	**15-19**	**20-24**	**25-29**	**30-34**	**35+**	**ALL**
<25	0	0	0	0	0	0	0	0	0
25-29	0	0	0	0	0	0	0	0	0
30-34	0	0	0	0	0	0	0	0	0
35-39	0	0	0	0	0	0	0	0	0
40-44	0	0	0	0	0	0	0	0	0
45-49	0	0	0	0	0	0	0	0	0
50-54	0	0	0	0	0	0	0	0	0
55-59	0	0	0	0	0	0	0	0	0
60-64	0	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	1	1
ALL	0	0	0	0	0	0	0	1	1

AVERAGE ANNUAL EARNINGS

	Years of Service								
Age	**<5**	**5-9**	**10-14**	**15-19**	**20-24**	**25-29**	**30-34**	**35+**	**ALL**
<25	0	0	0	0	0	0	0	0	0
25-29	0	0	0	0	0	0	0	0	0
30-34	0	0	0	0	0	0	0	0	0
35-39	0	0	0	0	0	0	0	0	0
40-44	0	0	0	0	0	0	0	0	0
45-49	0	0	0	0	0	0	0	0	0
50-54	0	0	0	0	0	0	0	0	0
55-59	0	0	0	0	0	0	0	0	0
60-64	0	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	155,772	155,772
ALL	0	0	0	0	0	0	0	155,772	155,772

	Prior Fiscal Year Earnings (IN THOUSANDS) by Years of Service								
	<5	**5-9**	**10-14**	**15-19**	**20-24**	**25-29**	**30-34**	**35 & Over**	**ALL**
ALL	0	0	0	0	0	0	0	156	156

Table 4A
Basic Service Retirements as of June 30, 2018

Age	Years Retired <5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
<45	0	0	0	1	0	0	0	0	0	1
45-49	0	0	0	1	0	0	0	0	0	1
50-54	1	0	0	0	0	0	0	0	0	1
55-59	4	0	0	0	0	0	0	0	0	4
60-64	12	18	0	0	0	0	0	0	0	30
65-69	25	75	114	1	0	0	0	0	0	215
70-74	4	51	213	135	4	0	0	0	0	407
75-79	0	7	43	185	86	1	0	0	0	322
80-84	0	0	2	60	159	49	0	0	0	270
85-89	0	0	0	0	70	59	36	0	0	165
90+	0	0	0	1	4	25	40	17	1	88
ALL	46	151	372	384	323	134	76	17	1	1,504

AVERAGE ANNUAL BENEFIT

Age	Years Retired <5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
<45	0	0	0	5,825	0	0	0	0	0	5,825
45-49	0	0	0	5,825	0	0	0	0	0	5,825
50-54	5,246	0	0	0	0	0	0	0	0	5,246
55-59	7,096	0	0	0	0	0	0	0	0	7,096
60-64	33,054	44,315	0	0	0	0	0	0	0	39,810
65-69	43,858	43,073	44,530	5,825	0	0	0	0	0	43,764
70-74	33,663	50,627	44,859	39,413	59,779	0	0	0	0	43,812
75-79	0	46,009	47,812	42,565	41,564	29,235	0	0	0	43,032
80-84	0	0	69,596	51,855	48,518	33,319	0	0	0	46,657
85-89	0	0	0	0	58,547	40,283	30,629	0	0	45,925
90+	0	0	0	40,916	36,804	43,185	27,795	29,128	35,097	33,066
ALL	36,117	45,908	45,233	42,617	48,834	38,196	29,137	29,128	35,097	43,498

Total Annual Benefit (IN THOUSANDS) by Years RETIRED

	<5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
ALL	1,661	6,932	16,828	16,366	15,773	5,118	2,214	495	35	65,421

Table 5A
Basic Disability Retirements as of June 30, 2018*

Age	Years Disabled									
	<5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
<45	0	0	0	0	0	0	0	0	0	0
45-49	0	0	0	0	0	0	0	0	0	0
50-54	0	0	0	0	0	0	0	0	0	0
55-59	0	0	0	0	0	0	0	0	0	0
60-64	0	1	0	0	0	0	0	0	0	1
65-69	0	0	0	0	0	0	0	0	0	0
70-74	0	0	0	0	0	0	0	0	0	0
75-79	0	0	0	0	0	0	0	0	0	0
80-84	0	0	0	0	0	0	0	0	0	0
85-89	0	0	0	0	0	0	0	0	0	0
90+	0	0	0	0	0	0	0	0	0	0
ALL	0	0	1	0	0	0	0	0	0	1

AVERAGE ANNUAL BENEFIT

Age	Years Disabled									
	<5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
<45	0	0	0	0	0	0	0	0	0	0
45-49	0	0	0	0	0	0	0	0	0	0
50-54	0	0	0	0	0	0	0	0	0	0
55-59	0	0	0	0	0	0	0	0	0	0
60-64	0	0	13,681	0	0	0	0	0	0	13,681
65-69	0	0	0	0	0	0	0	0	0	0
70-74	0	0	0	0	0	0	0	0	0	0
75-79	0	0	0	0	0	0	0	0	0	0
80-84	0	0	0	0	0	0	0	0	0	0
85-89	0	0	0	0	0	0	0	0	0	0
90+	0	0	0	0	0	0	0	0	0	0
ALL	0	0	13,681	0	0	0	0	0	0	13,681

	Total Annual Benefit (IN THOUSANDS) by Years DISABLED									
	<5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
ALL	0	0	14	0	0	0	0	0	0	14

** Disability benefits convert to normal retirement benefits at normal retirement age (which occurs between ages 65 and 66).*

Table 6A
Basic Survivors as of June 30, 2018

Age	Years Since Member Death									
	<5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
<45	0	0	0	0	0	0	0	0	0	0
45-49	0	0	0	0	0	0	0	0	0	0
50-54	0	0	0	0	0	0	0	0	0	0
55-59	2	0	0	0	0	0	0	0	0	2
60-64	2	0	0	4	1	0	0	0	0	7
65-69	2	0	1	1	0	1	1	0	1	7
70-74	11	0	2	8	7	3	0	1	0	32
75-79	14	0	0	7	10	11	5	2	0	49
80-84	27	0	1	5	16	20	6	2	0	77
85-89	20	0	1	0	1	18	17	3	2	62
90+	5	0	0	0	1	3	19	10	4	42
ALL	83	0	5	25	36	56	48	18	7	278

AVERAGE ANNUAL BENEFIT

Age	Years Since Member Death									
	<5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
<45	0	0	0	0	0	0	0	0	0	0
45-49	0	0	0	0	0	0	0	0	0	0
50-54	0	0	0	0	0	0	0	0	0	0
55-59	46,002	0	0	0	0	0	0	0	0	46,002
60-64	34,126	0	0	10,236	49,897	0	0	0	0	22,728
65-69	39,078	0	51,275	44,880	0	43,152	28,174	0	3,350	35,570
70-74	43,952	0	46,419	26,736	37,188	24,172	0	20,787	0	35,744
75-79	38,283	0	0	45,165	45,566	37,965	22,952	18,628	0	38,314
80-84	46,603	0	65,810	28,095	42,322	39,481	38,063	24,800	0	41,679
85-89	45,417	0	41,094	0	27,536	50,463	30,291	24,318	22,990	40,632
90+	25,430	0	0	0	55,293	54,556	35,519	28,528	33,524	34,294
ALL	42,791	0	50,203	30,254	42,385	42,766	32,523	25,882	26,203	38,454

	Total Annual Benefit (IN THOUSANDS) by Years Since Member Death									
	<5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
ALL	3,552	0	252	756	1,526	2,395	1,561	466	183	10,690

Table 11A
Basic Determination of Contribution Sufficiency as of July 1, 2018 (dollars in thousands)

	Percent-of-Payroll	Dollar Amount
A. STATUTORY CONTRIBUTIONS - CHAPTER 354A		
1. Employee Contributions	10.00%	$ 16
2. Employer Contributions		
a. Regular	10.84%	17
b. Additional	3.64%	6
3. Supplemental Contribution		
a. 1996 Legislation	0.30%	0
b. 1997 Legislation	1.00%	2
c. 2014 Legislation	2.48%	4
d. 2018 Legislation	1.77%	3
4. Total	30.03%	$ 48
B. REQUIRED CONTRIBUTIONS - CHAPTER 356		
1. Normal Cost		
a. Retirement Benefits	6.16%	$ 10
b. Disability Benefits	0.34%	1
c. Surviving Spouse and Child Benefits	0.07%	-
d. Deferred Retirements	2.35%	4
e. Refund Liability Due to Death or Withdrawal	1.48%	2
f. Total	10.40%	$ 17
Projected Annual Payroll for Fiscal Year Beginning on the Valuation Date:		$ 160

Summary of Benefit Provisions for Basic Members as of July 1, 2018

STATUTORY CONTRIBUTIONS

Statutory contribution rates for members and their employers are shown as a percent of pay below:

Contribution After June 30,	Member	Employer Regular	Employer Additional
2017	10.00%	10.000%	3.64%
2018	10.00%	10.835%	3.64%
2019	10.00%	11.670%	3.64%
2020	10.00%	11.880%	3.64%
2021	10.00%	12.090%	3.64%
2022	10.25%	12.300%	3.64%
2023	10.25%	12.500%	3.64%

SUPPLEMENTAL CONTRIBUTIONS

1996 legislation provides for a variable amortization aid contribution paid annually on July 15. The actual contribution during the past fiscal year was $838,000.

Annual supplemental contributions of $14,827,000 will be contributed by the State of Minnesota each October 1. The contributions will continue until the plan is 100% funded or until June 30, 2048, whichever occurs earlier.

PARTICIPANTS

Professional Educators first employed prior to July 1, 1978 by schools in the City of St. Paul or St. Paul College whose position requires a license from the Minnesota Department of Education, who are not covered under the Social Security Act.

ACCREDITED SERVICE

Service which has been verified and accredited by the Association for the purpose of determining contributions and benefits (may include service earned while working outside of St. Paul Public Schools, previous St. Paul service, military service and governmental service).

ALLOWABLE ST. PAUL SERVICE

Service earned as a licensed educator in the St. Paul Public Schools, in the St. Paul College, or as an employee of the Association. Also includes service credited after receipt of payment as required, for licensed educators on leave.

SALARY

Total compensation earned during a school year (July 1 to June 30) excluding lump sum payments for unused leave at termination and employer-paid insurance coverage.

Summary of Benefit Provisions for Basic Members as of July 1, 2018

AVERAGE SALARY

Average of the highest five years of salary during the last 10 years of St. Paul service while making contributions or while disabled.

NORMAL RETIREMENT BENEFIT

Eligibility

Attainment of age 65 and 5 years of Accredited Service.

Benefit

2.50% of Average Salary for each year of Accredited Service.

EARLY RETIREMENT BENEFIT

Eligibility

Attainment of age 55 and 5 years of Accredited Service.

Benefit

The greater of the following benefits:

- 2.00 percent of Average Salary per year of Accredited Service, subject to a maximum of 40 years with a 0.25% reduction for each month the member is under age 65. If the member has 25 years of Accredited Service, the reduction is taken from age 60, therefore no reduction is required if the member is age 60 or older. No reduction is taken if age plus years of Accredited Service totals at least 90.
- 2.50 percent of Average Salary per year of Accredited Service, subject to a maximum of 40 years, reduced for each month the member is under age 65 using linear interpolation of the table listed below. The factors for retirements on or after July 1, 2024 will be phased in over a sixty-month period starting July 1, 2019.

UNDER AGE 62 OR LESS THAN 30 YEARS OF SERVICE

Age at Retirement	RETIREMENTS PRIOR TO JULY 1, 2019	RETIREMENTS ON OR AFTER JULY 1, 2024	AGE 62 OR OLDER WITH 30 YEARS OF SERVICE
55	0.5376	0.4200	
56	0.5745	0.4600	
57	0.6092	0.5000	
58	0.6419	0.5400	
59	0.6726	0.5800	
60	0.7354	0.6500	
61	0.7947	0.7200	
62	0.8507	0.7900	0.8831
63	0.9035	0.8600	0.9246
64	0.9533	0.9300	0.9635
65	1.0000	1.0000	1.0000

Summary of Benefit Provisions for Basic Members as of July 1, 2018

DISABILITY RETIREMENT BENEFIT

Eligibility

Total and permanent disablement before attaining age 65 and 5 years of Accredited Service.

Benefit

If the member is under age 65, 75 percent of the member's annual contract salary less any Social Security and Workers' Compensation benefits payable until age 65. At age 65, a normal retirement benefit is calculated using the projected service and average salary as if the member had continued to teach in their position held at the time of disability. Members age 65 or older at time of disability receive a normal retirement benefit.

DEFERRED RETIREMENT BENEFIT

Eligibility

5 years of Accredited Service.

Benefit

Benefit computed under law in effect at termination and payable as a normal or early retirement benefit. For members hired on or before June 30, 2006, the benefit is augmented at 3.00 percent compounded annually from the 1st of the month following termination until the January 1st after turning age 55 and then augmented at 5.00 percent compounded annually from that date to July 1, 2012. For members hired after June 30, 2006, the benefit is augmented at 2.50 percent compounded annually from the 1st of the month following termination to July 1, 2012. Augmentation for all members, regardless of hire date, changed to 2.00 percent as of July 1, 2012 for the portion of benefit deferral which occurs after June 30, 2012 to June 30, 2019. After June 30, 2019, benefits are not augmented.

ACTIVE SURVIVOR BENEFIT (Family Benefit)

Eligibility

Active member with three years of Accredited Service.

Benefit

- Children's Benefit: 25 percent of the maximum Bachelor of Arts salary for the year in which the member died for each eligible child up to a maximum of two. Benefits are paid until the child attains age 18, or 22 for full-time students.
- Spousal Benefit: 15 percent of the maximum Bachelor of Arts salary for an eligible spouse who has legal custody of an eligible child. Spousal benefits cease when the spouse remarries, dies, or elects the regular survivor benefit. Electing the regular survivor benefit does not disqualify the child from receiving the family benefit.

Summary of Benefit Provisions for Basic Members as of July 1, 2018

SURVIVOR BENEFIT (Active or Retired Member)

Eligibility

Active member or retired member with five years of Accredited Service. A surviving spouse must have been married to the member for three years at the earlier of his death or retirement.

Benefit

Retirement benefit earned at the time of death or retirement, whichever is earlier, reduced by the use of one hundred percent joint survivorship tables, based on the ages of the member and survivor at the time of retirement.

REFUND OF CONTRIBUTIONS

Eligibility

Termination or death where no annuity is payable, or prior to age 55, if a refund of contributions is chosen in lieu of an annuity.

Benefit

Member contributions with 6.00 percent interest accrued through June 30, 2011, 4.00 percent interest accrued through June 30, 2018, and 3.00 percent interest thereafter.

REEMPLOYED ANNUITANTS

The School District shall make the regular employer contribution and additional employer contribution, plus a supplemental contribution equal to 2.5% of salary, on behalf of any retired member who is reemployed by the School District. Reemployed annuitants do not accrue additional benefits.

NORMAL FORM OF RETIREMENT BENEFITS

Unreduced annuity payments made until the death of the member, with a 100 percent Joint & Survivor adjusted pension payable to the surviving beneficiary.

BENEFIT INCREASES

2019:	0.00 percent
2020:	0.00 percent
2021 and thereafter:	1.00 percent

For retirements on and after July 1, 2024, the first benefit increase is delayed until the retiree reaches Normal Retirement Age (not applicable to Rule of 90 retirees, Rule of 62/30 retirees, disability benefit recipients, or survivors).

Summary of Benefit Provisions for Basic Members as of July 1, 2018

CHANGES IN PLAN PROVISIONS

Lower early retirement factors will be phased in over a sixty-month period starting July 1, 2019.

Interest credited on refunds of member contributions decreased from 4.0% to 3.0% prospectively, beginning July 1, 2018.

Deferred augmentation was changed to 0.00% for future accruing benefits, effective July 1, 2019. Augmentation that has already accrued for deferred members will still apply.

Post-retirement benefit increases were changed from 1.0% per year with a provision to increase to 2.0% if the funding ratio reaches 80% for two consecutive years or 2.5% if the funding ratio reaches 90% for two consecutive years, to 0.0% for January 1, 2019 and 2020 and 1.0% thereafter.

For retirements on or after July 1, 2024, the first benefit increase is delayed until the retiree reaches Normal Retirement Age. Does not apply to Rule of 90 retirees, Rule of 62/30 retirees, disability benefit recipients, or survivors.

Member contributions will increase from 10.00% of pay to 10.25% of pay, effective July 1, 2022.

Employer regular contributions will increase from 10.00% of pay to 12.50% of pay over six years, beginning July 1, 2018.

Additional supplemental contributions of $5,000,000 will be made by the State of Minnesota annually beginning October 1, 2018.

SECTION 6

COORDINATED PLAN

Table 3B
Coordinated Active Members as of June 30, 2018*

Age	Years of Service <5	5-9	10-14	15-19	20-24	25-29	30-34	35+	ALL
<25	33	0	0	0	0	0	0	0	33
25-29	227	44	0	0	0	0	0	0	271
30-34	190	192	20	0	0	0	0	0	402
35-39	172	170	136	22	1	0	0	0	501
40-44	118	90	127	184	27	0	0	0	546
45-49	101	70	67	133	190	17	0	0	578
50-54	56	35	44	101	156	86	16	1	495
55-59	47	26	32	63	97	98	75	3	441
60-64	22	10	29	35	55	50	29	18	248
65+	16	5	6	10	8	6	6	4	61
ALL	982	642	461	548	534	257	126	26	3,576

AVERAGE ANNUAL EARNINGS

Age	Years of Service <5	5-9	10-14	15-19	20-24	25-29	30-34	35+	ALL
<25	37,121	0	0	0	0	0	0	0	37,121
25-29	44,959	61,582	0	0	0	0	0	0	47,658
30-34	49,737	67,670	76,359	0	0	0	0	0	59,626
35-39	53,418	72,706	80,282	84,657	81,440	0	0	0	68,683
40-44	50,852	73,610	82,368	82,987	88,531	0	0	0	74,626
45-49	58,749	78,554	79,958	87,360	91,944	96,512	0	0	82,212
50-54	50,792	76,232	82,166	85,102	91,910	95,282	88,856	129,371	84,457
55-59	40,320	78,033	72,439	87,656	90,322	96,057	99,777	100,203	85,540
60-64	37,530	59,788	73,947	79,034	88,488	91,084	93,627	108,316	82,339
65+	21,065	31,978	75,867	65,230	87,911	101,377	73,302	116,505	62,652
ALL	48,783	71,091	79,819	84,465	91,031	94,984	95,714	109,450	73,981

	Prior Fiscal Year Earnings (In THOUSANDS) by Years of Service <5	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over	ALL
ALL	47,905	45,641	36,797	46,287	48,610	24,411	12,060	2,846	264,556

**Including those on leave of absence; pay annualized for new hires.*

Table 4B
Coordinated Service Retirements as of June 30, 2018

	Years Retired									
Age	<5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
<45	0	0	0	0	0	0	0	0	0	0
45-49	0	0	0	0	0	0	0	0	0	0
50-54	0	0	0	0	0	0	0	0	0	0
55-59	81	1	0	0	0	0	0	0	0	82
60-64	282	106	0	0	0	0	0	0	0	388
65-69	338	276	81	0	0	0	0	0	0	695
70-74	67	236	147	38	1	0	0	0	0	489
75-79	16	30	103	76	19	0	0	0	0	244
80-84	4	5	10	41	31	4	0	0	0	95
85-89	0	3	2	5	20	8	0	0	0	38
90+	0	0	1	2	0	4	5	0	0	12
ALL	788	657	344	162	71	16	5	0	0	2,043

AVERAGE ANNUAL BENEFIT

	Years Retired									
Age	<5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
<45	0	0	0	0	0	0	0	0	0	0
45-49	0	0	0	0	0	0	0	0	0	0
50-54	0	0	0	0	0	0	0	0	0	0
55-59	16,918	1,657	0	0	0	0	0	0	0	16,731
60-64	25,449	21,490	0	0	0	0	0	0	0	24,367
65-69	18,991	19,987	16,361	0	0	0	0	0	0	19,080
70-74	15,140	19,718	18,700	13,950	20,333	0	0	0	0	18,338
75-79	6,054	14,692	16,422	17,176	10,751	0	0	0	0	15,323
80-84	7,865	5,741	13,682	15,284	15,908	8,728	0	0	0	14,228
85-89	0	11,477	3,549	9,815	20,671	12,748	0	0	0	15,948
90+	0	0	496	28,154	0	20,367	5,594	0	0	13,854
ALL	20,442	19,716	17,180	15,849	15,932	13,648	5,594	0	0	19,049

	Total Annual Benefit (IN THOUSANDS) by Years RETIRED									
	<5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
ALL	16,108	12,953	5,910	2,568	1,131	218	28	0	0	38,917

Table 5B
Coordinated Disability Retirements as of June 30, 2018*

	Years Disabled									
Age	<5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
<45	0	1	0	0	0	0	0	0	0	1
45-49	0	1	0	0	0	0	0	0	0	1
50-54	1	4	0	0	0	0	0	0	0	5
55-59	1	3	1	1	1	0	0	0	0	7
60-64	2	4	0	1	0	0	0	0	0	7
65-69	2	0	1	0	0	0	0	0	0	3
70-74	0	0	0	0	0	0	0	0	0	0
75-79	0	0	0	0	0	0	0	0	0	0
80-84	0	0	0	0	0	0	0	0	0	0
85-89	0	0	0	0	0	0	0	0	0	0
90+	0	0	0	0	0	0	0	0	0	0
ALL	6	13	2	2	1	0	0	0	0	24

AVERAGE ANNUAL BENEFIT

	Years Disabled									
Age	<5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
<45	0	3,525	0	0	0	0	0	0	0	3,525
45-49	0	34,355	0	0	0	0	0	0	0	34,355
50-54	26,221	17,516	0	0	0	0	0	0	0	19,257
55-59	12,766	18,905	1,377	25,166	5,750	0	0	0	0	14,539
60-64	46,710	16,808	0	28,282	0	0	0	0	0	26,991
65-69	15,504	0	428	0	0	0	0	0	0	10,479
70-74	0	0	0	0	0	0	0	0	0	0
75-79	0	0	0	0	0	0	0	0	0	0
80-84	0	0	0	0	0	0	0	0	0	0
85-89	0	0	0	0	0	0	0	0	0	0
90+	0	0	0	0	0	0	0	0	0	0
ALL	27,236	17,838	902	26,724	5,750	0	0	0	0	19,013

	Total Annual Benefit (IN THOUSANDS) by Years DISABLED									
	<5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Over	ALL
ALL	163	232	2	53	6	0	0	0	0	456

** Disability benefits convert to normal retirement benefits at normal retirement age (which occurs between ages 65 and 66).*

Table 6B
Coordinated Survivors as of June 30, 2018

	Years Since Member Death									
Age	**<5**	**5-9**	**10-14**	**15-19**	**20-24**	**25-29**	**30-34**	**35-39**	**40 & Over**	**ALL**
<45	4	2	0	0	0	0	0	0	0	6
45-49	1	0	3	0	0	0	0	0	0	4
50-54	2	0	2	0	0	0	0	0	0	4
55-59	1	1	0	0	0	0	0	0	0	2
60-64	3	3	1	1	0	0	0	0	0	8
65-69	2	2	1	0	0	0	0	0	0	5
70-74	8	2	0	4	2	0	0	0	0	16
75-79	1	0	5	6	1	0	0	0	0	13
80-84	2	0	0	1	1	1	0	0	0	5
85-89	0	0	0	0	0	0	0	0	0	0
90+	1	0	0	0	0	0	0	0	0	1
ALL	25	10	12	12	4	1	0	0	0	64

AVERAGE ANNUAL BENEFIT

	Years Since Member Death									
Age	**<5**	**5-9**	**10-14**	**15-19**	**20-24**	**25-29**	**30-34**	**35-39**	**40 & Over**	**ALL**
<45	7,225	7,568	0	0	0	0	0	0	0	7,339
45-49	5,709	0	737	0	0	0	0	0	0	1,980
50-54	9,778	0	832	0	0	0	0	0	0	5,305
55-59	40,265	299	0	0	0	0	0	0	0	20,282
60-64	22,982	6,889	18,725	708	0	0	0	0	0	13,631
65-69	26,364	23,137	16,221	0	0	0	0	0	0	23,045
70-74	14,655	25,708	0	14,503	9,027	0	0	0	0	15,295
75-79	23,103	0	17,875	19,058	17,432	0	0	0	0	18,789
80-84	4,016	0	0	1,961	14,930	27,145	0	0	0	10,414
85-89	0	0	0	0	0	0	0	0	0	0
90+	897	0	0	0	0	0	0	0	0	897
ALL	14,615	13,379	10,683	14,586	12,604	27,145	0	0	0	13,749

	Total Annual Benefit (IN THOUSANDS) by Years Since Member Death									
	<5	**5-9**	**10-14**	**15-19**	**20-24**	**25-29**	**30-34**	**35-39**	**40 & Over**	**ALL**
ALL	365	134	128	175	50	27	0	0	0	880

Table 11B
Coordinated Determination of Contribution Sufficiency as of July 1, 2018 (dollars in thousands)

	Percent-of-Payroll	Dollar Amount
A. STATUTORY CONTRIBUTIONS - CHAPTER 354A		
1. Employee Contributions	7.50%	$ 21,122
2. Employer Contributions		
a. Regular	7.34%	20,671
b. Additional	3.84%	10,814
3. Supplemental Contribution		
a. 1996 Legislation	0.30%	838
b. 1997 Legislation	1.00%	2,825
c. 2014 Legislation	2.48%	6,996
d. 2018 Legislation	1.77%	4,997
4. Total	24.23%	$ 68,263
B. REQUIRED CONTRIBUTIONS - CHAPTER 356		
1. Normal Cost		
a. Retirement Benefits	5.44%	$ 15,320
b. Disability Benefits	0.18%	507
c. Surviving Spouse and Child Benefits	0.07%	197
d. Deferred Retirements	1.90%	5,351
e. Refund Liability Due to Death or Withdrawal	0.67%	1,887
f. Total	8.26%	$ 23,262

Projected Annual Payroll for Fiscal Year Beginning on the Valuation Date: $ 281,622

Summary of Benefit Provisions for Coordinated Members as of July 1, 2018

STATUTORY CONTRIBUTIONS

Statutory contribution rates for members and their employers are shown as a percent-of-pay below.

Contribution After June 30,	Member	Employer Regular	Employer Additional
2017	7.50%	6.500%	3.84%
2018	7.50%	7.335%	3.84%
2019	7.50%	8.170%	3.84%
2020	7.50%	8.380%	3.84%
2021	7.50%	8.590%	3.84%
2022	7.75%	8.800%	3.84%
2023	7.75%	9.000%	3.84%

SUPPLEMENTAL CONTRIBUTIONS

1996 legislation provides for a variable amortization aid contribution paid annually on July 15. The actual contribution during the past fiscal year was $838,000.

Annual supplemental contributions of $14,827,000 will be contributed by the State of Minnesota each October 1. The contributions will continue until the plan is 100% funded or until June 30, 2048, whichever occurs earlier.

PARTICIPANTS

Professional educators in the public schools of the City of St. Paul, excluding charter schools, whose position requires a license from the Minnesota Department of Education, and who are covered under the Social Security Act and make contributions to the St. Paul Teachers' Retirement Fund Association, are covered under the Coordinated Plan.

ALLOWABLE SERVICE

Service earned as a licensed educator in the St. Paul Public Schools, in the St. Paul College, or in certain charter schools, or as an employee of the Association. Also includes service credited after receipt of payment as required, for licensed educators on leave. Service is granted on a proportional basis for part-time teachers.

Summary of Benefit Provisions for Coordinated Members as of July 1, 2018

SALARY

Total compensation excluding lump sum payments for unused leave at termination and employer-paid insurance coverage.

AVERAGE SALARY

Average of the highest five successive years of salary while making contributions. In cases where the Allowable Service is less than five years, Average Salary is based on the Allowable Service years.

NORMAL RETIREMENT BENEFIT

Eligibility

Three years of Allowable Service. The eligibility age is 65 for those hired before July 1, 1989 and the earlier of eligibility for full Social Security retirement benefits to a maximum of age 66 for those hired on or after July 1, 1989. A Proportionate Retirement Annuity is available at Normal Retirement Age with one year of Allowable Service.

Benefit

1.70 percent of Average Salary for each year of Allowable Service rendered before July 1, 2015 and 1.90 percent of Average Salary for each year of Allowable Service rendered after June 30, 2015.

Summary of Benefit Provisions for Coordinated Members as of July 1, 2018

EARLY RETIREMENT BENEFIT

Eligibility

Attainment of age 55 and 3 years of Allowable Service.

Benefit

Members hired before July 1, 1989 are eligible for the greater of the following benefits. Members hired after July 1, 1989 are eligible for the benefits shown in item (b):

a) For the first ten years of Allowable Service, 1.20 percent of Average Salary for each year of Allowable Service rendered prior to July 1, 2015, plus 1.40 percent of Average Salary for each year of Allowable Service rendered after June 30, 2015. Additionally, for each subsequent year of Allowable Service in excess of ten years, 1.70 percent of Average Salary for each year rendered prior to July 1, 2015, plus 1.90 percent of Average Salary for each year rendered after June 30, 2015. There is a reduction of 0.25 percent for each month the member is under age 65, or under age 62 with 30 years of Allowable Service. No reduction applies if the age plus years of service totals at least 90.

b) 1.70 percent of Average Salary per year of Allowable Service rendered before July 1, 2015 and 1.90 percent of Average Salary for each year of service rendered after June 30, 2015 reduced for each month the member is under the Normal Retirement Age using linear interpolation of the factors in the tables listed below. The factors for retirements on or after July 1, 2024 will be phased in over a sixty-month period starting July 1, 2019.

	UNDER AGE 62 OR LESS THAN 30 YEARS OF SERVICE					
	RETIREMENTS PRIOR TO JULY 1, 2019		RETIREMENTS ON OR AFTER JULY 1, 2024		AGE 62 OR OLDER WITH 30 YEARS OF SERVICE	
Normal Retirement Age:	**65**	**66**	**65**	**66**	**65**	**66**
Age at Retirement						
55	0.5376	0.4592	0.4200	0.3500		
56	0.5745	0.4992	0.4600	0.3900		
57	0.6092	0.5370	0.5000	0.4300		
58	0.6419	0.5726	0.5400	0.4700		
59	0.6726	0.6062	0.5800	0.5100		
60	0.7354	0.6726	0.6500	0.5800		
61	0.7947	0.7354	0.7200	0.6500		
62	0.8507	0.7947	0.7900	0.7200	0.8831	0.8389
63	0.9035	0.8507	0.8600	0.7900	0.9246	0.8831
64	0.9533	0.9035	0.9300	0.8600	0.9635	0.9246
65	1.0000	0.9533	1.0000	0.9300	1.0000	0.9635
66		1.0000		1.0000		1.0000

Summary of Benefit Provisions for Coordinated Members as of July 1, 2018

DISABILITY RETIREMENT BENEFIT

Eligibility

Total and permanent disablement and three years of Allowable Service with service earned within the current fiscal year and at least two years of Allowable Service since the last interruption in service.

Benefit

Calculated as a normal retirement benefit payable for life without reduction for early commencement. At normal retirement age, the benefit converts from a disability benefit to a retirement benefit. The disability benefit is reduced by any Workers' Compensation benefits payable.

DEFERRED RETIREMENT BENEFIT

Eligibility

Three years of Allowable Service.

Benefit

Benefit computed under law in effect at termination and payable as a normal or early retirement benefit. For members hired on or before June 30, 2006, the benefit is augmented at 3.00 percent compounded annually from the 1st of the month following termination until the January 1st after turning age 55 and then augmented at 5.00 percent compounded annually from that date to July 1, 2012. For members hired after June 30, 2006, the benefit is augmented at 2.50 percent compounded annually from the 1st of the month following termination to July 1, 2012. Augmentation for all members, regardless of hire date, changed to 2.00 percent as of July 1, 2012 for the portion of benefit deferral which occurs after June 30, 2012 to June 30, 2019. After June 30, 2019, benefits are not augmented.

SURVIVOR BENEFIT (Active Members)

Eligibility

Active member with three years of Allowable service. A surviving spouse is defined as the person legally married to the member at the time of death. If none, a dependent child who is the legal child of the member, who is less than 20 years of age and unmarried.

Benefit

Retirement benefit earned at the time of death with choices for either a reduced for 100 percent joint survivorship, or 5-, 10-, 15-, or 20-year term certain. The benefit is available immediately upon application. Actuarial reductions assuming 2.5% augmentation for the calculation of the survivorship portion of a 100 percent joint and survivor benefit are actuarially determined based on the member's and survivor's ages at the death of the member.

Early retirement reductions apply to the survivor benefit based on the member's age when deceased. If the deceased member had not yet attained age 55 at time of death, the additional early retirement reduction from age 55 to the age of the member at death applies at only one-half of the actuarial rate.

Summary of Benefit Provisions for Coordinated Members as of July 1, 2018

REFUND OF CONTRIBUTIONS

Eligibility

Termination or death where no annuity is payable or a refund of contributions is chosen in lieu of an annuity.

Benefit

Member contributions with 6.00 percent interest accrued through June 30, 2011, 4.00 percent interest accrued through June 30, 2018, and 3.00 percent interest thereafter.

REEMPLOYED ANNUITANTS

The School District shall make the regular employer contribution and additional employer contribution, plus a supplemental contribution equal to 2.5% of salary, on behalf of any retired member who is reemployed by the School District. Reemployed annuitants do not accrue additional benefits.

NORMAL FORM OF RETIREMENT BENEFITS

Straight life annuity. Actuarially equivalent options are available to provide post-retirement beneficiary or survivor benefits.

BENEFIT INCREASES

2019:	0.00 percent
2020:	0.00 percent
2021 and thereafter:	1.00 percent

For retirements on and after July 1, 2024, the first benefit increase is delayed until the retiree reaches Normal Retirement Age (not applicable to Rule of 90 retirees, Rule of 62/30 retirees, disability benefit recipients, or survivors).

CHANGES IN PLAN PROVISIONS

Lower early retirement factors will be phased in over a sixty-month period starting July 1, 2019.

Interest credited on refunds of member contributions decreased from 4.0% to 3.0% prospectively, beginning July 1, 2018.

Deferred augmentation was changed to 0.00% for future accruing benefits, effective July 1, 2019. Augmentation that has already accrued for deferred members will still apply.

Post-retirement benefit increases were changed from 1.0% per year with a provision to increase to 2.0% if the funding ratio reaches 80% for two consecutive years or 2.5% if the funding ratio reaches 90% for two consecutive years, to 0.0% for January 1, 2019 and 2020 and 1.0% thereafter.

Summary of Benefit Provisions for Coordinated Members as of July 1, 2018

For retirements on or after July 1, 2024, the first benefit increase is delayed until the retiree reaches Normal Retirement Age. Does not apply to Rule of 90 retirees, Rule of 62/30 retirees, disability benefit recipients, or survivors.

Member contributions will increase from 7.50% of pay to 7.75% of pay, effective July 1, 2022.

Employer regular contributions will increase from 6.50% of pay to 9.00% of pay over six years, beginning July 1, 2018.

Additional supplemental contributions of $5,000,000 will be made by the State of Minnesota annually beginning October 1, 2018.

SECTION 7

ADDITIONAL DISCLOSURES

Table 14
Additional Disclosures – Schedule of Funding Progress
(dollars in thousands)

Actuarial Valuation Date	Actuarial Value of Assets (A)	Actuarial Accrued Liability (B)	Unfunded AAL (UAAL) (B)-(A)	Funded Ratio (A)/(B)	Actual Covered Payroll (Previous FY) (C)	UAAL as % of Covered Payroll ((B)-(A))/(C)
07/01/96	$ 494,931	$ 664,072	$ 169,141	74.53%	$ 145,677	116.11%
07/01/97	556,406	805,066	248,660	69.11%	151,363	164.28%
07/01/98	625,053	861,584	236,531	72.55%	168,564	140.32%
07/01/99	704,233	938,847	234,614	75.01%	178,254	131.62%
07/01/00	801,823	998,253	196,430	80.32%	187,950	104.51%
07/01/01	869,045	1,060,931	191,886	81.91%	202,915	94.56%
07/01/02	899,572	1,141,300	241,728	78.82%	201,456	119.99%
07/01/03	898,760	1,189,361	290,601	75.57%	205,655	141.31%
07/01/04	898,860	1,251,460	352,600	71.82%	221,685	159.05%
07/01/05	905,292	1,299,832	394,540	69.65%	223,762	176.32%
07/01/06	938,919	1,346,072	407,153	69.75%	226,351	179.88%
07/01/07	1,015,722	1,380,151	364,429	73.59%	229,172	159.02%
07/01/08	1,075,951	1,432,040	356,089	75.13%	235,993	150.89%
07/01/09	1,049,954	1,454,314	404,360	72.20%	243,166	166.29%
07/01/10	1,001,444	1,471,630	470,185	68.05%	239,996	195.91%
07/01/11	972,718	1,389,875	417,157	69.99%	239,738	174.01%
07/01/12	911,930	1,471,216	559,286	61.98%	239,053	233.96%
07/01/13	886,296	1,467,350	581,054	60.40%	247,432	234.83%
07/01/14	947,972	1,533,603	585,631	61.81%	259,740	225.47%
07/01/15	999,736	1,596,770	597,034	62.61%	263,844	226.28%
07/01/16	1,007,360	1,592,570	585,210	63.25%	258,787	226.14%
07/01/17	1,038,467	1,611,208	572,741	64.45%	264,342	216.67%
07/01/18	1,067,675	1,676,193	608,518	63.70%	263,122	231.27%

Table 15
Additional Disclosures – Schedule of Employer Contributions (dollars in thousands)

Year Ended June 30	Actuarially Required Contribution Rate (A)	Actual Covered Payroll (B)	Actual Member Contributions (C)	Annual Required Contributions (D) = [(A)*(B)]-(C)	Actual Employer Contributions [1] (E)	Percentage Contributed (E) / (D)
1997	16.97%	$ 151,363	$ 9,484	$ 16,202	$ 16,043	99.02%
1998	20.35%	168,564	11,057	23,246	21,702	93.36
1999	18.82%	178,254	11,649	21,898	21,066	96.20
2000	18.09%	187,950	13,184	20,816	22,622	108.68
2001	16.57%	202,915	13,170	20,453	23,569	115.23
2002	15.81%	201,456	14,468	17,382	24,216	139.32
2003	18.56% [2]	205,655	14,222	23,948	23,370	97.59
2004	20.36%	221,685	14,308	30,827	23,771	77.11
2005	21.59%	223,762	13,587	34,723	23,833	68.64
2006	23.78%	226,351	13,453	40,373	24,015	59.48
2007	24.55%	229,172	13,438	42,823	24,117	56.32
2008	23.40%	235,993	13,642	41,580	24,285	58.40
2009	17.63%	243,166	13,864	29,007	24,844	85.65
2010	18.40%	239,996	13,832	30,328	25,126	82.85
2011	19.84%	239,738	13,745	33,819	25,090	74.19
2012	18.37%	239,053	14,117	29,797	25,109	84.27
2013	22.87%	247,432	15,164	41,424	26,445	63.84
2014	22.13%	259,740	16,564	40,916	35,197	86.02
2015	21.94%	263,844	17,567	40,320	36,711	91.05
2016	22.26%	258,787	18,538	39,068	37,228	95.29
2017	22.44%	264,342	20,146	39,172	38,350	97.90
2018	22.16%	263,122	20,112	38,196	39,209	102.65

[1] *Includes contributions from other sources (if applicable).*

[2] *Actuarially Required Contribution Rate prior to change in Actuarial Assumptions is 16.19%.*

Table 16
Additional Disclosures – Development of the Fund
(dollars in thousands)

Year Ended June 30	Employer Contributions	Employee Contributions	Supplemental Contributions*	Actuarial Net Investment Return	Administrative Expenses	Benefit Payments	Actuarial Value of Assets EOY
2006	$ 19,815	$ 13,453	$ 4,200	$ 76,317	$ 591	$ 79,567	$ 938,919
2007	19,666	13,438	4,451	124,214	696	84,271	1,015,722
2008	20,775	13,642	3,509	112,804	691	89,810	1,075,951
2009	21,501	13,864	3,343	28,924	605	93,024	1,049,954
2010	21,018	13,832	4,108	9,496	602	96,362	1,001,444
2011	21,013	13,745	4,077	31,391	722	98,230	972,718
2012	21,452	14,117	3,658	3,447	736	102,726	911,930
2013	22,780	15,164	3,665	37,919	751	104,411	886,296
2014	24,532	16,564	10,665	117,499	739	106,845	947,972
2015	25,505	17,567	11,206	107,987	748	109,753	999,736
2016	26,433	18,538	10,795	64,402	749	111,795	1,007,360
2017	27,543	20,146	10,807	87,243	889	113,743	1,038,467
2018	28,199	20,112	11,010	86,771	786	116,098	1,067,675

** Includes employer contributions for reemployed annuitants.*

Table 17
Additional Disclosures – Supplementary Information

Valuation Date	July 1, 2018
Actuarial Cost Method	Entry Age Normal
Amortization Method	Level Percent of Pay, Closed, Assuming Three Percent Payroll Growth
Amortization Period	Closed Period ending June 30, 2048
Asset Valuation Method	5-Year Smoothed Market
Actuarial Assumptions:	
Investment rate of return	7.50%
Projected salary increases	3.00% - 9.00%; service based
Plan Membership:	
Active Members	3,577
Retirees and Beneficiaries	3,914
Terminated Vested Members	2,031
Other Non-Vested Terminated Members	3,014
Total	12,536