

**TENNESSEE CONSOLIDATED
RETIREMENT SYSTEM**

**VALUATION AND REPORT
AS OF
JULY 1, 2013**



Bryan, Pendleton, Swats & McAllister, LLC
A Wells Fargo Company

February 20, 2014

The Honorable David H. Lillard, Jr.
Chairman, Board of Trustees
Tennessee Consolidated Retirement System
Tenth Floor
Andrew Jackson State Office Building
Nashville, Tennessee 37243-0230

Dear Mr. Lillard:

Submitted herewith are the results of an actuarial valuation of the Tennessee Consolidated Retirement System prepared as of July 1, 2013, pursuant to the provisions of TCA Section 8-34-506. Also included are the actuary's recommendations with respect to contributions by the employers.

We trust that this report will be helpful in formulation of policy with respect to the operation and financing of the System. We very much appreciate the opportunity to serve the Board of Trustees, and will be pleased to supplement this report in any way, as you request.

The staff of the Tennessee Consolidated Retirement System has been extremely helpful and cooperative in developing the information required for this valuation. Their cooperation has been greatly appreciated, and is hereby acknowledged.

Respectfully submitted,

A handwritten signature in black ink that reads 'Justin Thacker'.

Justin C. Thacker, F.S.A.

/mec

Enclosures

g:\1---\6--\00\2013\report\rpt13.docx

TABLE OF CONTENTS

SECTION

- A. INTRODUCTION
- B. MEMBERSHIP
- C. DETERMINATION OF FUNDING LEVELS
- D. GAIN AND LOSS ANALYSIS
- E. FUNDING STATUS
- F. VALIDITY OF DATA
- G. BENEFIT PAYMENT PROJECTION
- H. OUTLINE OF BENEFIT AND CONTRIBUTION PROVISIONS
- I. APPENDIX

A. INTRODUCTION

An actuarial valuation of the Tennessee Consolidated Retirement System was performed as of July 1, 2013. The purpose of the valuation was to determine the funding requirements of the various components of the System, with the intention that the funding requirements indicated by the valuation would be used as the basis for contributions commencing on July 1, 2014.

The Tennessee Consolidated Retirement System (TCRS) was established as of July 1, 1972 as a successor to the following superseded retirement systems:

- Tennessee State Retirement System
- Tennessee Teachers' Retirement System
- Tennessee Judges Retirement System
- Retirement System for County Paid Judges of Tennessee
- Attorneys General Retirement System of Tennessee
- Public Service Commissioners' Retirement System
- Tennessee Retirement System for County Officials

As of the date of establishment, all members and beneficiaries of the superseded systems were covered under the Consolidated System. The assets of each superseded system were transferred to the credit of the Consolidated System, and no further contributions have been made to the superseded systems by either the members or the employers. Separate accounting is maintained under the Consolidated System for the assets and liabilities attributable to the various classes of members and beneficiaries. Benefits under the System are funded by contributions made by members and employers (including the State). The level of such contributions is determined biennially by an actuarial valuation. This report presents the results of the actuarial valuation of the System performed as of July 1, 2013.

The following sections of this report discuss the membership in the System as of the valuation date; the funding levels generated under the approach to funding adopted by the Board; the current financial status of the System as a whole and of each major subdivision of the System; an analysis of the factors causing change in the required contribution levels; the validity of the records on which the study was based; the benefits provided by current and superseded systems; and the data on which the valuation was based and the actuarial assumptions utilized in the valuation.

B. MEMBERSHIP

The statute which established the Tennessee Consolidated Retirement System in 1972 specified the three following classifications of employment:

- Group I Teachers and General Employees (State and Political Subdivisions)
- Group II State Policemen, Wildlife Officers, Firemen and Policemen
- Group III State Judges, County Judges, Attorneys General, County Officials, and Public Service Commissioners

Any person who was a member of a superseded system as of June 30, 1972 became a member of the Consolidated System on the date of establishment. Such a member could elect to remain covered by the benefit and contribution provisions of the superseded system of which he was a member, in which case he was classified as a "prior class member". If he did not so elect, he was classified as a member of Group I, Group II or Group III on the basis of his employment category.

Effective July 1, 1976, all new entrants to the System, without regard to their employment category, entered the System as Group I employees. Despite this change, several small groups (those previously classified as "Group III") are treated differently from the bulk of the general employees with respect to funding levels for various reasons.

Effective September 1, 1990, a new Group IV category became available to State Judges. State Judges previously participating in Group I or Group III became eligible to transfer to the new category, and those becoming State Judges on or after the effective date automatically enter Group IV.

The following tables show the number of active and retired members included in the July 1, 2011 and July 1, 2013 valuations.

THE NUMBER AND ANNUAL COMPENSATION OF
ACTIVE MEMBERS INCLUDED IN THE 2011 AND 2013 VALUATIONS

GROUP	Number		Pct Change	Compensation		Pct Change
	2011	2013		2011	2013	
Group I						
Contributory Teachers	75,139	74,366	(1.0%)	3,626,582,283	3,747,220,849	3.3%
General Employees:						
State	59,402	57,520	(3.2%)	2,329,453,493	2,386,905,135	2.5%
University of Tennessee (TIAA)	234	166	(29.1%)	26,052,104	19,549,925	(25.0%)
Separately Funded Systems	622	658	5.8%	47,699,967	53,279,515	11.7%
Sub-Total	60,258	58,344	(3.2%)	2,403,205,564	2,459,734,575	2.4%
Political Subdivisions	79,469	77,050	(3.0%)	2,353,751,984	2,374,004,970	0.9%
Total - Group I	214,866	209,760	(2.4%)	8,383,539,831	8,580,960,394	2.4%
Group II						
State Policemen and Wildlife Officers	7	4	(42.9%)	518,555	311,847	(39.9%)
Firemen and Policemen	19	14	(26.3%)	1,187,254	942,610	(20.6%)
Total - Group II	26	18	(30.8%)	1,705,809	1,254,457	(26.5%)
Group III (including Superseded Systems)						
State Judges - Group III	1	0	(100.0%)	154,320	0	(100.0%)
Attorneys General - Group III	3	2	(33.3%)	429,404	294,088	(31.5%)
County Judges - Group III	0	0	--	0	0	--
County Officials - Group III	3	2	(33.3%)	232,721	185,324	(20.4%)
State Judges - Superseded	1	0	(100.0%)	162,336	0	(100.0%)
Attorneys General - Superseded	2	2	--	253,320	263,628	4.1%
County Judges - Superseded	0	0	--	0	0	--
County Officials - Superseded	2	2	--	119,502	121,478	1.7%
Total - Group III	12	8	(33.3%)	1,351,603	864,518	(36.0%)
Group IV - Judges	172	178	3.5%	26,689,705	28,797,757	7.9%
State - All Groups	135,588	132,900	(2.0%)	6,058,347,710	6,236,929,546	2.9%
Political Subdivisions- All Groups	79,488	77,064	(3.0%)	2,354,939,238	2,374,947,580	0.8%
Grand Total - All Groups	215,076	209,964	(2.4%)	8,413,286,948	8,611,877,126	2.4%

THE NUMBER AND ANNUAL RETIREMENT ALLOWANCES CURRENTLY PAYABLE TO
BENEFICIARIES ON THE RETIREMENT ROLLS

GROUP	Number		Pct Change	Amount		Pct Change
	2011	2013		2011	2013	
Group I						
Contributory Teachers	40,130	43,773	9.1%	850,065,796	980,741,672	15.4%
General Employees:						
State	39,544	43,516	10.0%	534,127,889	624,803,691	17.0%
University of Tennessee (TIAA)	1,954	1,736	(11.2%)	26,521,052	29,224,837	10.2%
Separately Funded Systems	204	247	21.1%	3,380,681	4,740,480	40.2%
Sub-Total	41,702	45,499	9.1%	564,029,622	658,769,008	16.8%
Political Subdivisions	32,959	36,601	11.1%	226,715,758	271,032,694	19.5%
Total - Group I	114,791	125,873	9.7%	1,640,811,176	1,910,543,374	16.4%
Group II						
State Policemen and Wildlife Officers	579	549	(5.2%)	18,614,502	18,720,396	0.6%
Firemen and Policemen	585	556	(5.0%)	15,194,606	15,305,572	0.7%
Total - Group II	1,164	1,105	(5.1%)	33,809,108	34,025,968	0.6%
Group III (including Superseded Systems)						
State Judges - Group III	0	0	--	0	0	--
Attorneys General - Group III	14	15	7.1%	539,155	674,770	25.2%
County Judges - Group III	28	29	3.6%	628,333	672,861	7.1%
County Officials - Group III	70	66	(5.7%)	1,541,666	1,496,140	(3.0%)
State Judges - Superseded	65	57	(12.3%)	5,349,944	4,759,644	(11.0%)
Attorneys General - Superseded	103	99	(3.9%)	5,625,667	5,597,067	(0.5%)
County Judges - Superseded	92	81	(12.0%)	3,858,167	3,595,294	(6.8%)
County Officials - Superseded	136	115	(15.4%)	3,040,307	2,762,132	(9.1%)
Total - Group III	508	462	(9.1%)	20,583,239	19,557,908	(5.0%)
Group IV - Judges	122	131	7.4%	4,681,285	5,003,187	6.9%
State - All Groups	83,041	90,414	8.9%	1,457,974,444	1,682,792,171	15.4%
Political Subdivisions - All Groups	33,544	37,157	10.8%	241,910,364	286,338,266	18.4%
Grand Total - All Groups	116,585	127,571	9.4%	1,699,884,808	1,969,130,437	15.8%

C. DETERMINATION OF FUNDING LEVELS

General Method

The statute which established the Tennessee Consolidated Retirement System prescribed a "frozen initial liability" method of valuation, under which an initial unfunded accrued liability is established for each major cost group, and the remainder of the cost of the System is borne by a "normal cost" contribution. Under that method as it is usually utilized, the "normal cost" calculated as a part of each subsequent valuation absorbs any variation of actual from expected experience.

Prior to 1975, the unfunded accrued liability was not being amortized. In that year, a 40-year amortization of the unfunded accrued liability was begun, except that (in accordance with the statute at that time) cost of living benefits remained on a "pay-as-you-go" basis.

In 1977, the statute was changed to provide for advance funding of cost of living benefits. It was decided to amortize the additional accrued liability arising from these benefits as a percent of payroll, rather than by level dollar annual payments. The result was to arrive at a contribution rate consisting of three segments: a "normal cost"; an "accrued liability level dollar" amortization of the unfunded accrued liability for basic benefits; and an "accrued liability percent of payroll" amortization for the additional accrued liability arising from cost of living benefits. For closed groups, all of the unfunded accrued liability was amortized on a level dollar basis.

Under the present statute, the Trustees can decide whether to freeze the prior valuation's unfunded accrued liability, or to reestablish that figure. From time to time, the unfunded accrued liability has been reestablished rather than frozen. Reestablishment has generally occurred when there have been significant changes in benefits or actuarial experience and has been elected in order to more accurately portray the unfunded liability of the system.

State

Funding History

In 1981, the State began making the contributions previously made by State Group I employees and teachers associated with higher education, in lieu of part of the salary increase these participants would otherwise have received. Separate contribution rates were developed for "contributory" (K-12) teachers and "non-contributory" (higher education) teachers. These rates were artificially adjusted so as to retain a reasonable relationship between the two rates; exact separate calculations were not made because the total pool of assets accumulated for teachers was not being accumulated separately for the two groups.

In 1983, several improvements were made to the funding program:

1. The unfunded accrued liability was treated as if it had been frozen in 1981, rather than being reestablished. This action had little effect on 1983 contribution rates, but established the desired precedent --- once frozen, the unfunded accrued liability would decrease regularly until it disappeared in 2015.

2. All of the "percent of payroll" amortization piece for State employees and 70% of the equivalent piece for teachers were shifted to the stronger "level dollar" amortization basis.
3. Contribution rates for several of the smaller groups were recombined to reflect more accurately the sources of the money used to fund them.

Separate rates were again computed for "contributory" and "non-contributory" teachers, involving an artificial differential intended to keep the relationship of the two rates reasonable.

In 1984 and again in 1985, the Legislature allocated excess general State funds to the TCRS. Some of these funds were allocated to the superseded ("prior class") State Judges and Attorney General Systems, for which existing funding was not proving adequate. The intention of this infusion of funds was to make it feasible to fund the remaining liabilities of these closed systems in reasonably level dollar amounts over the next 30 years. Other funds were intended to fund in advance the "bonus", "aged teacher" and "aged State employee" programs that had previously been funded on a year-by-year basis from the operating budget.

In 1985, the remaining 30% of the frozen accrued liability for teachers was shifted to the "level dollar" amortization basis. A new set of actuarial assumptions was adopted, based on the 1984 study of actual experience under the TCRS. The rates called for by the 1985 valuation were generally somewhat lower than the rates then being contributed. As a conservative measure, the Board of Trustees voted to continue utilizing the then-current rates, rather than allowing the rates to drop.

Between 1985 and 1987, the TCRS experienced large actuarial gains due to investment earnings substantially in excess of the actuarial assumption of 8.5%. Even when the smoothing procedure utilized since 1981 was applied to plan assets, to avoid undue fluctuations in contribution rates, the strong investment performance of the two-year period generated actuarial gains, lowering the required contribution rates. The Board of Trustees, unsure how the stock market would react to a 500 point decline of the Dow Jones Industrial Average on October 19, 1987, adopted contribution rates which "split the difference" between the then-current rates and the much lower rates called for by the 1987 valuation. Contribution rates for the major groups still dropped significantly; nevertheless, the adopted rates included considerable margins over the "required" rates, in order to minimize the likelihood of having to increase the rates in 1989.

Also in 1987, a "consolidated State" contribution rate covering all groups for whom the State was directly responsible was adopted. This group included higher education (non-contributory) teachers and a closed group of University of Tennessee teachers whose TIAA benefits are supplemented by the TCRS, as well as all Group I and Group II State employees. This change was made for purposes of administrative simplicity, and also to avoid questions concerning classification of higher education employees which had arisen in the past. Teachers who were still contributing to the TCRS (K-12 teachers) remained as a separate group.

Between 1987 and 1989, the valuation "target" rates necessary to continue the 40-year funding program begun in 1975 decreased still further. Several factors contributed to this decline. First, the unfunded accrued liability frozen in 1981 was being amortized by level dollar annual contributions; as the covered payroll increases, as it had each year since 1983, these level dollar

amounts represent a decreasing percentage of each year's covered payroll. Second, actuarial gains had emerged. Third, the fact that contributions during the two years actually exceeded the targets called for by the 1987 valuation meant that current assets exceeded the amounts which would have been on hand if the valuation "target" rates had actually been adopted. For all these reasons, the 1989 valuation rates declined significantly from the 1987 rates.

A 1988 study of experience under the TCRS had led to the adoption by the Board of Trustees of a new set of actuarial assumptions for the 1989 valuation. While some of the new assumptions would require less money to go into the trust (for example, it was assumed that continuing participants would receive annual salary increases of 7% each year, rather than 8%), overall the new set of assumptions was more conservative than the old set. Therefore, the "1989 valuation rates" were somewhat higher than they would have been if the new, more conservative set of assumptions had not been adopted.

Because it was felt that most of the conditions which had caused the required contribution rates to decline from 1987 to 1989 would continue to apply after 1989, the Board of Trustees voted to adopt the 1989 "target" rates as the actual contribution rates, effective July 1, 1990.

As expected, the required contribution rates developed in 1991 were lower than the 1989 rates. The Board of Trustees again voted to adopt the 1991 "target" rates as the actual contribution rates, effective July 1, 1992.

The quadrennial experience study performed in 1992 indicated that the demographic assumptions which had been used in the 1989 and 1991 valuations had turned out to be accurate. Investment performance during the preceding few years had substantially exceeded the 8% interest assumption, and salary increases during the last few years had fallen short of the 7% salary assumption. Therefore, the Board of Trustees took the position that continuing to utilize the same set of actuarial assumptions was an appropriate practice, retaining a reasonable yet conservative approach to the calculation of required contribution rates.

From 1991 to 1993, the System generated unusually large actuarial gains. Investment earnings exceeded expected earnings (on the 8% basis) by over \$675,000,000. Freezes on salaries had minimized salary increases during the valuation period, leading to additional large actuarial gains. The effect of these two large sources of gains was to lower required contribution rates substantially.

A further result of these actuarial gains was to create several anomalies in the funding method; the most prominent of which was a "negative normal cost" for the Consolidated State. The unfunded accrued liability of each group for which a contribution rate is obtained had not been reestablished since 1981. During that period, there had been substantial actuarial gains, culminating in the large gains from 1991 to 1993. All of the gains had been absorbed into the "normal cost" component of the contribution. As a result, the remaining unfunded accrued liability had become the major component of the remaining employer liability; in the case of the Consolidated State, the unfunded accrued liability, which had been brought forward as a dollar amount from year to year, exceeded the State's total liability for the group.

In order to remove these anomalies, the Board of Trustees decided, as authorized by TCA Section 8-37-304, to reestablish the unfunded accrued liability for each group. The result was that a much smaller unfunded accrued liability remained for teachers, that unfunded accrued liabilities increased for County Judges and Officials and for State Judges and Attorneys General (Superseded), and that there was no longer an unfunded accrued liability for the other contribution groups.

Actual contributions for the two smaller groups which still had unfunded accrued liabilities were not affected by the reestablishment. Benefits for County Judges and Officials are funded through litigation taxes, so the actuarially determined contribution rate serves only as a benchmark. Superseded State Judges and Attorneys General were being funded by level annual contributions which were intended to pay off the group's total liability by 2015, without regard to the subdivision between "normal cost" and "accrued liability."

Rather than allowing the rates to drop substantially, the Board of Trustees followed the course which had been authorized in previously-approved legislation:

1. Portability among members who had service in more than one membership classification was improved.
2. The base benefit of active and retired members in most categories was increased by 5%.
3. The amortization period for the Contributory Teachers was decreased to 10 years. However, the Board retained the right to increase the amortization period in the future.

Even after these benefit and funding improvements, the 1993 contribution rates for the major groups decreased slightly.

From 1993 to 1995, actuarial experience was not as favorable as it had been in prior years. Although the required contribution rate for Contributory Teachers decreased further, the required contribution rate for the Consolidated State group increased for the first time in several years.

The Trustees adopted the actuary's recommendation that unfunded accrued liabilities be reestablished for the three groups for which such liabilities existed. Since Section 8-37-305 of the TCA specifies that the accrued liability contribution is to be discontinued for any member classification as soon as the unfunded accrued liability becomes zero, the unfunded accrued liabilities were not reestablished for the groups which had reached that goal in 1993. Reestablishment for the three entities with remaining liabilities was elected in order to maintain a more realistic balance between the accrued liability contribution and the normal cost contribution.

As mentioned above, the Board retained the right to extend the amortization period for Contributory Teachers from the eight-year period remaining from the ten-year amortization schedule adopted in 1993 to a period that in 1995 was permitted to be as much as twenty years. The primary purpose of retaining this right was as a safety valve to avoid undue strain on the State's resources in the event of a future increase in required contributions due to actuarial losses. Reversion to the twenty-year amortization schedule was elected in order to mitigate contribution

volatility associated with the leveraged position as plan assets equaled approximately 80% of projected benefit values.

The quadrennial experience study conducted in 1996 led the Trustees to adopt a set of more conservative withdrawal and mortality assumptions for the Contributory Teacher group. The study also concluded that economic assumptions should be revised to reflect lower prevailing rates of inflation, as inflation had declined significantly since the previous review was conducted. Consequently, the assumed investment return rate was revised downward from the 8% per annum rate used in the 1995 valuation to 7.5%. The assumed annual rate of salary increase, which is also expected to contain an inflation component, was revised downward from 7% to 5.5%.

Unrelated to the assumption changes resulting from the experience study was a recommended modification in the asset valuation method. An asset smoothing procedure had been applied in determining the asset value upon which contributions are based since 1981. The purpose of the smoothing process was to dampen the effect of investment volatility so that contributions were not unduly affected by short-term changes in investment results. Under the procedure used in prior plan valuations, fixed income investments had been treated differently than equities and had been valued at book value. Equities were valued by adjusting the book value of the equity portion of the portfolio by a factor which reflected the five-year moving average ratio of the equity market to book values.

While the previous methodology had served the purpose of reducing volatility adequately, the procedure differed from the methods mandated by the then recently applicable Governmental Accounting Standards Board (GASB) Statements 25 and 27. Under the GASB standards, the entire portfolio, rather than the equity portion only, must be adjusted to recognize changes in market value. The revised methodology approved for the plan expanded the moving average procedure then in use to apply to all plan assets.

The 1997 valuation recognized benefit modifications that were adopted by the legislature in the 1997 Appropriation Act as follows –

1. The arithmetic, or simple, form of cost-of-living adjustment was replaced by a geometric, or compounded, adjustment. The modification was effective January 1, 1998 and included a "catch-up" feature for then current retirees.
2. Salary "loading" for Consolidated State employees hired prior to July 1, 1981 and for whom employee contributions had been eliminated was permanently extended.
3. Contribution rates related to the geometric cost-of-living adjustment and permanent salary extension were implemented effective as of January 1, 1998 and July 1, 1998, respectively.

As of July 1, 1997, an unfunded accrued liability remained for the Contributory Teacher group and two other small groups. The Trustees elected to reestablish the liability for all three groups resulting in the elimination of the unfunded accrued liability for Contributory Teachers and leaving an unfunded accrued liability for only the County Judges and Officials and State Judges and Attorneys General (Superseded).

Contribution rates produced by the 1999 valuation continued to benefit from favorable investment experience. Lower than expected salary increases to Teachers also contributed to lower contribution rates. Factors influencing higher contributions were the addition of new entrants for whom contribution rates were higher because they did not benefit from prior accumulated gains and modifications in valuation programming to accommodate improvements in valuation techniques. The trend for the Teachers employer contribution rate continued to decline. An increase in the State employer contribution rate resulted in the State rate for the first time exceeding that for Teachers.

Between 1997 and 1999, TCRS record keeping procedures were revised to eliminate maintenance of the fund book value. Since prior asset valuation methods were based on a historical comparison of the relationship between book and market value, the valuation asset method was revised for the 1999 valuation. A primary consideration in selecting the revised method was that the prior method should not be altered more than necessary. Under the revised method, the asset value used in computing plan contributions was determined by recognizing “excess earnings” occurring in each preceding year over a five year period following the year of recognition. Excess earnings in a year are earnings above the investment returns that would have occurred if the plan earned the actuarially assumed rate for the year. Excess earnings or losses so computed for each year were phased in ratably over five years. For conservatism, excess gains or losses for a year were applied first to offset accumulated excess earnings on a dollar for dollar basis before phasing in the remainder.

During 1999, an actuarial audit of the primary calculations underlying the valuation was conducted by Buck Consultants. Conclusions and opinions resulting from the audit were discussed in a report prepared by Buck Consultants. Significantly, the audit endorsed the actuarial valuation methodology and the basic liability results used in computing contributions for the TCRS.

A quadrennial experience study conducted in 2000 concluded that economic assumptions including the assumed rate of investment return and the inflation assumption should be unchanged. Modifications were recommended for the salary increase rate and many of the demographic assumptions.

The assumed rate of salary increase employed in the 1999 actuarial valuation was a uniform rate of 5.5% that was applied to all ages. The assumed rate was higher than actual aggregate experience. Also, the pattern of actual salary increase rates was such that increases for younger participants were considerably higher than those for older participants. An age graded scale was recommended to replace the uniform scale. The revised scale was slightly lower than the prior scale but more accurately reflected career salary patterns.

In the four-year period covered by the experience study, post retirement mortality rates improved extending the precedent established in earlier studies. Improvement was observed for both Teacher and State groups. Since the standard tables did not appear to represent the TCRS retiree mortality pattern, a revised table modeled after TCRS experience was developed.

Predicted rates of termination and retirement of both State and Teacher groups were modified significantly to recognize separation patterns measured on the basis of liabilities. The revised

tables recommended by the study resulted in increased contribution rates for both groups. Following a policy of gradual absorption of significant contribution rate changes, the Board elected to phase-in the termination rates for the State and Political Subdivision groups ratably over a cycle of three actuarial biennial valuations beginning in 2001.

The aggregate effect of recommended salary and demographic changes (including the decision to phase-in State termination rates) in the 2001 actuarial valuation was to increase Teacher and State employer contribution rates by 0.3% and 1.1% respectively.

Administrative factors for survivorship, early reduction and delayed retirement had been last revised prior to 1990. Since the time of their adoption, the assumed actuarial valuation interest rate was reduced from 8.0% to 7.5%, and mortality improvements had been implemented. Accordingly, the Board recommended modification of the administrative factors as of July 1, 2002.

Plan contributions established by the 2003 actuarial valuation suffered from continued adverse investment experience. Rates of investment return for fiscal years ending in both 2002 and 2003 were below that assumed in the valuation. Contribution rates for the Teacher and State groups increased by 2.1% and 2.8%, respectively, due primarily to the unfavorable investment performance.

In addition, the 2003 valuation recognized the second step in the phase-in process of adopting the recommended termination rates for the State and Political Subdivision groups. Consolidated State contributions increased by 0.40% due to the 2003 change in termination assumptions.

A quadrennial experience study was conducted in 2004 covering the period of plan operations from July 1, 2000 through June 30, 2004. The review concluded that economic assumptions including the assumed rate of investment return and the inflation assumption should be unchanged. The study also validated the salary increase rates developed with the previous experience study. Modifications, however, were recommended for many of the demographic assumptions.

In the four-year period covered by the experience study, post retirement mortality rates were noted to have improved predominantly in the male population of both the State and Teacher groups, extending the precedent established in earlier studies. As a result, new post retirement mortality rates were recommended to better reflect the actual experience.

Modifications were also recommended with the 2004 experience study to the termination and retirement rates. The new study validated the need to recognize the final phase-in of termination rates for the State group recommended from the 2000 study, with only a minor additional change recommended in 2004. Retirement rates dropped sharply during the study period from 2000 – 2004. Since retirement rate experience could be temporarily related to recent economic cycles, the 2004 study recommended that approximately one half of the reduction in retirement rates be reflected in the actuarial valuation, with further review again during the next experience study.

The 2005 actuarial valuation resulted in continued contribution rate increases for both groups. Contribution rates for Teacher and State groups increased by 2.63% and 3.18%, respectively, due to actuarial experience primarily from the recognition of prior investment performance. The

aggregate effect of the recommended assumption changes in the 2005 actuarial valuation was to reduce the Teacher and State employer contribution rates by 2.0% and 0.14% respectively.

As of July 1, 2005, the unfunded liability was eliminated for the County Judges and Officials group as it became fully funded. An unfunded accrued liability was only recognized for the State Judges and Attorneys General (Superseded) group.

Rates of investment return for fiscal years ending in 2006 and 2007 were 6.9% and 13.2%, respectively. While these market returns exceeded our assumed return for the two-year period, prior losses were still being phased-in with the valuation asset smoothing method for the 2007 valuation. Actuarial experience in the aggregate between 2005 and 2007 resulted in an increase in the contribution level; however, the increase was much smaller than in recent valuations. Contribution rates for Teacher and State groups increased by 0.29% and 0.52%, respectively, due to actuarial experience, primarily the recognition of prior investment performance.

Additional steps were taken with the 2007 valuation in an effort to curb contribution rate volatility going forward. First, the unfunded actuarial accrued liability was reestablished for all groups and amortized over a 20-year period. Even though the unfunded accrued liability had been eliminated in prior years for the State and Teacher groups (mostly due to excess asset performance on the 1990's), adverse investment performance since the 1990's had created an unfunded accrued liability as of the valuation date. The net effect of this change was to reduce the State contribution rate by 0.99%. Since the Teacher group had a relatively small unfunded accrued liability after reestablishment, the change did not impact the Teacher contribution rate.

In addition, a ten-year asset smoothing method was adopted to be used prospectively for fiscal years beginning after June 30, 2007. The purpose of this change was to more adequately smooth investment performance since the plan's contribution rates are so highly leveraged on the volatility of plan assets. It was believed that a ten-year method would more adequately smooth contribution rate volatility than the previous five-year smoothing method. Since this change was prospective only, it did not affect either the unfunded accrued liability or the contribution rates with the 2007 valuation.

The 2007 valuation also recognized benefit modifications that were adopted by the legislature during the prior period as follows –

1. An ad hoc increase for retirees with retirement dates on or before July 1, 1989. This increase was effective prospectively for retired State and Teacher participants on January 1, 2007. Each political subdivision was given the choice of offering the increase to its retirees.
2. Increase in the minimum benefit calculation to General Assembly members. The minimum benefit of \$70 per year of service began being indexed with the same percentage as the COLA paid to retirees effective July 1, 2006.
3. Benefits for public safety officers increased allowing for an unreduced benefit at age 55 with 25 years of service. In addition, the bridge benefit for public safety officers will begin at age 55 instead of age 60. Each political subdivision was given the choice of offering the increase to its public safety officers.

The impact on the State contribution rate due to these benefit improvements was minimal since the number of employees affected were small relative to the entire group.

Since the County Judges and Officials group was deemed to be fully funded as of July 1, 2005, this group was combined with the Consolidated State group for reporting purposes as of July 1, 2007. In addition, the three groups of State Judges and Attorneys General were combined for reporting purposes as of July 1, 2007.

Plan contributions established by the 2009 valuation were again impacted by adverse investment experience. Rates of investment return for fiscal years ending in 2008 and 2009 were negative 1.2% and negative 15.3%, respectively. The market returns between 2007 and 2009 created significant losses for the plan. Actuarial experience in the aggregate resulted in an increase in the contribution level. Contribution rates for Teacher and State groups increased by 4.28% and 5.16%, respectively, due to actuarial experience, primarily the recognition of prior investment performance.

A quadrennial experience study was conducted in 2008 covering the period of plan operations from July 1, 2004 through June 30, 2008. The study compared the actuarial assumptions used to determine contribution rates with the actual experience of the plan. The review concluded that economic assumptions including the assumed rate of investment return and the core inflation assumption should be unchanged. The study also validated the salary increase rates developed in a prior experience study. It was, however, recommended to change the future Cost of Living Adjustment assumption applicable to retiree benefits. The future COLA assumption was changed from 3.0% to 2.5% to better reflect expected experience since the annual COLA is limited to 3.0%. Historical experience validated this change. The effect on employer contributions of adopting the 2.5% future COLA assumption was to decrease the State rate by 2.74% and the Teacher rate by 2.88%.

In the four-year period covered by the experience study, post retirement mortality rates were noted to have improved in both the State and Teacher groups (unlike the 2004 study which reflected little mortality improvement among the Teacher group). As a result, new post retirement mortality rates were recommended to better reflect the actual experience. The effect on employer contributions of adopting the recommended mortality rates was to increase the State rate by 1.61% and increase the Teacher rate by 1.85%.

Modifications were also recommended with the 2008 experience study to the retirement rates. Retirement rates dropped sharply during the study period from 2000 to 2004. The 2004 study reflected only a portion of the change at that time in order to monitor the delayed retirement trend. Retirement rate experience continued to reflect later retirements during the 2004 – 2008 study period. As a result, changes to retirement rates were recommended in order to match experience. As a result of adopting recommended retirement rates, employer contribution rates for the State and Teacher groups decreased by 1.40% and 0.42%, respectively. Other changes to the demographic assumptions were minor and did not result in a significant change in employer contribution rates.

Due to the significant asset losses experienced between the 2007 and 2009 valuations, the valuation assets determined according to the asset smoothing method as of July 1, 2009 were

limited to 120% of the market value of assets. In addition, the unfunded actuarial accrued liability was reestablished again for all groups and amortized over a 20-year period. The net effect of the reestablishment was to reduce the State contribution rate by 0.72% and the Teacher contribution rate by 0.30%.

During 2010, an actuarial audit of the primary calculations underlying the valuation was conducted by Gabriel Roeder Smith & Company. Conclusions and opinions resulting from the audit were discussed in a report prepared by Gabriel Roeder Smith & Company. Significantly, the audit endorsed the actuarial valuation results used in computing contributions for the TCRS.

Administrative factors for survivorship, early reduction and delayed retirement had been last revised in 2002. Since the time of their adoption, the assumed actuarial valuation cost of living assumption was reduced from 3.0% to 2.5%, and mortality improvements had been implemented. Accordingly, the Board recommended modification of the administrative factors as of July 1, 2011. No material change to liabilities occurred from this update.

The 2011 actuarial valuation was impacted by strong investment performance during the previous two years. Rates of investment return for fiscal years ending in 2010 and 2011 were 10.2% and 19.6%, respectively. The market returns created significant gains for the plan. Contribution rates in 2011 for Teacher and State groups would have decreased by 3.20% and 3.11%, respectively, due to the actuarial experience and due to the 120% asset corridor that applied in 2009. However, prior investment losses were still being smoothed into the valuation assets. Specifically, \$3,020,000,000 of net investment losses were excluded from valuation assets to be recognized over the next five valuation cycles (ten years). In order to maintain contribution rate stability with the understanding that contribution rates would still need to increase in the future, the amortization periods were lowered to prevent a sharp decline in the contribution rates (6 years for Teachers and 9 years for the State). The net effect of the actuarial experience and resetting the amortization periods was to reduce the Teacher contribution rate by only 0.17% and increase the State contribution rate by only 0.13%.

The 2011 valuation recognized a benefit modification that was adopted by the legislature during the prior period. Political subdivisions may voluntarily elect to establish minimum benefits of \$8, \$14 (indexed), or \$20 (indexed) per year of service for county commissioners, school board members, and other such positions. The effect of this benefit improvement was minimal.

A quadrennial experience study was conducted in 2012 covering the period of plan operations from July 1, 2008 through June 30, 2012. The study compared the actuarial assumptions used to determine contribution rates with the actual experience of the plan. The review concluded that economic assumptions including the assumed rate of investment return, the core inflation assumption and the COLA assumption should be unchanged. The study concluded that salary increase rates should be modified based on recent experience. Salary increase rates were not changed to exactly match the experience observed during the study period, but were reduced by 0.50% at each age to better reflect future expectations. The effect on employer contributions in the 2013 valuation of adopting the lower salary increase assumption was to decrease the Teacher rate by 1.41% of payroll and to decrease the State rate by 1.14% of payroll.

In the four-year period covered by the experience study, post retirement mortality rates were noted to have improved in both the State and Teacher groups (consistent with results observed in the 2008 study). As a result, new post retirement mortality rates were recommended to better reflect the actual experience. The new post retirement mortality rates included a 2-year mortality projection to reflect continued mortality improvements. It was determined that mortality improvements would continue to be monitored in future experience studies with longer projection periods to be considered when appropriate. Pre-retirement mortality rates were modified to be based on the standard IRS tables as provided for by the Pension Protection Act of 2008 (which includes a 15-year projection of future mortality improvements). Disabled mortality rates were also modified to more closely match actual experience. The effect on employer contributions in the 2013 valuation of adopting the recommended mortality rates was to increase the Teacher rate by 1.73% of payroll and increase the State rate by 1.34% of payroll.

Modifications were not recommended with the 2012 experience study to the withdrawal, retirement and disability rates. Since the 2008-2012 study period reflected a difficult economic cycle, it was determined that the demographic experience observed during the period would not appropriately reflect long-term expectations.

2013 Valuation

Plan contribution rates resulting from the current and preceding valuations are shown in the schedule on page C-15. Even though investment performance during the prior period was consistent with assumed returns for the plan, contributions established by the current valuation continued to be impacted by the deferred investments losses from 2008 and 2009. Rates of investment return for fiscal years ending in 2012 and 2013 were 5.6% and 9.9%, respectively. Actual salary increases since the 2011 valuation were less than assumed in the actuarial valuation providing gains, but higher turnover during the period resulted in lower total payroll. Since contribution rates are expressed as a percent of pay, the lower payroll base created upward pressure on the contribution rates. Contribution rates for Teacher and State groups would have increased by 2.17% and 3.05%, respectively, due to the actuarial experience. However, since amortization periods in 2011 were set lower than normal to maintain contribution rate stability, the amortization periods were reset again in 2013 to continue to manage volatility in the contribution rates. The amortization period was reset to 8 years for Teachers and 13 years for the State. The net effect of the actuarial experience, assumption changes (described in the section above) and resetting the amortization periods was to increase the Teacher contribution rate from 2011 by 0.16% and to cause no change to the State contribution rate between 2011 and 2013. The impact of plan experience is discussed further in the Gain and Loss Analysis section of the report.

The only benefit modification that was adopted by the legislature since the 2011 valuation was a provision to remove the “AE-65 provision” for all participants who become members on or after July 1, 2011. This change allows participants to continue to receive credit for service after age 65, but removes the comparison of the benefit to the actuarial equivalent of the age 65 benefit upon the final age at retirement. The effect of this change was negligible on the contribution rates.

Annual contribution rates continue to include an administrative charge assumption. The charge was decreased in the 2013 valuation to 0.14% of payroll (the charge was 0.16% in the 2011 valuation). This change is included with the 2012 Experience Study line item in the Gain and Loss Analysis section of the report.

As prior investment losses continue to be recognized, political subdivisions may experience future contribution rates that are difficult to sustain for some entities. In order to reduce contribution volatility, it is recommended that sponsors be permitted to reestablish the unfunded accrued liability and reset the amortization period upon which payments are based to a new schedule up to thirty years.

Future expectations

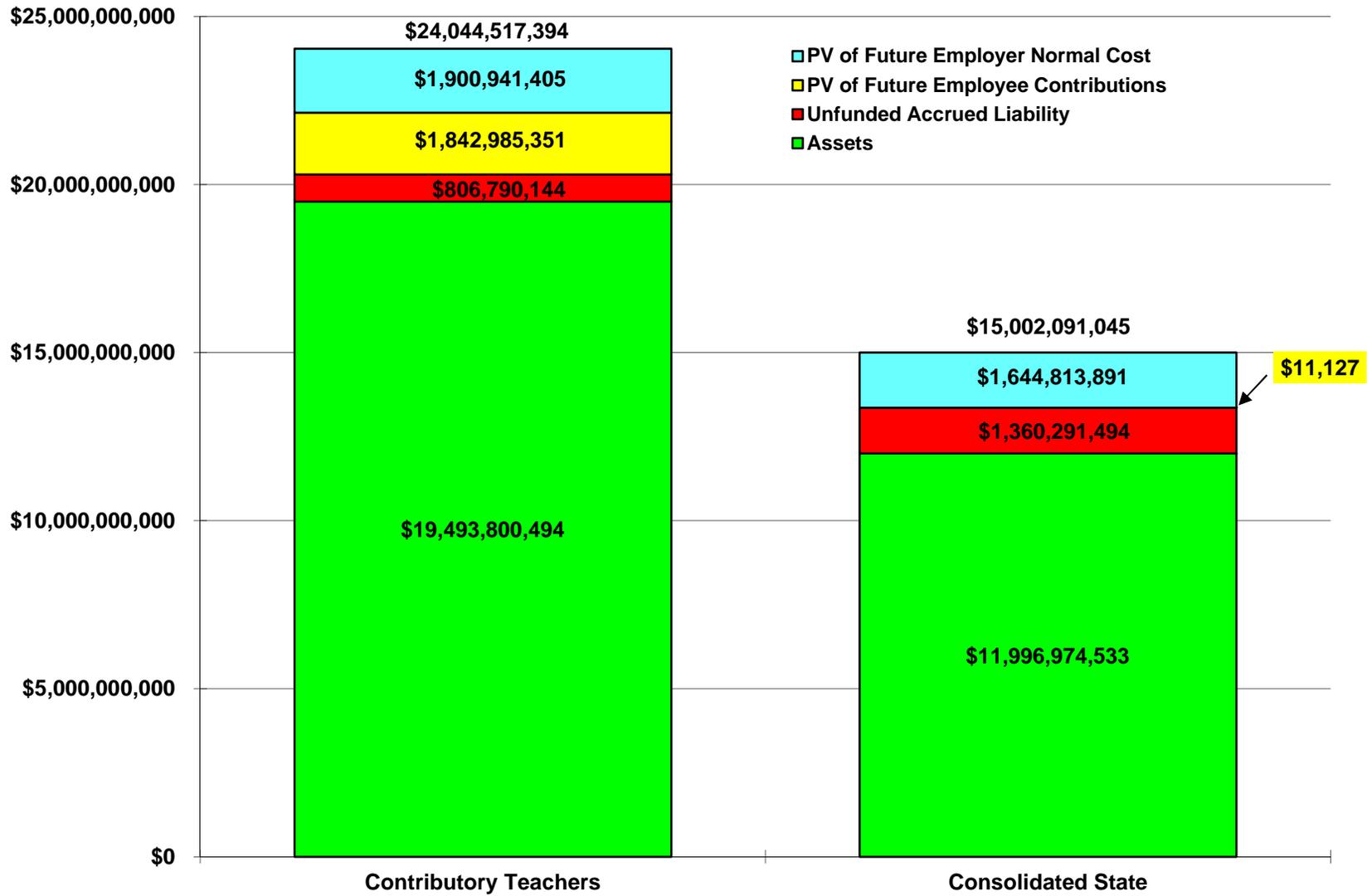
TCRS assets are based upon a valuation asset method that endeavors to reduce contribution volatility by recognizing investment gains and losses ratably over a ten-year period from the date of occurrence. Approximately \$1,680,000,000 of net investment losses are currently excluded from valuation assets and will be recognized over the next five valuation cycles (ten years). Continued recognition of prior investment losses is expected to increase Teacher and State contribution rates in future valuations. This increase can be managed by resetting the amortization period for the unfunded accrued liability in light of long-term contribution rate expectations, budget planning and actuarially sound funding levels. Investment performance is the most likely source of future contribution rate volatility.

Another factor contributing to future contribution rates is the opportunity for rehired former participants to purchase prior service credits. This results in upward rate pressure for both the Teacher and the State groups.

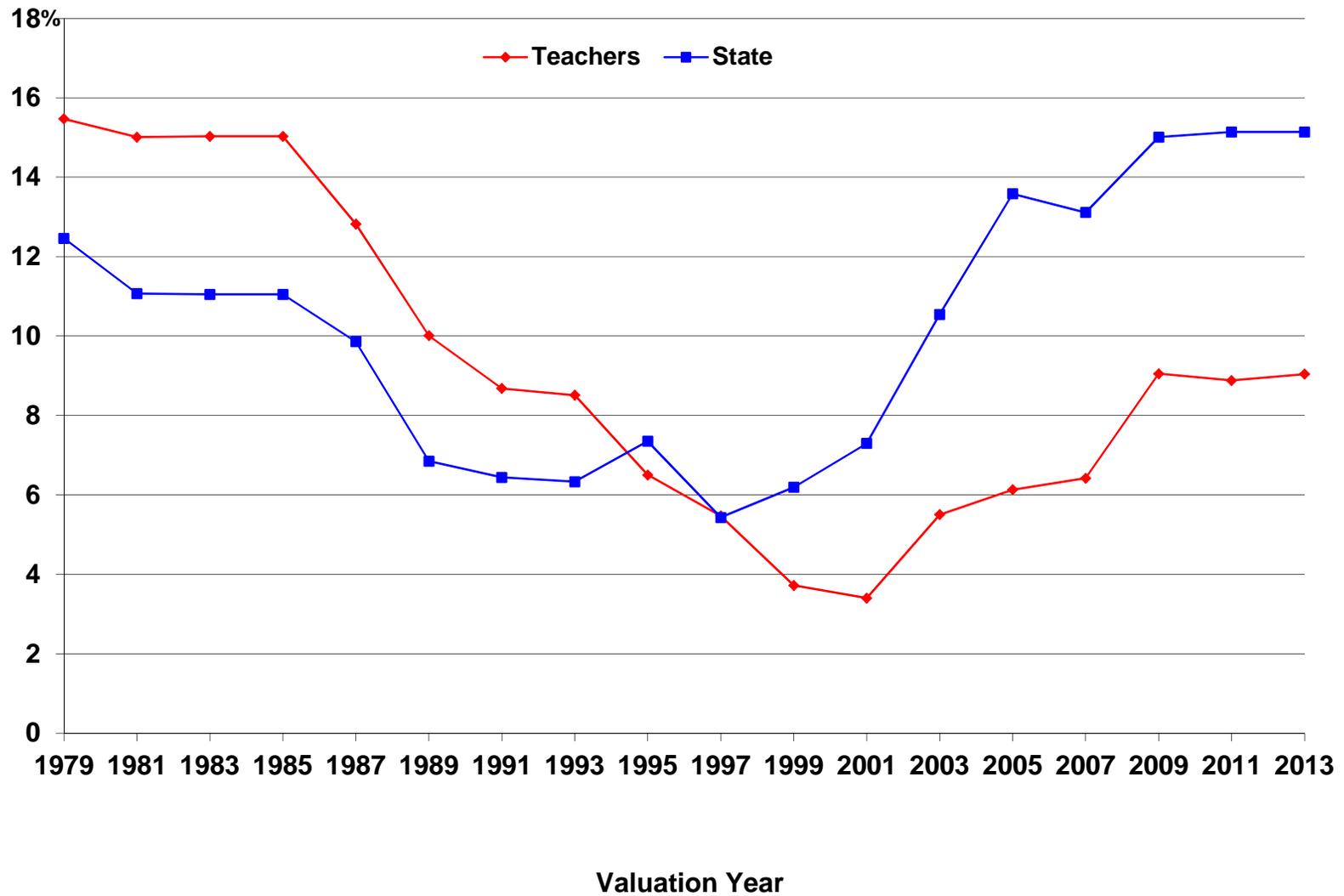
Additionally, future contribution rate increases will occur if continued mortality improvements are observed. This item will be monitored again during the next experience study to be performed in 2016.

Finally, TCRS pension reform was adopted during the 2013 legislative session. The new hybrid pension plan will only apply to participants hired on or after July 1, 2014 and will contain cost control features and a stabilization reserve fund. The new plan has no impact on the 2013 actuarial valuation and will not impact benefits for any participant in the current valuation. Plan costs and liabilities will gradually change over time as the legacy plan is closed to new entrants effective June 30, 2014 and as new participants enter the new plan.

VALUE OF BENEFITS
July 1, 2013



HISTORY OF TCRS CONTRIBUTION RATES



COMPARISON OF TCRS EMPLOYER CONTRIBUTION RATES

	2013 Active Payroll	2011 Contribution Rate	2013 Contribution Rate
Contributory Teachers	\$3,747,220,849	8.88%	9.04%
Consolidated State ^{1, 2}	2,407,296,133	15.14%	15.14%
State Judges (Groups I, III & IV), Attorneys General (Groups I & III), State Judges and Attorneys General (Superseded) ³	82,412,564	20.57%	22.87%

- ¹ The Consolidated State contribution rate includes the costs attributable to bridge and service retirement benefits for public safety officers. A separate contribution rate for this group will be collected and will offset the Consolidated State contribution rate.
- ² The University of Tennessee pays an additional 10% of covered payroll for TIAA coverage. The rates shown relate only to TCRS benefits.
- ³ State Judges (Groups I, III & IV), Attorneys General (Groups I & III) and State Judges and Attorneys General (Superseded) are combined for reporting purposes.

VALUATION BALANCE SHEET
TENNESSEE CONSOLIDATED RETIREMENT SYSTEM
July 1, 2013

ASSETS	Contributory Teachers	Consolidated State	State Judges & Attorneys- General
Present assets creditable to:			
State Accumulation Fund	\$16,306,892,102	\$11,470,851,261	\$313,374,853
Members' Fund	3,186,908,392	526,123,272	46,883,926
Total Present Assets	<u>\$19,493,800,494</u>	<u>\$11,996,974,533</u>	<u>\$360,258,779</u>
 Present value of prospective contributions payable to:			
State Accumulation Fund:			
Normal	\$1,900,941,405	\$1,644,813,891	\$55,368,366
Accrued Liability	806,790,144	1,360,291,494	105,444,761
Total	<u>\$2,707,731,549</u>	<u>\$3,005,105,385</u>	<u>\$160,813,127</u>
Members' Fund	<u>1,842,985,351</u>	<u>11,127</u>	<u>1,474,282</u>
Total Prospective Contributions	<u>\$4,550,716,900</u>	<u>\$3,005,116,512</u>	<u>\$162,287,409</u>
Total Assets	<u>\$24,044,517,394</u>	<u>\$15,002,091,045</u>	<u>\$522,546,188</u>
 LIABILITIES			
Present value of prospective benefits payable on accounts of:			
Present retired members and contingent annuitants	\$11,179,309,840	\$7,356,450,441	\$211,634,589
Present active members	12,528,153,285	7,128,651,863	299,294,173
Former members	337,054,269	516,988,741	11,617,426
Total Liabilities	<u>\$24,044,517,394</u>	<u>\$15,002,091,045</u>	<u>\$522,546,188</u>

Political Subdivisions

The next page comprises an actuarial balance sheet showing the assets and liabilities relating to the participating political subdivisions. The split between normal cost and accrued liability contributions for political subdivisions is theoretical, since no summary of the split for individual political subdivisions is available at the time of this report, but all other figures, including the total value of prospective employer contributions, reflect the actual situation. The table also combines the figures for political subdivisions with the aggregate State figures to provide a summary for the entire TCRS.

VALUATION BALANCE SHEET
TENNESSEE CONSOLIDATED RETIREMENT SYSTEM
 July 1, 2013

TOTAL SYSTEM

ASSETS	Contributory Teachers	Total State (Including State Judges & Attorneys-General)	Polisubs	Grand Total
Present assets creditable to:				
State Accumulation Fund	\$16,306,892,102	\$11,784,226,114	\$6,201,981,102	\$34,293,099,318
Members' Fund	3,186,908,392	573,007,198	1,196,303,018	4,956,218,608
Total Present Assets	\$19,493,800,494	\$12,357,233,312	\$7,398,284,120	\$39,249,317,926
Present value of prospective contributions payable to:				
State Accumulation Fund:				
Normal	\$1,900,941,405	\$1,700,182,257	\$1,134,666,864	\$4,735,790,526
Accrued Liability	806,790,144	1,465,736,255	391,589,555	2,664,115,954
Total	\$2,707,731,549	\$3,165,918,512	\$1,526,256,419	\$7,399,906,480
Members' Fund	1,842,985,351	1,485,409	564,031,054	2,408,501,814
Total Prospective Contributions	\$4,550,716,900	\$3,167,403,921	\$2,090,287,473	\$9,808,408,294
Total Assets	\$24,044,517,394	\$15,524,637,233	\$9,488,571,593	\$49,057,726,220
LIABILITIES				
Present value of prospective benefits payable on accounts of:				
Present retired members and contingent annuitants	\$11,179,309,840	\$7,568,085,030	\$3,075,665,133	\$21,823,060,003
Present active members	12,528,153,285	7,427,946,036	6,113,913,203	26,070,012,524
Former members	337,054,269	528,606,167	298,993,257	1,164,653,693
Total Liabilities	\$24,044,517,394	\$15,524,637,233	\$9,488,571,593	\$49,057,726,220

D. GAIN AND LOSS ANALYSIS

The contribution rate for any defined benefit pension plan is based on a set of actuarial assumptions. It is assumed that investments will increase in value at a certain rate, that salary increases will be granted according to a certain schedule, and that, in the aggregate, participants will withdraw, become disabled, die, and retire in certain patterns. Assumptions must also be made concerning other events --- for example, the pattern of future social security increases, or the percentage of participants who are married at the time of death.

It is possible to predict what would happen to the present value of benefits, the plan's assets, the normal cost rate, and the unfunded accrued ("past service" or "supplemental") liability from one valuation date to the next if all the actuarial assumptions prove to be exactly correct. Variations from these predicted values arise whenever actual experience differs from the actuarial assumptions. Analysis of these variations can reveal the degree to which actual experience has differed from assumed and can, over a period of years, provide an indication as to the validity of the various actuarial assumptions. Variations from "predicted" values also can arise from external sources, such as benefit changes and refinement of programming techniques.

A complete gain and loss analysis is a complex, technical task. It requires that the initial valuation be reproduced, predicting the amount of reserve expected to be released due to each type of decrement (death, disability, retirement, withdrawal) and the amount of liability expected to be incurred as a result of those terminations. Similar "expected" values must be obtained for increases in liability due to salary increases, and for changes in assets due to contributions, benefit payments, and interest earnings.

All these quantities must then be compared to actual experience. This process requires tracing each individual from the first valuation, determining if he is still active or, if not, why not and what benefit was paid and/or what liability remains for him.

Because of the complexity of this task, which is exacerbated by the fact that two years elapse between valuations, the primary procedure for analyzing TCRS experience has been the experience study. The most recent experience study covers the period for July 1, 2008 through June 30, 2012 and is set forth in a separate report.

One of the difficulties with a gain and loss analysis is the lack of intermediate check points at which progress can be determined. An initial value is projected, and is compared to an actual value at the end of the period. As a completely separate process, the "gain" or "loss" from each of a number of separate sources is calculated. It is then hoped that the net effect of the various gains and losses will approximately equal the difference between the projected value and the actual value. There is no method by which an individual gain or loss item can be "checked" against an intermediate figure.

Gains and losses may be measured with respect to the present value of benefits, the accrued liability, or the normal cost percentage. The gain and loss analyses with each valuation are conducted with respect to the normal cost percentage in order to measure the impact on the contribution rate.

The availability of a detailed analysis of past actuarial experience through the experience analysis process mitigates the need for a comparable analysis in the biennial valuation. Due to the availability of accurate detailed information in the experience report, the scope of valuation experience analyses was limited to the more accessible sources of gain and loss. Specifically, gains and losses due to death, disability, and turnover were not analyzed, since it was felt that doing so involved time and expense disproportionate to the attention given the results. Similarly, effects of early and delayed retirement were not quantified.

The table below indicates the effect of each measured assumption upon the 2013 valuation contribution rates.

CAUSES OF CHANGE IN CONTRIBUTION RATE

	Teachers	Consolidated State
	<hr/>	<hr/>
Investment results	2.37%	2.56%
Salary increases	(0.59)	(0.40)
New entrants	(0.01)	(0.59)
Cost of living escalation	(0.11)	(0.13)
Prior service purchases/Sick leave	0.10	0.10
Contribution rate change delay	(0.02)	0.02
Effect of turnover on total payroll	0.74	1.38
Other	(0.31)	0.11
	<hr/>	<hr/>
Subtotal	2.17%	3.05%
Assumption Changes resulting from 2012 Experience Study	0.30%	0.18%
Reestablishment and re-amortization of unfunded liability (8-year amortization for Teachers, 13-year amortization for State)	(2.31%)	(3.23%)
Total Change	0.16%	0.00%

Presented below is a brief discussion regarding items in the table. Comparisons to assumptions and methods are made to the assumptions and methods used in the previous valuation conducted in 2011.

Investment results - Market value returns on plan assets during the fiscal years ending in 2012 and 2013 were 5.6% and 9.9%, respectively. Investment performance is not reflected immediately in the valuation asset amount. Valuation assets are based on a ten year moving average of market values. The rate of return on valuation assets during the two year period was

approximately 2.2% per year less than the assumed return of 7.5% per annum. Investment deficiencies resulted in valuation assets that were approximately \$880,000,000 and \$525,000,000 less for the Teachers and Consolidated State groups, respectively, than would have been achieved if returns were equal to the assumed rate.

Salary Increases - The annual weighted-average rate of salary increase during the 2011-2013 period for both groups was below the assumed age-based rates used in preparing the 2011 valuation report. This resulted in a reduction in the contribution rate for both groups.

New Entrants - Rate pressure attributable to new entrants exists when the overall contribution rate is higher or lower than the contribution rate associated with only the new entrants. Contribution rates can be different for new entrants in comparison to rates for continuing participants, who benefit from past accumulated actuarial gains or losses. Employees entering the plan during the past two plan years carried employer contribution rates of approximately 8% and 11% for Teacher and State groups, respectively. This helped to lower the contribution rates for both Teachers and the State.

Cost of Living Escalation - The inflation experienced during the review period produced aggregate COLA increases that were less than the assumed rate of 2.5% per year. COLA adjustments for July 1, 2012 and July 1, 2013 payment dates were 3.0% and 1.7%, respectively, for a combined effective COLA adjustment of 2.3% per year. Lower than anticipated COLA adjustments among retirees resulted in a lower liability for these participants than expected.

Prior Service Purchases and Sick Leave Credits - Employee purchases of prior service credits and credits for sick leave result in liabilities to the plan that are not fully offset by related employee contributions. The impact of prior service purchases and sick leave credits has been estimated for purposes of the gain and loss summary.

Contribution Rate Change Delay - The policy of delaying the application of contribution rates produced by a valuation for one year means that contributions in the year following the valuation are greater or less than those actually required by the valuation. For the 2011-2012 fiscal year, continuation of the 2009 State employee rate of 15.01% resulted in lower plan assets in comparison to the 15.14% rate anticipated by the 2011 valuation. Consequently, contribution rates for the State group increased slightly by 0.02%. The Teacher contribution rate decreased between the 2009 and 2011 valuations from 9.05% to 8.88%. The additional contribution resulting from delaying application of valuation rates in the 2011-2012 fiscal year resulted in a contribution decrease of 0.02%.

Effect of turnover on total payroll - The turnover during the 2011-2013 period for both groups was above the assumed rates used in in the preparing the 2011 valuation report, which resulted in a lower payroll than expected for the 2013 valuation. Since contribution rates are expressed as a percent of pay, the lower payroll base led to a 0.74% increase for the Teachers and a 1.38% increase for the State group.

Other - The "other" category in the table above incorporates items that are not separately identified or are relatively insignificant. Included in the "other" category are differences between assumed and actual rates of retirement, termination, death and disability.

E. FUNDING STATUS

Until the unfunded accrued liability was frozen in 1981, it was occasionally used as a measure of the actuarial soundness of the funding of the TCRS. Concern was expressed when the unfunded amount was large and/or increasing as was the situation from 1975 to 1981. In fact, the liability is a by-product of the actuarial valuation method utilized to determine contribution rates for a retirement plan and the amount may vary significantly from one method to another. This variability renders comparability among plans on the basis of progress or lack of progress against the unfunded accrued liability standard as an unsatisfactory approach. However, comparability on this basis for a single plan from one year to another may be appropriate as long as the valuation method used for the plan does not change during the period of comparison.

From 1983 through 1987, valuations included an analysis of the Plan Termination Liability (PTL) as a measure of funding progress. This liability is equal to the present value of the benefits which are expected to be paid to retired and other inactive employees, plus the present value of the benefits that have accrued to date for active employees. Thus, it is a measure of the total obligation under the plan in the event the plan was to terminate in the current year. Since it relates strictly to a plan termination situation, the PTL is not a particularly significant figure for an ongoing plan.

In 1987, the Governmental Accounting Standards Board ("GASB") issued its Statement Number 5, setting out information to be disclosed concerning the progress being made in funding a pension plan sponsored by a governmental unit. Statement Number 5 compared the Pension Benefit Obligation ("PBO") to the assets available as of the date of measurement. The PBO increases throughout an employee's career, pro-rating throughout his period of service the liability which is expected to be generated by his benefits. Unlike the PTL, it does not relate to the "shutdown value" as of any given time; it represents a method of spreading the pension cost related to a particular employee throughout his working lifetime, and measuring the amount of that cost which has been accrued as of the date of measurement.

Due to its nature, the PBO as of a particular date does not have any special significance. However, followed over a number of years, the "percentage funded" (i.e., the ratio of assets to PBO) would be expected to increase if progress is being made in the funding of a pension plan and it was reasonable during the period when GASB 5 was effective to make inferences regarding funding progress using this standard.

In 1994, the Governmental Accounting Standards Board revised the methodology to be used in presenting funding progress results to require reporting based upon a plan's unfunded accrued liability. This GASB pronouncement relating to financial reporting standards was effective for fiscal years ending June 30, 1997. The statements provide that certain parameters are to be used in determining the unfunded liability position in each year, including a parameter for the measurement of plan assets. A schedule of funding progress based upon comparison to the unfunded accrued liability is to be included in financial statements for the years in which the calculations are consistent with the parameters.

The schedule presented herein is based upon valuation results for the current valuation period only and is consistent with GASB Statement Number 50 released in May 2007. Information for

earlier periods is presented in the TCRS Comprehensive Annual Financial Report. Results displayed in the table below are based upon the frozen initial liability actuarial valuation method used by the plan.

**Tennessee Consolidated Retirement System
Schedule of Funding Progress
July 1, 2013**

Funding Group	Actuarial Value of Assets	Actuarial Accrued Liability	Unfunded Actuarial Accrued Liability	Funded Ratio	Covered Payroll	Unfunded Actuarial Accrued Liability as a Pct of Covered Payroll
Consolidated State	\$11,996,974,533	\$13,357,266,027	\$1,360,291,494	89.82%	\$2,407,296,133	56.51%
State Judges & Attorneys General	360,258,779	465,703,540	105,444,761	77.36%	82,412,564	127.95%
Total State	\$12,357,233,312	\$13,822,969,567	\$1,465,736,255	89.40%	\$2,489,708,697	58.87%
Teachers	19,493,800,494	20,300,590,638	806,790,144	96.03%	3,747,220,849	21.53%
Political Subdivisions *	7,398,284,120	7,789,873,675	391,589,555	94.97%	2,374,947,580	16.49%
Total	\$39,249,317,926	\$41,913,433,880	\$2,664,115,954	93.64%	\$8,611,877,126	30.94%

* Political subdivision results are presented in the aggregate and are not representative of results for individual entities.

F. VALIDITY OF DATA

The quality of the records available on retired members and on active members was excellent. Almost every record relating to a retired life was used in the valuation. Similarly, very few records on active participants had to be excluded due to questionable data. A list of the records containing apparent discrepancies has been furnished to the staff of the System.

In addition to retired and active members, the master records of the System contain approximately 36,400 records for former members with deferred vested benefits and approximately 48,000 records on other terminated members. Of this latter group, about 23,800 relate to those who terminated without vested benefits, but who have not withdrawn their contributions, and the remaining 24,200 relate to those for whom records are incomplete for various reasons, such as failure to complete membership cards, reporting contradictory social security numbers, etc.

For inactive members with vested benefits, the vested benefit was calculated and the value of the benefit was compared with the current value of the member's accumulated contributions; the larger of the two amounts was established as a liability of the System. For all other "miscellaneous" categories, the amount of each member's accumulated contributions was established as a liability of the System; thus, some liability was established for each of these records.

Records on active participants were obtained from the master file which has been built on all TCRS participants. The records were examined extensively with only minor discrepancies being observed. In general, the TCRS records seem to be in excellent condition, especially for a system which is so large and which receives data from so many widely-dispersed sources.

	Contributory Teachers	Total State (Including State Judges & Attorneys- General)	Polisubs
Number of Deferred Vested	7,073	18,419	10,932
Average Age of Deferred Vested	47.0	51.1	50.2
Average Earnings of Deferred Vested	\$38,059	\$27,974	\$25,101
Average Service of Deferred Vested	9.5	9.0	9.1

G. BENEFIT PAYMENT PROJECTION

Advance funding for TCRS is based upon ongoing plan concepts including recognition of the likelihood of when currently active participants will retire in the future. An examination of the incidence of future benefit payments can be of interest to financial managers in forecasting future cash flows from the plan. Such information is valuable in assessing the liquidity needs that must be satisfied by plan investments in order to satisfy the needs of participants.

Plan benefits are funded by means of employee and employer contributions accumulated in advance of the benefit payment commencement date. Consequently, significant funds build up within the plan during the working lifetime of participants. The following table provides a projection of expected benefit payment patterns. The projection is based upon assumptions utilized in preparing the actuarial valuation. The assumptions include those regarding future salary levels, retirement dates, incidence of disability and mortality and annual cost of living adjustments.

Payments in the table are separated into amounts paid to existing retirees and amounts paid to current and future active employees who are expected to retire in the future. The payments have been developed assuming no new entrants after July 1, 2014. Payments to existing retirees decline with increases attributable to cost of living adjustment mitigating decreases related to the incidence of mortality. In the aggregate, the decline in payments to existing retirees is more than offset by the influx of new retirees.

BENEFIT PAYMENT PROJECTION

<i>Year</i>	<i>Current retirees</i>	<i>Current and future active employees</i>	<i>Total</i>
2013	\$1,937,004,516	\$66,806,787	\$2,003,811,303
2014	1,932,549,521	200,405,190	2,132,954,711
2015	1,925,196,751	335,783,965	2,260,980,716
2016	1,914,801,572	474,771,669	2,389,573,241
2017	1,901,218,660	616,979,903	2,518,198,563
2018	1,884,276,478	764,733,980	2,649,010,458
2019	1,863,825,417	919,830,304	2,783,655,721
2020	1,839,740,912	1,079,768,207	2,919,509,119
2021	1,811,897,118	1,243,050,450	3,054,947,568
2022	1,780,173,476	1,415,060,483	3,195,233,959
2023	1,744,467,549	1,594,440,116	3,338,907,665
2024	1,704,707,949	1,777,281,390	3,481,989,339
2025	1,660,850,795	1,966,370,538	3,627,221,333
2026	1,612,850,112	2,162,100,354	3,774,950,466
2027	1,560,691,527	2,362,871,186	3,923,562,713
2028	1,504,415,832	2,572,593,091	4,077,008,923
2029	1,444,126,438	2,789,740,845	4,233,867,283
2030	1,379,984,671	3,012,246,125	4,392,230,796
2031	1,312,209,777	3,239,968,250	4,552,178,027
2032	1,241,097,960	3,469,423,597	4,710,521,557

H. OUTLINE OF BENEFIT AND CONTRIBUTION PROVISIONS

(As Amended through July 1, 2013)

Any person who becomes a teacher not participating in a local retirement fund, a general employee of the State, a state policeman, or a wildlife officer on or after July 1, 1972 becomes a member of the Tennessee Consolidated Retirement System as a condition of employment. Membership is optional for any person who becomes a state judge, a part-time employee, a commissioner, a county judge or county official in a participating political subdivision, an attorney general, an assistant attorney general, a criminal investigator, or an elected or appointed official of the general assembly. Membership is mandatory for any person employed on or after July 1, 1993 as an attorney general in the office of the Attorney General and reporter. Membership is compulsory for other employees of participating political subdivisions, except that for employees in service on the date the political subdivision commences participation, membership is optional.

A member of a superseded system as of June 30, 1972 had the choice of becoming a Group I, II, or III member of the Consolidated System according to his employment classification, or remaining subject to the benefit and contribution provisions of the superseded system as a "prior class" member with all rights, benefits and privileges under the superseded system. This choice was extended to members eligible to enter Group III prior to September 1, 1974. A transferred former Class A or Class B member of the System who is not a prior class member receives the greater of the retirement allowance provided under the Consolidated System or the superseded system. Effective July 1, 1976, all new members began to enter Group I, regardless of employment classification. Effective September 1, 1990, new state judges began to enter a new Group IV; Group I and Group III state judges could elect to transfer to this new category.

"Creditable service" means membership service under the Consolidated System for which contributions are made by the member, plus prior service credited under a superseded system as of June 30, 1972. Additional service may also be credited for certain periods of military service and service before the date of membership for which the member makes the required contributions.

The term "Average Final Compensation "(AFC) means average compensation during the five consecutive years of creditable service producing the highest average. "Social Security Integration Level" (SSIL) means, for the calendar year in which a member retires, the average annual amount of earnings (rounded to the nearest multiple of \$600) with respect to which old age and survivors' benefits would be provided under Title II of the Federal Social Security Act for a male employee attaining age 65 in such calendar year, computed as though for each year prior to such calendar year, annual earnings are at least equal to the maximum amount of earnings subject to contributions under the provisions of the Federal Insurance Contributions Act. The SSIL is \$64,800 in 2013 and will be \$67,200 in 2014. "Social Security Base" (SSB) means for each calendar year the amount of a member's compensation subject to Social Security contributions, except that for years prior to 1966 SSB means \$6,600 for the superseded Teachers' System. For the period prior to July 1, 1963 SSB means \$4,200 and for the period between July 1, 1963 and January 1, 1966 SSB means \$4,800 under the superseded State System. "Benefit Base" (BB) means the annual salary in the position from which certain prior class

members in a superseded system covering elected officials retired, as of the dates of their retirement; except that for members who are eligible for escalation, the Benefit Base is increased to reflect any post-retirement changes in annual salary for the position from which the member retired.

The regular form of benefit under the System is a monthly annuity payable to the member for life, with all payments ceasing at his death. In lieu of the regular benefit, a member may elect an optional plan to convert his allowance into a reduced benefit of equivalent actuarial value in accordance with one of the following options:

Option I - In the event of the member's death, the designated beneficiary will receive 100% of the member's reduced monthly benefit for life.

Option II - In the event of the member's death, the designated beneficiary will receive 50% of the member's reduced monthly benefit for life.

Option III - In the event of the member's death, the designated beneficiary will receive 100% of the member's reduced monthly benefit for life. Should the beneficiary die before the member, the benefit payable to the member reverts to the unreduced regular benefit.

Option IV - In the event of the member's death, the designated beneficiary will receive 50% of the member's reduced monthly benefit for life. Should the beneficiary die before the member, the benefit payable to the member reverts to the unreduced regular benefit.

Social Security Adjustment - A member may convert his retirement allowance into an increased benefit payable prior to the date he is eligible to receive Social Security benefits and a reduced allowance payable after that date, so that his total income will be approximately the same before and after the commencement of Social Security payments.

Benefits payable to retired members are increased on each July 1 according to the percentage increase in the Consumer Price Index during the preceding calendar year, provided that the increase will not exceed 3% of the current benefit in any year, and provided that the member has been retired for at least 12 months. Prior to July 1, 1998, the CPI increase percentage was applied to the initial base, rather than the current benefit.

Every member is guaranteed the return of his account balance arising from his own contributions (including interest) either as benefit payments to him or his designated beneficiary, or upon his death or termination as a lump sum amount equal to the excess of his accumulated contributions over any benefits paid on his behalf.

Effective July 1, 1981, the System became non-contributory (or, for classes of employees who previously contributed more than 5%, contribution rates were reduced by 5%) for State employees and for teachers in higher education. Teachers in grades K-12 and political subdivisions remained contributory, except that political subdivisions were given the option of electing to become non-contributory.

For employees who moved from "contributory" to "non-contributory" on July 1, 1981, withdrawals in the event of termination have been calculated as though their personal contributions had continued, and retirement benefits have been calculated by loading each of the next 15 years' salaries by 3.6%. This provision, which otherwise would have expired on June 30, 1996, has been extended permanently effective July 1, 1998 by the Legislature for those members in the system at the onset of non-contributory retirement.

The following summaries give the main provisions of the Tennessee Consolidated Retirement System on which the valuation was based. Summaries are also given of the various superseded systems, whose provisions are applicable for certain members. Throughout these summaries, the symbol # means that the actual benefit (or minimum or maximum) is 105% of the indicated amount for State employees (including teachers) in these categories, and that participating political subdivisions may elect this improvement as an optional provision.

Note: In the following tables, minimum benefits are described as \$96.00 per year or \$103.92 per year for various classifications. These amounts apply to members with at least 10 years of creditable service. If a benefit is calculated for a member with less than 10 years of creditable service, minimum benefits of \$84.00 per year and \$91.92 per year, respectively, apply instead of the amounts shown in the tables.

TENNESSEE CONSOLIDATED RETIREMENT SYSTEM

	GROUP			
	I	II	III	IV
<u>SERVICE RETIREMENT</u>				
<u>Full Benefit:</u>				
Eligibility conditions (Age and years of creditable service)	Age 60 and vested, or 30 years	Age 60 and vested, or 55 with 25 years or 30 years of service*	Age 65 and vested, or age 55 with 24 years or 30 years	Age 55 with 24 years, or Age 60 with 8 years
Benefit percentages (% of AFC for each year of Creditable service):				
% up to SSIL	1.50% [#]	1.75% [#]	2.00%	2.50%
% over SSIL	1.75 [#]	2.25 [#]	2.50	2.50
<u>Early Reduced Benefit:</u>				
Eligibility conditions	N/A	55 with 10 years	Age 55 with 8 years	N/A
Benefit	Full benefit reduced by 4/10 of 1% for each month prior to eligibility for full benefit.			
<u>25 Year Benefit:</u>				
Eligibility Conditions	25 years	N/A	N/A	N/A
Benefit	Full benefit is reduced 4/10 of 1% for each of first 60 months prior to 30 years of service. Benefit so calculated is further reduced by actuarial factor if member's age at commencement of benefits is less than 55.			

*See note on next page.

[#]See explanation on page H-3.

TENNESSEE CONSOLIDATED RETIREMENT SYSTEM
(Continued)

	GROUP			
	I	II	III	IV
<u>Vested Benefit:</u>				
Eligibility conditions	5 years**	10 years	8 years	8 years
Benefit	Reduced benefit payable at age 55 or later Benefit further reduced by 15% for each year of service less than 10 years			
<u>Maximum Benefit:</u> (before reduction)	90% [#] of average final compensation	80%	75%	75%
<u>Minimum Benefit:</u>	\$96.00 [#] for each year of creditable service, but not in excess of 100% of average final compensation.			

ORDINARY DISABILITY RETIREMENT

Eligibility conditions	5 years	5 years	8 years	8 years
Benefit percentages:*				
% up to SSIL	1.350% [#]	1.575% [#]	1.800%	2.250%
% over SSIL	1.575 [#]	2.025 [#]	2.250	2.250

* Benefit % for each year of creditable service. If service to date of disability retirement is less than 20 years, projected years of service to the full benefit date are added to creditable service, but not to bring total years of creditable service to more than 20 years, nor less than ten years of creditable service. Benefit changes to normal service benefit (including projected years of service) when the conditions for normal service retirement are met.

NOTE: During certain time restricted periods, certain Group II members could elect to become covered by a special provision whereby the eligibility condition for service retirement is age 55 (and vested) or 25 years of service. In order to elect this provision of the law, the Group II member must make additional contributions to the retirement system at the rate of 5% of salary.

**If membership date is prior to 7-1-79, 4 years.

TENNESSEE CONSOLIDATED RETIREMENT SYSTEM
(Continued)

	GROUP			
	I	II	III	IV
<u>ORDINARY DISABILITY RETIREMENT (Continued)</u>				
<u>Maximum Benefit:</u>	75% [#] of average final compensation			
<u>Minimum Benefit:</u> (no reduction)	\$96.00 [#] for each year of creditable service to date of disability retirement, but not in excess of 100% of final compensation.			
<u>ACCIDENTAL DISABILITY RETIREMENT</u>				
Eligibility condition	In performance of duty	In performance of duty	N/A	N/A
Benefit:				
To age 62 or receipt of Social Security Disability	50% [#] of average final compensation	50% [#] of average final compensation	N/A	N/A
After age 62 or receipt of Social Security Disability	33-1/3% [#] of average final compensation	33-1/3% [#] of average final compensation	N/A	N/A
For members joining on or after 7/1/97, benefit is determined in same manner as ordinary disability.				
<u>INACTIVE DISABILITY</u>				
Eligibility condition	5 years	5 years	8 years	8 years
Benefit:	Actuarial equivalent of age 55 benefit			
<u>ORDINARY DEATH BENEFITS</u>				
1. Eligibility condition	Eligible for early or service retirement benefit			
Benefit	Survivor benefit as if member had retired and elected joint and 100% survivor annuity			

TENNESSEE CONSOLIDATED RETIREMENT SYSTEM
(Continued)

	GROUP			
	I	II	III	IV
<u>ORDINARY DEATH BENEFITS (Continued)</u>				
2. Eligibility condition*	10 years	10 years	10 years	10 years
Benefit	To surviving spouse, as if member had retired and elected immediate joint and 100% survivor annuity (Option I)			
3. Eligibility condition	In service within 150 days and no other benefit			
Benefit	Lump sum equal to the member's account balance plus an equal amount payable from the employer fund.			
<u>ACCIDENTAL DEATH BENEFITS</u>				
Eligibility condition	Death in performance of duty			
Benefit	50% of average final compensation to eligible dependent(s). The aggregate total death benefit payable on account of a member who dies in the line of duty shall have a value of not less than \$50,000. If the death benefit is payable to a single beneficiary, the guaranteed minimum value shall be paid in monthly installments calculated on a sixty-month basis.			
	If no surviving spouse exists on the date of the member's death and if the projected payments to be made to all the minor children do not exceed a minimum total value of \$50,000 the projected excess shall be paid to the member's estate for the benefit of all the member's surviving children regardless of age. (All death benefits are assumed to be ordinary death benefits for valuation purposes.)			
<u>INACTIVE DEATH BENEFITS</u>				
Eligibility condition*	10 years	10 years	10 years	10 years
Benefit	To surviving spouse as if member had retired and elected Option II (50%)			

* Optional to political subdivisions

TENNESSEE CONSOLIDATED RETIREMENT SYSTEM
(Continued)

	GROUP			
	I	II	III	IV
<u>MEMBER CONTRIBUTION RATES</u>				
<u>Contributory</u>				
% of compensation up to SSB	5.0%	5.5%	5.5%	N/A
% of compensation in excess of SSB	5.0%	5.5%	7.0%	N/A
<u>Non-Contributory</u>				
% of compensation up to SSB	0.0%	0.5%	0.5%	0.5%
% of compensation in excess of SSB	0.0%	0.5%	2.0%	2.0%

**SUPERSEDED SYSTEMS
TENNESSEE TEACHERS' RETIREMENT SYSTEM**

	PRIOR CLASS A	TRANSFERRED CLASS B	PRIOR CLASS B
<u>SERVICE RETIREMENT</u>			
<u>Full Benefit:</u>			
Eligibility conditions (Age and years of creditable service)	----- Age 60 or 30 years -----		
Benefit percentages (% of AFC for each year of creditable service):			
% up to SSB	1.125% [#]	1.875% [#]	1.875% [#]
% over SSB	1.875 [#]	1.875 [#]	1.875 [#]
<u>Vested Benefit:</u>			
Eligibility conditions	10 years or 4 years at higher learning institute (only Class A)		
Benefit	Full benefit deferred to age 60		
<u>Minimum Benefit</u> (No reduction)	\$96.00 [#]	\$103.92 [#]	\$103.92 [#]
<u>DISABILITY RETIREMENT</u>			
Eligibility conditions	10 years	10 years	10 years
Benefit percentages:			
% up to SSB	1.0125% ^{*#}	1.6875% ^{**#}	1.6875% ^{**#}
% over SSB	1.6875 [#]	1.6875 [#]	1.6875 [#]
<u>Minimum Benefit</u> (No reduction)	\$96.00 [#]	\$103.92 [#]	\$103.92 [#]

* If service to date of disability retirement is less than 20 years, projected years of service to the full benefit date are added to creditable service, but not to bring total years of creditable service to more than 20 years, nor less than 10 years.

** Total benefit package percentage based on years of service not to be less than 25%.[#]

SUPERSEDED SYSTEMS

TENNESSEE TEACHERS' RETIREMENT SYSTEM

(Continued)

	PRIOR CLASS A	TRANSFERRED CLASS B	PRIOR CLASS B
--	------------------	------------------------	------------------

DEATH BENEFITS

1. Eligibility condition	Eligible for early or service retirement		
Benefit	Joint and 100% survivor option as if member had retired and elected this option		
2. Eligibility condition	10 years	10 years	10 years
Benefit	To surviving spouse, as if member had retired and elected immediate joint and 100% survivor annuity (Option I)		
3. Eligibility condition	In service within 120 days and no other benefit		
Benefit	Lump sum equal to the member's account balance plus an equal amount payable from the employer fund		

INACTIVE DEATH BENEFITS

Eligibility condition*	10 years	10 years	10 years
Benefit	To surviving spouse as if member had retired and elected Option II (50%)		

MEMBER CONTRIBUTION RATES

Contributory

% of compensation up to SSB	3.0%	5.0%	7.0%
% of compensation in excess of SSB	3.0%	5.0%	7.0%
<u>Non-Contributory</u>	0.0%	0.0%	2.0%

*Optional to political subdivisions

SUPERSEDED SYSTEMS

TENNESSEE STATE RETIREMENT SYSTEM

GENERAL EMPLOYEES

	PRIOR CLASS A	TRANSFERRED CLASS B	PRIOR CLASS B
<u>SERVICE RETIREMENT</u>			
<u>Full Benefit:</u>			
Eligibility conditions (Age and years of creditable service)	Age 65	Age 60 with 20 years or 30 years	Age 60 with 20 years or 30 years
Benefit percentages (% of AFC for each year of creditable service):			
% up to SSB	1.125% [#]	1.875% [#]	1.875% [#]
% over SSB	1.750 [#]	1.875 [#]	1.875 [#]
<u>Vested Benefit:</u>			
Eligibility conditions	10 years	10 years	10 years
	Payable at age 55 or later		
Benefit	Full benefit reduced by 4/10 of 1% for each month prior to eligibility for full benefit		
<u>Maximum Benefit:</u>	75% [#] of average final compensation		
<u>Minimum Benefit:</u>			
(Per year of creditable service)			
No reduction	\$96.00 [#]	\$103.92 [#]	\$103.92 [#]
<u>Death Benefits:</u>			
1. Eligibility condition	Eligible for early or service retirement		
Benefit	Joint and 100% survivor option as if member had retired and elected this option.		
2. Eligibility condition*	10 years	10 years	10 years
Benefit	To surviving spouse, as if member had retired and elected immediate joint and 100% survivor annuity (Option I)		
* Optional to political subdivisions.			

SUPERSEDED SYSTEMS

TENNESSEE STATE RETIREMENT SYSTEM

(Continued)

		GENERAL EMPLOYEES		
		PRIOR	TRANSFERRED	PRIOR
		CLASS A	CLASS B	CLASS B

3. Eligibility condition	In service within 120 days and no other benefit
Benefit	Lump sum equal to the member's account balance plus an equal amount payable from the employer fund.

INACTIVE DEATH BENEFITS

Eligibility condition***	10 years	10 years	10 years
Benefit	To surviving spouse as if member had retired and elected Option II (50%)		

DISABILITY RETIREMENT

Eligibility conditions	10 years	5 years	5 years
Benefit percentages:			
% up to SSB	1.0125%*#	1.6875%**#	1.6875%**#
% over SSB	1.5750#	1.6875#	1.6875#
<u>Maximum Benefit</u>	75% of average final compensation		
<u>Minimum Benefit</u> (No reduction)	\$96.00#	\$103.92#	\$103.92#

MEMBER CONTRIBUTION RATES

Contributory

% of compensation up to SSB	3.0%	5.5%	7.0%
% of compensation in excess of SSB	5.0%	5.5%	7.0%

<u>Non-Contributory</u>	0.0%	0.0%	2.0%
-------------------------	------	------	------

* If service to date of disability retirement is less than 20 years, projected years of service to the full benefit date are added to creditable service, but not to bring total years of creditable service to more than 20 years.

** Total benefit percentage based on years of service not to be less than 25%.#

*** Optional to political subdivisions

SUPERSEDED SYSTEMS

TENNESSEE STATE RETIREMENT SYSTEM

(Continued)

	GAME AND FISH OFFICERS	STATE POLICEMEN	FIREMEN AND POLICEMEN
<u>SERVICE RETIREMENT</u>			
<u>Full Benefit:</u>			
Eligibility conditions (Age and years of creditable service)	Age 60 or 55 with 25 years, or 30 years	Age 50 or 25 years	Age 55 with 25 years, or 30 years
Benefit percentages (% of AFC for each year of creditable service)	2.125% [#]	2.250% [#]	2.250% [#]
<u>Vested Benefit:</u>			
Eligibility conditions	10 years	10 years	10 years
	Payable at age 55 or later for Class A Payable upon completion of 10 years for Class B		
Benefit	Full benefit reduced by 4/10 of 1% for each month prior to eligibility for full benefit		
<u>Maximum Benefit</u>	75% [#] of average final compensation		
<u>Minimum Benefit</u> (Per year of creditable service)	Class A - \$96.00 [#] Class B - \$103.92 [#]	N/A	Class A - \$96.00 [#] Class B - \$103.92 [#]
<u>DISABILITY RETIREMENT</u>			
Eligibility conditions	Class A - 10 years Class B - 5 years	5 years	Class A - 10 years Class B - 5 years
Benefit percentages	1.9125% ^{**#}	2.025% ^{**#}	2.025% ^{**#}
<u>Maximum Benefit</u>	75% of average final compensation		
<u>Minimum Benefit</u> (No projected service)	Class A - \$96.00 [#] Class B - \$103.92 [#]	N/A	Class A - \$96.00 [#] Class B - \$103.92 [#]

* For Class A, if service to date of disability retirement is less than 20 years, projected years of service to age 55 are added to creditable service, but not to bring total years of creditable service to more than 20 years. Class B does not get projected years.

** Total benefit percentage based on years of service (without projection) not to be less than 25%.[#]

SUPERSEDED SYSTEMS

TENNESSEE STATE RETIREMENT SYSTEM

(Continued)

	GAME AND FISH OFFICERS	STATE POLICEMEN	FIREMEN AND POLICEMEN
<u>ACCIDENTAL DISABILITY</u>			
Eligibility conditions	N/A	In performance of duty	N/A
Benefit	N/A	50% of AFC [#]	N/A
<u>ORDINARY DEATH BENEFITS</u>			
1. Eligibility conditions	In service within 120 days and no other benefit		
Benefit	Lump sum equal to the member's account balance plus an equal amount payable from the employer fund.		
2. Eligibility conditions*	10 years	10 years	10 years
Benefit	To surviving spouse, as if member had retired and elected immediate joint and 100% survivor annuity (Option I)		
3. Eligibility conditions	Eligible for early or service retirement		
Benefit	Joint and 100% survivor option as if member had retired and elected this option.		
<u>INACTIVE DEATH BENEFITS</u>			
Eligibility condition	10 years	10 years	10 years
Benefit	To surviving spouse as if member had retired and elected Option II (50%)		
<u>DEATH IN PERFORMANCE OF DUTY</u>	N/A	50% of AFC [#]	N/A
(All death benefits are assumed to be ordinary death benefits for valuation purposes.)			
<u>MEMBER CONTRIBUTION RATES</u>			
% of compensation to SSB	5.0%	6.63%	Class A - 3.0% Class B - 7.0%
% of compensation in excess of SSB	5.0%	6.63%	Class A - 5.0% Class B - 7.0%

*Optional to political subdivisions.

SUPERSEDED SYSTEMS

	STATE JUDGES	ATTORNEYS GENERAL	COUNTY JUDGES
<u>SERVICE RETIREMENT</u>			
<u>Full Benefit:</u>			
Eligibility conditions (Age and years of service)	Age 65 or age 54 with 8 years	Age 54 with 10 years	Age 55 with 8 years
Benefit percentages (% of BB for each year of creditable service)	3.75%	3.75%	3.0%*
<u>Vested Benefit:</u>			
Eligibility conditions	Immediate	10 years	8 years
Benefit	Full benefit deferred to age 54 with 8 years or age 65	Full benefit deferred to age 54	Full benefit deferred to age 55
<u>Maximum Benefit</u>	75% of BB	75% of BB	75% of BB
<u>DISABILITY RETIREMENT</u>			
Eligibility conditions	10 years	10 years	8 years
Benefit	Full service benefit	Full service benefit	Full service benefit
<u>Minimum Benefit</u>	N/A	N/A	25% of AFC

BB (Benefit Base) definition:

- (1) If member's benefit is subject to escalation, the BB is the salary the retired member would have received had he remained in office.
- (2) If member's benefit is not subject to escalation, the BB is the salary at the time the member retired or the salary in effect May 1, 1975, whichever is greater.

* Minimum total rate of 75% of average final compensation after 24 years of creditable service.

SUPERSEDED SYSTEMS

(Continued)

	STATE JUDGES	ATTORNEYS GENERAL	COUNTY JUDGES
<u>DEATH BENEFIT</u>			
Eligibility conditions			
1. Eligible for service retirement	If elected, survivorship option as if member retired; otherwise 100% joint and survivor option to designated beneficiary	If elected, survivorship option as if member retired; otherwise 100% joint and survivor option to designated beneficiary	If elected, survivorship option as if member retired; otherwise 50% joint and survivor option to designated beneficiary
2. Eligibility conditions	10 years	10 years	10 years
Benefit	To surviving spouse, as if member had retired and elected immediate joint and 100% survivor annuity (Option I)		
3. 10 years	N/A	Optional benefit paid at age 54 if elected	N/A
4. Age 54 with 10 years or 18 years	N/A	50% joint and survivor option as if member had retired	N/A
5. Eligibility condition	In service within 120 days and no other benefit		
Benefit	Lump sum equal to the member's account balance plus an equal amount payable from the employer fund.		
<u>INACTIVE DEATH BENEFITS</u>			
Eligibility condition	10 years	10 years	10 years
Benefit	To surviving spouse as if member had retired and elected Option II (50%)		
<u>MEMBER CONTRIBUTION RATES</u>			
	3.0%	8.0% contributory 3.0% non-contributory	8.0% contributory 3.0% non-contributory

SUPERSEDED SYSTEMS
(Continued)

	COUNTY OFFICIALS	PUBLIC SERVICE COMMISSIONERS
<u>SERVICE RETIREMENT</u>		
<u>Full Benefit:</u>		
Eligibility conditions (Age and years of service)	Age 55 with 12 years	Age 65 or age 54 with 12 years
Benefit percentages (% of BB or AFC for each year of creditable service)	2.5% of AFC	3.75% of salary at retirement
<u>Maximum Benefit</u>	75% of AFC	75% of salary at retirement
<u>Vested Benefit:</u>		
Eligibility conditions	12 years	Immediate
Benefit	Full benefit deferred to age 55	Deferred to age 65 or to age 54 with 12 years
<u>DISABILITY RETIREMENT</u>		
Eligibility conditions	N/A	10 years
Benefit	N/A	Full benefit
<u>DEATH BENEFITS</u>		
1. Eligibility conditions	12 years	Eligible for full benefit
Benefit	Full benefit payable to beneficiary for 10 years; if eligible for service retirement, beneficiary may elect joint and 100% survivor option	If elected, survivorship option as if member retired; otherwise 100% joint and survivor option to designated beneficiary
2. Eligibility conditions	10 years	10 years
Benefit	To surviving spouse, as if member had retired and elected immediate joint and 100% survivor annuity (Option I)	
3. Eligibility condition	In service within 120 days and no other benefit	
Benefit	Lump sum equal to the member's account balance plus an equal amount payable from the employer fund.	

SUPERSEDED SYSTEMS
(Continued)

	COUNTY OFFICIALS	PUBLIC SERVICE COMMISSIONERS
<u>INACTIVE DEATH BENEFITS</u>		
1. Eligibility conditions	10 years	10 years
Benefit	To surviving spouse as if member had retired and elected Option II (50%)	
2. Eligibility conditions	Out of service more than 120 days	
Benefit	Lump sum payment equal to member's account balance	
<u>MEMBER CONTRIBUTION RATES</u>	8.0%	8.0%

I. APPENDIX

TABLE	PAGE	
I.	Distribution of Earnings by Age Groups - Active Lives	
	1. Contributory Teachers	I-2
	2. State General Employees, Group I	I-3
	3. Political Subdivision Group I General Employees	I-4
	4. University of Tennessee (TIAA)	I-5
	5. Group II	I-6
	6. Group III	I-7
	7. Total	I-8
II.	Distribution of Earnings by Service Groups - Active Lives	
	1. Contributory Teachers	I-9
	2. State General Employees, Group I	I-10
	3. Political Subdivision Group I General Employees	I-11
	4. University of Tennessee (TIAA)	I-12
	5. Group II	I-13
	6. Group III	I-14
	7. Total	I-15
III.	Distribution of Current Benefits by Age Groups - Retired Lives	I-16
IV.	Distribution of Current Benefits by Years Since Retirement - Retired Lives	I-17
V.	Plan Assets	
	1. Market Value of Assets	I-18
	2. Change in Market Value of Assets	I-19
	3. History of Investment Returns	I-20
	4. Actuarial Value of Assets	I-21
VI.	Amounts to be Amortized	
	1. Rollforward	I-22
	2. Reestablishment of Unfunded Accrued Liability	I-23
VII.	Calculation of Contribution Rates	I-24
VIII.	Summary of Actuarial Methods and Assumptions – Prior Assumptions	I-25
IX.	Summary of Actuarial Methods and Assumptions – Revised Assumptions	I-36
X.	Effect of Revised Actuarial Methods and Assumptions on Key Valuation Results	I-47
XI.	Actuarial Certification	I-48

TABLE I-1
CONTRIBUTORY TEACHERS
DISTRIBUTION OF ACTIVE PARTICIPANTS' EARNINGS
BY AGE

Age Group	Number	Earnings	
		Total	Average
1-20	1	\$36,859	\$36,859
21-25	3,354	127,956,282	38,150
26-30	9,068	367,619,065	40,540
31-35	10,317	465,841,555	45,153
36-40	11,003	543,047,854	49,355
41-45	11,087	579,845,284	52,300
46-50	8,508	455,166,176	53,499
51-55	8,304	462,131,070	55,652
56-60	7,736	447,085,340	57,793
61-65	4,072	243,468,605	59,791
66-70	772	46,341,867	60,028
71-75	117	7,002,744	59,853
76-80	19	1,204,475	63,393
81-85	8	473,673	59,209
86-90	0	0	0
Total	74,366	\$3,747,220,849	\$50,389

TABLE I-2
STATE GENERAL EMPLOYEES
(INCLUDES NON-CONTRIBUTORY TEACHERS AND SEPARATELY-FUNDED SYSTEMS)
DISTRIBUTION OF ACTIVE PARTICIPANTS' EARNINGS
BY AGE

Age Group	Number	Earnings	
		Total	Average
1-20	132	\$3,002,838	\$22,749
21-25	1,801	51,424,881	28,554
26-30	3,843	125,072,228	32,545
31-35	5,265	191,290,992	36,333
36-40	5,829	231,594,309	39,731
41-45	6,860	287,893,762	41,967
46-50	7,999	341,624,662	42,708
51-55	9,274	407,616,276	43,953
56-60	9,008	413,871,528	45,945
61-65	5,652	277,916,219	49,171
66-70	1,972	100,843,589	51,138
71-75	513	26,866,534	52,371
76-80	147	7,571,675	51,508
81-85	61	2,392,914	39,228
86-90	0	0	0
Total	58,356	\$2,468,982,407	\$42,309

TABLE I-3
POLITICAL SUBDIVISION GENERAL EMPLOYEES
DISTRIBUTION OF ACTIVE PARTICIPANTS' EARNINGS
BY AGE

Age Group	Number	Earnings	
		Total	Average
1-20	187	\$4,109,137	\$21,974
21-25	2,506	64,576,401	25,769
26-30	4,771	140,203,910	29,387
31-35	6,352	197,105,311	31,030
36-40	8,109	255,431,639	31,500
41-45	10,669	336,426,833	31,533
46-50	11,653	361,266,630	31,002
51-55	11,770	370,239,554	31,456
56-60	10,747	345,578,707	32,156
61-65	6,409	196,265,417	30,623
66-70	2,505	69,230,880	27,637
71-75	981	24,693,395	25,172
76-80	316	7,327,110	23,187
81-85	75	1,550,046	20,667
86-90	0	0	0
Total	77,050	\$2,374,004,970	\$30,811

TABLE I-4
UNIVERSITY OF TENNESSEE (TIAA)
DISTRIBUTION OF ACTIVE PARTICIPANTS' EARNINGS
BY AGE

Age Group	Number	Earnings	
		Total	Average
1-20	0	\$0	\$0
21-25	0	0	0
26-30	0	0	0
31-35	0	0	0
36-40	0	0	0
41-45	0	0	0
46-50	0	0	0
51-55	0	0	0
56-60	3	375,266	125,089
61-65	42	5,005,601	119,180
66-70	73	8,971,489	122,897
71-75	28	3,090,555	110,376
76-80	14	1,516,131	108,295
81-85	6	590,883	98,480
86-90	0	0	0
Total	166	\$19,549,925	\$117,771

TABLE I-5

GROUP II

DISTRIBUTION OF ACTIVE PARTICIPANTS' EARNINGS
BY AGE

Age Group	Number	Earnings	
		Total	Average
1-20	0	\$0	\$0
21-25	0	0	0
26-30	0	0	0
31-35	0	0	0
36-40	0	0	0
41-45	1	94,515	94,515
46-50	0	0	0
51-55	1	71,087	71,087
56-60	7	521,309	74,472
61-65	8	516,396	64,549
66-70	1	51,150	51,150
71-75	0	0	0
76-80	0	0	0
81-85	0	0	0
86-90	0	0	0
Total	18	\$1,254,457	\$69,692

TABLE I-6

GROUP III

DISTRIBUTION OF ACTIVE PARTICIPANTS' EARNINGS
BY AGE

Age Group	Number	Earnings	
		Total	Average
1-20	0	\$0	\$0
21-25	0	0	0
26-30	0	0	0
31-35	0	0	0
36-40	0	0	0
41-45	0	0	0
46-50	0	0	0
51-55	0	0	0
56-60	0	0	0
61-65	0	0	0
66-70	3	415,672	138,557
71-75	1	142,044	142,044
76-80	4	306,802	76,700
81-85	0	0	0
86-90	0	0	0
Total	8	\$864,518	\$108,064

TABLE I-7

TOTAL

DISTRIBUTION OF ACTIVE PARTICIPANTS' EARNINGS
BY AGE

Age Group	Number	Earnings	
		Total	Average
1-20	320	\$7,148,834	\$22,340
21-25	7,661	243,957,564	31,844
26-30	17,682	632,895,203	35,793
31-35	21,934	854,237,858	38,946
36-40	24,941	1,030,073,802	41,300
41-45	28,617	1,204,260,394	42,082
46-50	28,160	1,158,057,468	41,124
51-55	29,349	1,240,057,987	42,252
56-60	27,501	1,207,432,150	43,905
61-65	16,183	723,172,238	44,687
66-70	5,326	225,854,647	42,406
71-75	1,640	61,795,272	37,680
76-80	500	17,926,193	35,852
81-85	150	5,007,516	33,383
86-90	0	0	0
Total	209,964	\$8,611,877,126	\$41,016

TABLE II-1
CONTRIBUTORY TEACHERS
DISTRIBUTION OF ACTIVE PARTICIPANTS' EARNINGS
BY LENGTH OF SERVICE

<u>Service Group</u>	<u>Number</u>	<u>Earnings</u>	
		<u>Total</u>	<u>Average</u>
0	4,157	\$168,722,234	\$40,587
1	3,877	154,202,544	39,774
2	3,688	153,622,923	41,655
3	3,178	133,880,808	42,127
4	3,207	138,582,131	43,212
0-4	18,107	749,010,640	41,366
5-9	16,297	756,583,769	46,425
10-14	13,493	699,116,399	51,813
15-19	10,013	558,737,086	55,801
20-24	6,590	381,429,968	57,880
25-29	5,041	302,267,928	59,962
30-34	2,540	155,837,005	61,353
35-39	1,768	110,078,254	62,261
40-44	437	28,986,512	66,331
45-49	80	5,173,288	64,666
Total	74,366	\$3,747,220,849	\$50,389

TABLE II-2
STATE GENERAL EMPLOYEES
(INCLUDES NON-CONTRIBUTORY TEACHERS AND SEPARATELY-FUNDED SYSTEMS)
DISTRIBUTION OF ACTIVE PARTICIPANTS' EARNINGS
BY LENGTH OF SERVICE

Service Group	Number	Earnings	
		Total	Average
0	3,906	\$130,322,312	\$33,365
1	3,212	114,450,086	35,632
2	2,500	91,372,993	36,549
3	1,928	69,286,044	35,937
4	1,691	62,199,464	36,783
0-4	13,237	467,630,899	35,328
5-9	12,863	500,432,581	38,905
10-14	9,579	387,510,450	40,454
15-19	6,690	295,058,183	44,104
20-24	5,143	247,035,887	48,033
25-29	5,798	287,578,068	49,600
30-34	2,804	148,234,533	52,865
35-39	1,600	93,642,521	58,527
40-44	512	33,258,234	64,957
45-49	130	8,601,051	66,162
Total	58,356	\$2,468,982,407	\$42,309

TABLE II-3

POLITICAL SUBDIVISION GENERAL EMPLOYEES
 DISTRIBUTION OF ACTIVE PARTICIPANTS' EARNINGS
 BY LENGTH OF SERVICE

Service Group	Number	Earnings	
		Total	Average
0	4,793	\$109,288,288	\$22,802
1	4,778	112,960,581	23,642
2	4,321	110,459,930	25,564
3	3,565	91,838,490	25,761
4	3,655	97,322,836	26,627
0-4	21,112	521,870,125	24,719
5-9	19,077	539,963,499	28,304
10-14	14,071	447,147,431	31,778
15-19	9,998	348,149,280	34,822
20-24	6,070	229,789,990	37,857
25-29	4,041	163,996,935	40,583
30-34	1,712	75,934,461	44,354
35-39	740	35,508,153	47,984
40-44	191	9,882,097	51,739
45-49	38	1,762,999	46,395
Total	77,050	\$2,374,004,970	\$30,811

TABLE II-4
UNIVERSITY OF TENNESSEE (TIAA)
DISTRIBUTION OF ACTIVE PARTICIPANTS' EARNINGS
BY LENGTH OF SERVICE

Service Group	Number	Earnings	
		Total	Average
0	0	\$0	\$0
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
0-4	0	0	0
5-9	1	27,977	27,977
10-14	2	41,221	20,610
15-19	3	402,866	134,288
20-24	0	0	0
25-29	2	240,692	120,346
30-34	12	1,339,560	111,630
35-39	85	10,492,982	123,446
40-44	47	5,435,810	115,655
45-49	14	1,568,817	112,058
Total	166	\$19,549,925	\$117,771

TABLE II-5

GROUP II

DISTRIBUTION OF ACTIVE PARTICIPANTS' EARNINGS
BY LENGTH OF SERVICE

Service Group	Number	Earnings	
		Total	Average
0	0	\$0	\$0
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
0-4	0	0	0
5-9	0	0	0
10-14	0	0	0
15-19	0	0	0
20-24	1	94,515	94,515
25-29	0	0	0
30-34	0	0	0
35-39	11	769,891	69,990
40-44	4	277,410	69,352
45-49	2	112,641	56,320
Total	18	\$1,254,457	\$69,692

TABLE II-6

GROUP III

DISTRIBUTION OF ACTIVE PARTICIPANTS' EARNINGS
BY LENGTH OF SERVICE

Service Group	Number	Earnings	
		Total	Average
0	0	\$0	\$0
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
0-4	0	0	0
5-9	0	0	0
10-14	0	0	0
15-19	0	0	0
20-24	0	0	0
25-29	0	0	0
30-34	0	0	0
35-39	3	397,650	132,550
40-44	3	345,390	115,130
45-49	2	121,478	60,739
Total	8	\$864,518	\$108,064

TABLE II-7

TOTAL

DISTRIBUTION OF ACTIVE PARTICIPANTS' EARNINGS
BY LENGTH OF SERVICE

Service Group	Number	Earnings	
		Total	Average
0	12,856	\$408,332,834	\$31,762
1	11,867	381,613,211	32,158
2	10,509	355,455,846	33,824
3	8,671	295,005,342	34,022
4	8,553	298,104,431	34,854
0-4	52,456	1,738,511,664	33,142
5-9	48,238	1,797,007,826	37,253
10-14	37,145	1,533,815,501	41,293
15-19	26,704	1,202,347,415	45,025
20-24	17,804	858,350,360	48,211
25-29	14,882	754,083,623	50,671
30-34	7,068	381,345,559	53,954
35-39	4,207	250,889,451	59,636
40-44	1,194	78,185,453	65,482
45-49	266	17,340,274	65,189
Total	209,964	\$8,611,877,126	\$41,016

TABLE III
DISTRIBUTION OF CURRENT BENEFITS BY AGE GROUPS
RETIRED LIVES

Age Group	Number	Annual Benefit	
		Total	Average
1-20	0	\$0	\$0
21-25	0	0	0
26-30	3	54,733	18,244
31-35	18	186,613	10,367
36-40	74	651,225	8,800
41-45	169	1,306,069	7,728
46-50	487	4,398,628	9,032
51-55	2,599	40,894,514	15,735
56-60	11,237	196,046,539	17,447
61-65	27,340	447,919,735	16,383
66-70	28,694	458,066,060	15,964
71-75	20,813	321,276,956	15,436
76-80	15,243	226,863,787	14,883
81-85	10,833	152,012,691	14,032
86-90	10,061	119,452,887	11,873
Total	127,571	\$1,969,130,437	\$15,436

TABLE IV
DISTRIBUTION OF CURRENT BENEFITS BY YEARS SINCE RETIREMENT
RETIRED LIVES

Years Since Retirement	Number	Annual Benefit	
		Total	Average
0	5,973	\$90,793,768	\$15,201
1	9,270	144,738,488	15,614
2	8,278	136,504,637	16,490
3	7,166	117,036,591	16,332
4	7,975	129,931,545	16,292
0- 4	38,662	619,004,872	16,011
5-9	30,781	491,198,176	15,958
10-14	23,150	368,888,540	15,935
15-19	16,253	245,907,425	15,130
20-24	9,730	140,626,914	14,453
25-29	5,282	65,257,299	12,355
30-34	2,689	28,691,837	10,670
35-39	824	7,848,936	9,525
40-44	179	1,510,010	8,436
45-49	21	196,428	9,354
Total	127,571	\$1,969,130,437	\$15,436

TABLE V-1

MARKET VALUE OF ASSETS
July 1, 2013

<u>Asset Allocation</u>	<u>Market Value</u>
Total US Equity	\$13,220,876,164
Canada Index Fund	1,529,587,739
International Developed Markets	5,015,179,150
International Emerging Markets	1,458,565,018
US Fixed Income	10,674,788,956
International Fixed Income	31,920
Inflation Hedged Bond	2,696,319,897
Real Estate	1,830,160,160
Private Equity	273,051,696
Short Term Fund	791,586,282
Other ¹	<u>76,811,400</u>
Total Market Value	<u>\$37,566,958,382</u>

Note: The above breakdown was provided by the TCRS.

¹Other includes receivables and payables.

TABLE V-2

CHANGE IN MARKET VALUE OF ASSETS
July 1, 2013

	Contributory Teachers	Consolidated State	State Judges & Attorneys- General	Polisubs	Grand Total
Market Value of Assets at July 1, 2011	\$16,875,007,268	\$10,443,814,533	\$320,680,287	\$6,022,512,317	\$33,662,014,405
Employer Contributions	343,594,496	366,146,883	16,740,847	276,194,121	1,002,676,347
Employee Contributions	189,801,472	1,413,548	394,733	69,111,174	260,720,927
Investment Income	917,602,189	573,785,030	10,328,943	332,769,698	1,834,485,860
Benefit Payments	(872,812,731)	(621,747,437)	(19,461,798)	(255,776,234)	(1,769,798,200)
Refunds of Employee Contributions	(17,256,869)	(1,808,286)	(43,486)	(16,765,649)	(35,874,290)
Administrative Expense	(18,883,032)	(12,048,519)	(210,764)	(8,403,645)	(39,545,960)
Net Transfers ¹	9,644,260	(7,784,344)	334,989	(2,593,772)	(398,867)
Market Value of Assets at July 1, 2012	\$17,426,697,053	\$10,741,771,408	\$328,763,751	\$6,417,048,010	\$34,914,280,222
Employer Contributions	344,534,643	375,514,221	17,144,927	273,217,118	1,010,410,909
Employee Contributions	195,444,779	860,278	713,389	71,847,064	268,865,510
Investment Income	1,684,179,259	1,050,054,849	18,040,556	629,852,078	3,382,126,742
Benefit Payments	(947,493,127)	(674,527,496)	(19,935,204)	(281,660,968)	(1,923,616,795)
Refunds of Employee Contributions	(18,308,946)	(1,373,507)	0	(19,778,427)	(39,460,880)
Administrative Expense	(21,844,951)	(13,847,002)	(233,644)	(9,705,138)	(45,630,735)
Net Transfers ¹	(4,978,948)	4,290,563	323,085	348,709	(16,591)
Market Value of Assets at July 1, 2013	\$18,658,229,762	\$11,482,743,314	\$344,816,860	\$7,081,168,446	\$37,566,958,382

¹Net transfers within a given year may not reconcile to zero due to timing.

TABLE V-3
HISTORY OF INVESTMENT RETURNS
July 1, 2013

Year Ending	Investment Return
June 30, 2013	9.92 %
June 30, 2012	5.60
June 30, 2011	19.59
June 30, 2010	10.24
June 30, 2009	(15.27)
June 30, 2008	(1.21)
June 30, 2007	13.15
June 30, 2006	6.94
June 30, 2005	7.30
June 30, 2004	9.32
June 30, 2003	4.90
June 30, 2002	(1.92)
June 30, 2001	(1.57)
June 30, 2000	7.91
June 30, 1999	9.47
June 30, 1998	15.10
June 30, 1997	15.70
June 30, 1996	12.80
June 30, 1995	12.80
June 30, 1994	0.50

Note: The above investment returns are on a market value basis.

**TABLE V-4
ACTUARIAL VALUE OF ASSETS
July 1, 2013**

Year Ending	Actual Investment Return	Expected Investment Return at 7.50%	Excess Income Base	Recognized as of June 30, 2013	Deferred as of June 30, 2013
June 30, 2013	\$3,382,126,742	\$2,592,507,858	\$789,618,884	\$78,961,888	\$710,656,996
June 30, 2012	1,834,485,860	2,504,100,892	(669,615,032)	(133,923,006)	(535,692,026)
June 30, 2011	5,560,368,166	2,126,617,957	3,433,750,209	1,030,125,063	2,403,625,146
June 30, 2010	2,724,777,261	1,949,848,310	774,928,951	309,971,580	464,957,371
June 30, 2009	(4,836,986,786)	2,357,334,600	(7,194,321,386)	(3,597,160,695)	(3,597,160,691)
June 30, 2008	(405,332,444)	2,416,533,412	(2,821,865,856)	(1,693,119,516)	(1,128,746,340)
June 30, 2007	3,815,211,225	2,152,427,637	1,662,783,588	1,662,783,588	0
June 30, 2006	n/a	n/a	n/a	n/a	n/a
June 30, 2005	n/a	n/a	n/a	n/a	n/a
June 30, 2004	n/a	n/a	n/a	n/a	n/a
Total Deferred Income:					(\$1,682,359,544)

- | | |
|---|------------------------|
| 1. Market Value of Assets | \$37,566,958,382 |
| 2. Total Deferred Income | <u>(1,682,359,544)</u> |
| 3. Preliminary Actuarial Value of Assets, (1) - (2) | \$39,249,317,926 |
| 4. Actuarial Value of Assets, (3) but not less than 80%
of (1) or greater than 120% of (1) | \$39,249,317,926 |
| 5. Ratio of Actuarial Value to Market Value, (4) / (1) | 104.48% |

	Contributory Teachers	Consolidated State	State Judges & Attorneys- General	Polisubs	Grand Total
Market Value of Assets at July 1, 2013	\$18,658,229,762	\$11,482,743,314	\$344,816,860	\$7,081,168,446	\$37,566,958,382
Ratio of Actuarial Value to Market Value	104.48%	104.48%	104.48%	104.48%	104.48%
Actuarial Value of Assets at July 1, 2013	\$19,493,800,494	\$11,996,974,533	\$360,258,779	\$7,398,284,120	\$39,249,317,926

TABLE VI-1
AMOUNTS TO BE AMORTIZED
ROLLFORWARD

	Contributory Teachers	Consolidated State	State Judges & Attorneys General
2011 Unfunded Supplemental Liability	1,034,814,934	1,472,856,583	81,774,775
Contribution	205,080,963	214,786,551	7,837,367
Interest	62,230,048	94,355,252	5,545,306
2012 Unfunded Supplemental Liability	891,964,019	1,352,425,284	79,482,714
Contribution	205,080,963	214,786,551	7,837,367
Interest	51,516,229	85,322,905	5,373,401
2013 Unfunded Supplemental Liability	738,399,285	1,222,961,638	77,018,748
Amortization Period	4 years	7 years	16 years
Amortization Payment	205,080,963	214,786,552	7,837,367
Eligible Payroll	3,747,220,849	2,407,296,133	82,412,564
Contribution as % of Pay	5.473%	8.922%	9.510%

TABLE VI-2
AMOUNTS TO BE AMORTIZED
REESTABLISHMENT OF UNFUNDED ACCRUED LIABILITY
July 1, 2013

	Contributory Teachers	Consolidated State	State Judges & Attorneys General
Entry Age Past Service Liability	20,300,590,638	13,357,266,027	465,703,540
Valuation Assets	19,493,800,494	11,996,974,533	360,258,779
Unfunded Accrued Liability	806,790,144	1,360,291,494	105,444,761
Amortization Period	8 years	13 years	16 years
Amortization Payment	128,131,051	155,723,888	10,729,976
Eligible Payroll	3,747,220,849	2,407,296,133	82,412,564
Contribution as % of Pay	3.419%	6.469%	13.020%

TABLE VII

CALCULATION OF CONTRIBUTION RATES

	Contributory Teachers	Consolidated State	State Judges & Attorneys General
1. Present Value of Benefits	24,044,517,394	15,002,091,045	522,546,188
2. Current Members' Fund	3,186,908,392	526,123,272	46,883,926
3. Current State Accumulation Fund	16,306,892,102	11,470,851,261	313,374,853
4. Present Value of Future			
Employee Contributions	1,842,985,351	11,127	1,474,282
5. Unfunded Accrued Liability	806,790,144	1,360,291,494	105,444,761
6. Present Value of Future			
Normal Costs,			
((1)-(2)-(3)-(4)-(5))	1,900,941,405	1,644,813,891	55,368,366
7. Present Value of Future Salaries	36,860,307,742	20,583,882,623	622,982,201
8. Normal/Aggregate Cost			
Percentage ((6)/(7))	5.157%	7.991%	8.888%
9. Unfunded Accrued			
Liability Percentage			
(Table VI-2)	3.419%	6.469%	13.020%
10. Total Contribution Rate			
((8)+(9)) x 1.0375+0.14%	9.038%	15.142%	22.869%

TABLE VIII

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

PRIOR ASSUMPTIONS

The actuarial assumptions and methods set forth below have been selected by the actuary based on results of an actuarial experience study covering the period from July 1, 2004 through June 30, 2008 and expectations regarding future events and economic conditions.

The assumptions and methods were adopted as of July 1, 2009 unless otherwise noted.

Actuarial Funding Method:

Frozen Initial Liability. Unfunded accrued liabilities were originally established and funded over the 40-year period commencing in 1975. If, through reestablishment, no unfunded accrued liabilities are recognized, the aggregate actuarial funding method is utilized. Effective July 1, 2009, unfunded accrued liabilities were reestablished and were amortized over a 20-year period. Effective July 1, 2011, the amortization period was reset to 6 years for Teachers and 9 years for the State.

Asset Valuation Method:

(Effective for fiscal years ending on or before June 30, 2007):

Five-year moving market value average. Earnings in excess of or below expected investment returns are recognized over a five year period. Investment gains and losses are applied to offset accumulated investment gains or losses prior to determining the amount of earnings to be phased in.

(Effective prospectively for fiscal years ending after June 30, 2007):

Ten-year moving market value average. Earnings in excess of or below expected investment returns are recognized over a ten year period. In no event will the actuarial value of assets be less than 80% of the market value of assets or greater than 120% of the market value of assets.

Interest Rate:

7.5% per annum, compounded annually

TABLE VIII (Continued)

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

PRIOR ASSUMPTIONS

Salary Increases:

Salary increase rates vary by age. Sample rates are shown below.

<u>Age</u>	<u>Rate</u>
20	9.49%
30	7.25
40	5.86
50	4.79
60	4.30
65	4.22

Increase in Social Security Wage Base:

3.5% annual increase

Cost of Living Adjustment:

2.5% annual increase in monthly retirement benefits

Inflation:

3.0% annual rate of inflation is assumed in establishing economic assumptions

Marital Status:

(a) Percent married --

Eligible for service retirement – 80%

Ineligible for service retirement – 75%

(b) Age difference – males are assumed to be four years older than spouse

TABLE VIII (Continued)

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

PRIOR ASSUMPTIONS

Post Retirement Mortality:

Age	Annual Rate of Mortality After					
	Service Retirement				Disability Retirement	
	Teachers and Group III		Others		Male	Female
	Male	Female	Male	Female	Male	Female
40	0.1%	0.1%	0.2%	0.1%	2.6%	2.6%
50	0.3	0.2	0.4	0.2	3.3	3.3
55	0.5	0.3	0.7	0.4	3.7	3.7
60	0.6	0.5	1.0	0.7	4.1	4.1
65	1.0	0.7	1.4	0.9	4.6	4.6
70	1.8	1.1	2.2	1.3	5.5	5.5
75	3.0	1.9	3.8	2.3	6.9	6.9
80	5.2	3.4	6.5	4.3	9.2	9.2
85	9.3	6.5	10.2	7.2	12.9	12.9
90	17.7	12.7	16.7	13.7	18.4	18.4
95	27.0	19.8	24.6	22.5	26.4	26.4

The mortality assumptions include mortality improvements through June 30, 2008 (the most recent experience study observation date). There is no assumed mortality improvement beyond this date.

Separations from Service:

Representative values of the assumed annual rates of death, disability, withdrawal and service retirement for the various membership groups are shown on the following pages.

TABLE VIII (Continued)

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

PRIOR ASSUMPTIONS

GROUP I

TEACHERS

MALE

Age	Mortality	Disability	Annual Rate of Withdrawal		
			First Year	Second Year	Later
20	0.02%	0.01%	18.0%	13.5%	10.0%
25	0.02	0.01	18.0	13.5	8.5
30	0.03	0.01	18.0	13.5	6.0
35	0.05	0.03	18.0	13.5	3.6
40	0.06	0.08	18.0	13.5	2.0
45	0.09	0.14	18.4	13.5	1.5
50	0.13	0.17	19.7	14.2	2.0
55	0.18	0.17	22.1	16.8	3.1
60	0.29	--	25.5	21.6	4.7
65	0.45	--	28.0	23.5	--

TABLE VIII (Continued)

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

PRIOR ASSUMPTIONS

GROUP I

TEACHERS

FEMALE

Age	Mortality	Disability	Annual Rate of Withdrawal		
			First Year	Second Year	Later
20	0.01%	0.01%	18.0%	13.5%	10.5%
25	0.01	0.01	18.0	13.5	10.0
30	0.02	0.01	18.0	13.5	7.6
35	0.03	0.03	18.0	13.5	4.6
40	0.04	0.08	18.0	13.5	2.3
45	0.07	0.14	18.4	13.5	1.1
50	0.10	0.17	19.7	14.2	1.6
55	0.15	0.17	22.1	16.8	3.8
60	0.24	--	25.5	21.6	5.0
65	0.35	--	28.0	23.5	--

TABLE VIII (Continued)

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

PRIOR ASSUMPTIONS

GROUP I

GENERAL EMPLOYEES

MALE

Age	Mortality	Disability		Annual Rate of Withdrawal					
		State	Polisubs	First Year		Second Year		Later	
				State	Polisubs	State	Polisubs	State	Polisubs
20	0.03%	0.06%	0.03%	30.0%	26.2%	24.6%	21.8%	17.8%	13.7%
25	0.03	0.06	0.03	25.4	23.0	21.4	19.1	14.4	10.3
30	0.04	0.07	0.03	23.0	21.8	18.6	17.9	9.6	7.4
35	0.06	0.11	0.03	20.8	20.7	16.1	17.0	5.2	5.1
40	0.09	0.16	0.08	18.6	19.2	13.8	15.9	2.6	3.5
45	0.12	0.22	0.20	16.5	17.7	12.0	14.1	1.8	2.8
50	0.17	0.27	0.38	14.8	17.0	11.1	13.0	2.2	2.8
55	0.24	0.27	0.49	15.3	17.4	11.6	13.0	2.6	3.6
60	0.39	--	--	17.9	20.4	14.4	14.9	4.3	4.6
65	0.61	--	--	24.0	26.3	20.5	19.1	--	--

TABLE VIII (Continued)

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

PRIOR ASSUMPTIONS

GROUP I

GENERAL EMPLOYEES

FEMALE

Age	Mortality	Disability		Annual Rate of Withdrawal					
		State	Polisubs	First Year		Second Year		Later	
				State	Polisubs	State	Polisubs	State	Polisubs
20	0.02%	0.03%	0.03%	30.0%	26.2%	24.6%	21.8%	18.3%	19.6%
25	0.02	0.03	0.03	25.4	23.0	21.4	19.1	14.8	15.1
30	0.02	0.04	0.03	23.0	21.8	18.6	17.9	10.3	11.1
35	0.04	0.06	0.03	20.8	20.7	16.1	17.0	6.3	7.7
40	0.06	0.14	0.08	18.6	19.2	13.8	15.9	3.4	5.4
45	0.09	0.24	0.20	16.5	17.7	12.0	14.1	2.2	4.1
50	0.13	0.33	0.38	14.8	17.0	11.1	13.0	2.3	3.8
55	0.20	0.38	0.49	15.3	17.4	11.6	13.0	3.4	4.3
60	0.31	--	--	17.9	20.4	14.4	14.9	4.9	5.3
65	0.47	--	--	24.0	26.3	20.5	19.1	--	--

TABLE VIII (Continued)

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

PRIOR ASSUMPTIONS

GROUP II

Age	Mortality		Disability		Withdrawal	
	Male	Female	Male	Female	Male	Female
20	0.03%	0.02%	0.06%	0.03%	7.50%	7.50%
25	0.03	0.02	0.06	0.03	7.50	7.50
30	0.04	0.02	0.07	0.04	7.50	7.50
35	0.06	0.04	0.11	0.06	7.50	7.50
40	0.09	0.06	0.16	0.14	7.50	7.50
45	0.12	0.09	0.22	0.24	7.50	7.50
50	0.17	0.13	0.27	0.33	7.50	7.50
55	0.24	0.20	0.27	0.38	7.50	7.50
60	0.39	0.31	--	--	7.50	7.50
65	0.61	0.47	--	--	--	--

TABLE VIII (Continued)

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

PRIOR ASSUMPTIONS

GROUP III

Age	Mortality		Disability		Withdrawal	
	Male	Female	Male	Female	Male	Female
20	0.02%	0.01%	0.01%	0.01%	--	--
25	0.02	0.01	0.01	0.01	--	--
30	0.03	0.02	0.01	0.01	--	--
35	0.05	0.03	0.03	0.03	--	--
40	0.06	0.04	0.08	0.08	--	--
45	0.09	0.07	0.14	0.14	--	--
50	0.13	0.10	0.17	0.17	--	--
55	0.18	0.15	0.17	0.17	--	--
60	0.29	0.24	--	--	--	--
65	0.45	0.35	--	--	--	--

TABLE VIII (Continued)

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

PRIOR ASSUMPTIONS

SERVICE RETIREMENT RATES

The following rates are applied at each age at which a member is eligible for an unreduced service retirement benefit.

MALE

<u>Age</u>	<u>Teachers</u>	<u>State</u>	<u>Polisubs</u>	<u>Group II</u>	<u>Group III</u>
50	6.5%	6.0%	9.0%	10.0%	--
51	7.0	6.0	9.0	10.0	8.0%
52	7.0	6.0	9.0	15.0	8.0
53	8.5	6.0	9.0	15.0	8.0
54	9.0	6.5	9.0	20.0	8.0
55	10.0	6.5	9.0	20.0	9.6
56	12.0	7.0	9.0	20.0	9.6
57	12.0	7.0	9.5	20.0	9.6
58	13.0	7.5	9.5	25.0	9.6
59	14.0	8.0	10.0	25.0	9.6
60	15.0	8.5	10.5	30.0	9.6
61	16.0	11.0	15.0	30.0	9.6
62	22.0	16.0	20.0	45.0	20.0
63	16.0	12.0	17.5	35.0	9.6
64	18.0	14.0	17.5	35.0	9.6
65	35.0	22.0	24.0	40.0	20.0
66	16.0	15.5	18.5	40.0	20.0
67	16.0	15.5	16.0	40.0	20.0
68	16.0	15.5	16.0	100.0	20.0
69	16.0	15.5	16.5	100.0	20.0
70	16.0	15.5	18.0	100.0	20.0
71	17.0	15.5	18.0	100.0	100.0
72	17.0	15.5	18.0	100.0	100.0
73	17.0	15.5	18.0	100.0	100.0
74	17.0	15.5	18.0	100.0	100.0
75	100.0	100.0	100.0	100.0	100.0

Additional increments for retirees who have fifteen or more years of service at retirement on or after age 60

8.0%	2.0%	2.0%	na	na
------	------	------	----	----

Additional increments for retirees in the year in which they are first eligible for unreduced retirement prior to age 60

12.5%	7.5%	7.5%	15.0%	na
-------	------	------	-------	----

TABLE VIII (Continued)

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

PRIOR ASSUMPTIONS

SERVICE RETIREMENT RATES

The following rates are applied at each age at which a member is eligible for an unreduced service retirement benefit.

FEMALE

<u>Age</u>	<u>Teachers</u>	<u>State</u>	<u>Polisubs</u>	<u>Group II</u>	<u>Group III</u>
50	6.5%	7.5%	8.0%	10.0%	--
51	7.0	7.5	8.0	10.0	8.0%
52	8.0	7.5	8.0	15.0	8.0
53	9.0	7.5	8.0	15.0	8.0
54	10.0	7.5	8.0	20.0	8.0
55	10.0	7.5	8.0	20.0	9.6
56	12.0	8.0	9.0	20.0	9.6
57	14.0	8.0	9.5	20.0	9.6
58	14.0	8.0	10.0	25.0	9.6
59	15.0	8.0	11.0	25.0	9.6
60	17.0	9.0	11.0	30.0	9.6
61	20.0	12.0	13.0	30.0	9.6
62	26.0	18.0	18.0	45.0	20.0
63	19.5	12.0	16.0	35.0	9.6
64	24.0	14.0	16.0	35.0	9.6
65	37.5	22.0	22.0	40.0	20.0
66	24.0	17.0	19.0	40.0	20.0
67	24.0	17.0	19.0	40.0	20.0
68	24.0	17.0	19.0	100.0	20.0
69	24.0	17.0	19.0	100.0	20.0
70	34.0	17.0	19.0	100.0	20.0
71	40.0	17.0	19.0	100.0	100.0
72	40.0	17.0	19.0	100.0	100.0
73	40.0	17.0	19.0	100.0	100.0
74	40.0	17.0	19.0	100.0	100.0
75	100.0	100.0	100.0	100.0	100.0

Additional increments for retirees who have fifteen or more years of service at retirement on or after age 60

8.0%	2.0%	2.0%	na	na
------	------	------	----	----

Additional increments for retirees in the year in which they are first eligible for unreduced retirement prior to age 60

12.5%	7.5%	7.5%	15.0%	na
-------	------	------	-------	----

TABLE IX

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

REVISED ASSUMPTIONS

The actuarial assumptions and methods set forth below have been selected by the actuary based on results of an actuarial experience study covering the period from July 1, 2008 through June 30, 2012 and expectations regarding future events and economic conditions.

The assumptions and methods were adopted as of July 1, 2013 unless otherwise noted.

Actuarial Funding Method:

Frozen Initial Liability. Unfunded accrued liabilities were originally established and funded over the 40-year period commencing in 1975. If, through reestablishment, no unfunded accrued liabilities are recognized, the aggregate actuarial funding method is utilized. Effective July 1, 2013, unfunded accrued liabilities were reestablished for all groups and the amortization period was reset to 8 years for Teachers and 13 years for the State. The amortization period for the State Judges and Attorneys General was previously reset to 20 years effective July 1, 2009 and continues on that schedule.

Asset Valuation Method:

(Effective for fiscal years ending on or before June 30, 2007):

Five-year moving market value average. Earnings in excess of or below expected investment returns are recognized over a five year period. Investment gains and losses are applied to offset accumulated investment gains or losses prior to determining the amount of earnings to be phased in.

(Effective prospectively for fiscal years ending after June 30, 2007):

Ten-year moving market value average. Earnings in excess of or below expected investment returns are recognized over a ten year period. In no event will the actuarial value of assets be less than 80% of the market value of assets or greater than 120% of the market value of assets.

Interest Rate:

7.5% per annum, compounded annually

TABLE IX (Continued)

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

REVISED ASSUMPTIONS

Salary Increases:

Salary increase rates vary by age. Sample rates are shown below.

<u>Age</u>	<u>Rate</u>
20	8.97%
30	6.73
40	5.35
50	4.27
60	3.79
65	3.71

Increase in Social Security Wage Base:

3.5% annual increase

Cost of Living Adjustment:

2.5% annual increase in monthly retirement benefits

Inflation:

3.0% annual rate of inflation is assumed in establishing economic assumptions

Marital Status:

- (a) Percent married --
 - Eligible for service retirement – 80%
 - Ineligible for service retirement – 75%

- (b) Age difference – males are assumed to be four years older than spouse

TABLE IX (Continued)

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

REVISED ASSUMPTIONS

Post Retirement Mortality:

Age	Annual Rate of Mortality After					
	Service Retirement				Disability Retirement	
	Teachers and Group III		Others		Male	Female
	Male	Female	Male	Female	Male	Female
40	0.1%	0.1%	0.1%	0.1%	1.8%	1.4%
50	0.2	0.1	0.3	0.2	2.6	1.8
55	0.3	0.2	0.5	0.4	3.2	2.1
60	0.4	0.4	0.9	0.7	4.0	2.5
65	0.8	0.6	1.2	0.9	4.9	3.0
70	1.4	0.9	2.0	1.2	6.3	3.6
75	2.5	1.5	3.5	2.2	8.5	4.9
80	4.6	3.0	6.1	3.8	10.9	6.6
85	8.8	6.2	10.2	6.7	14.2	9.2
90	15.6	12.1	16.5	13.3	18.9	13.5
95	24.6	19.6	24.5	22.4	25.7	20.3

The mortality assumptions include observed mortality improvements through June 30, 2012 (the most recent experience study observation date). The Service Retirement rates also include an additional 2 years of projected mortality improvement beyond this date under Projection Scale AA.

Separations from Service:

Representative values of the assumed annual rates of death, disability, withdrawal and service retirement for the various membership groups are shown on the following pages.

TABLE IX (Continued)

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

REVISED ASSUMPTIONS

GROUP I

TEACHERS

MALE

Age	Mortality	Disability	Annual Rate of Withdrawal		
			First Year	Second Year	Later
20	0.02%	0.01%	18.0%	13.5%	10.0%
25	0.03	0.01	18.0	13.5	8.5
30	0.04	0.01	18.0	13.5	6.0
35	0.07	0.03	18.0	13.5	3.6
40	0.09	0.08	18.0	13.5	2.0
45	0.11	0.14	18.4	13.5	1.5
50	0.13	0.17	19.7	14.2	2.0
55	0.18	0.17	22.1	16.8	3.1
60	0.32	--	25.5	21.6	4.7
65	0.52	--	28.0	23.5	--

TABLE IX (Continued)

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

REVISED ASSUMPTIONS

GROUP I

TEACHERS

FEMALE

Age	Mortality	Disability	Annual Rate of Withdrawal		
			First Year	Second Year	Later
20	0.01%	0.01%	18.0%	13.5%	10.5%
25	0.01	0.01	18.0	13.5	10.0
30	0.02	0.01	18.0	13.5	7.6
35	0.04	0.03	18.0	13.5	4.6
40	0.05	0.08	18.0	13.5	2.3
45	0.07	0.14	18.4	13.5	1.1
50	0.11	0.17	19.7	14.2	1.6
55	0.20	0.17	22.1	16.8	3.8
60	0.34	--	25.5	21.6	5.0
65	0.51	--	28.0	23.5	--

TABLE IX (Continued)

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

REVISED ASSUMPTIONS

GROUP I

GENERAL EMPLOYEES

MALE

Age	Mortality	Disability		Annual Rate of Withdrawal					
		State	Polisubs	First Year		Second Year		Later	
				State	Polisubs	State	Polisubs	State	Polisubs
20	0.02%	0.06%	0.03%	30.0%	26.2%	24.6%	21.8%	17.8%	13.7%
25	0.03	0.06	0.03	25.4	23.0	21.4	19.1	14.4	10.3
30	0.04	0.07	0.03	23.0	21.8	18.6	17.9	9.6	7.4
35	0.07	0.11	0.03	20.8	20.7	16.1	17.0	5.2	5.1
40	0.09	0.16	0.08	18.6	19.2	13.8	15.9	2.6	3.5
45	0.11	0.22	0.20	16.5	17.7	12.0	14.1	1.8	2.8
50	0.13	0.27	0.38	14.8	17.0	11.1	13.0	2.2	2.8
55	0.18	0.27	0.49	15.3	17.4	11.6	13.0	2.6	3.6
60	0.32	--	--	17.9	20.4	14.4	14.9	4.3	4.6
65	0.52	--	--	24.0	26.3	20.5	19.1	--	--

TABLE IX (Continued)

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

REVISED ASSUMPTIONS

GROUP I

GENERAL EMPLOYEES

FEMALE

Age	Mortality	Disability		Annual Rate of Withdrawal					
		State	Polisubs	First Year		Second Year		Later	
				State	Polisubs	State	Polisubs	State	Polisubs
20	0.01%	0.03%	0.03%	30.0%	26.2%	24.6%	21.8%	18.3%	19.6%
25	0.01	0.03	0.03	25.4	23.0	21.4	19.1	14.8	15.1
30	0.02	0.04	0.03	23.0	21.8	18.6	17.9	10.3	11.1
35	0.04	0.06	0.03	20.8	20.7	16.1	17.0	6.3	7.7
40	0.05	0.14	0.08	18.6	19.2	13.8	15.9	3.4	5.4
45	0.07	0.24	0.20	16.5	17.7	12.0	14.1	2.2	4.1
50	0.11	0.33	0.38	14.8	17.0	11.1	13.0	2.3	3.8
55	0.20	0.38	0.49	15.3	17.4	11.6	13.0	3.4	4.3
60	0.34	--	--	17.9	20.4	14.4	14.9	4.9	5.3
65	0.51	--	--	24.0	26.3	20.5	19.1	--	--

TABLE VIII (Continued)

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

PRIOR ASSUMPTIONS

GROUP II

Age	Mortality		Disability		Withdrawal	
	Male	Female	Male	Female	Male	Female
20	0.02%	0.01%	0.06%	0.03%	7.50%	7.50%
25	0.03	0.01	0.06	0.03	7.50	7.50
30	0.04	0.02	0.07	0.04	7.50	7.50
35	0.07	0.04	0.11	0.06	7.50	7.50
40	0.09	0.05	0.16	0.14	7.50	7.50
45	0.11	0.07	0.22	0.24	7.50	7.50
50	0.13	0.11	0.27	0.33	7.50	7.50
55	0.18	0.20	0.27	0.38	7.50	7.50
60	0.32	0.34	--	--	7.50	7.50
65	0.52	0.51	--	--	--	--

TABLE VIII (Continued)

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

PRIOR ASSUMPTIONS

GROUP III

Age	Mortality		Disability		Withdrawal	
	Male	Female	Male	Female	Male	Female
20	0.02%	0.01%	0.01%	0.01%	--	--
25	0.03	0.01	0.01	0.01	--	--
30	0.04	0.02	0.01	0.01	--	--
35	0.07	0.04	0.03	0.03	--	--
40	0.09	0.05	0.08	0.08	--	--
45	0.11	0.07	0.14	0.14	--	--
50	0.13	0.11	0.17	0.17	--	--
55	0.18	0.20	0.17	0.17	--	--
60	0.32	0.34	--	--	--	--
65	0.52	0.51	--	--	--	--

TABLE IX (Continued)

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

REVISED ASSUMPTIONS

SERVICE RETIREMENT RATES

The following rates are applied at each age at which a member is eligible for an unreduced service retirement benefit.

MALE

<u>Age</u>	<u>Teachers</u>	<u>State</u>	<u>Polisubs</u>	<u>Group II</u>	<u>Group III</u>
50	6.5%	6.0%	9.0%	10.0%	--
51	7.0	6.0	9.0	10.0	8.0%
52	7.0	6.0	9.0	15.0	8.0
53	8.5	6.0	9.0	15.0	8.0
54	9.0	6.5	9.0	20.0	8.0
55	10.0	6.5	9.0	20.0	9.6
56	12.0	7.0	9.0	20.0	9.6
57	12.0	7.0	9.5	20.0	9.6
58	13.0	7.5	9.5	25.0	9.6
59	14.0	8.0	10.0	25.0	9.6
60	15.0	8.5	10.5	30.0	9.6
61	16.0	11.0	15.0	30.0	9.6
62	22.0	16.0	20.0	45.0	20.0
63	16.0	12.0	17.5	35.0	9.6
64	18.0	14.0	17.5	35.0	9.6
65	35.0	22.0	24.0	40.0	20.0
66	16.0	15.5	18.5	40.0	20.0
67	16.0	15.5	16.0	40.0	20.0
68	16.0	15.5	16.0	100.0	20.0
69	16.0	15.5	16.5	100.0	20.0
70	16.0	15.5	18.0	100.0	20.0
71	17.0	15.5	18.0	100.0	100.0
72	17.0	15.5	18.0	100.0	100.0
73	17.0	15.5	18.0	100.0	100.0
74	17.0	15.5	18.0	100.0	100.0
75	100.0	100.0	100.0	100.0	100.0

Additional increments for retirees who have fifteen or more years of service at retirement on or after age 60

8.0%	2.0%	2.0%	na	na
------	------	------	----	----

Additional increments for retirees in the year in which they are first eligible for unreduced retirement prior to age 60

12.5%	7.5%	7.5%	15.0%	na
-------	------	------	-------	----

TABLE IX (Continued)

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

REVISED ASSUMPTIONS

SERVICE RETIREMENT RATES

The following rates are applied at each age at which a member is eligible for an unreduced service retirement benefit.

FEMALE

<u>Age</u>	<u>Teachers</u>	<u>State</u>	<u>Polisubs</u>	<u>Group II</u>	<u>Group III</u>
50	6.5%	7.5%	8.0%	10.0%	--
51	7.0	7.5	8.0	10.0	8.0%
52	8.0	7.5	8.0	15.0	8.0
53	9.0	7.5	8.0	15.0	8.0
54	10.0	7.5	8.0	20.0	8.0
55	10.0	7.5	8.0	20.0	9.6
56	12.0	8.0	9.0	20.0	9.6
57	14.0	8.0	9.5	20.0	9.6
58	14.0	8.0	10.0	25.0	9.6
59	15.0	8.0	11.0	25.0	9.6
60	17.0	9.0	11.0	30.0	9.6
61	20.0	12.0	13.0	30.0	9.6
62	26.0	18.0	18.0	45.0	20.0
63	19.5	12.0	16.0	35.0	9.6
64	24.0	14.0	16.0	35.0	9.6
65	37.5	22.0	22.0	40.0	20.0
66	24.0	17.0	19.0	40.0	20.0
67	24.0	17.0	19.0	40.0	20.0
68	24.0	17.0	19.0	100.0	20.0
69	24.0	17.0	19.0	100.0	20.0
70	34.0	17.0	19.0	100.0	20.0
71	40.0	17.0	19.0	100.0	100.0
72	40.0	17.0	19.0	100.0	100.0
73	40.0	17.0	19.0	100.0	100.0
74	40.0	17.0	19.0	100.0	100.0
75	100.0	100.0	100.0	100.0	100.0

Additional increments for retirees who have fifteen or more years of service at retirement on or after age 60

8.0%	2.0%	2.0%	na	na
------	------	------	----	----

Additional increments for retirees in the year in which they are first eligible for unreduced retirement prior to age 60

12.5%	7.5%	7.5%	15.0%	na
-------	------	------	-------	----

TABLE X

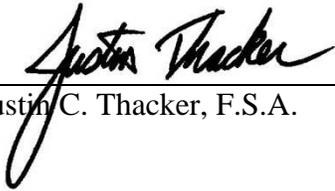
**EFFECT OF REVISED ACTUARIAL METHODS AND ASSUMPTIONS
ON KEY VALUATION RESULTS**

	Prior Assumptions	Revised Assumptions
Present Value of Benefits		
Contributory Teachers	24,091,154,907	24,044,517,394
Consolidated State	15,026,220,622	15,002,091,045
State Judges & Attorneys General	520,036,170	522,546,188
Political Subdivisions	9,604,567,549	9,488,571,593
Entry Age Past Service Liability		
Contributory Teachers	19,953,255,517	20,300,590,638
Consolidated State	13,222,622,507	13,357,266,027
State Judges & Attorneys General	458,366,750	465,703,540
Political Subdivisions	7,750,138,822	7,789,873,675
Present Value of Future Salaries		
Contributory Teachers	38,378,268,614	36,860,307,742
Consolidated State	21,297,781,674	20,583,882,623
State Judges & Attorneys General	642,823,678	622,982,201
Political Subdivisions	20,787,248,184	20,110,289,602
Present Value of Future Employee Contributions		
Contributory Teachers	1,918,883,150	1,842,985,351
Consolidated State	N/A	N/A
State Judges & Attorneys General	1,535,784	1,474,282
Political Subdivisions	582,979,367	564,031,054

TABLE XI

ACTUARIAL CERTIFICATION

The actuarial valuation summarized in this report has been performed utilizing generally accepted actuarial principles and is based on the current provisions of the TCRS and on actuarial assumptions which we consider to be internally consistent and reasonably related, in the aggregate, to experience under the plan and to reasonable expectations. The valuation was performed in accordance with principles of practice prescribed by the Actuarial Standards Board, by me personally or by other qualified actuaries under my direct supervision. I am a member of the American Academy of Actuaries and have experience in performing valuations for public retirement systems. It is our opinion that the results fully and fairly disclose the actuarial position of the plan on the valuation date.



Justin C. Thacker, F.S.A.

February 20, 2014

Date



Timothy C. Lavender, F.S.A

February 20, 2014

Date