GRS Gabriel Roeder Smith & Company
Consultants & Actuaries

# SOUTH CAROLINA RETIREMENT SYSTEM (SCRS)

*ACTUARIAL VALUATION REPORT*

*AS OF JULY 1, 2016*

GRS

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December 8, 2016

Public Employee Benefit Authority
South Carolina Retirement Systems
P.O. Box 11960
Columbia, SC 29211-1960

**Subject: Actuarial Valuation as of July 1, 2016**

Dear Members of the Board:

This report describes the current actuarial condition of the South Carolina Retirement System (SCRS), determines the calculated employer and member contribution rates, and analyzes changes in the System's financial condition. In addition, the report provides various summaries of the data. A separate report is issued with regard to valuation results determined in accordance with Governmental Accounting Standards Board (GASB) Statements 67 and 68. Results of this report should not be used for any other purpose without consultation with the undersigned. Valuations are prepared annually as of July 1, the first day of the plan year for SCRS. This report was prepared at the request of the Board of Directors of the South Carolina Public Employee Benefit Authority (Board) and is intended for use by the Public Employee Benefit Authority (PEBA) staff and those designated or approved by the Board.

## Financing Objectives and Funding Policy

The employer and member contribution rate is determined in accordance with Section 9-1-1085 of the South Carolina Code. As specified by the Code, in the event the scheduled employer and member contribution rate is insufficient to maintain a thirty-year amortization period for financing the unfunded liability of the System, the Board shall increase the employer and member contribution rates in equal amounts, as necessary, to maintain a funding period that does not exceed thirty years. The Statute also allows the Board to increase the member and employer contribution rate by up to 50 basis points in a year, even if the funding period is less than 30 years. The contribution rate determined by a given actuarial valuation becomes effective twenty-four months after the valuation date. In other words, the contribution rate determined by this July 1, 2016 actuarial valuation will be used by the Board when certifying the employer and member contribution rates for the year beginning July 1, 2018 and ending June 30, 2019.

Since the employer and member contribution rates that are in effect as of July 1, 2016 are no longer sufficient to maintain a funding period that does not exceed 30 years as of this valuation date, the required contribution rate increase must increase to 11.99% of pay for the employer and 9.09% of pay for the member to decrease the funding period to 30 years. The Board may also wish to consider increasing the contribution rates, as permitted by State Statute, to further improve in the financial security of the system.

According to State code, the Board is not permitted to decrease the employer and member contribution rates until the funded ratio of the plan is at least 90%. Also, any change in the rates must maintain the 2.90% differential between the employer and member contribution rates.

If new legislation is enacted between the valuation date and the date the contribution rate becomes effective, the Board may adjust the calculated rate before certifying them, in order to reflect this new legislation. Such adjustments are based on information supplied by the actuary.

### PROGRESS TOWARD REALIZATION OF FINANCING OBJECTIVES

The funded ratio (the ratio of the actuarial value of assets to the actuarial accrued liability) is a standard measure of a plan's funded status. In the absence of benefit improvements, it should increase over time, until it reaches at least 100%.

The funded ratio of the System decreased from 62.0% to 59.5%. Absent favorable investment or liability experience, we expect the funded ratio will slightly decrease for the next several years before it begins to gradually improve.

If the market value of assets had been used in the calculation instead of the actuarial (smoothed) value of assets, the funded ratio for the System would have been 52.3%, compared to 57.0% in the prior year. The decrease in the funded ratio on a market value basis is primarily due to the use of updated actuarial assumptions and unfavorable investment experience during the last fiscal year. Specifically, the market value of assets earned a -0.47% return determined using the method specified by GASB 67 and reported in the financial statement of the South Carolina Retirement Systems for the year ending June 30, 2016. The -0.7% return documented in this report was determined on a dollar-weighted basis and is net of expenses and assumed mid-year cash flows.

### ASSUMPTIONS AND METHODS

South Carolina State Code also requires that an experience analysis that reviews the economic and demographic assumptions be performed at least every five years. An experience study was conducted for the five-year period ending June 30, 2015. The following is a summary of the assumptions that were adopted by the Board and used in preparing this actuarial valuation:

- Decrease the price inflation assumption from 2.75% to 2.25%.
- Decrease in the assumed rate of salary increases for individual members.
- Decrease the payroll growth assumption from 3.50% to 3.00%.
- Adopt new post-retirement mortality tables specific to South Carolina retiree experience. Mortality for retirees is assumed to improve based on generational projection Scale AA.
- Minor adjustments to the pre-retirement mortality assumption.
- Modify the rates of withdrawal and retirement for state.

- Modify the asset method such that each year's investment gain or loss (determined on a market value of asset basis) is recognized over a closed five-year period at the rate of 20% per year.

The investment return assumption is a prescribed assumption in Section 9-16-335 in South Carolina State Code and remains at 7.50% investment return assumption.

It is our opinion that the current assumptions are internally consistent and reasonably reflect the anticipated future experience of the System.

The results of the actuarial valuation are dependent on the actuarial assumptions used. Actual results can, and almost certainly will, differ as actual experience deviates from the assumptions. Even seemingly minor changes in the assumptions can materially change the liabilities, calculated contribution rate, and funding periods. The actuarial calculations are intended to provide information for rational decision making.

**BENEFIT PROVISIONS**

The benefit provisions reflected in this valuation are those which were in effect on July 1, 2016. There were no legislative changes enacted since the previous valuation that had a measurable effect on the current valuation.

**DATA**

Member data for retired, active and inactive members was supplied as of July 1, 2016, by the PEBA staff. The staff also supplied asset information as of July 1, 2016. We did not audit this data, but we did apply a number of tests to the data, and we concluded that it was reasonable and consistent with the prior year's data. GRS is not responsible for the accuracy or completeness of the information provided to us by PEBA.

**CERTIFICATION**

We certify that the information presented herein is accurate and fairly portrays the actuarial position of SCRS as of July 1, 2016.

All of our work conforms with generally accepted actuarial principles and practices, and is in conformity with the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, our calculations also comply with the requirements of South Carolina Code of Laws and, where applicable, the Internal Revenue Code, ERISA, and the Statements of the Governmental Accounting Standards Board.

The undersigned are independent actuaries and consultants. Mr. Newton and Mr. White are Enrolled Actuaries and Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries. Both are experienced in performing valuations for large public retirement systems.

Sincerely,

**Gabriel, Roeder, Smith & Co.**

Joseph P. Newton, FSA, MAAA, EA
Senior Consultant

Daniel J. White, FSA, MAAA, EA
Senior Consultant

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# SECTION A

## EXECUTIVE SUMMARY

# Executive Summary

**(Dollar amounts expressed in thousands)**

| | Valuation Date: | |
|---|---|---|
| | July 1, 2016 | July 1, 2015 |
| **Membership** | | |
| • Number of | | |
| - Active Members | 190,923 | 187,318 |
| - TERI Members | 8,332 | 8,765 |
| - Retirees and Beneficiaries | 129,523 | 125,875 |
| - Inactive Members | 169,806 | 164,509 |
| - Total | 498,584 | 486,467 |
| • Projected payroll of active members | $8,213,042 | $7,765,588 |
| • Projected payroll for all members, including members in ORP, TERI, and working retirees | $10,497,446 | $10,012,960 |
| **Minimum Required Contribution Rates[1,2]** | | |
| • Employer contribution rate | 11.99% | 11.09% |
| • Member | 9.09% | 8.19% |
| **Assets** | | |
| • Market value | $23,996,362 | $25,131,828 |
| • Actuarial value | 27,293,968 | 27,365,921 |
| • Return on market value | -0.7% | 1.4% |
| • Return on actuarial value | 3.3% | 5.4% |
| • Ratio of actuarial to market value of assets | 113.7% | 108.9% |
| • External cash flow % | -3.9% | -3.8% |
| **Actuarial Information** | | |
| • Normal cost % | 10.27% | 9.83% |
| • Actuarial accrued liability (AAL) | $45,859,906 | $44,119,176 |
| • Unfunded actuarial accrued liability (UAAL) | 18,565,938 | 16,753,255 |
| • Funded ratio | 59.5% | 62.0% |
| • Funding period (years) | 30 | 30 |
| **Reconciliation of UAAL** | | |
| • Beginning of Year UAAL | $16,753,255 | $15,978,874 |
| - Interest on UAAL | 1,256,494 | 1,198,416 |
| - Amortization payment | (1,017,186) | (978,816) |
| - Assumption/method changes | 467,722 | 0 |
| - Asset experience | 1,131,589 | 558,523 |
| - Salary experience | (17,241) | (76,578) |
| - Other liability experience | (8,695) | 72,836 |
| - Legislative Changes | 0 | 0 |
| • End of Year UAAL | $18,565,938 | $16,753,255 |

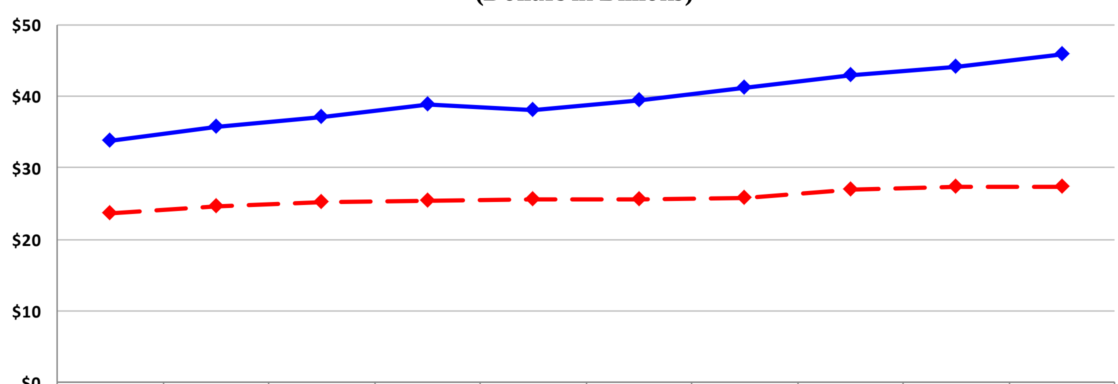
[1] The contribution rates determined by the 2016 valuation are established by Section 9-1-1085 of the South Carolina Code and become effective for the fiscal year beginning July 1, 2018. The employer contribution rates shown above include the cost of incidental death benefits.

[2] The rates shown for the 2015 and 2016 valuation are the minimum required contribution rates. State Statutes permit the Board to increase the contribution rates above the amounts shown, up to certain limits. Effective July 1, 2016, the Board elected to increase the employer and member contribution rate to 11.56% and 8.66%, respectively.

## EXECUTIVE SUMMARY (CONTINUED)

The unfunded actuarial accrued liability increased by $1.813 billion since the prior year's valuation to $18.566 billion. The largest source of this increase is the result of the continued recognition of deferred investment losses experienced in prior fiscal years in the actuarial value of assets (i.e. $1.132 billion was recognized in the July 1, 2016 valuation), followed by a $0.468 billion increase due to updated actuarial assumptions, followed by a $0.239 billion increase because the contributions to the plan attributable to financing the unfunded actuarial accrued liability were less than the interest cost on the unfunded liability. Below is a chart with the historical actuarial value of assets and actuarial accrued liability for SCRS. The divergence in the assets and liability over the last 10 years has generally been due to a combination of: (i) the actual investment experience being less than the System's expected investment return assumption, (ii) increases in the actuarial accrued liability due to cost of living adjustments provided to retirees prior to the enactment of retirement reform legislation in 2012, and (iii) assumption changes recommended by the actuary and adopted by the Budget and Control Board in 2011.

**Chart 1. - History of Actuarial Assets vs. Actuarial Accrued Liability**
**(Dollars in Billions)**




| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| AAL | 33.8 | 35.7 | 37.2 | 38.8 | 38.0 | 39.5 | 41.2 | 42.9 | 44.1 | 45.9 |
| AVA | 23.5 | 24.7 | 25.2 | 25.4 | 25.6 | 25.5 | 25.8 | 26.9 | 27.4 | 27.3 |

Effective July 1, 2016, the Board elected to increase the employer and member contribution rate by 50 basis points each to 11.56% and 8.66%, respectively, to improve the financial security of the retirement system. However, these contribution rates in effect for fiscal year 2017 are no longer sufficient to maintain a funding period that does not exceed 30 years (determined on an actuarial value of asset basis). As a result, the employer and member contribution rates must increase to 11.99% and 9.09% of pay, respectively, for fiscal year 2019 (i.e. effective July 1, 2018) to decrease the funding period to 30 years. The Board may wish to consider increasing the contribution rates, as permitted by State Statute, on July 1, 2017 to further improve in the financial security of the system.

Absent legislative changes or significantly favorable experience, we project that the employer and member contribution rates will increase within the next few years as the $3.3 billion in deferred investment losses become recognized in the actuarial value of assets over the next four years. Specifically, if emerging investment and liability experience is consistent with the current assumptions, both the employer and member contribution rates are projected to increase by approximately 1.00% over the next 4 or 5 years in order to maintain a 30-year funding period.

# SECTION B

## DISCUSSION

# DISCUSSION

The results of the July 1, 2016 actuarial valuation of the South Carolina Retirement System are presented in this report. The primary purposes of the valuation report are to depict the current financial condition of the System, determine the annual required contribution, and analyze changes in the System's financial condition. In addition, the report provides various summaries of the data.

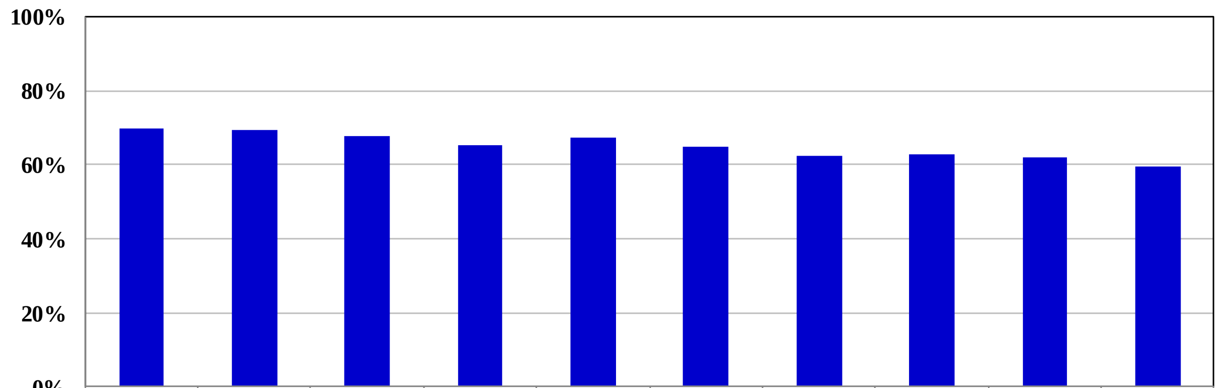
This section discusses the determination of the current funding requirements and the System's funded status, as well as changes in financial condition of the retirement system.

All of the actuarial and financial tables referenced by the other sections of this Report appear in Section C. Section D provides member data and statistical information. Appendices A and B provide summaries of the principle actuarial assumptions and methods and plan provisions. Finally, Appendix C provides a glossary of technical terms that are used throughout this report.

## Funding Progress

The funded ratio decreased from 62.0% to 59.5% since the prior valuation. Chart 2, shown below provides a 10-year history of the system's funded ratio. The gradual decline in the funded ratio over the last 10 years has generally been due to a combination of: (i) investment losses (ii) increases in the actuarial accrued liability due to cost of living adjustments provided to retirees prior to the enactment of retirement reform legislation in 2012, and (iii) assumption changes recommended by the actuary and adopted by the Budget and Control Board in 2011 and 2016. Table 10, Schedule of Funding Progress, in the following section of the report provides additional detail regarding the funding progress of the Retirement System.

**Chart 2. - Funded Ratio**
**Actuarial Assets as a percentage of Actuarial Accrued Liability**




| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| Funded Ratio | 69.7% | 69.3% | 67.8% | 65.5% | 67.4% | 64.7% | 62.5% | 62.7% | 62.0% | 59.5% |

Absent future unfavorable investment or demographic experience, or legislative changes, we expect the funded ratio to slightly decrease for the next three or four years, then begin to gradually improve. Also, based on the current funding policy and contribution rates, we expect the dollar amount of the unfunded actuarial accrued liability, or the difference between the actuarial accrued liability and the actuarial value of assets, to gradually increase for the next 10 to 12 years before beginning to decrease.

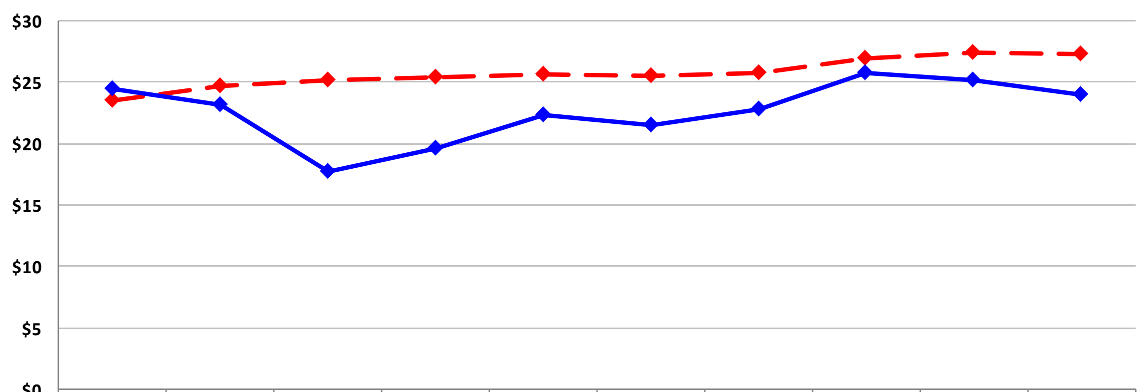
## Asset Gains/ (Losses)

The actuarial value of assets ("AVA") is based on a smoothed market value of assets, using a systematic approach to phase-in the difference between the actual and expected investment return on the market value of assets (adjusted for receipts and disbursements during the year). This is appropriate because it dampens the short-term volatility inherent in investment markets. The returns are computed net of investment expenses. The actuarial value of assets slightly decreased from $27.4 billion to $27.3 billion since the prior valuation. Table 8 in the following section of the report provides the development of the actuarial value of assets.

The rate of return on the market value of assets on a dollar-weighted basis for fiscal year 2016 was a -0.7%; which is less than the 7.50% expected annual return. The return on an actuarial (smoothed) asset value was 4.2%. This difference in the estimated return on market value and actuarial value illustrates the smoothing effect of the asset valuation method.

The market value of assets is $3.3 billion less than the actuarial value of assets, which signifies that the retirement system is in a position of deferred losses. Therefore, unless the System experiences investment returns in excess of the assumed rate of return, the future recognition of these deferred losses is expected to increase the unfunded actuarial accrued liability.

**Chart 3. - History of Actuarial Value and Market Value of Assets**
**(Dollars in Billions)**




| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| AVA | 23.5 | 24.7 | 25.2 | 25.4 | 25.6 | 25.5 | 25.8 | 26.9 | 27.4 | 27.3 |
| MVA | 24.4 | 23.1 | 17.7 | 19.7 | 22.4 | 21.5 | 22.8 | 25.7 | 25.1 | 24.0 |

Assets as of July 1,

Tables 6 and 7 in the following section of this report provide asset information that was included in the annual financial statements of the System. Also, Table 9 shows the estimated yield on a market value basis and on the actuarial asset valuation method.

## Actuarial Gains/ (Losses) and the Funding Period

The annual actuarial valuation is a snapshot analysis of the benefit liabilities, assets and funded position of the System as of the first day of the plan year. In any one fiscal year, the experience can be better or worse from that which is assumed or expected. The actuarial assumptions do not necessarily attempt to model what the experience will be for any one given fiscal year, but instead try to model the overall experience over many years. Therefore, as long as the actual experience of the retirement system is reasonably close to the current assumptions, the long-term funding requirements of the System will remain relatively consistent.

The unfunded actuarial accrued liability (UAAL) has increased from $16.8 billion in 2015 to $18.6 billion in 2016. The table below shows the source of the gains and losses and the impact of those gains and losses on the UAAL.

**Reconciliation of UAAL**
(Dollars in thousands)

| | |
|---|---|
| • Beginning of Year UAAL | $16,753,255 |
| - Interest on UAAL | 1,256,494 |
| - Amortization payment | (1,017,186) |
| - Assumption/method changes | 467,722 |
| - Asset Experience | 1,131,589 |
| - Salary Experience | (17,241) |
| - Other liability experience | (8,695) |
| - Legislative changes | 0 |
| • End of Year UAAL | $18,565,938 |

The System experienced a net $26 million gain in liability, due to salary and other demographic experience. This net gain is approximately 0.03% of the total actuarial accrued liability.

Based on the valuation as of July 1, 2016, the funding period based on the current contribution rates in effect for fiscal year 2017 are no longer sufficient to satisfy the 30-year funding requirement in the State code. Therefore, the employer and member contribution rates will need to increase to 11.99% and 9.09%, respectively, for fiscal year 2019 (i.e. effective July 1, 2018) in order to comply with the 30-year funding requirement (determined on an actuarial value of asset basis). The Board may wish to consider increasing the contribution rates, as permitted by State Statute, on July 1, 2017 to further improve in the financial security of the system. The following page provides a table reconciling the change in the funding period from the prior year's valuation based on the contribution rates that are currently in effect for fiscal year 2017.

**Change in Funding Period (Years)**
**Based on the Employer and Member Contribution**
**Before Reflecting Required Increase in Contribution Rate**
**for FY 2018**

| | |
|---|---|
| • Prior Year | 30.0 |
| - Expected experience | (1.0) |
| - Assumption and method changes | 11.4 |
| - Asset experience | 8.7 |
| - Salary and demographic experience | (2.8) |
| - Legislative changes | 0.0 |
| - Board approved rate increase for FY 2017 | (10.1) |
| - Total Change | 6.2 |
| • Current Year Valuation | 36.2 |

Since the current funding period (after reflecting the required increase contribution rates) is close to the maximum permitted 30 years, it is possible that any near-term adverse experience, whether investment or demographic related, will require an increase to future contribution rates. In fact, absent favorable investment experience, we expect the funding period to increase in future years as deferred investment losses become fully recognized in the actuarial value of assets and calculation of the contribution rates.

Also, note that the current funding policy utilizes a level percentage of payroll amortization, which assumes that covered payroll will increase at the rate of 3.00% per year in the future. As a result, the amortization payments will not be sufficient to cover all of the interest charges on the UAAL until the funding period decreases to approximately 20 years. Therefore, stakeholders should expect the dollar amount of the unfunded actuarial accrued liability to gradually increase until the funding period decreases below 20 years.

## Actuarial Assumptions and Methods

In determining costs and liabilities, actuaries use assumptions about the future, such as rates of salary increase, probabilities of retirement, termination, death and disability, and an annual investment return assumption. South Carolina State Code also requires that an experience analysis that reviews the economic and demographic assumptions be performed every five years. An experience study was conducted for the five-year period ending June 30, 2015. The following is a summary of the assumptions that were adopted by the Board and used in preparing this actuarial valuation:

- Decrease the price inflation assumption from 2.75% to 2.25%.
- Decrease in the assumed rate of salary increases for individual members.
- Decrease the payroll growth assumption from 3.50% to 3.00%.
- Adopt new post-retirement mortality tables specific to South Carolina retiree experience. Mortality for retirees is assumed to improve based on generational projection Scale AA.
- Minor adjustments to the pre-retirement mortality assumption.
- Modify the rates of withdrawal and retirement.
- Make an explicit refund election assumption for members who terminate employment with a vested benefit.
- Modify the asset method such that each year's investment gain or loss (determined on a market value of asset basis) is recognized over a closed five-year period at the rate of 20% per year.

The investment return assumption is a prescribed assumption in Section 9-16-335 in South Carolina State Code and remains at 7.50% investment return assumption.

Appendix A includes a summary of the actuarial assumptions and methods used in this valuation. It is our opinion that the assumptions are internally consistent, reasonable, and reflect anticipated future experience of the System. The next experience study will be conducted no later than as of June 30, 2020.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. This report does not include a more robust assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment.

An actuarial valuation assumes that all assumptions will be met in future years, including a 7.50% return on the actuarial value of assets determined as of the actuarial valuation date. Establishing the contribution rates, funding period, and other financial metrics on an actuarial value of asset basis is consistent with applicable actuarial standards of practice, industry prevalence, and applicable provisions in South Carolina State Code.

Emerging experience due to liabilities or investments that is different than assumed (including the recognition of previously deferred investment losses) may result in a change in the required contribution rate and or funding period that is different than expected based on the prior actuarial valuation. Also, separate projections provided outside of this report that may illustrate the financial effect of future gains or losses on actuarial basis in subsequent years may be useful for business making decisions, but such projections should not be misunderstood as documentation of satisfaction of a 30-year amortization requirement specified in State Code.

## Benefit Provisions

Appendix B of this report includes a summary of the benefit provisions for SCRS. There were no legislative changes enacted since the previous valuation that had a measurable effect on the current valuation. Below is a summary of the retirement provisions for Class Two members, members hired prior to July 1, 2012, and Class Three members, members hired after June 30, 2012.

**Summary of Retirement Provisions for:**

*Class Two Members (members hired prior to July 1, 2012)*

- Average Final Compensation (AFC) is based on the highest 12 consecutive quarters of compensation. The determination of a member's AFC also includes up to 45 days of unused annual leave paid at termination. Monthly benefits are based on one-twelfth of this amount.
- The retirement benefit amount is equal to 1.82% of the member's AFC times the member's credited service (years). Credited service may include up to 90 days of unused sick leave.
- Members are eligible to commence a normal retirement benefit after they have (i) 28 years of credited service or (ii) attained age 65 with 5 years of earned service.
- At each July 1 after their first full year of retirement, annuitants will receive an automatic cost of living adjustment equal to the lesser of 1.00% of their retirement benefit or $500 per annum.

*Class Three Members (members hired after June 30, 2012)*

- Average Final Compensation (AFC) is based on the highest twenty (20) consecutive quarters of compensation. The determination of a member's AFC will not include unused annual leave paid at termination. Monthly benefits are based on one-twelfth of this amount;
- The retirement benefit is equal to 1.82% of the member's AFC times the member's credited service (years). Credited service will not include unused sick leave.
- Members are eligible to commence a normal retirement benefit after they have (i) attained age 65 with eight years of earned service or (ii) the combination of the member's age and years of credited service equals or exceeds 90 (i.e. the rule of 90).
- At each July 1 after their first full year of retirement, annuitants will receive an automatic cost of living adjustment equal to the lesser of 1.00% of their retirement benefit or $500 per annum.

# SECTION C

## ACTUARIAL TABLES

## ACTUARIAL TABLES

## Summary of Cost Items

**(Dollar amounts expressed in thousands)**

| | | July 1, 2016<br>(1) | July 1, 2015<br>(2) |
|---|---|---|---|
| 1. | Projected payroll of active members[1] | $ 8,213,042 | $ 7,765,588 |
| 2. | Present value of future pay | $ 65,013,981 | $ 63,403,897 |
| 3. | Normal cost rate | | |
| | a. Total normal cost rate | 10.27% | 9.83% |
| | b. Less: member contribution rate | -9.09% | -8.19% |
| | c. Employer normal cost rate | 1.18% | 1.64% |
| 4. | Actuarial accrued liability for active members | | |
| | a. Present value of future benefits | $ 21,097,284 | $ 20,448,693 |
| | b. Less: present value of future normal costs | (6,095,180) | (5,932,209) |
| | c. Actuarial accrued liability | $ 15,002,104 | $ 14,516,484 |
| 5. | Total actuarial accrued liability | | |
| | a. Retirees and beneficiaries | $ 29,830,649 | $ 28,645,954 |
| | b. Inactive members | 1,027,153 | 956,738 |
| | c. Active members (Item 4c) | 15,002,104 | 14,516,484 |
| | d. Total | $ 45,859,906 | $ 44,119,176 |
| 6. | Actuarial value of assets | $ 27,293,968 | $ 27,365,921 |
| 7. | Unfunded actuarial accrued liability (UAAL) (Item 5d - Item 6) | $ 18,565,938 | $ 16,753,255 |
| 8. | Annual Required Contribution Rate | | |
| | a. Employer normal cost rate | 1.18% | 1.64% |
| | b. Employer contribution rate available to amortize the UAAL | 10.81% | 9.45% |
| | c. Total employer contribution rate | 11.99% | 11.09% |
| 9. | Funding period based on the required employer contribution rate (years) | 30 | 30 |
| 10. | Applicable statutorily required contribution rates[2] | | |
| | a. Employer contribution rate | 11.99% | 11.09% |
| | b. Member contribution rate | 9.09% | 8.19% |

[1] The projected payroll does not include payroll for members in ORP, TERI, and who are working retirees.

[2] The applicable employer and member contribution rates are determined in accordance with Section 9-1-1085 of the South Carolina Code. The contribution rates determined by the July 1, 2016 valuation become effective for the fiscal year beginning July 1, 2018. The contribution rate includes the cost of incidental death benefits.

## Actuarial Present Value of Future Benefits
**(Dollar amounts expressed in thousands)**

| | | July 1, 2016 (1) | July 1, 2015 (2) |
|---|---|---|---|
| 1. | Active members | | |
| | a. Service retirement | $ 18,487,417 | $ 17,477,781 |
| | b. Deferred termination benefits and refunds | 679,251 | 906,488 |
| | c. Survivor benefits | 601,475 | 786,544 |
| | d. Disability benefits | 1,329,141 | 1,277,880 |
| | e. Total | $ 21,097,284 | $ 20,448,693 |
| 2. | Retired members | | |
| | a. Service retirement | $ 26,929,180 | $ 25,821,386 |
| | b. Disability retirement | 1,707,619 | 1,679,069 |
| | c. Beneficiaries | 1,035,629 | 986,873 |
| | d. Incidental death benefits | 158,221 | 158,626 |
| | e. Total | $ 29,830,649 | $ 28,645,954 |
| 3. | Inactive members | | |
| | a. Vested terminations | $ 804,384 | $ 747,289 |
| | b. Nonvested terminations | 222,769 | 209,449 |
| | c. Total | $ 1,027,153 | $ 956,738 |
| 4. | Total actuarial present value of future benefits | $ 51,955,086 | $ 50,051,385 |

## Analysis of Normal Cost

| | | July 1, 2016 | July 1, 2015 |
|---|---|---|---|
| | | (1) | (2) |
| 1. | Total normal cost rate | | |
| | a. Service retirement | 6.89% | 6.67% |
| | b. Deferred termination benefits and refunds | 2.20% | 2.01% |
| | c. Survivor benefits | 0.34% | 0.45% |
| | d. Disability benefits | 0.72% | 0.70% |
| | e. Total | 10.15% | 9.83% |
| 2. | Administrative expenses | 0.12% | N/A |
| 3. | Less: member contribution rate | 9.09% | 8.19% |
| 4. | Net employer normal cost rate | 1.18% | 1.64% |

## Results of July 1, 2016 Valuation
**(Dollar amounts expressed in thousands)**

| | | | July 1, 2016<br>(1) |
|---|---|---|---|
| 1. | Actuarial Present Value of Future Benefits | | |
| | a. Present retired members and beneficiaries | $ | 29,830,649 |
| | b. Present active and inactive members | | 22,124,437 |
| | c. Total actuarial present value | $ | 51,955,086 |
| 2. | Present Value of Future Normal Contributions | | |
| | a. Employee | $ | 5,909,771 |
| | b. Employer | | 185,409 |
| | c. Total future normal contributions | $ | 6,095,180 |
| 3. | Actuarial Liability | $ | 45,859,906 |
| 4. | Current Actuarial Value of Assets | $ | 27,293,968 |
| 5. | Unfunded Actuarial Liability | $ | 18,565,938 |
| 6. | UAAL Amortization Rates based on an employer contribution rate of 11.99% | | |
| | a. Active members | | 10.81% |
| | b. TERI members (including employee contributions) | | 21.08% |
| | c. ORP members | | 6.99% |
| | d. Re-employed retirees (including employee contributions) | | 21.08% |
| 7. | Unfunded Actuarial Liability Liquidation Period | | 30 years |

Note: The employer contribution rate includes the cost for incidental death benefits.

## Actuarial Balance Sheet

**(Dollar amounts expressed in thousands)**

| | July 1, 2016<br>(1) | July 1, 2015<br>(2) |
|---|---|---|
| 1. Assets | | |
| a. Current assets (actuarial value) | | |
| i. Employee annuity savings fund | $ 7,447,442 | $ 7,054,277 |
| ii. Employer annuity accumulation fund | 19,846,526 | 20,311,644 |
| iii. Total current assets | $ 27,293,968 | $ 27,365,921 |
| b. Present value of future member contributions | $ 5,909,771 | $ 5,192,778 |
| c. Present value of future employer contributions | | |
| i. Normal contributions | $ 185,409 | $ 739,431 |
| ii. Accrued liability contributions | 18,565,938 | 16,753,255 |
| iii. Total future employer contributions | $ 18,751,347 | $ 17,492,686 |
| d. Total assets | $ 51,955,086 | $ 50,051,385 |
| 2. Liabilities | | |
| a. Employee annuity savings fund | | |
| i. Past member contributions | $ 7,447,442 | $ 7,054,277 |
| ii. Present value of future member contributions | 5,909,771 | 5,192,778 |
| iii. Total contributions to employee annuity savings fund | $ 13,357,213 | $ 12,247,055 |
| b. Employer annuity accumulation fund | | |
| i. Benefits currently in payment | $ 29,830,649 | $ 28,645,954 |
| ii. Benefits to be provided to other members | 8,767,224 | 9,158,376 |
| iii. Total benefits payable from employer annuity accumulation fund | $ 38,597,873 | $ 37,804,330 |
| c. Total liabilities | $ 51,955,086 | $ 50,051,385 |

## System Net Assets
## Assets at Market or Fair Value
**(Dollar amounts expressed in thousands)**

| Item<br>(1) | July 1, 2016<br>(2) | July 1, 2015<br>(3) |
|---|---|---|
| 1. Cash and cash equivalents (operating cash) | $ 3,385,664 | $ 2,473,892 |
| 2. Receivables | 871,729 | 628,977 |
| 3. Investments | | |
| a. Short-term securities | $ 677,357 | $ 657,551 |
| b. Fixed income (global) | 5,003,122 | 6,854,019 |
| c. Public equities (global) | 6,161,285 | 6,128,632 |
| d. Global tactical asset allocation | 1,680,189 | 1,909,410 |
| e. Alternative investments | 7,688,980 | 7,703,664 |
| f. Total investments | $ 21,210,933 | $ 23,253,276 |
| 4. Securities lending cash collateral invested | $ 47,690 | $ 60,229 |
| 5. Prepaid administrative expenses | 3,081 | 2,641 |
| 6. Capital assets, net of accumulated depreciation | 2,461 | 2,693 |
| 7. Total assets | $ 25,521,558 | $ 26,421,708 |
| 8. Liabilities | | |
| a. Due to other systems | $ 302 | $ 173 |
| b. Accounts payable | 1,231,849 | 1,028,515 |
| c. Investment fees payable | 8,076 | 7,270 |
| d. Obligations under securities lending | 47,690 | 60,229 |
| e. Deferred retirement benefits | 71,693 | 68,104 |
| f. Due to employee insurance program | 63,358 | 58,868 |
| g. Benefit payable | 3,602 | 3,608 |
| h. Other liabilities | 98,626 | 63,113 |
| i. Total liabilities | $ 1,525,196 | $ 1,289,880 |
| 9. Total market value of assets available for benefits (Item 7 - Item 8.i.) | $ 23,996,362 | $ 25,131,828 |
| 10. Asset allocation (investments)[1] | | |
| a. Short-term securities | 14.4% | 10.1% |
| b. Fixed income | 20.8% | 27.3% |
| c. Public equities | 25.7% | 24.4% |
| d. Global tactical asset allocation | 7.0% | 7.6% |
| e. Alternative investments | 32.1% | 30.6% |
| f. Total investments | 100.0% | 100.0% |

[1] These asset allocations are calculated based on the dollar amounts shown in items 1. through 9. above and, due to cash flow and rebalancing timing, may be slightly different than the allocation percentages reported by the South Carolina Retirement System Investment Commission.

# Reconciliation of System Net Assets

**(Dollar amounts expressed in thousands)**

| | Year Ending July 1, 2016 (1) | Year Ending July 1, 2015 (2) |
|---|---|---|
| 1. Value of assets at beginning of year | $ 25,131,828 | $ 25,738,521 |
| 2. Revenue for the year | | |
| a. Contributions | | |
| i. Member contributions | $ 754,153 | $ 716,107 |
| ii. Employer contributions | 1,073,093 | 1,022,985 |
| iii. Total | $ 1,827,246 | $ 1,739,092 |
| b. Income | | |
| i. Interest, dividends, and other income | $ 338,723 | $ 293,319 |
| ii. Investment expenses | (224,772) | (41,219) |
| iii. Net | $ 113,951 | $ 252,100 |
| c. Net realized and unrealized gains (losses) | (279,345) | 122,052 |
| d. Total revenue | $ 1,661,852 | $ 2,113,244 |
| 3. Expenditures for the year | | |
| a. Disbursements | | |
| i. Refunds | $ 93,694 | $ 95,104 |
| ii. Regular annuity benefits | 2,668,385 | 2,590,299 |
| iii. Other benefit payments | 21,093 | 20,651 |
| iv. Transfers to other systems | 997 | 1,329 |
| v. Total | $ 2,784,169 | $ 2,707,383 |
| b. Administrative expenses and depreciation | 13,149 | 12,554 |
| c. Total expenditures | $ 2,797,318 | $ 2,719,937 |
| 4. Increase in net assets (Item 2. - Item 3.) | $ (1,135,466) | $ (606,693) |
| 5. Value of assets at end of year (Item 1. + Item 4.) | $ 23,996,362 | $ 25,131,828 |
| 6. Net external cash flow | | |
| a. Dollar amount | $ (970,072) | $ (968,291) |
| b. Percentage of market value | -3.9% | -3.8% |

## Development of Actuarial Value of Assets
**(Dollar amounts expressed in thousands)**

| | | Year Ending June 30, 2016 |
|---|---|---|
| 1. | Actuarial value of assets at beginning of year | $ 27,365,921 |
| 2. | Market value of assets at beginning of year | $ 25,131,828 |
| 3. | Net new investments | |
| | a. Contributions | $ 1,827,246 |
| | b. Disbursements[1] | (2,784,169) |
| | c. Subtotal | (956,923) |
| 4. | Market value of assets at end of year | $ 23,996,362 |
| 5. | Net earnings (Item 4. - Item 2. - Item 3.c.) | $ (178,543) |
| 6. | Assumed investment return rate for fiscal year | 7.50% |
| 7. | Expected return | $ 1,849,002 |
| 8. | Excess return (Item 5. - Item 7.) | $ (2,027,545) |
| 9. | Excess return on assets as of June 30, 2016: | |

| | Fiscal Year Ending June 30, (1) | Excess Return (2) | Percent Deferred (3) | Deferred Amount (4) |
|---|---|---|---|---|
| a. | 2016 | $ (2,027,545) | 80% | $ (1,622,036) |
| b. | 2015 | (2,792,616) | 60% | (1,675,570) |
| c. | 2014 | N/A | 40% | N/A |
| d. | 2013 | N/A | 20% | N/A |
| e. | 2012 | N/A | 0% | N/A |
| f. | Total | | | $ (3,297,606) |

| | | |
|---|---|---|
| 10. | Actuarial value of assets as of June 30, 2016 (Item 4. - Item 9.f.) | $ 27,293,968 |
| 11. | Expected actuarial value as of June 30, 2016 | $ 28,425,557 |
| 12. | Asset gain (loss) for year (Item 10. - Item 11.) | $ (1,131,589) |
| 13. | Asset gain (loss) as % of the actuarial value of assets | -4.1% |
| 14. | Ratio of actuarial value to market value | 113.7% |

[1] For the year ending June 30, 2016, the investment return assumption was net of administration and investment expenses. Beginning July 1, 2016, the investment return assumption is only net of investment expenses.

# Estimation of Yields

**(Dollar amounts expressed in thousands)**

| | | Year Ending | |
|---|---|---|---|
| | | July 1, 2016 | July 1, 2015 |
| | | (1) | (2) |
| 1. | Market value yield | | |
| | a. Beginning of year market assets | $ 25,131,828 | $ 25,738,521 |
| | b. Contributions to fund during the year | 1,827,246 | 1,739,092 |
| | c. Disbursements | (2,784,169) | (2,707,383) |
| | d. Investment income (net of investment and administrative expenses) | (178,543) | 361,598 |
| | e. End of year market assets | $ 23,996,362 | $ 25,131,828 |
| | f. Estimated dollar-weighted market value yield | -0.7% | 1.4% |
| 2. | Actuarial value yield | | |
| | a. Beginning of year actuarial assets | $ 27,365,921 | $ 26,910,740 |
| | b. Contributions to fund during the year | 1,827,246 | 1,739,092 |
| | c. Disbursements | (2,784,169) | (2,707,383) |
| | d. Investment income (net of investment and administrative expenses) | 884,970 | 1,423,472 |
| | e. End of year actuarial assets | $ 27,293,968 | $ 27,365,921 |
| | f. Estimated actuarial value yield | 3.3% | 5.4% |

## Schedule of Funding Progress
**(Dollar amounts expressed in thousands)**

| July 1, | Actuarial Value of Assets (AVA) | Actuarial Accrued Liability (AAL) | Unfunded Actuarial Accrued Liability (UAAL) (3) - (2) | Funded Ratio (2)/(3) | Annual Covered Payroll[1] | UAAL as % of Payroll (4)/(6) |
|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| 2002 | 19,298,174 | 22,446,574 | 3,148,400 | 86.0% | 6,147,712 | 51.2% |
| 2003 | 20,197,936 | 24,398,931 | 4,200,995 | 82.8% | 6,240,768 | 67.3% |
| 2004 | 20,862,659 | 25,977,852 | 5,115,193 | 80.3% | 6,180,599 | 82.8% |
| 2005 | 21,625,510 | 30,217,471 | 8,591,961 | 71.6% | 6,356,489 | 135.2% |
| 2006 | 22,293,446 | 32,018,519 | 9,725,073 | 69.6% | 6,733,379 | 144.4% |
| 2007 | 23,541,438 | 33,766,678 | 10,225,240 | 69.7% | 7,093,181 | 144.2% |
| 2008 | 24,699,678 | 35,663,419 | 10,963,741 | 69.3% | 7,559,172 | 145.0% |
| 2009 | 25,183,062 | 37,150,315 | 11,967,253 | 67.8% | 7,761,808 | 154.2% |
| 2010 | 25,400,331 | 38,774,029 | 13,373,698 | 65.5% | 7,769,820 | 172.1% |
| 2011 | 25,604,823 | 38,011,610 | 12,406,787 | 67.4% | 7,687,558 | 161.4% |
| 2012 | 25,540,749 | 39,457,708 | 13,916,959 | 64.7% | 7,356,231 | 189.2% |
| 2013 | 25,753,068 | 41,196,062 | 15,442,994 | 62.5% | 7,434,820 | 207.7% |
| 2014 | 26,910,740 | 42,889,614 | 15,978,874 | 62.7% | 7,539,996 | 211.9% |
| 2015 | 27,365,921 | 44,119,176 | 16,753,255 | 62.0% | 7,765,588 | 215.7% |
| 2016 | 27,293,968 | 45,859,906 | 18,565,938 | 59.5% | 8,213,042 | 226.1% |

[1] Covered payroll does not include payroll attributable to members in ORP, TERI, or working retirees.

## Summary of Principle Assumptions and Methods

Below is a summary of the principle economic assumptions, cost method, and the method for financing the unfunded actuarial accrued liability:

| | |
|---|---|
| Valuation date: | July 1, 2016 |
| Actuarial cost method: | Entry Age Normal |
| Amortization method: | Level percentage of payroll |
| Amortization period for contribution rate: | 30-year open period[1] |
| Asset valuation method: | 5-Year Smoothed |
| Actuarial assumptions: | |
| Investment rate of return[2] | 7.50% |
| Projected salary increases | 3.00% to 12.50% (varies by service) |
| Inflation | 2.25% |
| Post-retirement benefit adjustments[3] | 1.00% |
| Retiree Mortality | 2016 Public Retirees of South Carolina Mortality Table for Males and Females, projected using AA from the year 2016. Male rates multiplied by 100% for non-educators and 92% for educators. Female rates multiplied by 111% for non-educators and 98% for educators. |

[1] The employer and member contribution rates are determined in accordance with Section 9-1-1085 of the South Carolina Code. The funding period, determined on an actuarial value of asset basis, may not exceed 30 years. Contribution rates are not permitted to decrease until the ratio of the actuarial value of assets and the actuarial accrued liability is at least 90%.

[2] This is a prescribed assumption in Section 9-16-335 of South Carolina State Code.

[3] The benefit increase is the lesser of 1.00% or $500 annually.

# Solvency Test

**(Dollar amounts expressed in thousands)**

| | Actuarial Accrued Liability | | | | Portion of Aggregate Accrued Liabilities Covered by Assets | | |
|---|---|---|---|---|---|---|---|
| July 1, | Active Member Contributions | Retirants & Beneficiaries | Active & Inactive Members (Employer Financed) | Valuation Assets | Active | Retirants | ER Financed |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| 2002 | $ 4,512,402 | $ 11,600,395 | $ 6,333,777 | $ 19,298,174 | 100.0% | 100.0% | 50.3% |
| 2003 | 4,627,360 | 13,240,368 | 6,531,203 | 20,197,936 | 100.0% | 100.0% | 35.7% |
| 2004 | 4,750,077 | 14,184,765 | 7,043,010 | 20,862,659 | 100.0% | 100.0% | 27.4% |
| 2005 | 4,915,423 | 16,891,954 | 8,410,094 | 21,625,510 | 100.0% | 98.9% | 0.0% |
| 2006 | 5,229,175 | 17,800,254 | 8,989,090 | 22,293,446 | 100.0% | 95.9% | 0.0% |
| 2007 | 5,464,756 | 19,084,672 | 9,217,250 | 23,541,438 | 100.0% | 94.7% | 0.0% |
| 2008 | 5,708,022 | 20,624,862 | 9,329,937 | 24,699,678 | 100.0% | 92.1% | 0.0% |
| 2009 | 5,980,022 | 21,381,561 | 9,788,732 | 25,183,062 | 100.0% | 89.8% | 0.0% |
| 2010 | 6,222,854 | 22,585,243 | 9,965,932 | 25,400,331 | 100.0% | 84.9% | 0.0% |
| 2011 | 6,472,646 | 23,160,658 | 8,378,306 | 25,604,823 | 100.0% | 82.6% | 0.0% |
| 2012 | 6,459,192 | 24,732,406 | 8,266,110 | 25,540,749 | 100.0% | 77.2% | 0.0% |
| 2013 | 6,491,895 | 26,548,472 | 8,155,695 | 25,753,068 | 100.0% | 72.6% | 0.0% |
| 2014 | 6,717,327 | 27,942,644 | 8,229,643 | 26,910,740 | 100.0% | 72.3% | 0.0% |
| 2015 | 7,054,277 | 28,645,954 | 8,418,945 | 27,365,921 | 100.0% | 70.9% | 0.0% |
| 2016 | 7,447,442 | 29,830,649 | 8,581,815 | 27,293,968 | 100.0% | 66.5% | 0.0% |

# SECTION D

## MEMBERSHIP DATA

## MEMBERSHIP TABLES

# Summary of Membership Data

| | | July 1, 2016 (1) | July 1, 2015 (2) |
|---|---|---|---|
| 1. | Active members | | |
| | a. Males | 59,271 | 57,860 |
| | b. Females | 131,652 | 129,458 |
| | c. Total members | 190,923 | 187,318 |
| | d. Total annualized prior year salaries | $ 7,890,906,774 | $ 7,418,513,313 |
| | e. Average salary | $ 41,330 | $ 39,604 |
| | f. Average age | 45.1 | 45.1 |
| | g. Average service | 10.1 | 10.2 |
| | h. Member contributions with interest | $ 6,551,568,016 | $ 6,209,112,712 |
| | i. Average contributions with interest | $ 34,315 | $ 33,147 |
| 2. | Vested inactive members | | |
| | a. Number | 20,892 | 20,097 |
| | b. Total annual deferred benefits | $ 136,821,761 | $ 128,229,506 |
| | c. Average annual deferred benefit | $ 6,549 | $ 6,381 |
| 3. | Nonvested inactive members | | |
| | a. Number | 148,914 | 144,412 |
| | b. Member contributions with interest | $ 222,769,215 | $ 209,448,786 |
| | c. Average contributions with interest | $ 1,496 | $ 1,450 |
| 4. | Service retirees | | |
| | a. Number | 115,338 | 112,242 |
| | b. Total annual benefits | $ 2,469,794,069 | $ 2,391,772,188 |
| | c. Average annual benefit | $ 21,414 | $ 21,309 |
| | d. Average age at the valuation date | 69.8 | 69.5 |
| 5. | Disabled retirees | | |
| | a. Number | 13,133 | 13,349 |
| | b. Total annual benefits | $ 182,525,500 | $ 183,766,967 |
| | c. Average annual benefit | $ 13,898 | $ 13,766 |
| | d. Average age at the valuation date | 64.2 | 63.5 |
| 6. | Beneficiaries | | |
| | a. Number | 9,384 | 9,049 |
| | b. Total annual benefits | $ 114,143,577 | $ 108,007,534 |
| | c. Average annual benefit | $ 12,164 | $ 11,936 |
| | d. Average age at the valuation date | 67.7 | 67.6 |

## Summary of Contributing Membership Data

**(Dollar amounts expressed in thousands)**

| | | June 30, 2016 | | June 30, 2015 |
|---|---|---|---|---|
| | | (1) | | (2) |
| **1. Active Members** | | | | |
| a. Number of state employees | | 51,018 | | 49,938 |
| Total annual compensation | $ | 2,321,521 | $ | 2,171,789 |
| b. Number of public school employees | | 84,916 | | 83,865 |
| Total annual compensation | $ | 3,357,550 | $ | 3,235,918 |
| c. Number of other agency employees | | 54,989 | | 53,515 |
| Total annual compensation | $ | 2,211,836 | $ | 2,010,806 |
| Total number of active members | | 190,923 | | 187,318 |
| Total annual compensation | $ | 7,890,907 | $ | 7,418,513 |
| **2. TERI Paricipants** | | | | |
| a. Number of state employees | | 3,165 | | 3,241 |
| Total annual compensation | $ | 181,768 | $ | 184,885 |
| b. Number of public school employees | | 4,302 | | 4,592 |
| Total annual compensation | $ | 236,836 | $ | 250,539 |
| c. Number of other agency employees | | 865 | | 932 |
| Total annual compensation | $ | 44,803 | $ | 47,490 |
| Number of active TERI partipants | | 8,332 | | 8,765 |
| Total annual compensation | $ | 463,407 | $ | 482,914 |
| **3. Rehired Retired Participants** | | | | |
| a. Number of state employees | | 3,767 | | 3,865 |
| Total annual compensation | $ | 139,754 | $ | 145,739 |
| b. Number of public school employees | | 7,687 | | 7,734 |
| Total annual compensation | $ | 251,894 | $ | 252,608 |
| c. Number of other agency employees | | 2,685 | | 2,639 |
| Total annual compensation | $ | 115,080 | $ | 113,722 |
| Number of rehired retired members | | 14,139 | | 14,238 |
| Total annual compensation | $ | 506,728 | $ | 512,069 |
| **4. ORP Participants** | | | | |
| a. Number of state employees | | 14,617 | | 14,157 |
| Total annual compensation | $ | 896,433 | $ | 854,020 |
| b. Number of public school employees | | 10,024 | | 9,784 |
| Total annual compensation | $ | 397,036 | $ | 377,080 |
| Number of ORP members | | 24,641 | | 23,941 |
| Total annual compensation | $ | 1,293,469 | $ | 1,231,100 |
| **5. All Groups Combined** | | | | |
| a. Number of state employees | | 72,567 | | 71,201 |
| Total annual compensation | $ | 3,539,476 | $ | 3,356,433 |
| b. Number of public school employees | | 106,929 | | 105,975 |
| Total annual compensation | $ | 4,243,316 | $ | 4,116,145 |
| c. Number of other agency employees | | 58,539 | | 57,086 |
| Total annual compensation | $ | 2,371,719 | $ | 2,172,018 |
| Total number members | | 238,035 | | 234,262 |
| Total annual compensation | $ | 10,154,511 | $ | 9,644,596 |

Note: Total compensation is the annualized pay for the prior year.

## Summary of Historical Active Membership

| July 1, | Number of Employers[2] | Active Members: Number | Active Members: Percent Increase /(Decrease) | Covered Payroll[1]: Amount in Thousands | Covered Payroll[1]: Percent Increase /(Decrease) | Average Annual Pay: Amount | Average Annual Pay: Percent Increase /(Decrease) | Average Age | Average Service |
|---|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| 2002 | 746 | 189,166 | -1.2% | 6,147,712 | 2.2% | 32,499 | 3.42% | 44 | 10 |
| 2003 | 763 | 185,538 | -1.9% | 6,240,768 | 1.5% | 33,636 | 3.50% | 44 | 10 |
| 2004 | 763 | 181,827 | -2.0% | 6,180,599 | -1.0% | 33,992 | 1.06% | 44 | 10 |
| 2005 | 768 | 181,022 | -0.4% | 6,356,489 | 2.8% | 35,114 | 3.30% | 44 | 10 |
| 2006 | 763 | 184,282 | 1.8% | 6,733,379 | 5.9% | 36,538 | 4.06% | 45 | 10 |
| 2007 | 777 | 187,968 | 2.0% | 7,093,181 | 5.3% | 37,736 | 3.28% | 45 | 10 |
| 2008 | 776 | 192,820 | 2.6% | 7,559,172 | 6.6% | 39,203 | 3.89% | 45 | 10 |
| 2009 | 781 | 192,319 | -0.3% | 7,761,808 | 2.7% | 40,359 | 2.95% | 45 | 10 |
| 2010 | 800 | 190,239 | -1.1% | 7,769,820 | -4.7% | 40,842 | 1.20% | 45 | 10 |
| 2011 | 803 | 187,611 | -1.4% | 7,687,558 | -1.1% | 40,976 | 0.33% | 45 | 11 |
| 2012 | 806 | 185,748 | -1.0% | 7,356,231 | -4.3% | 39,603 | -3.35% | 45 | 10 |
| 2013 | 808 | 184,690 | -0.6% | 7,434,820 | 1.1% | 40,256 | 1.65% | 45 | 10 |
| 2014 | 810 | 185,265 | 0.3% | 7,539,996 | 1.4% | 40,698 | 1.10% | 45 | 10 |
| 2015 | 816 | 187,318 | 1.1% | 7,765,588 | 3.0% | 41,457 | 1.86% | 45 | 10 |
| 2016 | 812 | 190,923 | 1.9% | 8,213,042 | 5.8% | 43,018 | 3.77% | 45 | 10 |

[1] Covered payroll is the annualized, projected compensation for the following year and does not include payroll attributable to members in ORP, TERI, or working retirees.

[2] Based on the number of employers that made a contribution during FY 2016. Also, each agency is considered to be separate participating employer for disclosure in this schedule.

## Distribution of Active Members by Age and by Years of Service

| | Years of Credited Service | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Attained Age | 0 Count & Avg. Comp. | 1 Count & Avg. Comp. | 2 Count & Avg. Comp. | 3 Count & Avg. Comp. | 4 Count & Avg. Comp. | 5-9 Count & Avg. Comp. | 10-14 Count & Avg. Comp. | 15-19 Count & Avg. Comp. | 20-24 Count & Avg. Comp. | 25-29 Count & Avg. Comp. | 30-34 Count & Avg. Comp. | 35 & Over Count & Avg. Comp. | Total Count & Avg. Comp. |
| Under 20 | 362 | 23 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 390 |
| | $12,612 | $13,064 | $13,764 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $12,654 |
| 20-24 | 2,781 | 1,848 | 728 | 233 | 97 | 29 | 0 | 0 | 0 | 0 | 0 | 0 | 5,716 |
| | $20,469 | $26,751 | $28,508 | $25,910 | $25,969 | $32,859 | $0 | $0 | $0 | $0 | $0 | $0 | $23,902 |
| 25-29 | 3,481 | 3,591 | 2,941 | 2,551 | 1,960 | 2,577 | 57 | 0 | 0 | 0 | 0 | 0 | 17,158 |
| | $25,517 | $30,119 | $33,375 | $34,969 | $36,615 | $37,637 | $28,660 | $0 | $0 | $0 | $0 | $0 | $32,331 |
| 30-34 | 2,373 | 2,228 | 1,958 | 1,873 | 1,693 | 7,619 | 2,353 | 47 | 0 | 0 | 0 | 0 | 20,144 |
| | $26,905 | $33,488 | $35,031 | $37,224 | $39,379 | $42,329 | $44,756 | $40,930 | $0 | $0 | $0 | $0 | $38,382 |
| 35-39 | 2,110 | 2,023 | 1,659 | 1,412 | 1,304 | 5,337 | 5,947 | 2,060 | 22 | 0 | 0 | 0 | 21,874 |
| | $27,216 | $32,636 | $36,441 | $38,656 | $41,004 | $43,715 | $48,825 | $51,530 | $42,705 | $0 | $0 | $0 | $42,183 |
| 40-44 | 1,840 | 1,742 | 1,484 | 1,253 | 1,208 | 4,742 | 4,380 | 5,928 | 1,585 | 43 | 0 | 0 | 24,205 |
| | $27,163 | $31,689 | $35,066 | $38,039 | $39,812 | $43,150 | $47,449 | $54,948 | $57,254 | $44,081 | $0 | $0 | $44,776 |
| 45-49 | 1,790 | 1,688 | 1,393 | 1,230 | 1,155 | 4,928 | 4,213 | 4,953 | 4,792 | 1,692 | 17 | 0 | 27,851 |
| | $26,428 | $31,574 | $35,677 | $34,768 | $37,695 | $41,870 | $45,685 | $51,588 | $59,717 | $59,138 | $41,061 | $0 | $45,882 |
| 50-54 | 1,641 | 1,371 | 1,212 | 1,052 | 926 | 4,480 | 4,084 | 4,336 | 3,348 | 3,614 | 472 | 7 | 26,543 |
| | $25,951 | $31,442 | $34,804 | $37,237 | $37,808 | $39,309 | $42,664 | $46,917 | $53,464 | $59,624 | $62,260 | $51,665 | $44,458 |
| 55-59 | 1,208 | 1,110 | 967 | 929 | 893 | 3,975 | 3,723 | 4,280 | 3,327 | 2,475 | 675 | 148 | 23,710 |
| | $25,536 | $30,657 | $33,305 | $35,100 | $37,258 | $38,660 | $40,640 | $44,015 | $49,666 | $55,612 | $61,569 | $61,291 | $42,591 |
| 60-64 | 581 | 625 | 593 | 564 | 660 | 2,998 | 2,614 | 2,943 | 2,243 | 1,591 | 366 | 221 | 15,999 |
| | $22,281 | $27,902 | $31,358 | $33,094 | $35,074 | $39,049 | $42,310 | $45,481 | $49,314 | $53,898 | $69,345 | $61,984 | $42,987 |
| 65 & Over | 593 | 375 | 338 | 328 | 379 | 1,752 | 1,302 | 965 | 602 | 389 | 154 | 156 | 7,333 |
| | $15,044 | $18,621 | $19,939 | $25,958 | $26,671 | $31,059 | $38,822 | $43,695 | $47,101 | $51,059 | $69,092 | $78,169 | $35,380 |
| Total | 18,760 | 16,624 | 13,278 | 11,425 | 10,275 | 38,437 | 28,673 | 25,512 | 15,919 | 9,804 | 1,684 | 532 | 190,923 |
| | $24,743 | $30,593 | $33,852 | $35,793 | $37,722 | $40,741 | $44,791 | $49,277 | $54,090 | $57,190 | $63,934 | $66,401 | $41,330 |

## Schedule of Annuitants by Type of Benefit

| Type of Benefit/ Form of Payment | Number | | Annual Benefits Amount | | Average Monthly Benefit |
|---|---|---|---|---|---|
| (1) | (2) | | (3) | | (4) |
| Service: | | | | | |
| Maximum & QDRO | 78,055 | $ | 1,558,560,011 | $ | 1,664 |
| 100% J&S | 18,805 | | 436,024,045 | | 1,932 |
| 50% J&S | 12,117 | | 329,825,276 | | 2,268 |
| 10 Years C&L | 404 | | 8,400,671 | | 1,733 |
| Level Income | 5,957 | | 136,984,066 | | 1,916 |
| Subtotal: | 115,338 | $ | 2,469,794,069 | | 1,784 |
| Disability: | | | | | |
| Maximum | 10,852 | $ | 153,458,326 | $ | 1,178 |
| 100% J&S | 1,341 | | 14,447,924 | | 898 |
| 50% J&S | 810 | | 12,909,441 | | 1,328 |
| 10 Years C&L | 130 | | 1,709,809 | | 1,096 |
| Subtotal: | 13,133 | $ | 182,525,500 | | 1,158 |
| Beneficiaries: | 9,384 | $ | 114,143,577 | $ | 1,014 |
| Total: | 137,855 | $ | 2,766,463,146 | $ | 1,672 |

# Distribution of Annuitants by Monthly Benefit

| Monthly Benefit Amount | Number of Annuitants | Female | Male | Average Service |
|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) |
| Under $200 | 7,275 | 4,766 | 2,509 | 7.03 |
| $ 200 - 399 | 12,582 | 8,973 | 3,609 | 10.62 |
| 400 - 599 | 12,071 | 8,630 | 3,441 | 13.76 |
| 600 - 799 | 10,327 | 7,609 | 2,718 | 16.57 |
| 800 - 999 | 9,089 | 6,506 | 2,583 | 19.06 |
| 1,000 - 1,199 | 8,285 | 5,992 | 2,293 | 21.27 |
| 1,200 - 1,399 | 7,587 | 5,453 | 2,134 | 23.10 |
| 1,400 - 1,599 | 6,985 | 4,993 | 1,992 | 24.54 |
| 1,600 - 1,799 | 6,664 | 4,777 | 1,887 | 25.76 |
| 1,800 - 1,999 | 6,317 | 4,389 | 1,928 | 26.82 |
| 2,000 - 2,199 | 6,669 | 4,810 | 1,859 | 27.49 |
| 2,200 - 2,399 | 7,190 | 5,343 | 1,847 | 28.04 |
| 2,400 - 2,599 | 7,576 | 5,757 | 1,819 | 28.43 |
| 2,600 - 2,799 | 6,816 | 5,069 | 1,747 | 28.75 |
| 2,800 - 2,999 | 4,990 | 3,464 | 1,526 | 29.17 |
| 3,000 - 3,199 | 3,725 | 2,439 | 1,286 | 29.43 |
| 3,200 - 3,399 | 2,578 | 1,530 | 1,048 | 29.55 |
| 3,400 - 3,599 | 2,060 | 1,135 | 925 | 29.88 |
| 3,600 - 3,799 | 1,700 | 907 | 793 | 29.89 |
| 3,800 - 3,999 | 1,337 | 641 | 696 | 30.12 |
| 4,000 & Over | 6,032 | 2,174 | 3,858 | 30.91 |
| Total | 137,855 | 95,357 | 42,498 | 21.95 |

## Distribution of Average Annual Benefit by Employer and Age

| Current Age | Teacher | | State | | Other | | **Total** | |
|---|---|---|---|---|---|---|---|---|
| | Number of Annuitants | Average Annual Benefit Amount | Number of Annuitants | Average Annual Benefit Amount | Number of Annuitants | Average Annual Benefit Amount | **Number of Annuitants** | **Average Annual Benefit Amount** |
| (1) | (2) | (3) | (2) | (3) | (4) | (5) | (6) | (7) |
| Under 50 | 927 | $ 9,769 | 998 | $ 10,435 | 796 | $ 9,614 | 2,721 | $ 9,968 |
| 50 - 54 | 1,806 | 25,099 | 1,625 | 21,804 | 1,037 | 19,284 | 4,468 | 22,551 |
| 55 - 59 | 5,502 | 27,720 | 3,959 | 23,805 | 2,002 | 22,093 | 11,463 | 25,385 |
| 60 - 64 | 11,326 | 24,089 | 8,309 | 22,672 | 3,913 | 18,493 | 23,548 | 22,659 |
| 65 - 69 | 16,491 | 21,678 | 11,800 | 22,015 | 5,831 | 15,322 | 34,122 | 20,708 |
| 70 - 74 | 11,585 | 19,325 | 9,295 | 21,747 | 4,421 | 13,350 | 25,301 | 19,171 |
| 75 - 79 | 6,944 | 17,151 | 5,998 | 21,484 | 2,824 | 11,738 | 15,766 | 17,830 |
| 80 - 84 | 4,586 | 16,448 | 3,971 | 20,090 | 1,792 | 11,126 | 10,349 | 16,924 |
| 85 - 89 | 2,950 | 16,745 | 2,290 | 19,634 | 1,074 | 10,706 | 6,314 | 16,766 |
| 90 And Over | 1,840 | 15,668 | 1,452 | 17,872 | 511 | 10,721 | 3,803 | 15,845 |
| Total | 63,957 | $ 20,856 | 49,697 | $ 21,529 | 24,201 | $ 14,986 | 137,855 | $ 20,068 |

## Schedule of Retirants Added to And Removed from Rolls

**(Dollar amounts except average allowance expressed in thousands)**

| | Added to Rolls | | Removed from Rolls | | Rolls End of the Year | | % Increase | Average |
|---|---|---|---|---|---|---|---|---|
| Year Ended | Number | Annual Benefits | Number | Annual Benefits | Number | Annual Benefits | in Annual Benefit | Annual Benefit |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| 2002 | 7,344 | $ 140,077 | 2,334 | $ 24,531 | 79,064 | $ 1,201,180 | 10.6% | $ 15,193 |
| 2003 | 7,866 | 163,867 | 2,510 | 27,662 | 84,420 | 1,337,385 | 11.3% | 15,842 |
| 2004 | 7,319 | 151,477 | 2,132 | 22,656 | 89,607 | 1,466,206 | 9.6% | 16,363 |
| 2005 | 7,203 | 167,748 | 2,143 | 23,537 | 94,667 | 1,610,417 | 9.8% | 17,011 |
| 2006 | 4,621 | 118,271 | 2,083 | 24,099 | 97,205 | 1,704,589 | 5.8% | 17,536 |
| 2007 | 5,944 | 130,286 | 2,252 | 28,455 | 100,897 | 1,806,420 | 6.0% | 17,904 |
| 2008 | 6,021 | 132,856 | 2,396 | 30,178 | 104,522 | 1,909,098 | 5.7% | 18,265 |
| 2009 | 6,190 | 101,813 | 2,698 | 36,834 | 108,014 | 1,974,077 | 3.4% | 18,276 |
| 2010 | 6,596 | 151,348 | 3,216 | 44,049 | 111,394 | 2,081,376 | 5.4% | 18,685 |
| 2011 | 6,336 | 141,242 | 2,358 | 31,382 | 115,372 | 2,191,236 | 5.3% | 18,993 |
| 2012 | 9,523 | 205,050 | 2,968 | 44,099 | 121,927 | 2,352,188 | 7.3% | 19,292 |
| 2013 | 9,088 | 204,581 | 3,319 | 50,142 | 127,696 | 2,506,627 | 6.6% | 19,630 |
| 2014 | 7,084 | 148,060 | 3,270 | 49,971 | 131,510 | 2,604,716 | 3.9% | 19,806 |
| 2015 | 6,640 | 133,490 | 3,510 | 54,660 | 134,640 | 2,683,547 | 3.0% | 19,931 |
| 2016 | 6,515 | 133,741 | 3,300 | 50,824 | 137,855 | 2,766,463 | 3.1% | 20,068 |

Includes Teacher and Employee Retention Incentive (TERI) participants.

Annual benefits added to rolls includes the benefit adjustments provided to continuing retirees.

# APPENDIX A

## ACTUARIAL ASSUMPTIONS AND METHODS

## Summary of Actuarial Methods and Assumptions

The following presents a summary of the actuarial assumptions and methods used in the valuation of the South Carolina Retirement System.

### Investment Rate of Return

Assumed annual rate of 7.50% net of investment and administrative expenses composed of a 2.25% inflation component and a 5.25% real rate of return, net of investment expenses.

This is a prescribed assumption set by another party in Section 9-16-335 of the South Carolina State Code.

### Rates of Annual Salary Increase

Rates of annual salary increase are assumed to vary for the first 20 years of service due to expected merit and promotional increases which differs by employee group. Beginning with the 21st year of service, the assumed annual rate of increase is 3.00% for both groups and for all future years of service.

The 3.00% rate of increase is composed of a 2.25% inflation component and a 0.75% real rate of wage increase (productivity) component.

| Active Male & Female Salary Increase Rate | | | | |
|---|---|---|---|---|
| | General Employees | | Teachers | |
| Years of Service | Annual Promotional/Longevity Rates of Increase | Total Annual Rate of Increase Including 3.00% Wage Inflation | Annual Promotional/Longevity Rates of Increase | Total Annual Rate of Increase Including 3.00% Wage Inflation |
| 1 | 4.00% | 7.00% | 7.00% | 10.00% |
| 2 | 3.00% | 6.00% | 9.50% | 12.50% |
| 3 | 2.25% | 5.25% | 3.00% | 6.00% |
| 4 | 1.75% | 4.75% | 2.75% | 5.75% |
| 5 | 1.50% | 4.50% | 2.50% | 5.50% |
| 6 | 1.25% | 4.25% | 2.25% | 5.25% |
| 7 | 1.00% | 4.00% | 2.00% | 5.00% |
| 8 | 1.00% | 4.00% | 1.75% | 4.75% |
| 9 | 1.00% | 4.00% | 1.75% | 4.75% |
| 10 | 0.75% | 3.75% | 1.50% | 4.50% |
| 11 | 0.50% | 3.50% | 1.50% | 4.50% |
| 12 | 0.50% | 3.50% | 1.25% | 4.25% |
| 13 | 0.50% | 3.50% | 1.00% | 4.00% |
| 14 | 0.50% | 3.50% | 1.00% | 4.00% |
| 15 | 0.50% | 3.50% | 0.75% | 3.75% |
| 16 | 0.50% | 3.50% | 0.75% | 3.75% |
| 17 | 0.50% | 3.50% | 0.50% | 3.50% |
| 18 | 0.50% | 3.50% | 0.50% | 3.50% |
| 19 | 0.25% | 3.25% | 0.25% | 3.25% |
| 20 | 0.25% | 3.25% | 0.25% | 3.25% |
| 21+ | 0.00% | 3.00% | 0.00% | 3.00% |

## Active Member Decrement Rates

a. Assumed rate of Service Retirement or TERI entry are shown in the following tables. The first table provides retirement rates for Class Two members who attain age 65 before attaining 28 years of service. The second table is based on service and is for Class Two members who attain 28 years of service before age 65. The third table provides the retirement rates applicable to Class Three members.

**Annual Age Based Retirement Rates***

| Age | Class Two | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | General Employees | | | | Teachers | | | |
| | Reduced | | Normal | | Reduced | | Normal | |
| | Male | Female | Male | Female | Male | Female | Male | Female |
| 55 | 10% | 9% | 0% | 0% | 10% | 9% | 0% | 0% |
| 56 | 9% | 10% | 0% | 0% | 11% | 9% | 0% | 0% |
| 57 | 9% | 10% | 0% | 0% | 11% | 10% | 0% | 0% |
| 58 | 9% | 11% | 0% | 0% | 11% | 10% | 0% | 0% |
| 59 | 9% | 11% | 0% | 0% | 11% | 10% | 0% | 0% |
| 60 | 9% | 11% | 0% | 0% | 11% | 10% | 0% | 0% |
| 61 | 9% | 11% | 0% | 0% | 11% | 13% | 0% | 0% |
| 62 | 22% | 20% | 0% | 0% | 22% | 20% | 0% | 0% |
| 63 | 16% | 18% | 0% | 0% | 22% | 20% | 0% | 0% |
| 64 | 16% | 18% | 0% | 0% | 22% | 20% | 0% | 0% |
| 65 | 0% | 0% | 20% | 22% | 0% | 0% | 20% | 25% |
| 66 | 0% | 0% | 20% | 22% | 0% | 0% | 20% | 25% |
| 67 | 0% | 0% | 17% | 19% | 0% | 0% | 20% | 20% |
| 68 | 0% | 0% | 17% | 19% | 0% | 0% | 20% | 20% |
| 69 | 0% | 0% | 17% | 19% | 0% | 0% | 20% | 20% |
| 70 | 0% | 0% | 17% | 19% | 0% | 0% | 20% | 20% |
| 71 | 0% | 0% | 17% | 19% | 0% | 0% | 20% | 20% |
| 72 | 0% | 0% | 17% | 19% | 0% | 0% | 20% | 20% |
| 73 | 0% | 0% | 17% | 19% | 0% | 0% | 20% | 20% |
| 74 | 0% | 0% | 17% | 19% | 0% | 0% | 20% | 20% |
| 75 | 0% | 0% | 100% | 100% | 0% | 0% | 100% | 100% |

* Retirement rate is 50% at the later of age 62 or when the member is first eligible for a normal retirement benefit (i.e. the first age the member is eligible to concurrently commence benefits and continue employment.)

**Class Two Service Based Retirement Rates***

| Years of Service | General Employees | | Teachers | |
|---|---|---|---|---|
| | Male | Female | Male | Female |
| 28 | 15% | 18% | 7% | 8% |
| 29 | 10% | 10% | 8% | 9% |
| 30 | 10% | 10% | 8% | 9% |
| 31 | 10% | 10% | 9% | 10% |
| 32 | 10% | 10% | 10% | 11% |
| 33 | 18% | 20% | 11% | 12% |
| 34 | 18% | 20% | 12% | 18% |
| 35 | 18% | 20% | 13% | 18% |
| 36 | 20% | 20% | 14% | 18% |
| 37 | 20% | 20% | 18% | 18% |
| 38 | 20% | 20% | 17% | 19% |
| 39 | 20% | 20% | 17% | 20% |
| 40+ | 100% | 100% | 100% | 100% |

* Retirement rate is 50% at the later of age 62 or when the member is first eligible for a normal retirement benefit (i.e. the first age the member is eligible to concurrently commence benefits and continue employment.)

| Class Three Retirement Rates* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | General Employees | | | | Teachers | | | | |
| Age | Reduced | | Normal | | Reduced | | Normal | | Rule of 90 |
| | Male | Female | Male | Female | Male | Female | Male | Female | |
| 55 | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 20% |
| 56 | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 20% |
| 57 | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 20% |
| 58 | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 20% |
| 59 | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 20% |
| 60 | 9% | 11% | 0% | 0% | 11% | 10% | 0% | 0% | 20% |
| 61 | 9% | 11% | 0% | 0% | 11% | 13% | 0% | 0% | 20% |
| 62 | 22% | 20% | 0% | 0% | 22% | 20% | 0% | 0% | 20% |
| 63 | 16% | 18% | 0% | 0% | 22% | 20% | 0% | 0% | 20% |
| 64 | 16% | 18% | 0% | 0% | 22% | 20% | 0% | 0% | 20% |
| 65 | 0% | 0% | 20% | 22% | 0% | 0% | 20% | 25% | 20% |
| 66 | 0% | 0% | 20% | 22% | 0% | 0% | 20% | 25% | 20% |
| 67 | 0% | 0% | 17% | 19% | 0% | 0% | 20% | 20% | 20% |
| 68 | 0% | 0% | 17% | 19% | 0% | 0% | 20% | 20% | 20% |
| 69 | 0% | 0% | 17% | 19% | 0% | 0% | 20% | 20% | 20% |
| 70 | 0% | 0% | 17% | 19% | 0% | 0% | 20% | 20% | 20% |
| 71 | 0% | 0% | 17% | 19% | 0% | 0% | 20% | 20% | 20% |
| 72 | 0% | 0% | 17% | 19% | 0% | 0% | 20% | 20% | 20% |
| 73 | 0% | 0% | 17% | 19% | 0% | 0% | 20% | 20% | 20% |
| 74 | 0% | 0% | 17% | 19% | 0% | 0% | 20% | 20% | 20% |
| 75 | 0% | 0% | 100% | 100% | 0% | 0% | 100% | 100% | 100% |

* Retirement rate is 50% at the later of age 62 or when the member is first eligible for a normal retirement benefit
(i.e. the first age the member is eligible to concurrently commence benefits and continue employment.)

b. Assumed rates of disability are shown in the following table.

| Disability Rates | | | | |
|---|---|---|---|---|
| | General Employees | | Teachers | |
| Age | Males | Females | Males | Females |
| 25 | 0.0504% | 0.0440% | 0.0419% | 0.0458% |
| 30 | 0.1008% | 0.0616% | 0.0629% | 0.0616% |
| 35 | 0.1512% | 0.1232% | 0.0838% | 0.0616% |
| 40 | 0.2520% | 0.1584% | 0.1572% | 0.1074% |
| 45 | 0.3528% | 0.2288% | 0.2620% | 0.2200% |
| 50 | 0.5040% | 0.3872% | 0.4192% | 0.3520% |
| 55 | 0.8064% | 0.6160% | 0.6812% | 0.5720% |
| 60 | 1.0080% | 0.9416% | 1.0480% | 0.8800% |
| 64 | 1.2600% | 1.3112% | 1.3100% | 1.1000% |

There is no differentation between duty and nonduty related disability benefits.

c. Active Member Mortality

Rates of active member mortality are based upon the RP-2014 Mortality Table for Employees with applicable multipliers to better reflect anticipated experience and provide margin for future improvement in mortality.

| Active Mortality Rates (Multiplier Applied) | | | | |
|---|---|---|---|---|
| Age | General Employees | | Teachers | |
| | Males | Females | Males | Females |
| 25 | 0.0460% | 0.0164% | 0.0460% | 0.0147% |
| 30 | 0.0429% | 0.0207% | 0.0429% | 0.0185% |
| 35 | 0.0497% | 0.0272% | 0.0497% | 0.0243% |
| 40 | 0.0597% | 0.0376% | 0.0597% | 0.0337% |
| 45 | 0.0924% | 0.0624% | 0.0924% | 0.0558% |
| 50 | 0.1602% | 0.1047% | 0.1602% | 0.0937% |
| 55 | 0.2649% | 0.1589% | 0.2649% | 0.1422% |
| 60 | 0.4454% | 0.2320% | 0.4454% | 0.2076% |
| 64 | 0.7008% | 0.3220% | 0.7008% | 0.2881% |
| Multiplier | 95% | 95% | 95% | 85% |

For purposes of determining active death benefits, 5% of active deaths for general employees are assumed to be duty related.

d. Rates of Withdrawal

Rate of withdrawal for active members prior to eligibility for retirement are for each employee group and differ by gender and service. Sample rates are shown in the tables below.

| Withdrawal Rates - Male General Employees | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age | Years of Service | | | | | | | | | | | | | | |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 25 | 0.200 | 0.175 | 0.123 | 0.103 | 0.090 | 0.085 | 0.071 | 0.064 | 0.055 | 0.050 | 0.040 | 0.000 | 0.000 | 0.000 | 0.000 |
| 30 | 0.200 | 0.175 | 0.123 | 0.103 | 0.090 | 0.085 | 0.071 | 0.064 | 0.055 | 0.050 | 0.040 | 0.040 | 0.037 | 0.034 | 0.031 |
| 35 | 0.200 | 0.175 | 0.123 | 0.103 | 0.090 | 0.085 | 0.071 | 0.064 | 0.055 | 0.050 | 0.040 | 0.040 | 0.037 | 0.034 | 0.031 |
| 40 | 0.200 | 0.175 | 0.123 | 0.103 | 0.090 | 0.085 | 0.071 | 0.064 | 0.055 | 0.050 | 0.034 | 0.034 | 0.034 | 0.034 | 0.031 |
| 45 | 0.200 | 0.175 | 0.123 | 0.103 | 0.090 | 0.085 | 0.071 | 0.064 | 0.055 | 0.050 | 0.031 | 0.031 | 0.029 | 0.026 | 0.023 |
| 50 | 0.200 | 0.175 | 0.123 | 0.103 | 0.090 | 0.085 | 0.071 | 0.064 | 0.055 | 0.050 | 0.020 | 0.020 | 0.020 | 0.020 | 0.020 |
| 55 | 0.200 | 0.175 | 0.123 | 0.103 | 0.090 | 0.085 | 0.071 | 0.064 | 0.055 | 0.050 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 |
| 60 | 0.200 | 0.175 | 0.123 | 0.103 | 0.090 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Age | Years of Service (Continued) | | | | | | | | | | | | | | |
| | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28+ | |
| 25 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| 30 | 0.029 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| 35 | 0.029 | 0.026 | 0.023 | 0.020 | 0.018 | 0.015 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| 40 | 0.029 | 0.026 | 0.023 | 0.020 | 0.018 | 0.015 | 0.013 | 0.011 | 0.010 | 0.009 | 0.008 | 0.000 | 0.000 | 0.000 | |
| 45 | 0.020 | 0.020 | 0.020 | 0.020 | 0.018 | 0.015 | 0.013 | 0.011 | 0.010 | 0.009 | 0.008 | 0.007 | 0.006 | 0.000 | |
| 50 | 0.020 | 0.018 | 0.015 | 0.013 | 0.011 | 0.010 | 0.010 | 0.010 | 0.010 | 0.009 | 0.008 | 0.007 | 0.006 | 0.000 | |
| 55 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | 0.009 | 0.008 | 0.007 | 0.006 | 0.000 | 0.000 | 0.000 | 0.000 | |
| 60 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |

| Withdrawal Rates - Female General Employees | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age | Years of Service | | | | | | | | | | | | | | |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 25 | 0.230 | 0.217 | 0.141 | 0.118 | 0.101 | 0.097 | 0.084 | 0.075 | 0.067 | 0.057 | 0.046 | 0.000 | 0.000 | 0.000 | 0.000 |
| 30 | 0.230 | 0.217 | 0.141 | 0.118 | 0.101 | 0.097 | 0.084 | 0.075 | 0.067 | 0.057 | 0.046 | 0.046 | 0.042 | 0.038 | 0.034 |
| 35 | 0.230 | 0.217 | 0.141 | 0.118 | 0.101 | 0.097 | 0.084 | 0.075 | 0.067 | 0.057 | 0.046 | 0.046 | 0.042 | 0.038 | 0.034 |
| 40 | 0.230 | 0.217 | 0.141 | 0.118 | 0.101 | 0.097 | 0.084 | 0.075 | 0.067 | 0.057 | 0.038 | 0.038 | 0.038 | 0.038 | 0.034 |
| 45 | 0.230 | 0.217 | 0.141 | 0.118 | 0.101 | 0.097 | 0.084 | 0.075 | 0.067 | 0.057 | 0.034 | 0.034 | 0.030 | 0.026 | 0.023 |
| 50 | 0.230 | 0.217 | 0.141 | 0.118 | 0.101 | 0.097 | 0.084 | 0.075 | 0.067 | 0.057 | 0.020 | 0.020 | 0.020 | 0.020 | 0.020 |
| 55 | 0.230 | 0.217 | 0.141 | 0.118 | 0.101 | 0.097 | 0.084 | 0.075 | 0.067 | 0.057 | 0.012 | 0.012 | 0.012 | 0.012 | 0.012 |
| 60 | 0.230 | 0.217 | 0.141 | 0.118 | 0.101 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Age | Years of Service (Continued) | | | | | | | | | | | | | | |
| | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28+ | |
| 25 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| 30 | 0.030 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| 35 | 0.030 | 0.026 | 0.023 | 0.020 | 0.018 | 0.016 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| 40 | 0.030 | 0.026 | 0.023 | 0.020 | 0.018 | 0.016 | 0.014 | 0.013 | 0.012 | 0.011 | 0.010 | 0.000 | 0.000 | 0.000 | |
| 45 | 0.020 | 0.020 | 0.020 | 0.020 | 0.018 | 0.016 | 0.014 | 0.013 | 0.012 | 0.011 | 0.010 | 0.009 | 0.008 | 0.000 | |
| 50 | 0.020 | 0.018 | 0.016 | 0.014 | 0.013 | 0.012 | 0.012 | 0.012 | 0.012 | 0.011 | 0.010 | 0.009 | 0.008 | 0.000 | |
| 55 | 0.012 | 0.012 | 0.012 | 0.012 | 0.012 | 0.012 | 0.011 | 0.010 | 0.009 | 0.008 | 0.000 | 0.000 | 0.000 | 0.000 | |
| 60 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |

| Withdrawal Rates - Male Teachers | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age | Years of Service | | | | | | | | | | | | | | |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 25 | 0.000 | 0.217 | 0.145 | 0.117 | 0.098 | 0.083 | 0.071 | 0.061 | 0.050 | 0.042 | 0.039 | 0.000 | 0.000 | 0.000 | 0.000 |
| 30 | 0.000 | 0.217 | 0.145 | 0.117 | 0.098 | 0.083 | 0.071 | 0.061 | 0.050 | 0.042 | 0.039 | 0.030 | 0.030 | 0.029 | 0.028 |
| 35 | 0.000 | 0.217 | 0.145 | 0.117 | 0.098 | 0.083 | 0.071 | 0.061 | 0.050 | 0.042 | 0.039 | 0.030 | 0.030 | 0.029 | 0.028 |
| 40 | 0.000 | 0.217 | 0.145 | 0.117 | 0.098 | 0.083 | 0.071 | 0.061 | 0.050 | 0.042 | 0.039 | 0.029 | 0.029 | 0.029 | 0.028 |
| 45 | 0.000 | 0.217 | 0.145 | 0.117 | 0.098 | 0.083 | 0.071 | 0.061 | 0.050 | 0.042 | 0.039 | 0.028 | 0.027 | 0.026 | 0.024 |
| 50 | 0.000 | 0.217 | 0.145 | 0.117 | 0.098 | 0.083 | 0.071 | 0.061 | 0.050 | 0.042 | 0.039 | 0.022 | 0.022 | 0.022 | 0.022 |
| 55 | 0.000 | 0.217 | 0.145 | 0.117 | 0.098 | 0.083 | 0.071 | 0.061 | 0.050 | 0.042 | 0.039 | 0.013 | 0.013 | 0.013 | 0.013 |
| 60 | 0.000 | 0.217 | 0.145 | 0.117 | 0.098 | 0.083 | 0.071 | 0.061 | 0.050 | 0.042 | 0.039 | 0.008 | 0.008 | 0.008 | 0.008 |
| Age | Years of Service (Continued) | | | | | | | | | | | | | | |
| | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28+ | |
| 25 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| 30 | 0.027 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| 35 | 0.027 | 0.026 | 0.024 | 0.022 | 0.020 | 0.017 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| 40 | 0.027 | 0.026 | 0.024 | 0.022 | 0.020 | 0.017 | 0.015 | 0.014 | 0.013 | 0.012 | 0.011 | 0.000 | 0.000 | 0.000 | |
| 45 | 0.022 | 0.022 | 0.022 | 0.022 | 0.020 | 0.017 | 0.015 | 0.014 | 0.013 | 0.012 | 0.011 | 0.010 | 0.009 | 0.000 | |
| 50 | 0.022 | 0.020 | 0.017 | 0.015 | 0.014 | 0.013 | 0.013 | 0.013 | 0.013 | 0.012 | 0.011 | 0.010 | 0.009 | 0.000 | |
| 55 | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 | 0.012 | 0.011 | 0.010 | 0.009 | 0.008 | 0.008 | 0.008 | 0.000 | |
| 60 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.000 | 0.000 | 0.000 | 0.000 | |

| Withdrawal Rates - Female Teachers | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age | Years of Service | | | | | | | | | | | | | | |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 25 | 0.000 | 0.202 | 0.125 | 0.103 | 0.089 | 0.074 | 0.069 | 0.057 | 0.053 | 0.046 | 0.037 | 0.000 | 0.000 | 0.000 | 0.000 |
| 30 | 0.000 | 0.202 | 0.125 | 0.103 | 0.089 | 0.074 | 0.069 | 0.057 | 0.053 | 0.046 | 0.037 | 0.030 | 0.030 | 0.027 | 0.024 |
| 35 | 0.000 | 0.202 | 0.125 | 0.103 | 0.089 | 0.074 | 0.069 | 0.057 | 0.053 | 0.046 | 0.037 | 0.030 | 0.030 | 0.027 | 0.024 |
| 40 | 0.000 | 0.202 | 0.125 | 0.103 | 0.089 | 0.074 | 0.069 | 0.057 | 0.053 | 0.046 | 0.037 | 0.030 | 0.027 | 0.027 | 0.024 |
| 45 | 0.000 | 0.202 | 0.125 | 0.103 | 0.089 | 0.074 | 0.069 | 0.057 | 0.053 | 0.046 | 0.037 | 0.024 | 0.022 | 0.020 | 0.018 |
| 50 | 0.000 | 0.202 | 0.125 | 0.103 | 0.089 | 0.074 | 0.069 | 0.057 | 0.053 | 0.046 | 0.037 | 0.018 | 0.016 | 0.016 | 0.016 |
| 55 | 0.000 | 0.202 | 0.125 | 0.103 | 0.089 | 0.074 | 0.069 | 0.057 | 0.053 | 0.046 | 0.037 | 0.010 | 0.009 | 0.009 | 0.009 |
| 60 | 0.000 | 0.202 | 0.125 | 0.103 | 0.089 | 0.074 | 0.069 | 0.057 | 0.053 | 0.046 | 0.037 | 0.006 | 0.006 | 0.006 | 0.006 |
| Age | Years of Service (Continued) | | | | | | | | | | | | | | |
| | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28+ | |
| 25 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| 30 | 0.022 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| 35 | 0.022 | 0.020 | 0.018 | 0.016 | 0.014 | 0.012 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| 40 | 0.022 | 0.020 | 0.018 | 0.016 | 0.014 | 0.012 | 0.011 | 0.010 | 0.009 | 0.008 | 0.007 | 0.000 | 0.000 | 0.000 | |
| 45 | 0.016 | 0.016 | 0.016 | 0.016 | 0.014 | 0.012 | 0.011 | 0.010 | 0.009 | 0.008 | 0.007 | 0.006 | 0.006 | 0.000 | |
| 50 | 0.016 | 0.014 | 0.012 | 0.011 | 0.010 | 0.009 | 0.009 | 0.009 | 0.009 | 0.008 | 0.007 | 0.006 | 0.006 | 0.000 | |
| 55 | 0.009 | 0.009 | 0.009 | 0.009 | 0.009 | 0.009 | 0.008 | 0.007 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.000 | |
| 60 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.000 | 0.000 | 0.000 | 0.000 | |

**Refund of Member Contributions**

The following percentage of vested members are assumed to elect to receive a refund of contributions upon termination of employment prior to becoming eligible to commence a service retirement benefit. This assumption is based on the plan's experience.

| Age: | Less than 40 | 40 - 49 | 50 or More |
|---|---|---|---|
| Refund rate: | 45% | 40% | 35% |

**Post Retirement Mortality**

a. Healthy retirees and beneficiaries – The 2016 Public Retirees of South Carolina Mortality Table for Males and the 2016 Public Retirees of South Carolina Mortality Table for Females**,** projected using the AA projection table from the year 2016 and with multipliers based on plan experience. The following are sample rates of the base table:

| Nondisabled Annuitant Mortality Rates Before Projection (Multiplier Applied) | | | | |
|---|---|---|---|---|
| Age | General Employees | | Teachers | |
| | Males | Females | Males | Females |
| 50 | 0.2038% | 0.1454% | 0.1875% | 0.1284% |
| 55 | 0.3205% | 0.2465% | 0.2949% | 0.2177% |
| 60 | 0.5863% | 0.4265% | 0.5394% | 0.3765% |
| 65 | 1.0198% | 0.5924% | 0.9382% | 0.5230% |
| 70 | 1.5718% | 0.9640% | 1.4461% | 0.8511% |
| 75 | 2.7195% | 1.8534% | 2.5019% | 1.6363% |
| 80 | 5.0493% | 3.7276% | 4.6454% | 3.2910% |
| 85 | 9.1594% | 7.0538% | 8.4266% | 6.2277% |
| 90 | 15.9042% | 12.3489% | 14.6319% | 10.9026% |
| Multiplier | 100% | 111% | 92% | 98% |

The following table provides the life expectancy for individuals retiring in future years based on the assumption with full generational projection:

| Life Expectancy for an Age 65 Retiree in Years | | | | |
|---|---|---|---|---|
| Employee Type | Year of Retirement | | | |
| | 2020 | 2025 | 2030 | 2035 |
| General Employee – Male | 20.6 | 20.9 | 21.3 | 21.6 |
| General Employee – Female | 22.7 | 22.8 | 23.0 | 23.2 |
| Teacher – Male | 21.2 | 21.5 | 21.9 | 22.2 |
| Teacher - Female | 23.6 | 23.8 | 24.0 | 24.1 |

b. A separate table of mortality rates is used for disabled retirees based on the RP-2014 Disabled Mortality table projected using the AA projection table from the year 2014 and with multipliers based on plan experience. The following are sample rates of the base table:

| Disabled Annuitant Mortality Rates (Multiplier Applied) | | | | |
|---|---|---|---|---|
| Age | General Employees | | Teachers | |
| | Males | Females | Males | Females |
| 50 | 2.5494% | 1.4884% | 2.5494% | 1.4884% |
| 55 | 2.9211% | 1.8099% | 2.9211% | 1.8099% |
| 60 | 3.3255% | 2.1249% | 3.3255% | 2.1249% |
| 65 | 3.9606% | 2.6075% | 3.9606% | 2.6075% |
| 70 | 5.0433% | 3.5254% | 5.0433% | 3.5254% |
| 75 | 6.7859% | 5.1306% | 6.7859% | 5.1306% |
| 80 | 9.5770% | 7.6295% | 9.5770% | 7.6295% |
| 85 | 14.1629% | 11.3025% | 14.1629% | 11.3025% |
| 90 | 21.6256% | 16.5815% | 21.6256% | 16.5815% |
| Multiplier | 125% | 125% | 125% | 125% |

## Asset Valuation Method

The actuarial value of assets is equal to the market value, adjusted for the five-year phase in of the actual investment return in excess of (or less than) the expected investment return on a market value of asset basis. This five-year phase in begins with the investment experience for the fiscal year ending June 30, 2016. The actual return is calculated net of investment expenses, and the expected investment return is equal to the assumed investment return rate multiplied by the prior year's market value of assets, adjusted for contributions, benefits paid, and refunds.

Expected earnings are determined using the assumed investment rate of return and the beginning of year actuarial value of assets (adjusted for receipts and disbursements during the year). The returns are computed net of administrative and investment expenses.

**Actuarial Cost Method**

The Entry Age Normal actuarial cost method allocates the System's actuarial present value of future benefits to various periods based upon service. The portion of the present value of future benefits allocated to years of service prior to the valuation date is the actuarial accrued liability, and the portion allocated to years following the valuation date is the present value of future normal costs. The normal cost is determined for each active member as the level percent of payroll necessary to fully fund the expected benefits to be earned over the career of each individual active member. The normal cost is partially funded with active member contributions with the remainder funded by employer contributions.

An unfunded accrued liability exists in the amount equal to the excess of accrued liability over valuation assets. The amortization period of the System is the number of years required to fully amortize the unfunded accrued liability, on an actuarial value of asset basis, with the expected amount of employer contributions in excess of the employers' portion of the normal cost.

Note, the principle financial measurement calculations in this actuarial valuation, which include the unfunded actuarial accrued liability, funded ratio, contributions rates, and funding period, are based on an actuarial value of assets (smoothed value) basis. The actuarial value of assets is a calculated asset value which may be greater than or less than the market value of assets and is used to dampen some of the volatility in the market value of assets. As a result, many of these measures would be different if they were determined on a market value of asset basis.

**Development of the Contribution Rate and Funding Period**

The calculation of the employer and member contribution rate as well as the derived funding period takes into account several differences in the contributions paid by the various members as well as the delayed timing (if any) in the effective date of the new contribution rate. Specifically, the factors that are reflected in the calculation of the contribution rate include:

1) The anticipated difference in expected contributions received by the System from members and employers as a result of a 24-month delay in effective date of the contribution rate increase after the valuation date.

2) The cost (normal cost and actuarial accrued liability) due to incidental death benefits provided to members in the ORP.

3) Member and employer contributions made on the payroll of working retirees and members participating in TERI are being used to finance the unfunded actuarial accrued liability since these members do not have a normal cost. Also, the number of working retirees is expected to decrease due to changes in working after retirement provisions enacted with Act 278 and TERI will be completely eliminated after June 30, 2018.

4) The money collected on the payroll of member in ORP that is allocated to finance the unfunded liability in SCRS, which is the SCRS employer contribution rate less 5%, is less than the money collected on the payroll of members in SCRS to finance the unfunded actuarial accrued liability.

5) For purposes of calculating the amortization cost and funding period, discrete pay increases and continuous interest was assumed, with amortization payments made at the end of each month.

**Unused Annual Leave**

To account for the effect of unused annual leave in Annual Final Compensation (AFC) of Class Two members, the AFC for Class Two members is increased 2.14% at their date of retirement. Unused annual leave is not included in the calculation of the AFC for Class Three members.

**Unused Sick Leave**

To account for the effect of unused sick leave on credited service for Class Two members, the service of active Class Two members who retire is increased 3 months. Unused sick leave is not included in determining the credited service for Class Three members.

**Future Post-Retirement Benefit Adjustments**

Benefits are assumed to increase by the lesser of 1.00% annually or $500 beginning on the July 1st following the receipt of 12 monthly benefit payments. The $500 limit in the annual increase is not indexed to escalate in future years.

**Payroll Growth Rate**

The total annual payroll of active members (also applies to TERI, ORP and rehired retiree participants) is assumed to increase at an annual rate of 3.00%. This rate represents the underlying expected annual rate of wage inflation and does not anticipate increases in the number of members.

**Other Assumptions**

1. Valuation payroll (used for determining the amortization contribution rate): Prior fiscal year payroll projected forward one year using the overall payroll growth rate. This was determined separately for TERI, and return to work employees by dividing the actual

member contributions received during the prior fiscal year by the member contribution rate in effect for that year, and then projecting that amount forward one year.

2. The normal cost rate is increased by 0.12% to account for administrative expenses that are paid with plan assets.
3. Individual salaries used to project benefits: Actual salaries from the past fiscal year are used to determine the final average salary as of the valuation date. For future salaries, the salary from the last fiscal year is projected forward with one year's salary scale.
4. Pay increase timing: Beginning of (fiscal) year. This is equivalent to assuming that reported salaries represent amounts paid to members during the year ended on the valuation date.
5. Percent married: 100% of male and 100% of female employees are assumed to be married.
6. Age difference: Males are assumed to be three years older than their spouses.
7. Percent electing annuity on death (when eligible): All of the spouses of vested, married participants are assumed to elect an immediate life annuity.
8. Inactive Population: All non-vested members are assumed to take an immediate refund.
9. There will be no recoveries once disabled.
10. Decrement timing: Terminations for public school employees are assumed to occur at the beginning of the year. Decrements of all types are assumed to occur mid-year.
11. Eligibility testing: Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
12. Decrement relativity: Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
13. Incidence of contributions: Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made. For valuation purposes, the member contribution rate projected to be in effect after FY 2016 is 9.13% of pay.
14. Benefit service: All members are assumed to accrue one year of eligibility service each year.
15. All calculations were performed without regard to the compensation limit in IRC Section 401(a)(17) and the benefit limit under IRC Section 415.

## Participant Data

Participant data was securely supplied in electronic text files. There were separate files for (i) active and inactive members, and (ii) members and beneficiaries receiving benefits.

The data for active members included birth date, gender, service with the current city and total vesting service, salary, and employee contribution account balances. For retired members and beneficiaries, the data included date of birth, gender, spouse's date of birth (where applicable), amount of monthly benefit, date of retirement, and form of payment code.

Salary supplied for the current year was based on the annualized earnings for the year preceding the valuation date.

Assumptions were made to correct for missing or inconsistent data. These had no material impact on the results presented.

# APPENDIX B

## BENEFIT PROVISIONS

## SUMMARY OF BENEFIT PROVISIONS FOR SOUTH CAROLINA RETIREMENT SYSTEM (SCRS)

***Effective Date***: July 1, 1945.

***Administration***: The South Carolina Public Employee Benefit Authority is responsible for the general administrative operations and day to day management of the Plan.

***Type of Plan***: This is a qualified governmental defined benefit retirement plan. Under GASB Statements No. 27, 67, and 68, it is considered to be a cost-sharing multiple-employer plan.

***Eligibility***: This System covers all permanent full-time or part-time employees of a covered employer (i.e. public school, state employer, city, county, and other local public governmental entity), unless specifically exempted by Statute or participate in the State Optional Retirement Program (ORP). Also, beginning with the 2012 general election, newly elected officials of the South Carolina General Assembly are also covered by this system.

***Employee Contributions***: Members are contributing 8.66% of earnable compensation for FY 2017. Furthermore, in the event that these contribution rates are insufficient to maintain a 30-year amortization period, the Board shall increase the employer and member contribution rates by an equal amount (i.e. maintain at least a 2.90% differential between the employer and member rates) as necessary to maintain a 30-year funding period. The employer and member contribution rates may not decrease until the plan attains a 90% funded ratio. These contributions are "picked-up" under Section 414(h) of the Internal Revenue Code. Contributions are credited with interest at the rate of 4.0% per annum while the member is actively employed.

***Average Final Compensation (AFC)***: The monthly average of the member's highest 12 consecutive quarters of earnable compensation (highest 20 consecutive quarters for Class Three members, members who are hired after June 30, 2012). Earnable compensation is the compensation that would be payable to a member if the member worked a full, normal working time, which includes gross salary, sick pay, and deferrals. Compensation due to overtime earned after December 31, 2012 will not be included unless that compensation is for time that is mandated by the employer.

The calculation of the AFC for Class One and Class Two members also includes up to 45 days pay for unused annual leave paid at termination. Members joining the System after January 1, 1996, have their compensation limited in accordance with IRC Section 401(a)(17) for determining benefits.

***Service Retirement (Unreduced):***

a. Eligibility: Class Two members may retire with an unreduced benefit at age 65 with five years of earned service or after 28 years of creditable service, if earlier. Class Three members may retire with an unreduced benefit at age 65 with eight years of earned service or after the satisfying the rule of 90 (i.e. age plus credited service equals or exceeds 90).

b. Monthly Benefit: 1.82% times the member's AFC times their years of creditable service.

c. Payment Forms: Maximum retirement allowance (Option A) and survivor allowances under Options B and C.

***Service Retirement (Reduced):***

a. Eligibility: Class Two members may retire with a reduced benefit upon attaining: (1) age 55 with 25 years of creditable service (minimum of 5 years of earned service), or (2) age 60 with five years of earned service. Class Three members may retire with a reduced benefit upon attaining age 60 with eight years of earned service.

b. Reduction: A Class Two member's benefit will be reduced by either an age or service based reduction factor described below, whichever results in the most favorable benefit. A Class Three member's benefit will be reduced by the age based reduction factor described below.

   Age Based: Members retiring after age 60 will have their benefit reduced at the rate of 5% per year for each year of their retirement age precedes age 65.

   Service Based: 4% per year for each year of creditable service that is less than 28.

c. Payment Forms: Maximum retirement allowance (Option A) and survivor allowances under Options B and C.

***Disability Retirement:***

a. Eligibility: The eligibility for a disability retirement will be based upon the member's entitlement for Social Security disability benefits.

b. Monthly Benefit: The net monthly disability benefit payable is equal to the member's benefit based on their credited service and AFC at the time of their disability.

c. Payment Form: Maximum retirement allowance (Option A) and survivor allowances under Options B and C.

d. Death while Disabled: A disabled member is treated as a retired member for purposes of determining a death benefit.

***Vesting and Refunds*:**

a. Eligibility: All members who are not vested are eligible for a refund when they terminate service. Class Two members are vested after five (5) years of earned service. Class Three members are vested after eight (8) years of earned service. Vested members may also elect to receive a refund in lieu of the deferred termination benefit described below.

b. Amount: The refund benefit is the accumulated value of the member's contributions plus interest credited by the fund while they were actively employed. Members do not earn interest on their employee contribution account balance while they are inactive.

***Deferred Termination Benefit*:**

a. Eligibility: Member must be vested (i.e. 5 years of earned service for Class Two members and 8 years of earned service for Class Three members) and must elect to leave his/her contributions on deposit.

b. Monthly Benefit: Same as the unreduced or reduced service retirement benefit, based on service and AFC at termination, and commencing once the member is eligible.

c. Payment Form: Maximum retirement allowance (Option A) and survivor allowances under Options B and C.

d. Death Benefit: The beneficiary of an inactive member who dies is entitled to receive the amount of the member's accumulated contributions (with interest). If the member met service eligibility requirement at their time of death, the beneficiary is eligible for a monthly survivor annuity benefit.

***Death while an Active Contributing Member*:**

a. In General: A refund of the member's accumulated contributions (with interest) is paid to the beneficiary of a deceased member.

b. Beneficiary Annuity: If the deceased member (i) attained 5 or more years of earned service and (ii) had attained the age of 60 or had accumulated 15 or more years of creditable service, may elect to receive, in lieu of the accumulated contributions, a monthly benefit for life of the beneficiary determined under "Option B" described under the Optional Forms of Benefit. For purposes of the benefit calculation, a member under the age of 60 with less than 28 years of creditable service is assumed to be 60 years of age and no age reduction applies.

***Optional Forms of Benefit*:** The System permits members to elect from three forms of benefit at retirement. In each case the benefit amount is adjusted to be actuarially equivalent to the "Option A" form. The optional forms are:

a. Option A (Maximum Retirement Allowance): A life annuity. Upon the member's death, any remaining member contributions and interest will be paid to the member's designated beneficiary.

b. Option B (100% Joint & Survivor with Pop-up): A reduced annuity payable as long as either the member or his/her spouse is living. In the event the member's designated beneficiary predeceases the member, then the member shall receive a retirement allowance equal to the maximum retirement allowance (Option A), plus any applicable benefit adjustments that would have been granted.

c. Option C (50% Joint & Survivor with Pop-up): A reduced annuity payable during the member's life, and continues after the member's death at 50% of the rate paid to the member for the life of the member's designated beneficiary. In the event the member's designated beneficiary predeceases the member, then the member shall receive a retirement allowance equal to the maximum retirement allowance (Option A), plus any applicable benefit adjustments that would have been granted.

***Incidental Death Benefit*:**

a. Active Employees: The beneficiary (or estate) of an active employee of an employer participating in the Preretirement Death Benefit Program who completes at least one full year of membership service, will receive a death benefit equal to the member's annual earnable compensation at the time of death.

The one-year membership requirement is waived for members whose death is a result of an injury arising out of and in the course of performing his duties.

For purposes of incidental death benefits, active employees include those members who are receiving a retirement allowance and are actively reemployed and contributing to the system with a participating employer.

b. Post Employment: The beneficiary (or estate) of a retiree, both current and retiree, of an employer participating in the Preretirement Death Benefit Program will receive a one-time payment upon the retiree's death. The amount of the one-time payment is based on the retiree's years of credited service at retirement.

| Years of Service Credit | Death Benefit |
|---|---|
| 10 or more, but less than 20 | $2,000 |
| 20 or more, but less than 28 | $4,000 |
| 28 or more | $6,000 |

***Postretirement Benefit Increases***: Benefits paid to retired members or surviving spouses are increased annually in an amount equal to the lesser of 1.00% of the pension benefit or $500. The $500 limit in the annual increase is not indexed to escalate in future years.

A member electing a reduced early retirement is ineligible to receive a benefit increase until the second July 1 after the earlier of:

(1) the member attains age 60, or

(2) the member would have 28 years of creditable service had he not retired.

***Teacher and Employee Retention Incentive Program (TERI)*:**

a. Eligibility: Active member eligible for a service retirement benefit.

b. Benefits: A member electing to participate in the program agrees to continue employment for a period not to exceed five years. During this period, the member's service retirement benefit is placed in the system's trust fund on behalf of the member. No interest is paid on the member's deferred monthly benefit during the program period. Upon termination of the program, the member must receive the balance in the account.

c. Other Adjustments: After June 30, 2005, the System shall recalculate the member's final compensation to reflect compensation increases earned after participating in the program. The AFC shall also include up to 45 days of unused annual leave.

d. Death while in TERI: If a member dies during the program period, the member's designated beneficiary will receive a distribution of the balance of benefits accumulated in the member's TERI account.

e. As a result of the pension reform legislation enacted in June 2012 (Act 278), the program will be closed and no members may participate in TERI after June 30, 2018.

# APPENDIX C

## GLOSSARY

## GLOSSARY

***Actuarial Accrued Liability (AAL):*** That portion, as determined by a particular Actuarial Cost Method, of the Actuarial Present Value of Future Plan Benefits which is not provided for by future Normal Costs. It is equal to the Actuarial Present Value of Future Plan Benefits minus the actuarial present value of future Normal Costs.

***Actuarial Assumptions:*** Assumptions as to future experience under the Fund. These include assumptions about the occurrence of future events affecting costs or liabilities, such as:

- mortality, withdrawal, disablement, and retirement;
- future increases in salary;
- future rates of investment earnings and future investment and administrative expenses;
- characteristics of members not specified in the data, such as marital status;
- characteristics of future members;
- future elections made by members; and
- other relevant items.

***Actuarial Cost Method*** or ***Funding Method:*** A procedure for allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability. These items are used to determine the ADC.

***Actuarial Gain*** or ***Actuarial Loss:*** A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates. Through the actuarial assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted, or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., the Fund's assets earn more than projected, salaries do not increase as fast as assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results that produce actuarial liabilities which are larger than projected. Actuarial gains will shorten the time required for funding of the actuarial balance sheet deficiency while actuarial losses will lengthen the funding period.

***Actuarially Equivalent:*** Of equal actuarial present value, determined as of a given date and based on a given set of Actuarial Assumptions.

***Actuarial Present Value (APV):*** The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. For purposes of this standard, each such amount or series of amounts is:

a. adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.)

b. multiplied by the probability of the occurrence of an event (such as survival, death, disability, termination of employment, etc.) on which the payment is conditioned, and

c. discounted according to an assumed rate (or rates) of return to reflect the time value of money.

***Actuarial Present Value of Future Plan Benefits:*** The Actuarial Present Value of those benefit amounts which are expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age and past and anticipated future compensation and service credits. The Actuarial Present Value of Future Plan Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive, nonretired members either entitled to a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.

***Actuarial Valuation***: The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial valuation for a governmental retirement system typically also includes calculations that provide the financial information of the plan, such as the funded ratio, unfunded actuarial accrued liability and the ADC.

***Actuarial Value of Assets*** or ***Valuation Assets:*** The value of the Fund's assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly actuaries use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the ADC.

***Actuarially Determined:*** Values which have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.

***Actuarially Determined Contribution (ADC):*** The employer's periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation. The ADC consists of the Employer Normal Cost and the Amortization Payment.

***Amortization Method:*** A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.

***Amortization Payment:*** That portion of the pension plan contribution or ADC which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.

***Closed Amortization Period:*** A specific number of years that is counted down by one each year, and therefore declines to zero with the passage of time. For example if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc. See Funding Period and Open Amortization Period.

***Decrements:*** Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or termination.

***Defined Benefit Plan:*** A retirement plan that is not a Defined Contribution Plan. Typically a defined benefit plan is one in which benefits are defined by a formula applied to the member's compensation and/or years of service.

***Defined Contribution Plan:*** A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, and the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.

***Employer Normal Cost:*** The portion of the Normal Cost to be paid by the employers. This is equal to the Normal Cost less expected member contributions.

***Experience Study:*** A periodic review and analysis of the actual experience of the Fund which may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified as deemed appropriate by the Actuary.

***Funded Ratio:*** The ratio of the actuarial value of assets (AVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a market funded ratio, using the market value of assets (MVA), rather than the AVA, although GASB 25 reporting requires the use of the AVA.

***Funding Period*** or ***Amortization Period:*** The term "Funding Period" is used two ways. In the first sense, it is the period used in calculating the Amortization Payment as a component of the ADC. This funding period is chosen by the Board of Trustees. In the second sense, it is a calculated item: the number of years in the future that will theoretically be required to amortize (i.e., pay off or eliminate) the Unfunded Actuarial Accrued Liability, based on the statutory employer contribution rate, and assuming no future actuarial gains or losses.

***GASB***: Governmental Accounting Standards Board.

***GASB 67*** and ***GASB 68***: Governmental Accounting Standards Board Statements No. 67 and No. 68. These are the governmental accounting standards that set the accounting and reporting rules for public retirement systems and the employers that sponsor, participate in, or contribute to them. Statement No. 67 sets the accounting rules for the financial reporting of the retirement systems, while Statement No. 68 sets the rules for the employers that sponsor, participate in, or contribute to public retirement systems.

***Normal Cost:*** That portion of the Actuarial Present Value of pension plan benefits and expenses which is allocated to a valuation year by the Actuarial Cost Method. Any payment in respect of an Unfunded Actuarial Accrued Liability is not part of Normal Cost (see Amortization Payment). For pension plan benefits which are provided in part by employee contributions, Normal Cost refers to the total of employee contributions and employer Normal Cost unless otherwise specifically stated. Under the entry age normal cost method, the Normal Cost is intended to be the level cost (when expressed as a percentage of pay) needed to fund the benefits of a member from hire until ultimate termination, death, disability or retirement.

***Open Amortization Period:*** An open amortization period is one which is used to determine the Amortization Payment but may not decrease by exactly one year in the subsequent year's actuarial valuation. In some instances, if the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year. In other instances, such as the case with the South Carolina Retirement System (SCRS) and Police Officers Retirement System (PORS), the amortization period denotes the expected number of years until the plan attains a 100% funded ratio (on an actuarial value of asset basis), based on the contribution rate that is in effect. In this instance, the amortization period may "float" from year to year, meaning it could increase, decrease, or remain relatively unchanged from the amortization period in the prior year's valuation.

***Unfunded Actuarial Accrued Liability:*** The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus.

***Valuation Date or Actuarial Valuation Date:*** The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Plan Benefits is determined. The expected benefits to be paid in the future are discounted to this date.