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Minnesota Legislative Commission on Pensions and Retirement

Replication of the Actuarial Valuation of the Teachers Retirement Association Fund as of July 1, 2011

Prepared by:

Milliman, Inc.

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Principal and Consulting Actuary

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Consulting Actuary

June 8, 2012

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June 8, 2012

Minnesota Legislative Commission
on Pensions and Retirement
State Office Building, Room 55
100 Rev. Dr. Martin Luther King Jr. Boulevard
St. Paul, Minnesota 55155

Attention: Mr. Lawrence A. Martin, Executive Director

Ladies and Gentlemen:

The enclosed report presents the findings and comments resulting from a review and replication of the July 1, 2011 actuarial valuation of the Teachers Retirement Association Fund (TRA). An overview of our major findings is included in the Executive Summary section of the report. More detailed commentary and information is provided in the sections that follow.

We pursued this analysis and review with a constructive mindset. We looked to identify any possible suggestions that might improve understanding of or confidence in the actuarial services being provided. Naturally, some of the comments may be viewed as personal preference or nit-picky in nature. While we are not trying to impose our own preferences or biases on the Fund or the retained actuary, neither did we hesitate to make such comments if we believed that some change, however minor, would improve the actuarial functions.

This report has been prepared for use by the Minnesota Legislative Commission on Pensions and Retirement (LCPR) in their oversight role with regard to the Fund. It has been prepared using Milliman valuation systems in a manner that would be used by Milliman to prepare a full actuarial valuation of the Fund. We recognize that there are hundreds of thousands of complex calculations performed by the actuarial valuation system. For this reason, even the smallest differences between valuation systems can produce noticeable differences in the valuation results between two different actuaries.

In preparing this report, we have relied without audit on the employee data, plan provisions, value of the plan assets and other plan financial information as provided by various involved entities including your office, TRA, Cavanaugh Macdonald Consulting LLC, and others. We have reviewed this data for reasonableness and for consistency with previously supplied information. If any of this information as summarized in this report is inaccurate or incomplete, the results shown could be materially affected and this report may need to be revised.

On the basis of the foregoing we hereby certify that, to the best of our knowledge and belief, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices which are consistent with the principles prescribed by the Actuarial Standards Board (ASB) and the Code of Professional Conduct and Qualification Standards for Public Statements of Actuarial Opinion of the American Academy of Actuaries.

Any distribution of the enclosed report must be in its entirety including this cover letter, unless prior written consent is obtained from Milliman, Inc. This report has been prepared in accordance with the terms and provisions of the Consulting Services Agreement effective September 26, 2011.

We, William V. Hogan, FSA, and Timothy J. Herman, FSA, are actuaries for Milliman, Inc. We are members of the American Academy of Actuaries and Fellows of the Society of Actuaries, and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

We look forward to making a personal presentation of our findings in briefings to the Minnesota Legislative Commission on Pensions and Retirement and to relevant staff members.

Respectfully submitted,

Milliman, Inc.

William V. Hogan

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Principal and Consulting Actuary

Timothy J. Herman

Timothy J. Herman, FSA, EA, MAAA
Consulting Actuary

WVH/TJH/bh

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Executive Summary

Purpose and Scope of the Actuarial Replication Audit

In accordance with Minnesota Statutes, Section 356.214, Subdivision 4, the LCPR has engaged Milliman, Inc. to perform a replication of the July 1, 2011 actuarial valuation of the Fund administered by TRA.

In performing the replication of the actuarial valuation, we follow several well defined steps. These steps involve a review and cleansing of the data used in the actuarial valuation, an assessment of the plan provisions to be valued, an analysis of the actuarial assumptions to be applied, a review of the reported value of plan assets as of the valuation date, and preparation of the actuarial calculations using appropriate computer programming and summarizing the results. All of the above steps are to be applied in accordance with the requirements of Minnesota statutes and the Actuarial Standards For Actuarial Work adopted by the LCPR.

In conducting our work, we initially prepared the above steps independently from the work of the Fund actuary. After completing that work, we conducted a review of some individual benefit trace information in order to identify any key differences in programming or technique. We then prepared a summary of the key valuation results, showing a comparative of our results to those of the Fund actuary.

It is important to recognize that the actuarial valuation process, while very sophisticated in its calculation methodology, is still an estimate of the financial value of benefits payable on contingent events, most of which occur many years into the future. As such, a considerable amount of uncertainty and variability surrounds those estimates. As actuaries we recognize this fact and are comfortable that small differences (in percentages) in the results do not change the overall financial results portrayed in the valuation. Furthermore, the actuarial software used by different firms has implicit differences that create differences in the valuation numbers. For this reason, we believe the comparison of valuation results should be evaluated in terms of percentage differences. To provide some context to our comments, in a replication audit, where the differences that are identified can also be quantified, we generally expect to be within 1%-2% on the calculation of the present value of future benefits and within 4%-5% on the calculation of the actuarial accrued liability and normal cost. The wider range on the latter items is because there tends to be more variability in how different actuarial software programs allocate the total liability (present value of future benefits) to past and future years of service.

Statement of Findings

In general, we found the actuarial calculations by the Fund actuary to be reasonably consistent with our own separate calculations to within a reasonable degree of tolerance. Where we saw differences, we attempted to identify the reasons. Overall, we are satisfied that the July 1, 2011 actuarial valuation results for the Fund as prepared by the Fund actuary present a fair and reasonable representation of the present value of future benefits, actuarial liabilities and contribution requirements for the Fund.

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The following commentary provides our main conclusions on the various areas of our review:

- Plan Provisions: We started with the summary of plan provisions for the Fund that Milliman reviewed last year. After reviewing the actuarial report prepared by the Fund actuary, we believe that their summary of plan provisions is consistent with our understanding of the current plan provisions with one exception. We note that it appears the Fund actuary used the current requirement to determine the status of inactive members who are not currently in-pay. It is our understanding that TRA administers the Fund by applying the law in effect at termination. Because the laws have changed over time requiring Members to have less time in the system to be eligible for deferred retirement benefits, the Fund actuary's approach tends to overstate the count by 1,335 lives and accrued liability by approximately $68 million for inactive Members who are vested. The reader should note that $68 million is 0.31% of the total accrued liability of the Fund.

- Membership Data: Our raw data counts matched up to within a few lives with the counts as summarized by TRA. After applying our own cleansing methods, our valuation data count was modestly different from the count as reported by the Fund actuary. Our active data count was different by 30 lives out of 76,725 while the inactive count, in total, was different by 87 lives out of approximately 92,000 lives (consisting mostly of nonvested terminated Members due a refund). Both of these differences are approximately 0.09% of the total. While we have some discrepancies, our conclusion is that the Fund actuary is reasonably reflecting the data received from TRA to within a reasonable degree of tolerance with our own determinations.

- Actuarial Assumptions and Methods: In general, we believe that the assumptions and methods employed by the Fund actuary are reasonable and consistent with statutes and the Standards for Actuarial Work. We note there appears to be a substantial difference between the Fund actuary's results and our results for active Member benefits for deferred retirement and refund of contributions. This apparent difference is due to the approaches used in the valuation system when an active Member is assumed to leave the System by withdrawal. In the actuarial assumptions, Members who withdraw from the System after becoming eligible for a deferred benefit are assumed to take the larger of their return of contributions, or their deferred annuity benefit. In the Fund actuary's results, the benefits are included in the deferred retirement component if the member is projected to be vested at the time of withdrawal. Otherwise, the benefits are included in the refund of contributions component. In the Milliman results, the deferred retirement component includes the value of annuity benefits for vested Members who withdraw from the System. The refund of contributions component includes both the refund of contributions for members who are not vested at the date of assumed withdrawal plus the value of the return of contributions for Members who are assumed to elect a refund of contributions in lieu of future annuity benefits. Because the Fund actuary's present value of future benefits for the withdrawal decrement (sum of deferred retirement component plus refund of contributions component) is within 1.4% of the Milliman results, we believe the Fund actuary is reasonably reflecting the withdrawal decrement.

- Actuarial Value of Assets: We believe that the Fund actuary has fairly and correctly presented the actuarial value of assets.

- Valuation System Results: Based upon our own valuation system results, we were able to match the Fund actuary valuation results within 0.9% on the present value of future benefits and within 0.2% on the actuarial liabilities. We are about 0.27 percentage points lower on the Normal Cost rate. All of

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these values track very well to the Fund actuary calculations in total. However, we note some differences in how those totals are split by decrement and group. Given how close the overall totals match, we are comfortable that the valuation results are reasonable.

- Valuation Report: We believe the actuarial valuation report prepared by the Fund actuary provides all of the information required by the Standards for Actuarial Work. Overall, the work by the Fund actuary is comprehensive and thorough. We note that the Actuarial Standards call for identification of the Actuarial Gain or Loss related to mortality. The report provides this information for current benefit recipients. We believe the work product could be improved by also separately providing the Actuarial Gain or Loss related to active Member mortality. We also note there is a slight difference in the pre-retirement mortality rates for males for the sample ages 40 to 75 reported by the Fund actuary compared to the mortality rates reported by Milliman in the Actuarial Basis of this report. At this time, we are unable to explain these differences. This assumption impacts the “Survivor’s Benefits” for active members who are projected by the actuarial assumption to die before retiring. The reader should note that the actuarial present value of projected benefits for Survivor’s Benefits are between 0.65% and 0.80% of the total actuarial present value of projected benefits for active members. Consequently, this issue is not expected to materially impact the valuation results. We will review this issue in the next valuation.

- COLA: As part of legislation enacted in 2010, the annual Cost of Living Adjustment (COLA) applied to the pensions of retired Members was changed from 2.5% to 2.0% in addition to a 0% COLA until January 1, 2013. However, if the Fund achieves a 90% funded ratio on the market value of assets to actuarial liability, the COLA will increase back to 2.5%. The valuation by the Fund actuary assumes that the lower 2.0% COLA will remain in place for all years. However, we would expect the report to describe the analysis that the Fund actuary prepared to reach this assumption. Such analysis might contain a roll-forward to expected results, a cash flow projection analysis, or some other objective determination. This creates interesting questions for future valuations if the funded ratio improves and/or contribution levels are raised. Questions such as (1) when is it appropriate to assume the return to a 2.5% COLA for valuation purposes and (2) how to handle the situation when the COLA achieves a 90% funded ratio when 2.0% is applied but is less than 90% when 2.5% is applied? We believe that these questions should be addressed in the near future.

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Principal Valuation Results

This section provides a summary of the key measurements from the July 1, 2011 Actuarial Valuation. As the numbers show, we were able to reasonably match the primary data totals with those shown by the Fund actuary in almost all cases.

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Principal Valuation Results

	Actuarial Valuation as of	
	July 1, 2011 (Fund Actuary)	July 1, 2011 (Milliman)
Contributions (% of Payroll)		
Normal Cost Rate	8.17%	7.90%
UAAL Amortization Payment	8.16%	8.08%
Expenses	0.24%	0.24%
Total Required Contributions (Chapter 356)	16.57%	16.22%
Statutory Contributions (Chapter 354)	12.69%	12.70%
Contribution (Deficiency)/Sufficiency	(3.88)%	(3.52)%
Unfunded Actuarial Accrued Liability		
Based upon AVA	$ 5,039,110	$4,988,306
Based upon MVA	4,874,101	4,823,297
Funding Ratios (dollars in thousands)		
Accrued Benefit Funding Ratio		
Current Assets (AVA)	$17,132,383	$17,132,383
Current Benefit Obligations	21,054,036	21,169,925
Funding Ratio	81.37%	80.93%
Accrued Liability Funding Ratio		
Current Assets (AVA)	$17,132,383	$17,132,383
Current Assets (MVA)	17,297,392	17,297,392
Actuarial Accrued Liability	22,171,493	22,120,689
Funding Ratio (AVA)	77.27%	77.45%
Funding Ratio (MVA)	78.02%	78.20%
Projected Benefit Funding Ratio		
Current and Expected Future Assets	$22,686,711	$22,688,615
Current and Expected Future Benefit Obligations	25,083,218	24,862,375
Funding Ratio	90.45%	91.26%
Participant Data		
Active Members		
Number	76,755	76,725
Projected Annual Earnings (000s)	$ 4,106,922	$ 4,105,555
Average Projected Annual Earnings	$ 53,507	$ 53,578
Average Age	43.5	43.5
Average Service	12.0	12.0
Service Retirements	49,079	49,214
Survivors	3,856	3,865
Disability Retirements	602	568
Deferred Retirements	13,237	11,876
Terminated Other Non-vested	25,196	26,534
TOTAL	168,725	168,782

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Plan Assets

Statement of Plan Net Assets for Year Ended June 30, 2010

(dollars in thousands)

We received asset information from TRA which provided assets by class as of June 30, 2011. We have reviewed these assets and summarized them below. Our summary exactly matches the summary provided by the Fund actuary in their Actuarial Valuation Report.

	Market Value	
	Fund Actuary	**Milliman**
Cash and Short-term Investments		
Cash	$ 4,277	$ 4,277
Building Account Cash	59	59
Short Term Investments	464,404	464,404
Total Cash and Short-term Investments	**468,740**	**468,740**
Receivables	15,624	15,624
Investments (at fair value)		
Fixed Income Pool	3,821,522	3,821,522
Minneapolis Pool	196	196
Alternative Investments Pool	2,530,478	2,530,478
Indexed Equity Pool	3,076,747	3,076,747
Domestic Equity Pool	4,675,143	4,675,143
Global Equity Pool	2,723,272	2,723,272
Total Investments	16,827,358	16,827,358
Securities Lending Collateral	1,185,570	1,185,570
Building		
Land	171	171
Building and Equipment	11,279	11,279
- Reserve for Building Depreciation	(2,821)	(2,821)
Deferred Bond Charge	146	146
- Reserve for Deferred Bond Charge Amortization	(50)	(50)
Total Building	8,725	8,725
Fixed Assets Net of Accumulation Depreciation	2,825	2,825
TOTAL ASSETS	**$18,508,832**	**$18,508,832**

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Plan Assets

Statement of Plan Net Assets for Year Ended June 30, 2010
(dollars in thousands)
(continued)

We received asset information from TRA which provided assets by class as of June 30, 2011. We have reviewed these assets and summarized them below. Our summary exactly matches the summary provided by the Fund actuary in their Actuarial Valuation Report.

	Market Value	
	Fund Actuary	**Milliman**
Liabilities		
Current		
Accounts Payable	$ 9,863	$ 9,863
Accrued Compensated Absences	68	68
Accrued Expenses – Building	61	61
Bonds Payable	265	265
Bonds Interest Payable	43	43
Securities Lending Collateral	1,185,570	1,185,570
Total Current Liabilities	**1,195,870**	**1,195,870**
Long Term		
Accrued Compensated Absences	673	673
Accrued OPEB Liability*	57	57
Bonds Payable	8,656	8,656
Total Long Term Liabilities	9,386	9,386
TOTAL LIABILITIES	**1,205,256**	**1,205,256**
Net Assets Held in trust for Pension Benefits	17,303,576	17,303,576
Earnings Limitation Savings Account (ELSA) Accounts Payable	(6,184)	(6,184)
Net Assets Held in Trust, After Adjustment for ELSA Accounts	$17,297,392	$17,297,392

*Not calculated by Fund actuary or Milliman.

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Plan Assets

Reconciliation of Plan Assets
(dollars in thousands)

The following exhibit shows the revenue, expenses and resulting assets of the Fund as reported by TRA for the Plan's Fiscal year July 1, 2010 to June 30, 2011.

We received this information directly from TRA and summarized it below. Our summary matches the summary provided by the Fund actuary. One item to note is that the information we received indicates that line item 9., "Increase/(Decrease) in ELSA Account Value," consists of the ELSA deductions. It is our understanding that this item was considered Refunds in prior years.

	Market Value	
	Fund Actuary	**Milliman**
1. Fund Balance at Market Value at July 1, 2010*	**$14,917,240**	**$14,917,240**
2. Contributions		
a. Member	218,024	218,024
b. Employer	222,723	222,723
c. Direct Aid (State/City/County)	21,510	21,510
d. Earnings Limitation Savings Account (ELSA)	1,291	1,291
e. Total Contributions	463,548	463,548
3. Investment Income		
a. Investment Income/(loss)	3,414,280	3,414,280
b. Investment Expenses	(24,150)	(24,150)
c. Total Investment Income/(Loss)	3,390,130	3,390,130
4. Other	4,271	4,271
5. Total Income (2.e. + 3.c. + 4.)	**$ 3,857,949**	**$ 3,857,949**
6. Benefits Paid		
a. Annuity Benefits	(1,459,550)	(1,459,550)
b. Refunds	(23,813)	(23,813)
c. Total Benefits Paid	(1,483,363)	(1,483,363)
7. Administrative Expenses	(9,264)	(9,264)
8. Total Disbursements (6.c. + 7)	**(1,492,627)**	**(1,492,627)**
9. Increase/(Decrease) in ELSA Account Value	**14,830**	**14,830**
10. Fund Balance at Market Value at June 30, 2011 (1. + 5. + 8. + 9.)	**$17,297,392**	**$17,297,392**

*As reported by Fund actuary.

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Plan Assets

Actuarial Asset Value

(dollars in thousands)

Based upon the assets reported to us by TRA and prior year actuarial valuation information regarding unrecognized asset returns, we have constructed the Actuarial Value of Assets for the July 1, 2011 Actuarial Valuation. Our calculation matches the Fund actuary.

				June 30, 2011
1.	Market Value of Assets Available for Benefits			$17,297,392
2.	Determination of Average Balance			
a.	Total Assets Available at July 1, 2010			14,939,540
b.	Total Assets Available at June 30, 2011			17,303,576
c.	Net Investment Income for Fiscal Year Ending June 30, 2011			3,390,130
d.	Average Balance [a.+ b. – c.] / 2			14,426,493
3.	Expected Return [8.5% x 2.d.]			1,226,252
4.	Actual Return			3,390,130
5.	Current Year Asset Gain/(Loss) [4. – 3.]			2,163,878
6.	Unrecognized Asset Returns			
		Original Amount	**% Not Recognized**	
a.	Year Ended June 30, 2011	$ 2,163,878	80%	$ 1,731,102
b.	Year Ended June 30, 2010	953,497	60	572,098
c.	Year Ended June 30, 2009	(4,812,478)	40	(1,924,991)
d.	Year Ended June 30, 2008	(1,066,002)	20	(213,200)
e.	Total Unrecognized Return			165,009
7.	Actuarial Value at June 30, 2011 (1. – 6.e.)			$17,132,383

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Development of Costs

Actuarial Valuation Balance Sheet

(dollars in thousands)

The actuarial balance sheet is based on the fundamental equation that at any given time the present value of benefits to be paid in the future must be equal to the assets on hand plus the present value of future contributions to be received. The total rate of contribution is determined as the amount which will make the total present and potential assets balance with the total present value of future benefits. The members' rate of contribution is fixed at the current schedule. The employer's rate of contribution is the balance required to cover the total rate of contribution.

The contributions made in excess of amounts required for current benefit payments are accumulated as a reserve to help meet benefit payments in later years. It is this reserve system which permits the establishment of a level rate of contribution each year.

	June 30, 2011 (Fund Actuary)	June 30, 2011 (Milliman)
A. Actuarial Value of Assets	$17,132,383	$17,132,383
B. Expected Future Assets		
1. Present Value of Expected Future Statutory Supplemental Contributions	2,642,603	2,814,546
2. Present Value of Future Normal Cost Contributions	2,911,725	2,741,686
3. Total Expected Future Assets (1. + 2.)	5,554,328	5,556,232
C. Total Current and Expected Future Costs	$22,686,711	$22,688,615
D. Current Benefit Obligations		
1. Benefit Recipients		
a. Service Retirements	13,024,543	13,042,364
b. Disability	149,341	138,251
c. Survivors	790,668	789,040
2. Deferred Retirement with Augmentation	540,453	472,786
3. Former Members without Vested Rights	47,550	67,757
4. Active Members	6,501,481	6,659,726
5. Total Current Benefit Obligations	21,054,036	21,169,924
E. Expected Future Benefit Obligations	4,029,182	3,692,451
F. Total Current and Expected Future Benefit Obligations	25,083,218	24,862,375
G. Unfunded Current Benefit Obligations (D.5. – A.)	3,921,653	4,037,541
H. Unfunded Current and Future Benefit Obligations (F. – C.)	2,396,507	2,173,760

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Development of Costs

Determination of Unfunded Actuarial Accrued Liability and Supplemental Contribution Rate

(dollars in thousands)

In the tables that follow the Commentary in this section, we provide the calculations which ultimately determine the required supplemental contribution rate. From these tables, a critical calculation is the Actuarial Present Value of Projected Benefits. This calculation reflects the actuary's estimate of the total present value cost of all benefits yet to be paid by the Fund to the current members (active and inactive). In replication audits, we typically strive to be within 2% of the actuary's calculation. If that level cannot be achieved, then it is important to identify the differences in more detail. In general, our calculations are within the 2% threshold with the exception of Deferred Members and Former Members Without Vested Rights who are outside the range due to the vesting issue described earlier in the report. It is our intent to review this component further in an effort to identify any other differences we may have compared to the Fund actuary. We suspect some of the difference relates to the categorization of vested Members expected to receive a refund of contributions rather than a deferred annuity. The table below shows, as a percentage, the ratio of the numbers calculated by Milliman to the numbers reported by the Fund actuary.

	Actuarial Present Value of Projected Benefits
Active Members	98.3%
Deferred Members	87.5
Former Members without Vested Rights	142.5
Benefit Recipients	100.0
Total	99.1%

The tables that follow the Actuarial Present Value of Projected Benefits are designed to determine how much of the Actuarial Present Value of Projected Benefits is to be funded by the future "normal cost" contributions (Actuarial Present Value of Future Normal Cost) versus how much belongs to past contributions (Actuarial Accrued Liability). This allocation does not change the total costs determined in the Actuarial Present Value of Projected Benefits. It simply allocates cost to past versus future based upon the Entry Age Normal actuarial cost method. In replication audits, we typically look to be within 5% of the actuary's calculations for active member Actuarial Accrued Liability. The larger range recognizes that different valuation systems have different ways of rounding service and ages. In addition, the Entry Age Method requires projection of theoretical past amounts which can be handled somewhat differently between actuarial valuation systems. The table below shows, as a percentage, the ratio of the numbers calculated by Milliman to the numbers reported by the Fund actuary.

	Actuarial Accrued Liability
Active Members	99.9%
Deferred Members	87.5
Former Members without Vested Rights	142.5
Benefit Recipients	100.0
Total	99.8%

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Development of Costs

Determination of Unfunded Actuarial Accrued Liability and Supplemental Contribution Rate

(dollars in thousands)

Once the Actuarial Accrued Liability is determined, it is compared to the Actuarial Value of Assets to determine the unfunded liability. The difference between these numbers is then amortized to the statutory amortization date of June 30, 2037 based upon the present value of future payrolls. Because this calculation is based upon the difference of two relatively close numbers, any change in one of the numbers can have a large impact when viewed as a percentage.

For example, if the Actuarial Accrued Liability is $1,000 and the Actuarial Value of Assets is $900, then unfunded liability is $100. If the Actuarial Accrued Liability is reduced by $25, the unfunded liability becomes $75. In this example, the reduction in the Actuarial Accrued Liability of 2.5% generates a reduction of 25% in both the unfunded liability and the supplemental contribution rate.

Based upon the above, it should be expected that small deviations in the amount of Actuarial Accrued Liability will have a larger impact on the supplemental contribution rate. It is evidenced here where our calculation of the Actuarial Accrued Liability is 0.2% lower than the Fund actuary but our supplemental contribution percentage rate is 1.0% lower than the Fund actuary.

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Development of Costs

Determination of Unfunded Actuarial Accrued Liability and Supplemental Contribution Rate
(dollars in thousands)

		Actuarial Present Value of Projected Benefits	
		Fund Actuary	Milliman
1.	Active Members		
	A. Retirement Annuities	$ 9,660,829	$ 9,507,286
	B. Disability Benefits	178,246	158,606
	C. Survivor's Benefits	83,243	69,633
	D. Deferred Retirements	602,516	108,155
	E. Refunds	5,829	508,497
	F. Total	10,530,663	10,352,177
2.	Deferred Retirements with Future Augmentation	540,453	472,786
3.	Former Members without Vested Rights	47,550	67,757
4.	Benefit Recipients	13,964,552	13,969,655
5.	Total	$25,083,218	$24,862,375

		Actuarial Present Value of Future Normal Costs	
		Fund Actuary	Milliman
1.	Active Members		
	A. Retirement Annuities	$ 2,241,978	$ 2,154,338
	B. Disability Benefits	69,199	63,261
	C. Survivor's Benefits	25,248	25,925
	D. Deferred Retirements	469,997	67,778
	E. Refunds	105,303	430,384
	F. Total	2,911,725	2,741,686
2.	Deferred Retirements with Future Augmentation	0	0
3.	Former Members without Vested Rights	0	0
4.	Benefit Recipients	0	0
5.	Total	$ 2,911,725	$ 2,741,686

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Development of Costs

Determination of Unfunded Actuarial Accrued Liability and Supplemental Contribution Rate

(dollars in thousands)

	Actuarial Accrued Liability	
	Fund Actuary	Milliman
A. Determination of Actuarial Accrued Liability (AAL)		
1. Active Members		
A. Retirement Annuities	$ 7,418,851	$ 7,352,948
B. Disability Benefits	109,047	95,345
C. Survivor's Benefits	57,997	43,708
D. Deferred Retirements	132,519	40,377
E. Refunds	(99,474)	78,113
F. Total	7,618,938	7,610,491
2. Deferred Retirements with Future Augmentation	540,453	472,786
3. Former Members without Vested Rights	47,550	67,757
4. Benefit Recipients	13,964,552	13,969,655
5. Total	22,171,493	22,120,689
B. Determination of Unfunded Actuarial Accrued Liability (UAAL)		
1. Actuarial Accrued Liability	$22,171,493	$22,120,689
2. Current Assets (AVA)	17,132,383	17,132,383
3. Unfunded Actuarial Accrued Liability	5,039,110	4,988,306
C. Determination of Supplemental Contribution Rate*		
1. Present value of future payrolls through the amortization date of June 30, 2037	61,743,070	61,722,525
2. Supplemental Contribution Rate (B.3. / C.1.)	8.16%	8.08%

*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.

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Development of Costs

Determination of Contribution Sufficiency/(Deficiency)

(dollars in thousands)

In this section, we compare the statutory contributions provided under Chapter 354 of Minnesota statutes (354 contributions) to the required contributions under chapter 356 of Minnesota statutes (356 contributions). The difference between these amounts results in a reported contribution sufficiency or deficiency.

With respect to the 354 contributions, the percentage is set by statute and we agree with the percentages reported by the Fund actuary. The dollar amount is determined by applying the statutory percentage to the member compensation provided in the data file and projected (and annualized where necessary) with expected pay increases for the upcoming year. While reasonably close, our projection methodology was slightly different from the Fund actuary resulting in a small dollar difference.

With respect to the 356 contributions, the total is equal to the sum of the Normal Cost (Entry Age Normal method) plus the supplemental contribution calculated earlier in this report plus an allowance for expected administrative expenses. Typically, in a replication audit, it is desirable to be within 5% of the actuary's Normal Cost. In this case, our Normal Cost percentage is 3.3% lower than the Fund actuary. We do note that our components of Normal Cost are somewhat different from the Fund actuary. This is not an uncommon result as the treatment of where to categorize certain costs on an "entry age" basis between actuarial valuation systems quite often results in these differences.

As mentioned earlier, the supplemental contributions are highly leveraged to the value of the Actuarial Accrued Liability. In this case, our supplemental contribution percentage is lower by 1.0% but this is based upon an Actuarial Accrued Liability that is lower by .2%.

Similar to the 354 contributions, we arrive at the same expense allowance percentage but our dollar contribution is different due to payroll projection methodology.

As a result of the above, our calculation of the Contribution Sufficiency/Deficiency is a deficiency of (3.52)%. This compares to a deficiency reported by the Fund actuary of (3.88)%. The difference of 0.36% is primarily the result of the supplemental contribution and Normal Cost difference.

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Development of Costs

Determination of Contribution Sufficiency/(Deficiency)

(dollars in thousands)

	Fund Actuary July 1, 2011 Percent of Payroll	Fund Actuary July 1, 2011 Dollar Amount	Milliman July 1, 2011 Percent of Payroll	Milliman July 1, 2011 Dollar Amount
A. Statutory Contributions – Chapter 354				
1. Employee Contributions	6.00%	$246,490	6.00%	$246,409
2. Employer Contributions	6.16	252,854	6.17	253,257
3. Supplemental Contributions				
a. 1993 Legislation	0.12	4,984	0.12	4,984
b. 1996 Legislation	0.09	3,572	0.09	3,572
c. 1997 Legislation	0.32	12,954	0.32	12,954
4. Total	12.69	520,854	12.70	521,176
B. Required Contributions – Chapter 356				
1. Normal Cost				
A. Retirement Benefits	6.44	264,572	6.35	260,825
B. Disability Benefits	0.18	7,398	0.17	6,872
C. Survivors	0.07	2,881	0.07	3,007
D. Deferred Retirement Benefits	1.18	48,473	0.26	10,559
E. Refunds	0.30	12,325	1.05	42,918
F. Total	8.17	335,649	7.90	324,181
2. Supplemental Contribution Amortization by June 30, 2037 of Unfunded Actuarial Accrued Liability	8.16	335,125	8.08	331,729
3. Allowance for Expenses	0.24	9,857	0.24	9,853
4. Total	16.57	680,631	16.22	665,763
C. Contribution Sufficiency/(Deficiency) (A.4. – B.4.)	(3.88)%	$(159,777)	(3.52)%	$(144,587)

Note: Projected annual payroll for fiscal year beginning on the valuation date:
$4,106,922 for Fund actuary and $4,105,555 for Milliman.

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Actuarial Basis

Actuarial Cost Method

Liabilities and contributions in this report are computed using the Individual Entry Age Normal Cost Method. This method is prescribed by Minnesota Statutes.

The objective under this method is to fund each member's benefits under the Plan as payments which are level as a percentage of salary, starting at original participation date (or employment date), and continuing until the assumed date of retirement, termination, disability or death. For valuation purposes, entry age for each member is determined as the age at valuation minus years of service as of the valuation date.

At any given date, a liability is calculated equal to the contributions which would have been accumulated if this method of funding had always been used, the current plan provisions had always been in place, and all assumptions had been precisely accurate. The difference between this liability and the assets (if any) which are held in the fund is the unfunded liability. The unfunded liability is typically funded over a chosen period in accordance with the amortization schedule.

A detailed description of the calculation follows:

The normal cost for each active member under the assumed retirement age is determined by applying to earnings the level percentage of salary which, if contributed each year from date of entry into the Plan until the assumed retirement (termination, disability or death) date, is sufficient to provide the full value of the benefits expected to be payable.

- The present value of future normal costs is the total of the discounted values of all active members' normal cost, assuming these to be paid in each case from the valuation date until retirement (termination, disability or death) date. The discount rate assumptions used in this calculation are 8.5% pre-retirement and 6.5% post-retirement, as described in the Summary of Actuarial Assumptions. The 8.5% pre-retirement assumption is used until the 2% benefit increases become payable effective January 1, 2013.

- The present value of projected benefits is calculated as the value of all benefit payments expected to be paid to the Plan's current members, including active and retired members, beneficiaries, and terminated members with vested rights.

- The accrued liability is the excess of the present value of projected benefits over the present value of future normal costs.

- The unfunded liability is the excess of the accrued liability over the assets of the fund, and represents that part of the accrued liability which has not been funded by accumulated past contributions.

Change in Actuarial Cost Method

None

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Asset Valuation Method

The assets are valued based on a five-year moving average of expected and market values (five-year average actuarial value) determined as follows:

At the end of each plan year, an average asset value is calculated as the average of the market asset value at the beginning and end of the fiscal year net of investment income for the fiscal year;

The investment gain or (loss) is taken as the excess of actual investment income over the expected investment income based on the average asset value as calculated above;

The investment gain or (loss) so determined is recognized over five years at 20% per year;

The asset value is, the sum of the market asset value plus the scheduled recognition of investment gains or (losses) during the current and the preceding four fiscal years.

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Summary of Actuarial Assumptions

The following assumptions were used in valuing the liabilities and benefits under the plan. All assumptions are prescribed by Statutes, the LCPR, or the Board of Trustees.

Investment Return	8.5% compounded annually post-retirement for 2011 to account for no benefit increases are payable before January 1, 2013 6.5% compounded annually post-retirement thereafter 8.5% compounded annually pre-retirement
Benefit Increases After Retirement	Payment of 2.0% annual benefit increases after retirement are accounted for by using a 6.5% post-retirement assumption, as required by statute.
Salary Increases	Reported salary for prior fiscal year, with new hires annualized, increased according to the salary increase table shown in the rate table to current fiscal year and annually for each future year. See table of sample rates.
Payroll Growth	For purposes of determining the amortization of the unfunded actuarial accrued liability, payroll is assumed to increase 3.75% compounded annually.
Future Service	Members are assumed to earn future service at a full-time rate.
Mortality	
Pre-retirement	RP 2000 non-annuitant generational mortality, white collar adjustment, male rates set back five years and females rates set back seven years.
Post-retirement	RP 2000 annuitant generational mortality, white collar adjustment, male rates set back two years and female rates set back three years.
Post-Disability	RP 2000 disabled retiree mortality, without adjustment.
Disability	Age-related rates based on experience; see table of sample rates.
Withdrawal	Select and ultimate rates based on actual plan experience. Ultimate rates after the third year are shown in the rate table. Select rates are as follows:

	First Year	Second Year	Third Year
Male	45%	12%	6%
Female	40%	10%	8%

Expenses	Prior year administrative expenses expressed as percentage of prior year payroll.
Retirement Age	Graded rates beginning at age 55 as shown in rate table. Members who have attained the highest assumed retirement age will retire in one year.
Return of Contributions	All employees withdrawing after becoming eligible for a deferred benefit are assumed to take the larger of their contributions accumulated with interest or the value of their deferred benefit.
Percentage Married	85% of male members and 65% of female members are assumed to be married. Members are assumed to have no children.
Age Difference	Females two years younger than males.
Allowance for Combined Service Annuity	Liabilities for active members are increased by 1.40% and liabilities for former members are increased by 4.00% to account for the effect of some Participants having eligibility for a Combined Service Annuity.

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Summary of Actuarial Assumptions (continued)

Interest on Member Contributions	Members and former members who are eligible for the money purchase annuity are assumed to receive interest credits equal to the Pre-Retirement interest rate. All other members and former members receive the interest crediting rate as specified in statutes.
Commencement of Deferred Benefits	Members receiving deferred annuities (including current terminated deferred members) are assumed to begin receiving benefits at unreduced retirement age.
Form of Payment	Married members are assumed to elect subsidized joint and survivor form of annuity as follows: Males: 10% elect 50% J&S option 15% elect 75% J&S option 70% elect 100% J&S option Females: 20% elect 50% J&S option 10% elect 75% J&S option 50% elect 100% J&S option Members eligible for deferred annuities (including current terminated deferred members) are assumed to elect a life annuity.
Unknown Data for Members	We used membership data as supplied by the plan sponsor as of July 1, 2011. Customarily, this information would not be verified by a plan's actuary. We have reviewed the information for internal consistency and we have no reason to doubt its substantial accuracy. In the small number of cases where submitted data was missing or incomplete, the following assumptions were applied: Data for active members: Salary: $50,600 Date of birth: July 1, 1967 Gender: Female Data for terminated members: Date of birth: July 1, 1962 Average salary: $29,000 Age at termination: Age 40, or current age if younger than40 Data for in-pay members: Beneficiary date of birth: Wife two years younger than husband Gender: Based on first name Form of payment: Life annuity
Change in Actuarial Assumptions	The salary increase assumption was changed to a service based assumption and the payroll growth assumption was lowered from 4.50% to 3.75%. Also, the decrement timing was changed from beginning of year to mid-year.

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Summary of Actuarial Assumptions (continued)

Summary of Rates

	Mortality Rates (%)					
	Pre-Retirement *		Post-Retirement**		Post-Disability	
Age	Male	Female	Male	Female	Male	Female
20	0.0269%	0.0155%	0.0316%	0.0184%	2.2571%	0.7450%
25	0.0345	0.0188	0.0373	0.0194	2.2571	0.7450
30	0.0376	0.0197	0.0393	0.0223	2.2571	0.7450
35	0.0353	0.0235	0.0481	0.0363	2.2571	0.7450
40	0.0591	0.0401	0.0766	0.0527	2.2571	0.7450
45	0.0890	0.0562	0.1124	0.0763	2.2571	0.7450
50	0.1342	0.0837	0.1711	0.1229	2.8975	1.1535
55	0.1978	0.1344	0.5716	0.2681	3.5442	1.6544
60	0.2747	0.2015	0.5688	0.4253	4.2042	2.1839
65	0.4263	0.3107	0.9232	0.6736	5.0174	2.8026
70	0.6725	0.4979	1.5834	1.1211	6.2583	3.7635
75	0.9823	0.7591	2.6710	1.8784	8.2067	5.2330

* Rates shown are RP 2000 employee mortality, white collar adjustment, set back five years for males and seven years for females.

** Rates shown are RP 2000 annuitant mortality, white collar adjustment, set back two years for males and three years for females.

	Rate (%)			
	Ultimate Withdrawal		Disability	
Age	Male	Female	Male	Female
20	3.70%	4.50%	0.00%	0.00%
25	3.20	4.50	0.00	0.00
30	2.70	4.50	0.00	0.00
35	2.50	3.90	0.01	0.01
40	2.35	2.75	0.03	0.03
45	2.10	2.10	0.05	0.05
50	1.85	1.85	0.10	0.10
55	0.00	0.00	0.16	0.16
60	0.00	0.00	0.25	0.25
65	0.00	0.00	0.00	0.00
70	0.00	0.00	0.00	0.00

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Summary of Actuarial Assumptions (continued)

Salary Scale	
Service	**Salary Increase**
1	12.00
2	9.00
3	8.00
4	7.50
5	7.25
6	7.00
7	6.85
8	6.70
9	6.55
10	6.40
11	6.25
12	6.00
13	5.75
14	5.50
15	5.25
16	5.00
17	4.75
18	4.50
19	4.25
20	4.00
21	3.90
22	3.80
23	3.70
24	3.60
25 or more	3.50

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Summary of Actuarial Assumptions (continued)

Summary of Retirement Rates

Rate %					
Coordinated			Basic		
Age	Members Eligible for Rule of 90	Members Not Eligible for Rule of 90	Age	Members Eligible for 30 and Out Provision	Members Not Eligible for 30 and Out Provisions
55 & Under	50	7	55 & under	40	5
56	55	7	56	40	5
57	45	7	57	40	5
58	45	8	58	40	5
59	45	10	59	40	5
60	40	12	60	25	25
61	45	16	61	25	25
62	45	20	62	25	25
63	40	18	63	25	25
64	45	20	61	25	25
65	40	40	65	40	40
66	35	35	66	40	40
67	30	30	67	40	40
68	30	30	68	40	40
69	30	30	69	40	40
70	35	35	70-74	60	60
71 & Over	100	100	75-79	60	100
			80 & Over	100	100

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Summary of Plan Provisions – Basic Members

This summary of provisions reflects our interpretation of applicable Statutes for purposes of preparing this valuation. This interpretation is not intended to provide a basis for administering the Plan.

Plan Year

July 1 through June 30

Eligibility

Teachers first hired prior to July 1, 1978 employed by the Board of Education of Special School District No. 1, other than a charter school, and not covered by the Social Security Act. Certain part-time licensed employees of Special School District No. 1 are also covered. These members were transferred to TRA as part of the merger of the Minneapolis Teachers Retirement Fund Association (MTRFA) effective June 30, 2006.

Contributions

Shown as a percent of Salary:

Date of Increase	Member	Employer
July 1, 2010	9.00%	13.14%
July 1, 2011	9.50%	13.64%
July 1, 2012	10.00%	14.14%
July 1, 2013	10.50%	14.64%
July 1, 2014	11.00%	15.14%

After June 30, 2015, the member and employer contribution rates may be adjusted as follows:

- if a contribution sufficiency of at least 1% has existed for two consecutive years, the member and employer contribution rates may be decreased to a level that is necessary to maintain a 1% sufficiency
- if a contribution deficiency of at least 0.25% has existed for two consecutive years, the member and employer contribution rates may each be increased as shown:

Contribution Deficiency	Allowable Increase in Member and Employer Contribution Rates
<2% of pay	.25% of pay
2% to 4% of pay	.50% of pay
>4% of pay	.75% of pay

Potential contribution increases after June 30, 2015 are not reflected in this valuation report.

Employee contributions are "picked up" according to the provisions of Internal Revenue Code 414(h).

Teaching Service

A year is earned during a calendar year if the member is employed in a covered position and employee contributions are deducted. Certain part-time service and military service is also included.

Salary

Periodic compensation used for contribution purposes excluding lump sum annual or sick leave payments, severance payments, any payments made in lieu of employer paid fringe benefits or expenses, and employer contributions to a Section 457 deferred compensation plan.

Average Salary

Average of the five highest successive years of Salary.

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Summary of Plan Provisions – Basic Members (continued)

Retirement	
Normal Retirement Benefit	
Age/Service Requirements	Age 60, or any age with 30 years of Teaching Service.
Amount	2.50% of Average Salary for each year of Allowable Service.
Early Retirement	
Age/Service Requirements	Age 55 with less than 30 years of Teaching Service.
Amount	The greater of (a) or (b): (a) 2.25% of Average Salary for each year of Teaching Service with reduction of 0.25% for each month before the Member would first be eligible for a normal retirement benefit. (b) 2.50% of Average Salary for each year of Teaching Service assuming augmentation to the age of first eligibility for a normal retirement benefit at 3.00% per year and actuarial reduction for each month before the member would be first eligible for a normal retirement benefit. An alternative benefit is available to members who are at least age 50 and have seven years of Teaching Service. The benefit is based on the accumulation of the 6.50% "city deposits" to the Retirement Fund. Other benefits are also provided under this alternative depending on the member's age and Teaching Service.
Form of Payment	Life annuity. Actuarially equivalent options are: (a) 10 or 15 year Certain and Life (b) 50%, 75% or 100% Joint and Survivor with bounce back feature (option is canceled if member is predeceased by beneficiary).
Benefit Increases	Benefit recipients will receive no annual increases in 2011 and 2012. Beginning January 1, 2013 the annual increase will be 2.0% per year. When the funding ratio reaches 90% (on a Market Value of Assets basis), the annual increase will be 2.5%. A benefit recipient who has been receiving a benefit for at least 18 full months as of December 31 will receive a full increase. Members receiving benefits for at least six full months but less than 18 full months will receive a pro-rata increase.

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Summary of Plan Provisions - Basic (continued)

Disability

Age/Service Requirement	Total and permanent disability with three years of Teaching Service.
Amount	An annuity actuarially equivalent to the continued accumulation of member and city contributions at the current rate for a period of 15 years (but not beyond age 65) plus an additional benefit equal to the smaller of 100% of the annuity provided by city contributions only or $150 per month. A member with 20 years of Teaching Service also receives an additional $7.50 per month. Payments stop earlier if disability ceases or death occurs. Benefits may be reduced on resumption of partial employment.
Form of Payment	Same as for retirement.
Benefit Increases	Same as for retirement.

Death

Benefit A

Age/Service Requirement	Death before retirement.
Amount	The accumulation of member and city contributions plus 6.00% interest. Paid as a life annuity, 15-year Certain and Life, or lump sum. If an annuity is chosen the beneficiary also receives additional benefits.

Benefit B

Age/Service Requirement	An active member with seven years of Teaching Service. A former member age 60 with seven years of Teaching Service who dies before retirement or disability benefits begin.
Amount	The actuarial equivalent of any benefits the member could have received if resignation occurred on the date of death.

Benefit C

Age/Service Requirement	As an active member who dies and leaves surviving children.
Amount	A monthly benefit of $248.30 to the surviving widow while caring for a child and an additional $248.30 per month for each surviving dependent child. The maximum family benefit is $579.30 per month. Benefits to the widow cease upon death or when no longer caring for an eligible child. Benefits for dependent children cease upon marriage or age 18 (age 22 if a full time student).
Benefit increases	Same as for retirement.

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Summary of Plan Provisions - Basic (continued)

Withdrawal	
Refund of Contributions	
Age/Service Requirements	Termination of Teaching Service.
Amount	Member's contributions with 6.00% interest compounded annually through June 30, 2011. Beginning July 1, 2011, a member's contributions earn 4.00% interest compounded annually. A deferred annuity may be elected in lieu of a refund.
Deferred Benefit	
Age/Service Requirements	Seven years of Teaching Service.
Amount	The benefit computed under law in effect at termination and increased by the following percentage compounded annually: (a) 3.00% therefore until the earlier of January 1 of the year following attainment of age 55 and January 1, 2012; (b) 5.00% thereafter until the earlier of June 30, 2012 and when the annuity begins; and (c) 2.00% from January 1, 2012. In addition, the interest earned on the member and city contributions between termination and age 60 can be applied to provide an additional annuity.

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Summary of Plan Provisions - Coordinated

This summary of provisions reflects the interpretation of applicable Statutes for purposes of preparing this valuation. This interpretation is not intended to create a basis for administering the Plan.

Plan Year

July 1 through June 30

Eligibility

A public school or MNSCU teacher who is covered by the Social Security Act, except for teachers employed by St. Paul or Duluth public schools or by the University of Minnesota. Charter school teachers employed by St. Paul or Duluth public schools are covered by TRA.

No MNSCU teacher will become a new Member unless that person elects coverage as defined by Minnesota Statutes under Chapter 354B.

Contributions

Shown as a percent of salary:

Date of Increase	Member	Employer
July 1, 2010	5.50%	5.50%
July 1, 2011	6.00%	6.00%
July 1, 2012	6.50%	6.50%
July 1, 2013	7.00%	7.00%
July 1, 2014	7.50%	7.50%

Employer also contributes Supplemental amount equal to 3.64% of Salary (members employed by Special School District #1 only).

After June 30, 2015, the member and employer contribution rates may be adjusted as follows:

- if a contribution sufficiency of at least 1% has existed for two consecutive years, the member and employer contribution rates may be decreased to a level that is necessary to maintain a 1% sufficiency
- if a contribution deficiency of at least 0.25% has existed for two consecutive years, the member and employer contribution rates may each be increased as shown below:

Contribution Deficiency	Allowable Increase in Member and Employer Contribution Rates
<2% of pay	.25% of pay
2% to 4% of pay	.50% of pay
>4% of pay	.75% of pay

Potential contribution increases after June 30, 2015 are not reflected in this valuation report.

Employee contributions are "picked up" according to the provisions of Internal Revenue Code 414(h).

Teaching Service

A year is earned during a calendar year if the member is employed in a covered position and employee contributions are deducted. Certain part-time service and military service is also included.

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Summary of Plan Provisions – Coordinated (continued)

Salary	Periodic compensation used for contribution purposes excluding lump sum annual or sick leave payments, severance payments, any payments made in lieu of employer paid fringe benefits or expenses, and employer contributions to a Section 457 deferred compensation plan.
Average Salary	Average of the five highest successive years of Salary. Average Salary is based on all Allowable Service if less than five years.

Retirement

<u>Normal Retirement Benefit</u>

Age/Service Requirements

First hired before July 1, 1989:

(a) Age 65 and three years of Allowable Service; or
(b) Age 62 and 30 years of Allowable Service.

Proportionate retirement annuity is available at age 65 and one year of Allowable Service.

First hired after June 30, 1989:

The age when first eligible for full Social Security retirement benefits (but not to exceed 66) and three years of Allowable Service.

Proportionate retirement annuity is available at normal retirement age and one year of Allowable Service.

<u>Early Retirement</u>

Age/Service Requirements

First hired after June 30, 1989:

(a) Age 55 and three years of Allowable Service; or
(b) Any age and 30 years of Allowable Service; or
(c) Rule of 90: Age plus Allowable Service totals 90.

First hired after June 30, 1989:

(a) Age 55 and three years of Allowable Service.

Amount

First hired before July 1, 1989:

The greater of (a.), (b.) or (c):

(a) 1.20% of Average Salary for each of the first ten years of Allowable Service.

1.70% of Average Salary for each year of Allowable Service in excess of 10 prior to July 1, 2006, and

1.90% of Average Salary for years of Allowable Service after July 1, 2006.

No actuarial reduction if age plus years of service totals 90. Otherwise reduction of 0.25% for each month the member is under age 65 (or 62 if 30 years of Allowable Service) at time of retirement.

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Summary of Plan Provisions – Coordinated (continued)

	(b) 1.70% of Average Salary for each year of Allowable Service prior to July 1, 2006 and 1.90% for each year of Allowable Service beginning July 1, 2006, assuming augmentation to age 65 at 3.00% per year and actuarial reduction for each month the member is under age 65.
	(c) For eligible members: the monthly benefit that is actuarially equivalent to 2.2 times the members' accumulated deductions plus interest thereon.
	First hired after June 30, 1989: 1.70% of Average Salary for each year of Allowable Service prior to July 1, 2006 and 1.90% for each year of Allowable Service beginning July 1, 2006, assuming augmentation to normal retirement age at 3.00% per year (2.50% per year for members hired after June 30, 2006) and actuarial reduction for each month the member is under the full Social Security benefit retirement age (not to exceed age 66).
Form of Payment	Life annuity. Actuarially equivalent options are: (a) 50%, 75% or 100% Joint and Survivor with bounce back feature (option is canceled if member is predeceased by beneficiary). (b) 15 year Certain and Life (c) Guaranteed Refund
Benefit Increases	Benefit recipients will receive no annual increase in 2011 and 2012. Beginning January 1, 2013 the annual increase will be 2.0% per year. When the funding ratio reaches 90% (on a Market Value of Assets basis), the annual increase will revert to 2.5%. A benefit recipient who has been receiving a benefit for at least 18 full months as of December 31 will receive a full increase. Members receiving benefits for at least six full months but less than 18 full months will receive a pro-rata increase.
Disability	
Age/Service Requirement	Total and permanent disability before Normal Retirement Age with three years of Allowable Service.
Amount	Normal Retirement Benefit based on Allowable Service and Average Salary at disability without reduction for commencement before Normal Retirement Age unless an optional annuity plan is selected. Payments stop at Normal Retirement Age or the five year anniversary of the effective date of the disability benefit, whichever is later. Payments stop earlier if disability ceases or death occurs. Benefits may be reduced on resumption of partial employment.
Form of Payment	Same as for retirement.
Benefit Increases	Same as for retirement.
Retirement After Disability	
Age/Service Requirement	Normal Retirement Age or the five year anniversary of the effective date of the disability benefit, whichever is later.
Amount	Any optional annuity continues. Otherwise, the larger of the disability benefit paid before Normal Retirement Age or the normal retirement benefit available at Normal Retirement Age, or an actuarially equivalent optional annuity.
Benefit Increases	Same as for retirement.

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Summary of Plan Provisions – Coordinated (continued)

Death	
Surviving Spouse	
Optional Annuity	
Age/Service Requirement	Member or former member with three years of Allowable Service who dies before retirement or disability benefits commence.
Amount	Survivor's payment of the 100% Joint and Survivor benefit or an actuarial equivalent term certain annuity. If commencement is prior to age 65 (age 62 if 30 years of service), the benefit is reduced for early retirement with half the applicable reduction factor used from age 55 to actual commencement age. If no surviving spouse, then an actuarial equivalent dependent child benefit is paid to age 20 or for five years if longer.
Benefit Increases	Same as for retirement.
Withdrawal	
Refund of Contributions	
Age/Service Requirement	Thirty days following termination of Teaching Service.
Amount	Member's contributions with 6.00% interest compounded annually through June 30, 2011. Beginning July 1, 2011, a Member's contributions earn 4.00% interest compounded annually. A deferred annuity may be elected in lieu of a refund.
Deferred Annuity	
Age/Service Requirement	Vested at date of termination. Current requirement is three years of Allowable Service.
Amount	For members first hired prior to July 1, 2006, the benefit is computed under law in effect at termination and increased by the following percentage compounded annually: (a) 3.00% therefore until the earlier of January 1 of the year following attainment of age 55 and June 30, 2012; (b) 5.00% thereafter until the earlier of June 30, 2012 and when the annuity begins; and (c) 2.00% from July 1, 2012 forward. Amount is payable as a normal or early retirement. A member who terminated service before July 1, 1997 whose benefit does not commence until after June 30, 1997 shall receive an actuarially equivalent increase to reflect the change from 5.00% to 6.00% in the post-retirement interest assumption; or For eligible members; the monthly benefit that is actuarially equivalent to 2.2 times the members' accumulated deductions plus interest thereon. For members first hired July 1, 2006 and after, the benefit computed under law in effect at termination is increased by 2.50% compounded annually until June 30, 2012 and increased by 2.00% from July 1, 2012 forward until the annuity begins.

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Teachers Retirement Association Fund

Active Members as of June 30, 2011

	Years of Service								
Age	≤1	1-4	5-9	10-14	15-19	20-24	25-29	30+	ALL
<25	852	720	1	0	0	0	0	0	1573
25-29	1537	5632	1295	0	0	0	0	0	8464
30-34	680	3052	5589	1105	0	0	0	0	10426
35-39	534	1546	2483	4596	573	0	0	0	9732
40-44	606	1449	1713	2978	3750	473	0	0	10969
45-49	518	1212	1323	1667	2172	2421	460	1	9774
50-54	415	997	1120	1468	1487	1730	1920	567	9704
55-59	341	683	774	1137	1364	1390	1321	2436	9446
60-64	322	428	488	616	776	877	694	1151	5352
65+	255	249	135	123	127	123	92	181	1285
ALL	6060	15968	14921	13690	10249	7014	4487	4336	76725

Average Annual Earnings

	Years of Service								
Age	≤1	1-4	5-9	10-14	15-19	20-24	25-29	30+	ALL
<25	19388	33480	43755	0	0	0	0	0	25854
25-29	17229	33627	45031	0	0	0	0	0	32394
30-34	16478	34038	46502	58057	0	0	0	0	42120
35-39	15775	32858	47002	59438	68915	0	0	0	50205
40-44	13586	30630	44940	58897	66293	71006	0	0	53531
45-49	13109	27819	44711	57876	65232	70079	72560	48019	55342
50-54	14022	25902	43244	56757	64037	68444	70981	70304	57005
55-59	11388	22762	40093	55814	63062	68503	71351	72199	59844
60-64	10089	17820	38307	52666	61071	67993	72641	75636	57269
65+	8593	9549	26527	48594	63519	67726	75531	85329	41181
ALL	15313	31166	45094	58028	65028	69124	71602	73406	50160

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Teachers Retirement Association Fund

Service Retirements as of June 30, 2011

	Years Retired							
Age	≤1	1-4	5-9	10-14	15-19	20-24	25+	ALL
<50	0	0	0	1	0	1	0	2
50-54	3	1	1	0	0	0	0	5
55-59	1177	536	18	2	0	0	0	1733
60-64	2363	3839	3547	158	4	1	1	9913
65-69	1058	2047	4746	4385	57	3	1	12297
70-74	103	443	1861	5156	1819	45	10	9437
75-79	16	53	261	1945	3481	988	31	6775
80-84	1	8	48	231	1693	1925	891	4797
85+	0	2	11	22	177	1148	2895	4255
ALL	4721	6929	10493	11900	7231	4111	3829	49214

Average Annual Benefit

	Years Retired							
Age	≤1	1-4	5-9	10-14	15-19	20-24	25+	ALL
<50	0	0	0	23099	0	3168	0	13134
50-54	26956	17411	4919	0	0	0	0	20640
55-59	35615	31213	35737	2007	0	0	0	34216
60-64	30118	32362	26527	29478	42823	1923	1501	29692
65-69	20819	21901	22942	23534	22121	2229	41881	22790
70-74	18643	19000	19680	26161	27500	13195	3134	24637
75-79	22048	12469	17419	27536	35143	29232	23041	31151
80-84	2584	22480	16459	28671	33302	32287	32117	32259
85+	0	55918	10134	24623	35393	31204	30846	31058
ALL	29119	28170	23415	25503	32698	31005	31002	27725

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Teachers Retirement Association Fund

Survivors as of June 30, 2011

	Years Since Death							
Age	<1	1-4	5-9	10-14	15-19	20-24	25+	ALL
<50	28	39	56	51	8	4	3	189
50-54	19	22	18	12	5	1	4	81
55-59	17	31	41	17	8	7	7	128
60-64	24	68	116	63	19	9	1	300
65-69	9	35	114	215	58	15	10	456
70-74	0	14	58	207	237	54	22	592
75-79	2	5	16	107	270	185	101	686
80-84	0	0	3	23	120	271	323	740
85+	0	0	6	3	17	122	545	693
ALL	99	214	428	698	742	668	1016	3865

Average Annual Benefit

	Years Since Death							
Age	<1	1-4	5-9	10-14	15-19	20-24	25+	ALL
<50	15228	14517	14046	20982	22242	32471	26109	17119
50-54	16204	13874	13245	21583	13799	14344	13584	15410
55-59	14935	17051	18507	16271	21048	11462	19746	17225
60-64	17303	23439	20569	19346	20647	17752	3074	20564
65-69	19430	20823	19099	20694	25400	23798	21825	21006
70-74	0	12081	18684	23948	26034	24089	27035	24115
75-79	23302	13587	23061	25001	32751	32164	32535	30960
80-84	0	0	9020	16850	32894	31744	32860	31863
85+	0	0	10965	31704	26637	30054	32159	31468
ALL	16414	18504	18441	22047	29238	30332	32002	26737

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Teachers Retirement Association Fund

Disability Retirements as of June 30, 2011

	Years Disabled							
Age	<1	1-4	5-9	10-14	15-19	20-24	25+	ALL
<50	9	17	17	3	2	0	0	48
50-54	11	14	15	4	2	0	0	46
55-59	32	31	41	21	10	2	0	137
60-64	23	50	118	66	23	7	2	289
65-69	2	17	10	14	3	1	0	47
70-74	0	1	0	0	0	0	0	1
75-79	0	0	0	0	0	0	0	0
80-84	0	0	0	0	0	0	0	0
85+	0	0	0	0	0	0	0	0
ALL	77	130	201	108	40	10	2	568

Average Annual Benefit

	Years Disabled							
Age	<1	1-4	5-9	10-14	15-19	20-24	25+	ALL
<50	13106	8007	7441	8521	3560	0	0	8610
50-54	19017	15459	14479	6957	11117	0	0	15063
55-59	23480	21571	16340	16406	14628	7507	0	18948
60-64	27442	22672	20889	21239	24241	16746	8829	21882
65-69	24004	16356	16688	25130	27178	17334	0	20078
70-74	0	23868	0	0	0	0	0	23869
75-79	0	0	0	0	0	0	0	0
80-84	0	0	0	0	0	0	0	0
85+	0	0	0	0	0	0	0	0
ALL	22827	18899	18137	19922	20368	14958	8830	19355

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