

ARKANSAS TEACHER RETIREMENT SYSTEM
ANNUAL ACTUARIAL VALUATION OF ANNUITIES
BEING PAID TO RETIREES AND BENEFICIARIES
JUNE 30, 2016

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REPORT OF ACTUARIAL VALUATION OF ATRS RETIRED LIVES

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December 21, 2016

Board of Trustees
Arkansas Teacher Retirement System
Little Rock, Arkansas

Dear Board Members:

Presented in this report are the results of the *Annual Actuarial Valuation of annuities being paid to retirees and beneficiaries* of the Arkansas Teacher Retirement System.

The date of the valuation was June 30, 2016 (using amounts payable as of July 1, 2016).

The valuation was based upon census data and financial information provided by the System's administrative staff. Preparation of this data requires considerable staff time. The helpful cooperation of the Arkansas Teacher Retirement System staff in furnishing the data is acknowledged with appreciation. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the data provided by ATRS.

This report was prepared at the request of the Board and is intended for use by the Retirement System and those designated or approved by the Board. This report may be provided to parties other than the Retirement System only in its entirety and only with the permission of the Board. GRS is not responsible for unauthorized use of this report.

The findings in this report are based on data and other information through June 30, 2015. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements; and changes in plan provisions or applicable law. The scope of an actuarial valuation does not contain an analysis of the potential range of such future measurements.

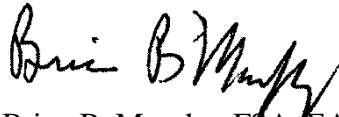
This report was prepared using certain assumptions approved by the Board under Section 24-7-305 of the Arkansas Code. The actuarial assumptions used for valuation purposes are summarized in the Appendix. These assumptions reflect experience during the period July 1, 2005 to June 30, 2010.

This is one of multiple documents comprising the actuarial results. The other document is the active and inactive valuation dated December 12, 2016.

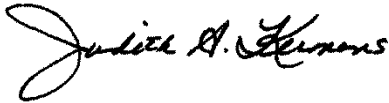
To the best of our knowledge, this report is complete and accurate and was made in accordance with standards of practice promulgated by the Actuarial Standards Board of the American Academy of Actuaries. The actuarial assumptions used for the valuation produce results which, individually and in the aggregate, are reasonable.

This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. Brian B. Murphy, Judith A. Kermans and Heidi G. Barry 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 actuaries submitting this report are independent of the plan sponsor.

Respectfully submitted,



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



Judith A. Kermans, EA, FCA, MAAA



Heidi G. Barry, ASA, MAAA

BBM/JAK/HGB:bd

COMMENTS

As expected, during the year ended June 30, 2016 the number of retired lives increased, as did the total amount being paid monthly to retired lives.

The financing diagram on page 8 shows the general pattern in which cash benefits increase (the gold line). The schedule below shows how ATRS history illustrates the general pattern.

June 30	Retired Lives Receiving Benefits		
	No.	Annual Rates (millions)	% of Active Payroll#
1967	3,846	\$ 6.27	
1972	5,453	11.08	
1977	7,524	23.96	
1982	8,828	36.64	
1987	10,526	66.45	10.0%
1992	12,033	115.50	10.7%
1997	14,233	194.90	15.0%
1998	14,802	220.38	16.1%
1999	15,887	248.75	17.4%
2000	16,657	280.14	18.9%
2001	17,778	309.03	19.8%
2002	19,199	334.15	20.5%
2003	20,271	359.98	21.4%
2004	21,428	386.23	22.1%
2005	22,680	415.04	21.2%
2006	24,153	449.77	21.6%
2007	25,611	484.55	21.1%
2008	26,801	515.56	21.5%
2009	28,818	564.59	22.8%
2010	30,587	612.77	23.1%
2011	32,099	657.08	24.1%
2012	34,160	709.17	26.1%
2013	36,254	763.76	28.0%
2014	38,478	822.19	29.8%
2015	40,748	916.62	33.0%
2016	43,095	983.87	35.3%

Doesn't include payroll for retirees who have returned to work.

A significant financial goal for the Teacher Retirement System was to reach a point in time where System assets fully covered the liabilities for future benefit payments to retirees and beneficiaries then on rolls. This goal was achieved in 1980 and retired life liabilities continue to be 100% funded.

OTHER OBSERVATIONS

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

Given the plan's contribution allocation procedure, if all actuarial assumptions are met (including the assumption of the plan earning 8.0% on the actuarial value of assets), it is expected that:

- 1) The unfunded actuarial accrued liabilities will be fully amortized after 29 years;
- 2) The funded status of the plan will increase gradually towards a 100% funded ratio; and
- 3) The unfunded accrued liability will increase for an extended period before beginning to decline.

Limitations of Funded Status Measurements

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

- 1) The measurement is inappropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations, in other words of transferring the obligations to an unrelated third party in an arm's length market value type transaction.
- 2) The measurement is dependent upon the actuarial cost method which, in combination with the plan's amortization policy, affects the timing and amounts of future contributions. A funded status measurement in this report of 100% is not synonymous with no required future contributions. If the funded status were 100%, the plan would still require future normal cost contributions (i.e., contributions to cover the cost of the active membership accruing an additional year of service credit).
- 3) The measurement would produce a different result if the market value of assets were used instead of the actuarial value of assets, unless the market value of assets is used in the measurement.

Limitations of Project Scope

Actuarial standards do not require the actuary to evaluate the ability of the plan sponsor or other contributing entity to make required contributions to the plan when due. Such an evaluation was not within the scope of this project and is not within the actuary's domain of expertise. Consequently, the actuary performed no such evaluation.

FINANCIAL PRINCIPLES

ANNUAL RESERVE TRANSFERS

The annual accounting transfers listed below are recommended so that retired life accounts will be fully funded as of the valuation date.

Reserve Account	June 30, 2016 Balance Reported	Transfer Amount	June 30, 2016 Balance After Transfer
RRA	\$9,533,653,119	\$ 607,791,665	\$10,141,444,784
808 RRA	14,894,565	895,711	15,790,276
SBA	88,768,471	10,191,787	98,960,258
EAA	(3,985,107,737)	(618,879,163)	(4,603,986,900)
Total	\$5,652,208,418	\$ 0	\$5,652,208,418

Lump sum death benefits for retirees are paid from the Employer Accumulation Account and are not included in the figures shown in this report. The liabilities for lump sum death benefits for retirees are currently \$103.8 million.

FINANCIAL PRINCIPLES AND OPERATIONAL TECHNIQUES

Promises Made and To Be Paid For. As each year is completed, the System in effect hands an “IOU” to each member then acquiring a year of service credit. The “IOU” says: “The Arkansas Teacher Retirement System owes you one year’s worth of retirement benefits, payments in cash commencing when you qualify for retirement.”

The related *key financial questions* are:

Which generation of taxpayers contributes the money to cover the IOU?

The present taxpayers, who receive the benefit of the member’s present year of service?

Or the future taxpayers, who happen to be in Arkansas at the time the IOU becomes a cash demand?

The financial objective of the ATRS is that this year’s taxpayers contribute the money to cover the IOUs being handed out this year so that ***the employer contribution rate will remain approximately level from generation to generation*** -- our children and our grandchildren will not have to contribute greater percents of pay than we contribute now. This objective was set forth in Act 793 of 1977.

(There are systems which have ***a design for deferring contributions to future taxpayers***, lured by a lower contribution rate now and putting aside the fact that the contribution rate must then relentlessly grow much greater over decades of time -- consume now, and let your children face higher contribution rates after you retire.)

An inevitable byproduct of the level-cost design is the accumulation of reserve assets for decades and the income produced when the assets are invested. ***Investment income*** becomes the ***third and largest contributor*** for benefits to employees, and is interlocked with the contribution amounts required from employees and employers.

Translated to actuarial terminology, this level-cost objective means that the contribution rates must total at least the following:

Normal Cost (the cost of members' service being rendered this year)

... plus ...

Interest on Unfunded Actuarial Accrued Liabilities (unfunded accrued liabilities are the difference between (i) liabilities for service already rendered and (ii) the accrued assets of the plan).

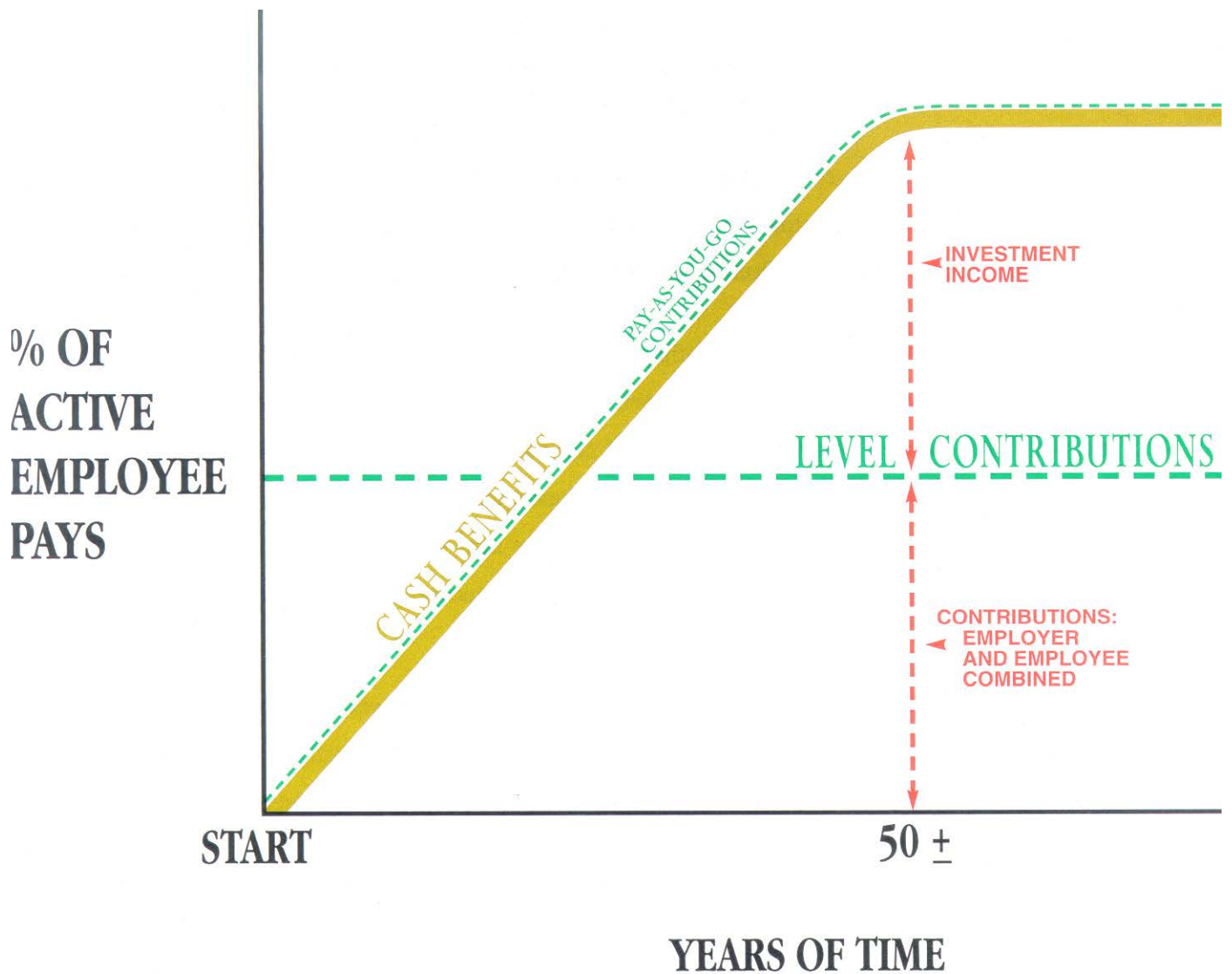
Computing Contributions to Support System Benefits. From a given schedule of benefits and from the employee data and asset data furnished, the actuary determines the contribution rates to support the benefits, by means of *an actuarial valuation*.

An actuarial valuation has a number of ingredients such as: the rate of investment income which plan assets will earn; the rates of withdrawal of active members who leave covered employment before qualifying for any monthly benefit; the rates of mortality; the rates of disability; the rates of pay increases; and the assumed age or ages at actual retirement.

In an actuarial valuation, assumptions must be made as to what the above rates will be, for the next year and for decades in the future. Only the subsequent actual experience of the System can indicate the degree of accuracy of the assumptions.

Reconciling Differences Between Assumed Experience and Actual Experience. Once actual experience has occurred and been observed, it will not coincide exactly with assumed experience, regardless of the accuracy of the assumptions or the skill of the actuary and the precision of the calculations made. The future can be predicted with considerable but not complete precision.

ATRS copes with these continually changing differences by having annual actuarial valuations. Each actuarial valuation is a complete recalculation of assumed future experience, taking into account all past differences between assumed and actual experience. The result is continual adjustments in financial position.



CASH BENEFITS LINE. This relentlessly increasing line is the fundamental reality of retirement plan financing. It happens each time a new benefit is added for future retirements (and happens regardless of the design for contributing for benefits).

LEVEL CONTRIBUTION LINE. Determining the level contribution line requires detailed assumptions concerning a variety of experiences in future decades, including:

Economic Risk Areas

- Rates of investment return
- Rates of pay increase
- Changes in active member group size

Non-Economic Risk Areas

- Ages at actual retirement
- Rates of mortality
- Rates of withdrawal of active members (turnover)
- Rates of disability

THE ACTUARIAL VALUATION PROCESS

The financing diagram on the preceding page shows the relationship between the two fundamentally different philosophies of paying for retirement benefits: the method where contributions match cash benefit payments (or barely exceed cash benefit payments, as in the Federal Social Security program), and is thus an *increasing contribution method*; and the *level contribution method* which equalizes contributions between the generations.

The actuarial valuation is the mathematical process by which the level contribution rate is determined, and the flow of activity constituting the valuation may be summarized as follows:

- A. *Census data*, furnished by plan administrator
 - Retired lives now receiving benefits
 - Former employees with vested benefits not yet payable
 - Active employees
- B. + *Asset data* (cash & investments), furnished by plan administrator
- C. + *Benefit provisions* that establish eligibility and amounts of payments to members
- D. + *Assumptions concerning future financial experience in various risk areas*, which assumptions are established by the Board of Trustees after consulting with the actuary
- E. + *The funding method* for employer contributions (the long-term planned pattern for employer contributions)
- F. + *Mathematically combining the assumptions, the funding method, and the data*
- G. = Determination of:
 - Plan financial position*, and/or
 - New Employer Contribution Rate*

BENEFIT PROVISIONS

SUMMARY OF PROVISIONS
JUNE 30, 2016

1. Post-Retirement Increases – A.C.A. §§ 24-7-713, 24-7-727 (compound COLA).

Each July 1, annuities are adjusted to be equal to the base annuity times 100% plus 3% for each full year in the period from the effective date of the base annuity to the current July 1. The base annuity is the amount of the member's annuity on the later of July 1, 2001 or the effective date of retirement, as re-determined by Acts 396 of 1999 and 992 of 1997. The July 1, 2009 cost of living adjustment for retirees was compounded. The annuity was adjusted by multiplying 3% times the June 30, 2009 retirement benefit amount. After it was calculated on July 1, 2009, the base amount was reset to be the July 1, 2009 benefit amount. Future cost of living raises will be established by the new updated base amount. Future cost of living adjustments will be evaluated on an annual basis to determine if a simple or compound cost of living increase will be given, depending on the financial condition of the System. Act 967 of 2013 would allow the ATRS Board to reverse the compounding of a benefit and reset the base amount to the pre-compounding amount. If this were to occur, it would include participants in the T-DROP plan. The future benefits of a member would not be reduced to recover any benefits paid to a member as a result of the compounding. In addition, the member's benefit on the date of the reversal would not be impacted, but future COLA's would be based upon the reset base amount. This act is dependent upon the actuary's certification that the amortization period is in excess of 30 years to pay unfunded liabilities prior to any reversal of the compounding of the COLA.

2. Lump Sum Death Benefit – A.C.A. § 24-7-720. Beneficiaries of deceased active members or retirees with 10 or more years of ATRS credited service are eligible to receive a lump sum death benefit of up to \$10,000 (\$6,667 for non-contributory service-benefit). The amount will be prorated for members who have both contributory service and non-contributory service. Members with 15 or more years of contributory service will receive the full \$10,000 (Act 977 of 2011).

3. Act 808 Retirement – A.C.A. § 24-4-732. Any employee of a state agency who was an active member of the Arkansas Teacher Retirement System on April 8, 1987, and who qualified for retirement before January 1, 1988, could become a member of the Arkansas Public Employees Retirement System and retire from that system. All credited service was transferred to that system but the member's contributions were retained by the Arkansas Teacher Retirement System and the benefit amount is transferred monthly to the Arkansas Public Employees Retirement System. Each July 1, annuities are adjusted by 3% (compound escalator).

SUMMARY OF PROVISIONS
JUNE 30, 2016

4. **Act 793 Retirement – A.C.A. § 24-4-522.** Any employee who was a member of the rehabilitation services in 1977 was permitted to become a member of the Arkansas Public Employees Retirement System. Liabilities associated with prior service earned through June 30, 1978 remain in the Arkansas Teacher Retirement System. Future service is allocated to the Arkansas Public Employees Retirement System. Each July 1, annuities are adjusted by 3% (compound escalator).

5. **Retiree Health Stipend – A.C.A. § 24-7-713.** Each retired member as of June 30, 2008, with 5 or more years of ATRS credited service receives \$75 per month toward retiree health care premiums. Members in T-DROP do not receive the \$75 per month until actual retirement. For all members retiring on or after July 1, 2008, a minimum of 10 years of ATRS credited service is required to receive the \$75 per month stipend. Act 603 of 2013 allows the ATRS Board to increase or decrease the stipend to a minimum of \$1 per month and a maximum of \$75 per month. This act is dependent upon the actuary's certification that the amortization period is in excess of 30 years to pay unfunded liabilities prior to any reduction in the current stipend. The stipend for fiscal year 2015 remains at \$75 per month.

6. **T-DROP Cash Balance Account.** Effective July 1, 2012, a T-DROP cash balance account was established that allows members exiting (retiring) from T-DROP to place all or a portion of their T-DROP proceeds into a Cash Balance Account (CBA) at ATRS. The interest rate credited will be between 2.0% and 4.0%, increasing 25 basis points for each year on deposit.

7. **Optional Forms of Benefits – A.C.A. § 24-7-706:**

Option 1 (*Straight Life Annuity*)

A member will receive the maximum monthly benefit for which he/she qualifies, throughout his/her lifetime. No monthly benefits will be paid to his/her beneficiary after the member's death. Should a member die before he/she has drawn in benefits an amount equal to his/her contributions plus earned interest, the balance will be paid to a designated beneficiary. The designated beneficiary may be anyone chosen by the member.

Option A (*100% Survivor Annuity*)

Under this option a member will receive a reduced annuity throughout his/her lifetime. Upon the member's death, the designated beneficiary will receive the same annuity for the balance of his/her lifetime.

SUMMARY OF PROVISIONS
JUNE 30, 2016

Option B (50% Survivor Annuity)

Under this option a member will receive a reduced annuity throughout his/her lifetime. Upon the member's death, the designated beneficiary will receive one-half (1/2) of this annuity for the balance of his/her lifetime.

Option C (Annuity for Ten Years Certain and Life Thereafter)

A reduced monthly benefit payable for 120 months. After that time, a member's monthly allowance will revert to the amount he/she would have received under the regular plan and continue for life. If the member dies before receiving 120 payments, the designated beneficiary will receive a monthly benefit in the same amount until monthly benefits to both the member and the beneficiary equal 120 monthly payments. No further benefits are then payable to the beneficiary.

Option Factors are based upon an 8.0% interest rate and the 1971 Group Annuity Mortality Table projected to 1984, with a 75% unisex mix.

**SAMPLE BENEFIT COMPUTATIONS FOR A MEMBER
RETIRING JULY 1, 2016 WITH A
SIMPLE 3% COLA**

Data for an Example member is shown below.

Annual retirement benefit as of July 1, 2016: \$30,000

Projected Benefits, taking into account increases after retirement would be:

<u>Year Ended June 30</u>	<u>Annual Amount</u>		<u>\$ Increase</u>
	<u>Base</u>	<u>Current</u>	
2017	\$30,000	\$30,000	\$ 0
2018	30,000	30,900	900
2019	30,000	31,800	900
2020	30,000	32,700	900
2021	30,000	33,600	900

Thereafter, the amount would increase by \$900 annually for life. Act 793 members and Act 808 members receive compound COLAs.

CHANGES IN PURCHASING POWER

BENEFIT CHANGES DURING RECENT YEARS OF RETIREMENT & RELATED CHANGES IN PURCHASING POWER (1980 \$)

Year Ended June 30	Increase Beginning of Year	Benefit Dollars in Year*	Inflation (Loss) in Year#	Purchasing Power at Year End	
				1980 \$	% of 1980
1980	\$ - - - -	\$ 5,000	- - - -	\$5,000	100%
1981	75	5,075	(9.6)%	4,632	93%
1982	152	5,227	(7.1)%	4,456	89%
1983	152	5,379	(2.6)%	4,471	89%
1984	431	5,810	(4.2)%	4,633	93%
1985	438	6,248	(3.7)%	4,802	96%
1986	509	6,757	(1.7)%	5,103	102%
1987	197	6,954	(3.7)%	5,067	101%
1988	400	7,354	(3.9)%	5,154	103%
1989	503	7,857	(5.1)%	5,236	105%
1990	497	8,354	(4.7)%	5,319	106%
1991	230	8,584	(4.7)%	5,220	104%
1992	762	9,346	(3.1)%	5,513	110%
1993	792	10,138	(3.0)%	5,806	116%
1994	820	10,958	(2.5)%	6,123	122%
1995	303	11,261	(3.0)%	6,107	122%
1996	303	11,564	(2.8)%	6,103	122%
1997	1,657	13,221	(2.3)%	6,821	136%
1998	1,214	14,435	(1.7)%	7,324	146%
1999	323	14,758	(2.0)%	7,344	147%
2000	1,039	15,797	(3.7)%	7,583	152%
2001	1,220	17,017	(3.2)%	7,907	158%
2002	672	17,689	(1.1)%	8,132	163%
2003	468	18,157	(2.1)%	8,174	163%
2004	468	18,625	(3.3)%	8,120	162%
2005	468	19,093	(2.5)%	8,118	162%
2006	468	19,561	(4.3)%	7,973	159%
2007	468	20,029	(2.7)%	7,950	159%
2008	468	20,497	(5.0)%	7,747	155%
2009	468	20,965	1.4 %	8,038	161%
2010	629	21,594	(1.1)%	8,193	164%
2011	648	22,242	(3.6)%	8,149	163%
2012	648	22,890	(1.7)%	8,249	165%
2013	648	23,538	(1.8)%	8,336	167%
2014	648	24,186	(2.1)%	8,392	168%
2015	648	24,834	(0.1)%	8,606	172%
2016	648	25,482	(1.0)%	8,744	175%
2017	648	26,130			

* The \$5,000 benefit used to begin this schedule is an arbitrary amount. A different beginning amount would show a different purchasing power amount, but the same in percent loss.

Based on Consumer Price Index, All Urban Consumers, United States City Average (June values).

**BENEFIT CHANGES DURING RECENT YEARS OF RETIREMENT
& RELATED CHANGES IN PURCHASING POWER (1990 \$)**

Year Ended June 30	Increase Beginning of Year	Benefit Dollars in Year*	Inflation (Loss) in Year#	Purchasing Power At Year End	
				1990 \$	% of 1990
1990	\$ - - - -	\$ 5,000	- - - -	\$5,000	100%
1991	150	5,150	(4.7)%	4,919	98%
1992	457	5,607	(3.1)%	5,195	104%
1993	475	6,082	(3.0)%	5,471	109%
1994	492	6,574	(2.5)%	5,770	115%
1995	182	6,756	(3.0)%	5,755	115%
1996	182	6,938	(2.8)%	5,751	115%
1997	330	7,268	(2.3)%	5,889	118%
1998	667	7,935	(1.7)%	6,324	126%
1999	177	8,112	(2.0)%	6,340	127%
2000	849	8,961	(3.7)%	6,756	135%
2001	826	9,787	(3.2)%	7,143	143%
2002	387	10,174	(1.1)%	7,346	147%
2003	270	10,444	(2.1)%	7,385	148%
2004	270	10,714	(3.3)%	7,337	147%
2005	270	10,984	(2.5)%	7,336	147%
2006	270	11,254	(4.3)%	7,205	144%
2007	270	11,524	(2.7)%	7,185	144%
2008	270	11,794	(5.0)%	7,002	140%
2009	270	12,064	1.4 %	7,265	145%
2010	362	12,426	(1.1)%	7,405	148%
2011	373	12,799	(3.6)%	7,366	147%
2012	373	13,171	(1.7)%	7,456	149%
2013	373	13,544	(1.8)%	7,535	151%
2014	373	13,917	(2.1)%	7,585	152%
2015	373	14,290	(0.1)%	7,779	156%
2016	373	14,663	(1.0)%	7,903	158%
2017	373	15,036			

* The \$5,000 benefit used to begin this schedule is an arbitrary amount. A different beginning amount would show a different purchasing power amount, but the same in percent loss.

Based on Consumer Price Index, All Urban Consumers, United States City Average (June values).

BENEFIT CHANGES DURING RECENT YEARS OF RETIREMENT & RELATED CHANGES IN PURCHASING POWER (2000 \$)

Year Ended June 30	Increase Beginning of Year	Benefit Dollars in Year*	Inflation (Loss) in Year#	Purchasing Power At Year End	
				2000 \$	% of 2000
2000	\$ - - - -	\$ 5,900	- - - -	\$5,900	100%
2001	177	6,077	(3.2)%	5,886	100%
2002	252	6,329	(1.1)%	6,065	103%
2003	179	6,508	(2.1)%	6,108	104%
2004	179	6,687	(3.3)%	6,078	103%
2005	179	6,867	(2.5)%	6,086	103%
2006	179	7,046	(4.3)%	5,987	101%
2007	179	7,225	(2.7)%	5,978	101%
2008	179	7,404	(5.0)%	5,834	99%
2009	179	7,583	1.4 %	6,061	103%
2010	228	7,811	(1.1)%	6,178	105%
2011	234	8,045	(3.6)%	6,145	104%
2012	234	8,280	(1.7)%	6,221	105%
2013	234	8,515	(1.8)%	6,287	107%
2014	234	8,749	(2.1)%	6,328	107%
2015	234	8,983	(0.1)%	6,490	110%
2016	234	9,217	(1.0)%	6,593	112%
2017	234	9,451			

* The \$5,900 benefit used to begin this schedule is an arbitrary amount. A different beginning amount would show a different purchasing power amount, but the same in percent loss.

Based on Consumer Price Index, All Urban Consumers, United States City Average (June values).

VALUATION DATA

**SUMMARY OF
ANNUITIES BEING PAID RETIREES AND BENEFICIARIES JULY 1, 2016
BY DISBURSING ACCOUNT AND GENDER**

Disbursing Account	Men		Women		Totals	
	No.	Annual Annuities	No.	Annual Annuities	No.	Annual Annuities
Retirement Reserve Account						
Age & Service Annuities						
Retirees	8,962	\$ 234,765,367	29,159	\$668,785,497	38,121	\$903,550,864
Beneficiaries	282	5,452,028	708	16,001,286	990	21,453,313
Totals	9,244	240,217,395	29,867	684,786,783	39,111	925,004,178
Disability						
Retirees	558	7,993,478	2,177	31,221,981	2,735	39,215,459
Beneficiaries	144	2,076,405	147	2,457,541	291	4,533,946
Totals	702	10,069,883	2,324	33,679,522	3,026	43,749,405
Act 793	102	1,346,983	97	707,783	199	2,054,766
Total retirees and beneficiaries being paid from Retirement Reserve Account	10,048	251,634,261	32,288	719,174,088	42,336	970,808,349
Survivor's Benefit Account	333	4,462,315	367	5,622,044	700	10,084,359
Act 808	34	2,125,532	25	852,721	59	2,978,253
Totals	10,415	258,222,108	32,680	725,648,853	43,095	983,870,961
Prior Year Totals	9,972	\$ 244,502,395	30,776	\$672,117,659	40,748	\$916,620,054

**SUMMARY OF
ANNUITIES BEING PAID RETIREES AND BENEFICIARIES JULY 1, 2016
BY DISBURSING ACCOUNT AND SOURCE OF FINANCING**

Disbursing Account	Annual Annuities		Total	
	Employee Financed	Employer Financed	No.	Annual Annuities
Retirement Reserve Account				
Age & Service Annuities				
Retirees	\$ 78,806,123	\$ 824,744,741	38,121	\$ 903,550,864
Beneficiaries	602,811	20,850,502	990	21,453,313
Totals	79,408,934	845,595,244	39,111	925,004,178
Disability				
Retirees	2,371,331	36,844,128	2,735	39,215,459
Beneficiaries	216,162	4,317,784	291	4,533,946
Totals	2,587,493	41,161,912	3,026	43,749,405
Act 793	160,792	1,893,974	199	2,054,766
Total retirees and beneficiaries being paid from Retirement Reserve Account	82,157,219	888,651,130	42,336	970,808,349
Survivor's Benefit Account	508,833	9,575,526	700	10,084,359
Act 808	138,921	2,839,332	59	2,978,253
Totals	82,804,973	901,065,988	43,095	983,870,961
Prior Year Totals	\$ 84,328,608	\$ 832,291,446	40,748	\$ 916,620,054

ANNUITIES BEING PAID RETIREES AND BENEFICIARIES JULY 1, 2016
BY TYPE OF ANNUITY BEING PAID

Type of Annuity	No.	Annual Amounts		
		Original Annuities	Base Annuities	Current Annuities
RETIREMENT RESERVE ACCOUNT				
Age & Service				
Option 1 (Basic single life)	30,225	\$ 450,304,455	\$ 583,831,630	\$ 691,311,126
Option A (Joint & 100% Survivor)	4,760	79,984,547	99,227,137	117,278,164
Option B (Joint & 50% Survivor)	2,401	52,414,559	67,708,339	80,523,395
Option C (10 year certain)	735	11,135,835	12,378,486	14,438,179
Beneficiaries	990	16,619,780	17,848,723	21,453,313
Totals	39,111	610,459,176	780,994,315	925,004,178
Disability				
Option 1	2,240	22,022,594	27,373,299	32,070,809
Option A	371	3,973,821	4,453,543	5,145,214
Option B	83	1,156,436	1,363,288	1,590,126
Option C	41	341,629	344,506	409,310
Beneficiaries	291	3,072,730	3,769,161	4,533,946
Totals	3,026	30,567,210	37,303,797	43,749,405
Totals	42,137	641,026,386	818,298,112	968,753,583
SURVIVOR'S BENEFIT ACCOUNT				
Beneficiaries of Deceased Members	700	\$ 6,848,309	\$ 8,606,608	\$ 10,084,359
OTHER ANNUITIES				
Act 793	199	\$ 1,130,865	\$ 2,054,766	2,054,766
Act 808	59	1,121,557	2,978,253	2,978,253
RETIREMENT SYSTEM TOTALS				
Total Annuities Being Paid	43,095	\$ 650,127,117	\$ 831,937,739	\$ 983,870,961

The Original Annuity is the annuity at the date of retirement.

The Base Annuity is the amount from which the 3.0% COLA is calculated.

The Current Annuity is the annuity payable at July 1, 2016 including the COLA granted on July 1.

**ANNUITIES BEING PAID JULY 1, 2016
FROM THE RETIREMENT RESERVE ACCOUNT TO
AGE AND SERVICE RETIREES AND BENEFICIARIES
BY ATTAINED AGES**

Attained Age	Annual Amounts			
	No.	Original Annuities	Base Annuities	Current Annuities
Under 40	10	\$ 192,512	\$ 182,437	\$ 216,171
40-44	3	44,915	50,457	60,348
45-49	34	641,132	648,018	677,030
50-54	393	9,877,714	10,002,963	10,749,186
55-59	1,480	39,190,531	41,774,149	48,085,512
60-64	6,825	124,979,095	141,277,449	162,618,978
65-69	11,953	200,353,045	239,272,285	281,903,576
70-74	7,963	116,857,066	152,107,166	183,652,389
75-79	5,064	64,036,056	93,200,216	112,984,084
80-84	3,011	33,508,587	56,250,239	68,114,966
85-89	1,572	15,142,658	30,847,799	37,331,175
90-94	585	4,513,689	11,391,007	13,782,995
95 & Up	218	1,122,176	3,990,130	4,827,768
Totals	39,111	\$610,459,176	\$780,994,315	\$925,004,178

ANNUITIES BEING PAID JULY 1, 2016
FROM THE RETIREMENT RESERVE ACCOUNT TO
DISABILITY RETIREES AND BENEFICIARIES BY ATTAINED AGES

Attained Age	Annual Amounts			
	No.	Original Annuities	Base Annuities	Current Annuities
Under 40	37	\$ 322,207	\$ 314,424	\$ 358,609
40-44	53	422,658	427,336	466,904
45-49	129	1,425,704	1,435,586	1,571,063
50-54	299	3,335,169	3,415,863	3,783,175
55-59	555	5,840,517	6,084,843	6,849,744
60-64	642	6,623,259	7,273,533	8,549,563
65-69	613	6,290,399	7,684,036	9,265,356
70-74	360	3,492,924	4,995,383	6,040,917
75-79	167	1,707,485	2,796,120	3,383,294
80-84	85	667,225	1,499,765	1,814,716
85-89	55	282,151	876,278	1,060,300
90-94	23	131,023	380,796	460,763
95 & Up	8	26,489	119,834	145,001
Totals	3,026	\$30,567,210	\$37,303,797	\$43,749,405

**ANNUITIES BEING PAID JULY 1, 2016
FROM THE RETIREMENT RESERVE ACCOUNT TO
ACT 793 RETIREES AND BENEFICIARIES BY ATTAINED AGES**

Attained Age	Annual Amounts		
	No.	Original Annuities	Current Annuities
Under 40	-	\$ -	\$ -
40-44	-	-	-
45-49	-	-	-
50-54	-	-	-
55-59	-	-	-
60-64	15	38,393	56,889
65-69	50	230,042	357,686
70-74	44	270,597	470,527
75-79	34	220,004	364,918
80-84	30	237,160	469,271
85-89	16	79,532	187,496
90-94	10	55,137	147,979
95 & Up	-	-	-
Totals	199	\$1,130,865	\$2,054,766

Base annuities are equal to current annuities since the COLA is compound.

**ANNUITIES BEING PAID JULY 1, 2016
FROM THE RETIREMENT RESERVE ACCOUNT TO
SURVIVOR BENEFICIARIES BY ATTAINED AGES**

Attained Age	Annual Amounts			
	No.	Original Annuities	Base Annuities	Current Annuities
Under 40	156	\$1,022,373	\$1,047,643	\$ 1,175,088
40-44	5	14,397	20,699	25,046
45-49	20	151,516	166,256	190,510
50-54	22	267,538	282,087	318,195
55-59	54	750,311	798,795	907,428
60-64	99	1,285,205	1,406,606	1,620,020
65-69	129	1,540,008	1,852,095	2,180,825
70-74	84	944,899	1,256,211	1,520,779
75-79	64	505,352	843,785	1,018,896
80-84	42	283,202	640,398	774,209
85-89	16	65,171	202,325	244,816
90-94	6	11,887	56,583	68,465
95 & Up	3	6,450	33,125	40,082
Totals	700	\$6,848,309	\$8,606,608	\$10,084,359

**ANNUITIES BEING PAID JULY 1, 2016
FROM THE ACT 808 RETIREMENT RESERVE ACCOUNT TO
ACT 808 RETIREES AND BENEFICIARIES BY ATTAINED AGES**

Attained Age	Annual Amounts		
	No.	Original Annuities	Current Annuities
Under 40	-	\$ -	\$ -
40-44	-	-	-
45-49	-	-	-
50-54	-	-	-
55-59	-	-	-
60-64	-	-	-
65-69	-	-	-
70-74	-	-	-
75-79	4	50,049	139,727
80-84	19	376,344	1,034,972
85-89	22	436,908	1,148,373
90-94	12	247,630	623,741
95 & Up	2	10,626	31,440
Totals	59	\$1,121,557	\$2,978,253

Base annuities are the same as current annuities since the COLA is compound.

**RETIREE AND BENEFICIARY DATA
AS OF JUNE 30**

Year	Estimated Number		Total Retirees*	Annual Allowances (Millions)	% Increase in Annual Allowances@	Average Annual Allowances
	Added	Removed				
1990	588	337	11,654	\$ 92.69	7.0%	\$ 7,954
1991	489	253	11,890	104.60	12.8%	8,797
1992	455	312	12,033	115.50	10.4%	9,599
1993	589	316	12,306	129.71	12.3%	10,540
1994	846	512	12,640	141.87	9.4%	11,224
1995	908	342	13,206	156.59	10.4%	11,857
1996	1,107	654	13,659	170.59	8.9%	12,489
1997	1,049	475	14,233	194.90	14.3%	13,694
1998	809	240	14,802	220.38	13.1%	14,888
1999	1,582	497	15,887	248.75	12.9%	15,658
2000	1,249	479	16,657	280.14	12.6%	16,818
2001	1,571	450	17,778	309.03	10.3%	17,383
2002	1,989	568	19,199	334.15	8.1%	17,404
2003	1,621	549	20,271	359.98	7.7%	17,758
2004	1,685	528	21,428	386.23	7.3%	18,025
2005	1,822	570	22,680	415.04	7.5%	18,300
2006	1,958	485	24,153	449.77	8.4%	18,622
2007	2,017	559	25,611	484.55	7.7%	18,920
2008	1,703	513	26,801	515.56	6.4%	19,237
2009	2,721	704	28,818	564.59	9.5%	19,591
2010	2,588	819	30,587	612.77	8.5%	20,034
2011	2,394	882	32,099	657.08	7.2%	20,470
2012	2,932	871	34,160	709.17	7.9%	20,760
2013	3,039	945	36,254	763.76	7.7%	21,067
2014	3,156	932	38,478	822.19	7.7%	21,368
2015	3,326	1,056	40,748	916.62	11.5% @	22,495
2016	3,272	925	43,095	983.87	7.3%	22,830

* T-DROP participants are classified as active members for purposes of the valuation and are not included in this schedule.
 @ T-DROP annuities for retired members included 2015 and later.

REPORTED ASSETS

The assets of the Retirement System, as of June 30, 2016, were reported to your actuary to be \$14,558,576,729. This amount, together with a funding value adjustment of \$679,945,286, is used to finance the Retirement System liability.

Accounts	Assets at June 30	
	2016	2015
Regular Accounts		
Members' Deposit Accounts		
Contributions	\$ 1,159,759,877	\$ 1,104,106,342
Interest	7,150,581,061	7,869,410,906
Total	8,310,340,938	8,973,517,248
T-Drop Member Deposit Accounts		
Contributions	24,074,666	24,219,104
Interest	37,090,183	43,020,907
Total	61,164,849	67,240,011
Cash Balance Account	69,976,233	52,200,512
Employer's Accumulation Account	(3,985,107,737)	(3,694,081,484)
Retirement Reserve Account	9,533,653,119	9,043,552,180
Act 808 Retirement Reserve Account	14,894,565	16,730,157
T-Lump Payable	454,943,811	476,250,673
Survivors Benefit Account	88,768,471	90,353,488
Total Regular Accounts	14,548,634,249	15,025,762,786
Other Accounts		
Income Expense Account	9,942,480	9,938,528
Other Special Reserves	-	-
Miscellaneous	-	-
Total Other Accounts	9,942,480	9,938,528
Total Market Value of Assets	14,558,576,729	15,035,701,313
Funding Value Adjustment	679,945,286	(601,877,324)
Funding Value of Assets	\$15,238,522,015	\$14,433,823,989

VALUATION RESULTS

LIABILITIES FOR ANNUITIES BEING PAID JULY 1, 2016
TABULATED BY TYPE OF ANNUITY BEING PAID

Type of Annuity	Liabilities July 1, 2016		
	Men	Women	Totals
RETIREMENT RESERVE ACCOUNT			
Age & Service Annuities			
Option 1 (Straight Life)	\$ 1,271,647,203	\$ 5,689,200,749	\$ 6,960,847,952
Option A (100% Joint & Survivor)	737,641,874	725,097,281	1,462,739,155
Option B (50% Joint & Survivor)	364,493,857	537,389,967	901,883,824
Option C (10 Years Certain & Life)	33,281,123	138,803,920	172,085,043
Beneficiaries	43,649,671	138,382,064	182,031,735
Total Age & Service	2,450,713,728	7,228,873,981	9,679,587,709
Disability Annuities			
Option 1	106,204	265,418,434	265,524,638
Option A	1,460,944	41,411,745	42,872,689
Option B	16,594,374	11,781,925	28,376,299
Option C	1,664,576	4,635,512	6,300,088
Beneficiaries	77,908,360	23,611,351	101,519,711
Total Disability	97,734,458	346,858,967	444,593,425
Total Retirement Reserve Account	2,548,448,186	7,575,732,948	10,124,181,134
SURVIVORS' BENEFIT ACCOUNT			
Beneficiaries of Deceased Members	\$ 42,961,507	\$ 55,998,751	\$ 98,960,258
OTHER LIABILITIES			
Act 793	\$ 11,020,710	\$ 6,242,940	\$ 17,263,650
Act 808	11,228,120	4,562,156	15,790,276
RETIREMENT SYSTEM TOTALS			
Total Annuity Liabilities	2,613,658,523	7,642,536,795	10,256,195,318
Cash Benefit Account Liabilities			69,976,233
Liabilities for Lump Sum Death Benefits			103,772,434
Total	\$ 2,613,658,523	\$ 7,642,536,795	\$10,429,943,985

RETIREMENT RESERVE ACCOUNT
COMPARATIVE STATEMENT OF ANNUITIES, ACCRUED LIABILITIES AND ASSETS
(\$ MILLIONS)

Valuation Date June 30	Annual Annuities Being Paid			Average	Computed Liabilities	Applicable Assets	Unfunded Retired Life Liabilities	Ratio of Assets to Liabilities
	No.	Amount	% Incr.					
1975*	6,381	\$ 19.80	21.4%	\$ 3,102	\$ 188.00	\$ 142.9	\$ 45.1	76.0%
1980*#	8,001	30.10	3.5%	3,761	280.7	280.7	none	100.0%
1985*+	9,331	51.49	13.6%	5,518	479.9	479.9	none	100.0%
1990	11,054	87.84	7.2%	7,946	847.7	847.7	none	100.0%
1995	12,622	150.45	10.8%	11,920	1,428.6	1,428.6	none	100.0%
2000* ##	16,172	275.65	14.6%	17,045	2,828.8	2,828.8	none	100.0%
2005	22,147	409.42	7.5%	18,486	4,148.1	4,148.1	none	100.0%
2006	23,606	443.98	8.4%	18,808	4,483.4	4,483.4	none	100.0%
2007	25,038	478.30	7.7%	19,103	4,816.4	4,816.4	none	100.0%
2008	26,258	509.29	6.5%	19,396	5,391.3	5,391.3	none	100.0%
2009	28,228	557.83	9.5%	19,762	5,891.9	5,891.9	none	100.0%
2010	29,969	605.55	8.6%	20,206	6,358.0	6,358.0	none	100.0%
2011**	31,498	649.47	7.3%	20,619	6,972.6	6,972.6	none	100.0%
2012	33,533	701.09	7.9%	20,907	7,481.0	7,481.0	none	100.0%
2013	35,622	755.26	7.7%	21,202	8,004.8	8,004.8	none	100.0%
2014	37,824	813.33	7.7%	21,503	8,561.9	8,561.9	none	100.0%
2015	40,070	907.09	11.5% @	22,638	9,515.7	9,515.7	none	100.0%
2016	42,395	973.78	7.4%	22,969	10,157.2	10,157.2	none	100.0%

* Includes amendments which increased benefits to retirees.

After change in interest assumption from 6.0% to 7.0%, change in post-retirement adjustments from 1.5% to 3.0% and recommended reserve transfer.

+ After redetermination of base, retroactive application of new minimum benefit formula and reserve transfers.

Includes Act 808 and Act 793 retirees beginning in 2000.

** After changes in assumptions.

@ TDROP annuities for retired members included 2015 and later.

**SURVIVORS' BENEFIT ACCOUNT
ACCRUED LIABILITIES AND ASSETS
COMPARATIVE STATEMENT**

Valuation Date June 30	Annual Annuities Being Paid		Computed Liabilities	Applicable Assets	Unfunded Accrued Liabilities	Ratio of Assets to Liabilities
	No.	Amount				
1975*	274	\$ 462,116	\$ 4,321,044	\$ 4,098,953	\$ 222,091	94.9%
1980*#	393	772,631	7,042,644	7,042,644	none	100.0%
1985*+	421	1,240,399	12,411,800	12,411,800	none	100.0%
1990	424	1,830,743	18,117,244	18,117,244	none	100.0%
1995	416	2,723,940	26,220,218	26,220,218	none	100.0%
2000*	485	4,487,519	43,701,138	43,701,138	none	100.0%
2005	533	5,619,675	56,257,745	56,257,745	none	100.0%
2006	547	5,791,974	57,605,939	57,605,939	none	100.0%
2007	573	6,250,603	63,481,565	63,481,565	none	100.0%
2008	543	6,269,551	66,496,539	66,496,539	none	100.0%
2009	590	6,761,034	70,857,161	70,857,161	none	100.0%
2010	618	7,224,585	75,108,334	75,108,334	none	100.0%
2011**	601	7,605,212	81,150,385	81,150,385	none	100.0%
2012	627	8,081,913	84,930,745	84,930,745	none	100.0%
2013	632	8,491,667	88,139,802	88,139,802	none	100.0%
2014	654	8,861,734	89,793,996	89,793,996	none	100.0%
2015	678	9,530,889	95,272,795	95,272,795	none	100.0%
2016	700	10,084,359	98,960,258	98,960,258	none	100.0%

* Includes amendments.

After change in interest assumption from 6.0% to 7.0%, change in post-retirement adjustments from 1.5% to 3.0% and recommended reserve transfer.

+ After redetermination of base annuity, retroactive application of new minimum benefit formula and recommended reserve transfer.

** After changes in assumptions.

**ANNUAL ALLOWANCES OF RETIRED LIVES
BY YEAR OF RETIREMENT
AS OF JUNE 30, 2016**

Calendar Year of Retirement	No.	Annual Amount Being Paid			Average
		Original	Total Increase	Current	
2016*	646	\$ 7,223,075	\$ 375,429	\$ 7,598,504	\$ 11,762
2015	3,143	50,808,364	9,302,219	60,110,583	19,125
2014	3,120	51,526,494	10,944,842	62,471,336	20,023
2013	2,857	47,371,996	12,161,289	59,533,285	20,838
2012	2,833	44,892,619	13,123,426	58,016,045	20,479
2011	2,541	40,785,785	13,111,977	53,897,762	21,211
2010	2,192	34,797,633	13,239,764	48,037,397	21,915
2009	2,295	36,921,284	15,502,868	52,424,152	22,843
2008	2,194	33,980,549	14,340,333	48,320,882	22,024
2007	2,066	31,198,123	13,456,686	44,654,809	21,614
2006	1,848	28,515,392	13,851,263	42,366,655	22,926
2005	1,800	28,257,153	15,583,376	43,840,529	24,356
2004	1,620	23,837,761	13,199,522	37,037,283	22,863
2003	1,457	21,294,636	12,337,703	33,632,339	23,083
2002	1,389	21,041,254	12,495,440	33,536,694	24,144
2001	1,484	19,858,566	12,080,756	31,939,322	21,522
2000	1,229	18,946,373	12,687,988	31,634,361	25,740
1999	1,068	15,150,237	11,519,817	26,670,054	24,972
1998	1,064	13,854,381	11,341,243	25,195,624	23,680
1997	792	11,939,064	10,895,138	22,834,202	28,831
1996	660	10,265,499	9,576,176	19,841,675	30,063
1995	691	10,802,358	10,547,664	21,350,022	30,897
1994	713	11,121,308	11,876,606	22,997,914	32,255
1993	528	8,259,302	9,262,777	17,522,079	33,186
1992	388	4,857,969	6,351,693	11,209,662	28,891
1991	282	3,148,169	4,547,407	7,695,576	27,289
1990	318	3,330,750	5,522,608	8,853,358	27,841
1989	302	3,249,594	5,545,238	8,794,832	29,122
1988	303	3,221,617	5,839,763	9,061,380	29,906
1987	299	2,974,565	6,020,128	8,994,693	30,083
1986	199	1,822,468	4,027,023	5,849,491	29,394
1985	184	1,529,943	3,449,936	4,979,879	27,065
1984	119	902,376	2,310,396	3,212,772	26,998
1983	114	720,324	1,856,196	2,576,520	22,601
1982	68	446,088	1,244,356	1,690,444	24,859
Before 1981	289	1,274,048	4,214,798	5,488,846	18,993
TOTAL	43,095	\$650,127,117	\$333,743,844	\$983,870,961	\$22,830

* Reporting for calendar year 2016 is not yet complete. The July 1st retirees are not included in the schedule.

APPENDIX

APPENDIX

*Single Life Retirement Values
Based on RP-2000 Mortality Tables Projected
25 Years with Scale AA (95% for Men & 87% for Women) & 8.0% Interest*

Sample Attained Ages	Present Value of \$1.00 Monthly for Life		Present Value of \$1 Monthly for Life Increasing 3.0% Annually		Future Life Expectancy (years)		Percent Dying within Next Year	
	Men	Women	Men	Women	Men	Women	Men	Women
40	\$147.45	\$148.74	\$192.83	\$195.36	43.26	45.92	0.08 %	0.04 %
45	144.24	145.78	186.54	189.56	38.45	41.03	0.10 %	0.07 %
50	139.69	141.63	178.19	181.91	33.65	36.18	0.13 %	0.10 %
55	133.32	135.93	167.29	172.06	28.89	31.39	0.21 %	0.19 %
60	124.93	128.62	153.79	160.06	24.28	26.77	0.43 %	0.39 %
65	114.53	119.62	137.94	146.03	19.92	22.41	0.85 %	0.74 %
70	102.19	109.01	120.09	130.24	15.89	18.36	1.45 %	1.28 %
75	87.25	96.62	99.84	112.72	12.15	14.64	2.53 %	2.00 %
80	70.65	82.27	78.66	93.60	8.86	11.25	4.76 %	3.35 %
85	54.64	66.59	59.29	73.90	6.25	8.29	8.83 %	5.80 %
Ref:	472 x 0.95	473 x 0.87	472 x 0.95	473 x 0.87				

Sample Attained Ages	Benefit Increasing 3.0% Yearly	Portion of Age 60 Lives Still Alive	
		Men	Women
60	\$100.00	100%	100%
65	115.00	97%	97%
70	130.00	92%	93%
75	145.00	84%	86%
80	160.00	71%	76%
Ref		472 x 0.95	473 x 0.87

For disabled retirees the mortality table used was the 1983 Group Annuity Mortality Table set forward 5 years.