STATE OF WISCONSIN
Department of Employee Trust Funds
Robert J. Conlin
SECRETARY

Wisconsin Department
of Employee Trust Funds
PO Box 7931
Madison WI 53707-7931
1-877-533-5020 (toll free)
Fax 608-267-4549
etf.wi.gov

Correspondence Memorandum

Date: June 1, 2018

To: Employee Trust Funds Board

From: Cindy Klimke-Armatoski, CPA
Chief Trust Finance Officer

Subject: Accumulated Sick Leave Actuarial Valuation

ETF requests the Employee Trust Funds Board (Board) approve the Accumulated Sick Leave Conversion Credit Programs Actuarial Valuation as of December 31, 2017.

Gabriel Roeder Smith & Company (GRS) has completed the actuarial valuation of the Accumulated Sick Leave Conversion Credit programs. The results of the study are summarized below (millions $):

	December 31,	
	2017	2016
Actuarial Accrued Liability	$ 2,558.7	$2,469.0
Actuarial Value of Assets	2,558.5	2,468.8
Unfunded Actuarial Accrued Liability	0.2	0.2
Funded Ratio	100.0%	100.0%

GRS is recommending a decrease of 0.1% in the contribution rates for 2019.

	Base ASLCC Program		Supplemental Plan		Total	
	2019	2018	2019	2018	2019	2018
Employer Normal Cost	0.8%	0.8%	0.3%	0.4%	1.1%	1.2%

Actuaries from GRS will be at the Board meeting to present the report and to answer any questions.

Attachment: Accumulated Sick Leave Conversion Credit Programs Annual Actuarial Valuation as of December 31, 2017

Reviewed and approved by Robert J. Conlin, Secretary

Electronically Signed 6/11/18

Board	Mtg Date	Item #
ETF	6.21.18	4B

Accumulated Sick Leave Conversion Credit Programs

Presented to the Wisconsin Department of Employee Trust Funds

Annual Actuarial Valuation

December 31, 2017

GRS Retirement Consulting

800.521.0498 | P: 248.799.9000 | F: 248.799.9020 | www.grsconsulting.com

June 1, 2018

Employee Trust Funds Board
Wisconsin Retirement System
4822 Madison Yards Way
Madison, Wisconsin 53705

Ladies and Gentlemen:

The results of the **Annual Actuarial Valuation** of benefit liabilities and costs of the Accumulated Sick Leave Conversion Credit (ASLCC) Programs are presented in this report. This report should not be relied upon for any other purpose. The recommended contribution rates are shown below:

	Health and Education Facility	Wiscraft	Other State Employers	Weighted Average
Base Rate	2.0%	1.1%	0.8%	0.8%
Supplemental Rate	1.2%	0.6%	0.3%	0.3%
Total	3.2%	1.7%	1.1%	1.1%

The date of the valuation was **December 31, 2017**.

The valuation was based upon data, furnished by the Department of Employee Trust Funds, concerning retired and non-retired participants and pertinent financial information.

Future actuarial measurements may differ significantly from those presented in this report due to such factors as experience differing from that anticipated by actuarial assumptions, changes in plan provisions, actuarial assumptions/methods or applicable law. Due to the limited scope of this assignment, we did not perform an analysis of the potential range of future measurements.

The valuation was completed in accordance with standards of practice prescribed by the Actuarial Standards Board and in conformance with Chapter 40 of the Wisconsin Statutes. To the best of our knowledge, this report is complete and accurate, and the actuarial methods and assumptions produced results which are reasonable. Brian B. Murphy, Mark Buis, 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.

Respectfully submitted,

Brian B. Murphy
FSA, EA, FCA, MAAA

Mark Buis
FSA, EA, FCA, MAAA

James D. Anderson
FSA, EA, FCA, MAAA

BBM/MB/JDA:ah

COMBINED RESULTS AND DISCUSSION

ASLCC Program
Base Plus Supplemental
Computed Total Employer Contribution Rates

The financial objectives of the ASLCC Program are to establish and receive contributions to support benefits that will remain approximately level from year to year. Combined program valuation results for the last 10 years are presented below:

Valuation Date December 31	Base	Supplemental	Total	UAAL* Amortization Years
2008	0.6%	0.2%	0.8%	17
2009^	0.8%	0.4%	1.2%	16
2010^	0.8%	0.4%	1.2%	15
2011	0.9%	0.4%	1.3%	14
2012^	0.9%	0.5%	1.4%	13
2013	0.8%	0.4%	1.2%	12
2014	0.8%	0.4%	1.2%	11
2015^	0.9%	0.4%	1.3%	10
2016	0.8%	0.4%	1.2%	9
2017	0.8%	0.3%	1.1%	8

** Unfunded actuarial accrued liabilities.*
^ Assumption change.

Comments

- Based on the policy established at the June 2002 ETF Board meeting, the amortization period for Unfunded Actuarial Accrued Liabilities (UAAL) was closed. Therefore, the remaining period will decline one year at a time until the UAAL is fully amortized.

- The State of Wisconsin issued Pension Obligation Bonds in 2003 that paid off the majority of unfunded liabilities of the ASLCC Program.

- In computing the rates in this report, we used the Frozen Initial Liability (FIL) method. This method was used because the Pension Obligation Bond paid off unfunded liabilities for some, but not all employers, requiring separate contribution rates for some of the employers. This method is described further on page 13.

- In total, during 2017, investment return on a market value basis was above the assumed level of 7.2%. Under the asset valuation method, gains and losses are phased-in over a five-year period, resulting in an 8.3% return on an actuarial value of assets basis. Overall, contribution rates for the December 31, 2017 valuation decreased from the prior year primarily due to favorable investment performance.

- The Market Value of Assets exceeds the Actuarial Value of Assets by approximately 3.4% as of the valuation date. The statutory asset valuation method will recognize all of the differences between actuarial value and market value over four future years. Given realization of the actuarial assumptions, including the 7.2% investment return assumption, the result will be downward pressure on contribution rates.

ASLCC Program
Summary of Participant Data
December 31, 2017

Active Participants

	State Employees (Non-University)	University	University Hospital	Total
Number	32,030	30,832	9,083	71,945
Annual Payroll	$1,788,970,889	$ 2,391,799,341	$600,198,799	$ 4,780,969,029
Accrued Unused Sick Days	2,692,476 days	2,769,541 days	342,558 days	5,804,575 days
Averages: Age	44.9 years	46.4 years	40.4 years	45.0 years
Service	11.7 years	10.9 years	7.8 years	10.9 years
Sick Leave Days	84.1 days	89.8 days	37.7 days	80.7 days

Retirees & Beneficiaries

	Rate Category		
	Without Medicare	With Medicare	Total
Number*	6,851	18,696	25,547
Monthly Premiums			
Total	$8,165,130	$13,295,820	$21,460,950
Average	1,191.82	711.16	
Prior Year Average	1,184.50	736.19	

** Number count does not include 5,777 escrowed annuitants.*

ASLCC Program
Summary of Assets
December 31, 2017

	Base Program	Supplemental Program	Total
Beginning Balance	$1,517,294,250	$951,514,541	$2,468,808,791
Adjustment	(5,124,944)	(3,143,087)	(8,268,031)
Adjusted Beginning Balance	$1,512,169,306	$948,371,454	$2,460,540,760
Revenues			
Contributions	$ 40,053,152	$ 17,864,218	$ 57,917,370
Investment Income	122,168,639	77,081,771	199,250,410
Total Revenues	$ 162,221,791	$ 94,945,989	$ 257,167,780
Expenses			
Insurance Premiums	$ 108,682,103	$ 49,717,028	$ 158,399,131
Administration	467,218	292,733	759,951
Total Expenses	$ 109,149,321	$ 50,009,761	$ 159,159,082
Ending Balance - December 31, 2017	$1,565,241,776	$993,307,682	$2,558,549,458
Internal Rate of Return	8.3%	8.3%	8.3%

The amounts shown above are based on the Market Recognition Account (MRA) and were provided by ETF.

ASLCC Program
Unfunded Actuarial Accrued Liability (UAAL)
December 31, 2017

	Health and Education Facility	Wiscraft	Other State Employers	Totals/Weighted Average
Balance December 31, 2016	$ 53,572	$ 127,215	$ 0	$ 180,787
Balance December 31, 2017	**$ 49,132**	**$ 110,760**	**$ 0**	**$ 159,892**
Base UAAL	**$ 27,957**	**$ 58,529**	**$ 0**	**$ 86,486**
Supplemental UAAL	**$ 21,175**	**$ 52,231**	**$ 0**	**$ 73,406**
Annual Payroll	$336,509	$2,474,782	$4,778,157,738	$4,780,969,029
Base Contribution Rate				
Normal Cost	0.8%	0.8%	0.8%	0.8%
UAAL	1.2%	0.3%	0.0%	0.0%
Total	2.0%	1.1%	0.8%	0.8%
Supplemental Contribution Rate				
Normal Cost	0.3%	0.3%	0.3%	0.3%
UAAL	0.9%	0.3%	0.0%	0.0%
Total	1.2%	0.6%	0.3%	0.3%
Total Contribution Rate	**3.2%**	**1.7%**	**1.1%**	**1.1%**

Annual payroll and UAAL balances for Health and Education Facility and Wiscraft were provided by ETF.

BASE PLAN RESULTS

Section 40.05(4)(b)
Accumulated Sick Leave Conversion Credit Program
Summary of Accumulation and Payment Conditions

Accumulation. The average annual sick leave balance of Wisconsin State employees (other than University employees) in 2017 was 84.1 days. Based upon an average of 11.7 years of service, this would correspond to an average annual addition of 7.2 days per year to sick leave accounts for past years. For University and University Hospital employees, the average balance was 78.0 days. Based upon an average of 10.2 years of service, this would correspond to an average annual addition of 7.6 days per year to the sick leave accounts for past years. For purposes of estimating sick leave balances at retirement, each individual was assumed to continue using sick leave at the same rate as in the past but not less than 25% nor more than 75% of the person's annual accrual rate (usually 16.25 days).

Eligibility for Payment of Accrued Sick Leave. Termination of employment with 20 or more years of service or eligibility for an immediate annuity from the Wisconsin Retirement System. State elected officials and certain State administrative officials terminating before their minimum service retirement age retain eligibility for benefits at their minimum service retirement age providing they do not elect a WRS separation benefit.

Amount of Payment for Unused Sick Leave. A conversion credit is computed at the time of retirement or death by multiplying the number of days of unused sick leave by the highest basic pay rate. The conversion credit is then used to cover the cost of health insurance premiums for the employee and eligible dependents. Unused portions are carried forward from year to year without interest and when total health insurance premiums paid on behalf of the retired employee equal or exceed the conversion credit, no further payments are made under the ASLCC Program. Payments from the sick leave account may be escrowed indefinitely after retirement for participants who provide evidence of comparable health insurance coverage from another source.

40.05(4)(B) - Base ASLCC Program
Development of Normal Cost

Actuarial Present Value of	December 31 2017	December 31 2016
(1) Future Amount to be paid on behalf of present retirees and beneficiaries	$ 451,553,676	$ 447,926,335
(2) Future Amount to be paid on behalf of future retirees and beneficiaries	1,456,725,220	1,441,358,649
(3) Total Actuarial Present Value	$ 1,908,278,896	$ 1,889,284,984
(4) Assets	1,565,241,776	1,517,294,250
(5) Unfunded Actuarial Accrued Liabilities (UAAL)	$ 86,486	$ 98,413
(6) Present Value of Future Normal Cost: (3) - (4) - (5)	$ 342,950,634	$ 371,892,321
(7) Present Value of Future Salary	$45,538,320,500	$44,276,526,110
(8) Normal Cost: (6) / (7) (not to exceed last year's rate + 0.2%)	0.8%	0.8%

40.05(4)(B) - Base ASLCC Program
Computed Employer Contributions
December 31, 2017

Contributions for	Computed Employer Contribution Rate as a % of Covered Payroll
Normal Cost	0.8%
UAAL*	0.0%
Total	**0.8%**

** Unfunded actuarial accrued liabilities of $0.1 million were amortized over 8 years. Although this results in a 0.0% of pay contribution due to rounding, unfunded liabilities are allocated to individual employers as shown on page 5 and employers having an unfunded liability will make a separate contribution towards this unfunded liability.*

Discussion

The financial objective of the ASLCC Program is to establish and receive contributions to support benefits that will remain approximately level from year to year. In 2003, the State of Wisconsin issued Pension Obligation Bonds which paid off the majority of unfunded liabilities of the ASLCC Program. Since unfunded liabilities remained for certain employers, the funding method was changed to the Frozen Initial Liability Actuarial Cost Method. Under this method, gains and losses arising from the difference between actual and assumed experience are reflected in the determination of the normal cost. Separate amortization schedules are established for employers with unfunded liabilities (see page 5), resulting in separate contribution rates for each participating employer.

40.05(4)(B) - Base ASLCC Program
Comparative Statement of Results

Valuation Date December 31	No. Active	Covered Payroll $ Millions	Average Age	Average Service	Average Accr. Sick Days	$ Millions Assets	$ Millions UAAL	Average Computed Employer Rate
1998	60,502	$2,415.5	44.4	12.2	79.9	$ 392.9	$ 241.9	1.9%
1999	62,158	2,521.6	44.6	12.2	81.0	457.0	260.0	1.8%
2000^	63,008	2,753.3	44.6	12.0	80.6	515.6	214.2	1.7%
2001	64,510	2,980.6	44.5	11.8	80.9	611.7	218.7	1.7%
2002	66,442	3,096.7	44.8	11.8	80.9	619.0	262.6	1.8%
2003^&	68,366	3,349.0	45.0	11.8	80.9	1,085.1	10.9	0.9%
2004	68,269	3,400.0	45.4	12.0	83.1	1,154.0	9.5	0.9%
2005	67,460	3,410.0	45.6	12.2	84.3	1,196.0	9.3	0.8%
2006^	67,892	3,592.5	45.8	12.2	85.5	1,272.7	9.2	0.7%
2007	68,789	3,726.4	45.9	12.2	87.1	1,394.4	7.2	0.6%
2008	69,720	3,878.0	45.9	12.1	85.1	1,402.8	8.9	0.6%
2009^	69,964	3,950.5	46.1	12.3	86.5	1,409.7	9.1	0.8%
2010^	69,920	3,962.1	46.3	12.3	86.9	1,416.1	9.0	0.8%
2011	66,533	3,905.5	45.9	11.9	86.2	1,373.1	8.8	0.9%
2012^	66,846	3,991.4	45.8	11.8	85.2	1,335.3	8.5	0.9%
2013	68,511	4,234.1	45.8	11.7	86.2	1,414.4	8.2	0.8%
2014	71,314	4,538.8	45.7	11.6	85.5	1,467.1	7.3	0.8%
2015^	71,520	4,613.4	45.5	11.4	84.5	1,490.1	0.1	0.9%
2016	71,587	4,677.2	45.2	11.0	82.0	1,517.3	0.1	0.8%
2017	71,945	4,781.0	45.0	10.9	80.7	1,565.2	0.1	0.8%

^ *Assumption change.*

& *Method change.*

SUPPLEMENTAL PLAN RESULTS

Accumulated Sick Leave Conversion Credit Program
Supplemental Plan
December 31, 2017

This supplemental plan provides matching credits for participants retiring with 15 or more years of State service as follows:

- Protective: Match up to 78 hours (9.75 days) per full year of service through 24 years, plus 104 hours (13 days) per full year of service over 24 years.

- Others: Match up to 52 hours (6.5 days) per full year of service through 24 years, plus up to 104 hours (13 days) per full year of service over 24 years.

The results below are for the supplemental program only. (The results on page 7 are for the ASLCC base program only.) The supplemental plan accrued liabilities are offset by supplemental plan assets which are accounted for separately by DETF.

Contributions for	Computed Employer Contribution Rate as a % of Covered Payroll
Normal Cost	0.3%
UAAL*	0.0%
Total	**0.3%**

* *Unfunded actuarial accrued liabilities of $0.1 million were amortized over 8 years. Although this results in a 0.0% of pay contribution due to rounding, unfunded liabilities are allocated to individual employers as shown on page 5 and employers having an unfunded liability will make a separate contribution towards this unfunded liability.*

The contribution rate shown above was developed based upon the active participant data as shown on page 3. This is the same data that was used in the development of the base plan rates.

40.05(4)(B) – Supplemental ASLCC Program
Development of Normal Cost

Actuarial Present Value of	December 31 2017	December 31 2016
(1) Future Amount to be paid on behalf of present retirees and beneficiaries	$ 487,060,394	$ 484,307,999
(2) Future Amount to be paid on behalf of future retirees and beneficiaries	662,062,823	657,788,196
(3) Total Actuarial Present Value	$ 1,149,123,217	$ 1,142,096,195
(4) Assets	993,307,682	951,514,541
(5) Unfunded Actuarial Accrued Liabilities (UAAL)	73,406	82,374
(6) Present Value of Future Normal Cost: (3) - (4) - (5)	$ 155,742,129	$ 190,499,280
(7) Present Value of Future Salary	$ 45,538,320,500	$ 44,276,526,110
(8) Normal Cost: (6) / (7)	0.3%	0.4%

ASLCC Supplemental Plan
Comparative Statement of Results

Valuation Date December 31	No. Active	Covered Payroll $ Millions	Average Age	Average Service	Average Accr. Sick Days	$ Millions Assets	$ Millions UAAL	Average Computed Employer Rate
2007	68,789	$3,726.4	45.9	12.2	87.1	$ 744.4	$ 6.5	0.2%
2008	69,720	3,878.0	45.9	12.1	85.1	757.0	7.2	0.2%
2009^	69,964	3,950.5	46.1	12.3	86.5	769.7	7.2	0.4%
2010^	69,920	3,962.1	46.3	12.3	86.9	782.3	7.2	0.4%
2011	66,533	3,905.5	45.9	11.9	86.2	771.5	7.4	0.4%
2012^	66,846	3,991.4	45.8	11.8	85.2	774.3	7.3	0.5%
2013	68,511	4,234.1	45.8	11.7	86.2	837.7	7.4	0.4%
2014	71,314	4,538.8	45.7	11.6	85.5	887.0	6.5	0.4%
2015^	71,520	4,613.4	45.5	11.4	84.5	919.7	0.1	0.4%
2016	71,587	4,677.2	45.2	11.0	82.0	951.5	0.1	0.4%
2017	71,945	4,781.0	45.0	10.9	80.7	993.3	0.1	0.3%

^ *Assumption change.*

For the 2000 and subsequent valuations, retiree liabilities were separately calculated for the supplemental plan.

ACTUARIAL METHODS AND ASSUMPTIONS

Actuarial Valuation Method

The actuarial funding method prescribed in the statute for WRS is the **Frozen Initial Liability Actuarial Cost Method**. This funding method is also used for the ASLCC valuation. Under this method, the amount of remaining unfunded actuarial accrued liabilities at any valuation date is affected only by the monthly amortization payments, compound interest, the added liability created by new employer units, and any added liabilities caused by changes in benefit provisions.

Actuarial gains or losses arising from the difference between actual and assumed experience are reflected in the determination of the normal cost. In this manner, experience gains or losses in any year are amortized (spread) over the average future working lifetime of the active participant group.

Asset Valuation Method

The asset valuation method used for ASLCC valuations is referred to as the "Market Recognition Account" or MRA. It is a statutory method. The MRA recognizes assumed returns fully each year. Differences between actual and assumed returns are phased-in over a closed 5-year period. The objective is to give recognition to long-term changes in asset values while minimizing the effect of short-term fluctuations in the capital markets. In accordance with its smoothing objective, the MRA will tend to exceed the market value when the markets are doing poorly, and will fall short of the market value when markets are doing well.

Actuarial Methods and Assumptions Used in Valuations

The principal areas of risk assumption are:

- long-term ***rates of investment return*** likely to be generated by system assets
- ***rates of mortality*** among participants, retirees and beneficiaries
- ***rates of withdrawal*** of active participants
- ***rates of disability*** among participants
- ***patterns of salary increases*** to be experienced by participants
- the age and service ***distribution of actual retirements***
- future ***rates of sick leave usage*** by plan participants

In an actuarial valuation, the actuary projects the monetary effect of each risk assumption for each distinct experience group, for the next year and for each year over the next half-century or longer.

Once actual risk experience has occurred and been observed, it will not coincide exactly with assumed risk experience, regardless of the skill of the actuary, the completeness of the data, and the precision of the calculations. Each valuation provides a complete recalculation of assumed future risk experience and takes into account all past differences between assumed and actual risk experience. The result is a continual series of small adjustments to the computed contribution rate. From time to time it becomes necessary to adjust the package of risk measurements to reflect basic experience trends -- but not random year to year fluctuations.

The liabilities calculated in this report reflect a 3% adjustment for future contingencies. An example of contingencies is higher than the anticipated rate of increase in health care costs.

Annual Actuarial Valuations
Assumptions Adopted by ETF Board After Consulting with Actuary

Economic Assumptions

The long-term rates of investment return used in making the valuation was 7.2% a year, compounded yearly.

The **Wage Inflation Rate** assumed in this valuation was 3.20% per year. The wage inflation rate is defined to be the portion of total pay increases for an individual that is due to macro-economic forces including productivity, price inflation, and labor market conditions. The wage inflation rate does not include pay changes related to individual merit and seniority effects.

No specific **Price Inflation** assumption is required to perform this valuation. The price inflation assumption used to evaluate the investment return assumption is 2.7%.

Salary adjustment factors used to project earnings for each participant between the valuation date and the participant's retirement age are shown below for sample years of service. This assumption is used to project a participant's current earnings to the earnings upon which benefits will be based.

Sick leave extracts were provided for State employees, University and University Hospital units of government. These extracts were then matched to our pension valuation data where assumptions are developed for the groups shown below:

% Merit and Longevity Increase Next Year						
		University	Public School	Protective		Exec. &
Service	General	Teachers	Teachers	With S.S.	W/O S.S.	Elec.
1	3.5 %	3.0 %	5.6 %	4.8 %	5.5 %	2.5 %
2	3.5 %	3.0 %	5.6 %	4.8 %	5.5 %	2.5 %
3	3.1 %	2.9 %	5.2 %	4.1 %	4.7 %	2.0 %
4	2.8 %	2.8 %	4.7 %	3.5 %	3.8 %	1.6 %
5	2.5 %	2.7 %	4.3 %	2.8 %	3.0 %	1.1 %
10	1.5 %	2.2 %	2.6 %	1.1 %	0.9 %	0.2 %
15	1.1 %	1.7 %	1.4 %	0.8 %	0.5 %	0.2 %
20	0.9 %	1.2 %	0.6 %	0.7 %	0.4 %	0.2 %
25	0.6 %	0.9 %	0.3 %	0.6 %	0.3 %	0.2 %
30	0.4 %	0.7 %	0.2 %	0.5 %	0.2 %	0.2 %

If the number of active participants remains constant, then the total active participant payroll will increase 3.2% a year, the base portion of the individual salary increase assumptions. This increasing payroll was recognized in amortizing unfunded actuarial accrued liabilities. Premium payments from the ASLCC Program are also assumed to increase 3.2% a year. The average premium payment was used in the projection of sick leave balances.

Separate assumptions regarding secular trend of health care inflation and aging assumptions were not used. Because of the structure of the ASLCC Program, use of these assumptions would not significantly affect results.

Decrement Probabilities

The mortality table used to measure mortality for retired participants was the Wisconsin 2012 Mortality Table. The rates in this table were based on actual WRS experience adjusted for future mortality improvements using the MP-2015 fully generational improvement scale (multiplied by 50%). This mortality assumption was adopted by the Board in connection with the 2012-2014 Experience Study. Sample life expectancy values from this table are shown below. This assumption is used to measure the probabilities of participants dying before retirement and the probabilities of each benefit payment being made after retirement.

Single Life Expectancy
Wisconsin 2012 Mortality Table

Sample Attained Ages in 2017	Future Life Expectancy (years)*	
	Males	Females
40	44.7	47.9
45	39.7	42.8
50	34.7	37.8
55	29.9	32.9
60	25.3	28.2
65	20.9	23.5
70	16.7	19.0
75	12.8	14.8
80	9.4	11.0
85	6.5	7.8

** Based on retirements in 2017. Retirements in future years will reflect improvements in life expectancy.*

The values shown above are for non-disabled participants.

Active Participant Mortality Rates

Sample Attained Ages in 2017	Mortality Rates*	
	Males	Females
20	0.000132	0.000077
25	0.000159	0.000085
30	0.000201	0.000117
35	0.000353	0.000210
40	0.000474	0.000295
45	0.000624	0.000457
50	0.000842	0.000679
55	0.001982	0.001216
60	0.002834	0.001745
65	0.004315	0.002648
70	0.007097	0.004478
75	0.012059	0.008133
80	0.022187	0.015248

** Based on mortality improvements to 2017. Future years will reflect improvements in mortality.*

This assumption is used to measure the probability of participants dying while in service.

Rates of Retirement for Those Eligible to Retire

Normal Retirement Pattern

Age	General		Public School		University		Protective*		Exec. & Elected
	Males	Females	Males	Females	Males	Females	With S.S.	W/O S.S.	
50							6%	4%	
51							7%	4%	
52							9%	5%	
53							23%	17%	
54							19%	25%	
55							19%	21%	
56							19%	27%	
57	18%	15%	36%	28%	12%	14%	19%	30%	12%
58	18%	15%	31%	28%	12%	12%	18%	30%	12%
59	18%	15%	24%	28%	12%	10%	16%	30%	12%
60	18%	15%	30%	28%	12%	12%	20%	26%	12%
61	18%	15%	28%	28%	12%	16%	20%	15%	12%
62	25%	25%	37%	36%	12%	14%	22%	20%	12%
63	30%	25%	32%	30%	12%	19%	26%	40%	12%
64	25%	25%	27%	27%	12%	13%	17%	40%	12%
65	25%	28%	29%	35%	15%	18%	30%	40%	12%
66	32%	32%	33%	35%	17%	22%	25%	40%	20%
67	26%	26%	27%	30%	16%	17%	30%	40%	15%
68	19%	22%	24%	30%	16%	16%	30%	40%	15%
69	19%	20%	24%	30%	16%	14%	30%	40%	10%
70	19%	20%	20%	35%	16%	18%	100%	100%	10%
71	19%	20%	20%	30%	18%	18%	100%	100%	10%
72	19%	20%	20%	22%	14%	18%	100%	100%	15%
73	19%	20%	20%	22%	14%	18%	100%	100%	15%
74	19%	20%	20%	22%	10%	18%	100%	100%	15%
75	100%	100%	100%	100%	100%	100%	100%	100%	100%

** Includes early retirements.*

Early Retirement Pattern

Age	% Retiring Next Year						
	General		Public School		University		Exec. & Elected
	Males	Females	Males	Females	Males	Females	
55	9.0%	7.0%	13.0%	12.0%	4.0%	5.5%	3.0%
56	9.0%	7.0%	13.0%	12.0%	3.0%	5.5%	3.0%
57	4.8%	5.0%	12.0%	12.0%	2.5%	4.0%	3.0%
58	5.8%	6.0%	13.0%	12.0%	2.5%	5.5%	3.0%
59	6.5%	6.0%	14.0%	13.0%	3.0%	6.5%	3.0%
60	8.5%	8.5%	14.0%	17.0%	4.3%	8.0%	5.0%
61	8.5%	8.5%	15.0%	17.0%	5.0%	6.0%	5.0%
62	16.0%	16.0%	21.0%	23.0%	6.0%	12.0%	
63	17.0%	16.0%	21.0%	23.0%	7.0%	12.0%	
64	17.0%	16.0%	21.0%	23.0%	7.0%	12.0%	

The assumed rates of separation from employment prior to service retirement due to disability and other causes are shown below for sample ages. For other terminations it was assumed that a percentage, depending on age of participants terminating after age 35 with 5 or more years of service, will leave their contributions on deposit and be paid a benefit at normal retirement age and that the remaining participants would take a separation benefit. The percentage taking a separation benefit is 25% at age 35, grading downward to 0% at retirement eligibility. All participants terminating prior to normal retirement age with less than 5 years of service were assumed to take a separation benefit.

Assumed Termination Rates
by Attained Age and Years of Service

		% of Active Participants Terminating								
		Protective								
		With Soc.	Without Soc.	Public Schools		University		Exec. &	Other	
Age	Service	Sec.	Sec.	Males	Females	Males	Females	Elected	Males	Females
	0	17.0%	4.0%	18.3%	16.0%	16.0%	16.0%	18.0%	16.8%	20.0%
	1	8.0%	3.5%	11.0%	10.8%	14.0%	15.0%	14.0%	12.7%	14.1%
	2	5.0%	1.5%	7.8%	7.7%	12.0%	13.0%	12.0%	9.0%	11.0%
	3	4.3%	1.3%	5.9%	5.8%	10.0%	10.0%	10.0%	7.3%	8.9%
	4	3.8%	1.2%	4.9%	5.0%	8.5%	9.9%	10.0%	7.0%	8.5%
	5	3.1%	1.1%	3.6%	4.3%	8.0%	8.4%	8.0%	4.8%	6.7%
	6	3.0%	1.0%	3.2%	3.8%	7.5%	6.4%	7.0%	4.3%	5.6%
	7	2.9%	0.9%	2.6%	3.4%	5.7%	5.7%	6.0%	4.2%	5.0%
	8	2.5%	0.8%	2.6%	2.8%	4.6%	4.7%	6.0%	3.4%	4.7%
	9	2.2%	0.7%	2.4%	2.5%	4.0%	4.2%	6.0%	3.1%	4.5%
25	10 & Over	2.0%	0.7%	1.3%	2.2%	4.0%	5.0%	6.0%	2.5%	4.5%
30		1.8%	0.7%	1.3%	1.9%	3.9%	4.6%	5.1%	2.5%	4.3%
35		1.6%	0.7%	1.3%	1.6%	3.6%	4.2%	4.3%	2.4%	3.5%
40		1.3%	0.6%	1.3%	1.3%	3.1%	3.4%	4.1%	2.1%	2.7%
45		1.1%	0.6%	1.3%	1.1%	2.3%	2.6%	3.2%	1.8%	2.2%
50		1.0%	0.5%	1.3%	1.0%	1.9%	2.1%	2.5%	1.5%	1.9%
55		1.0%	0.5%	1.3%	1.0%	1.8%	2.0%	2.4%	1.5%	1.8%
60		1.0%	0.5%	1.3%	1.0%	1.8%	2.0%	2.4%	1.5%	1.8%

Disability Rates

	% of Active Participants Becoming Disabled									
	Protective		Public Schools		University		Exec. & Elected		General	
Age	With SS	W/O SS	Males	Females	Males	Females	Males	Females	Males	Females
20	0.01%	0.04%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.01%	0.01%
25	0.01%	0.04%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.01%	0.01%
30	0.01%	0.04%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.01%	0.02%
35	0.02%	0.04%	0.01%	0.01%	0.00%	0.02%	0.01%	0.01%	0.01%	0.03%
40	0.02%	0.06%	0.01%	0.02%	0.01%	0.03%	0.01%	0.01%	0.03%	0.04%
45	0.03%	0.11%	0.03%	0.05%	0.01%	0.03%	0.01%	0.01%	0.06%	0.06%
50	0.06%	0.64%	0.08%	0.10%	0.02%	0.06%	0.02%	0.02%	0.13%	0.09%
55	0.87%	0.48%	0.16%	0.14%	0.05%	0.09%	0.09%	0.09%	0.24%	0.16%
60	1.46%	0.14%	0.26%	0.21%	0.07%	0.13%	0.11%	0.11%	0.43%	0.23%