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Legislative Retirement System of North Carolina

Report on the Actuarial Valuation Prepared as of December 31, 2015

October 2016

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October 13, 2016

Board of Trustees
Legislative Retirement
System of North Carolina
3200 Atlantic Avenue
Raleigh, NC 27604

Members of the Board:

We submit herewith our report on the actuarial valuation of the Legislative Retirement System of North Carolina (referred to as "LRS" or the "Legislative Plan") prepared as of December 31, 2015. The report has been prepared in accordance with North Carolina General Statute 120-4.

The primary purpose of the valuation report is to determine the required employer contribution rates, to describe the current financial condition of LRS, and to analyze changes in such condition. In addition, the report provides information that the Office of the State Controller (OSC) requires for its Comprehensive Annual Financial Report (CAFR) and it summarizes census data. Use of this report for any other purposes or by anyone other than OSC and its auditors may not be appropriate and may result in mistaken conclusions because of failure to understand applicable assumptions, methods, or inapplicability of the report for that purpose. The attached pages should not be provided without a copy of this cover letter. Because of the risk of misinterpretation of actuarial results, you should ask Buck to review any statement you wish to make on the results contained in this report. Buck will not accept any liability for any such statement made without prior review.

The valuation is based upon membership data and financial information as furnished by the Retirement Systems Division and the Financial Operations Division and as summarized in this report. Although reviewed for reasonableness and consistency with the prior valuation, these elements have not been audited by Buck and we cannot certify as to the accuracy and completeness of the data supplied. The valuation is also based on benefit and contribution provisions as presented in this report. If you have reason to believe that the plan provisions are incorrectly described, that important plan provisions relevant to this valuation are not described, or that conditions have changed since the calculations were made, you should contact the authors of this actuarial report prior to relying on this information.

The valuation is further based on the actuarial valuation assumptions, approved by the Board of Trustees, as presented in this report. We believe that these assumptions are appropriate and reasonable and also comply with the requirements of Governmental Accounting Standards Board (GASB) Statement No. 67. We prepared this valuation in accordance with the requirements of this standard and in accordance with all applicable Actuarial Standards of Practice (ASOP).

The latest assumptions were adopted for use with the December 31, 2015 actuarial valuation, based on the experience study prepared as of December 31, 2014 and adopted by the board of Trustees on January 21, 2016. The economic assumptions with respect to investment yield, salary increase and inflation have been based upon a review of the existing portfolio structure as well as recent and anticipated experience.

Where presented, references to “funded ratio” and “unfunded accrued liability” typically are measured on an actuarial value of assets basis. It should be noted that the same measurements using market value of assets would result in different funded ratios and unfunded accrued liabilities. Moreover, the funded ratio presented is appropriate for evaluating the need and level of future contributions but makes no assessment regarding the funded status of the plan if the plan were to settle (i.e. purchase annuities) for a portion or all of its liabilities. In various places in the report the results also show funded ratios and unfunded liabilities based upon varying sets of assumptions as well as market values of assets as that is required for certain disclosure information required per accounting rules or statutes. Where this has been done it has been clearly indicated.

Future actuarial measurements may differ significantly from current measurements due to plan experience differing from that anticipated by the economic and demographic assumptions, increases or decreases expected as part of the natural operation of the methodology used for these measurements, and changes in plan provisions or applicable law. Because of limited scope, Buck performed no analysis of the potential range of such future differences, except for some limited analysis in financial projections or required disclosure information.

The undersigned meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained in this report. This report has been prepared in accordance with all applicable Actuarial Standards of Practice, and we are available to answer questions about it.

Respectfully submitted,

Michael A. Ribble, FSA, EA, MAAA
Principal, Consulting Actuary

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Executive Summary

Overview

The North Carolina Retirement Systems Division (RSD) was established in 1941 to provide retirement benefits for public servants in the State of North Carolina. Today, under the management of the Department of State Treasurer, RSD administers eight public pension plans (defined benefit plans), three supplemental retirement plans (voluntary defined contributions plans), a health trust fund, a disability income plan, death benefit funds and a number of other benefit programs. As of December 31, 2015, the Retirement Systems defined benefit plans cover about 980,000 current and prior public servants in the state of North Carolina. During the fiscal year ending June 30, 2016, the Systems paid $5.7 billion in pensions to about 280,000 retirees. And as of June 30, 2016, the Systems' assets were valued at $87 billion.

Under the supplemental retirement plans, the amount of contributions in any given year is defined by law. The amount of benefits derived is dependent on the investment returns the individual achieves. Conversely, under the pension plans, the amount of the benefit paid to a member upon retirement, termination, death or disability is defined by law. The amount of contributions needed to fund these benefits cannot be known with certainty. In North Carolina, like other states, these contributions are paid during a public servant's career so that upon retirement, termination, death, or disability, there are funds available to pay these benefits. These amounts are determined through an actuarial valuation. Actuarial valuations are performed for each of the pension plans administered by RSD and the results are contained in actuarial valuation reports like this.

The Legislative Retirement System (referred to as "LRS" or the "Legislative Plan") provides benefits to all members of the General Assembly. LRS has almost $27 million in assets and 560 members. This actuarial valuation report is our annual analysis of the financial health of LRS. This report, prepared as of December 31, 2015, presents the results of the actuarial valuation of LRS.

Purpose

An actuarial valuation is performed on LRS annually as of the end of the calendar year. The actuary determines the amount of contributions to be made to LRS during each member's career that, when combined with investment return, will be sufficient to pay for retirement benefits.

In addition, the annual actuarial valuation is performed to:

- Determine the progress on funding LRS,
- Explore why the results of the current valuation differ from the results of the valuation of the previous year, and
- Satisfy regulatory and accounting requirements.

A detailed summary of the valuation process and a glossary of actuarial terms are provided in Appendix A.

Executive Summary

Key Takeaways

The actuarial valuation is performed each year to replace the estimates the actuary assumed for the prior valuation with the actual events that happened. This past year, as expected, some of the assumptions used in the prior valuation were not realized. Key results of the December 31, 2015 valuation as compared to the December 31, 2014 valuation were:

- Market value returns of 0.42% compared to 7.25% assumed
- Increase in covered payroll of less than 0.1% compared to approximately 3% expected
- Recent legislation signed into law since the prior valuation:
  - One-time pension supplement in the amount of 1.6% of the annualized benefit in effect on September 1, 2016 to be paid on or before October 31, 2016
- Changes in actuarial assumptions and methods in accordance with the latest experience study prepared as of December 31, 2014 and adopted by the Board of Trustees on January 21, 2016

When compared to the December 31, 2014 valuation, the above resulted in:

- Lower funded ratio (99.0% in the December 31, 2015 valuation compared to 120.5% in the December 31, 2014 valuation)
- Higher actuarially determined employer contribution rate (18.27% for fiscal year ending June 30, 2018 compared to the preliminary contribution rate of 0.46% calculated in the December 31, 2014 valuation for fiscal year ending June 30, 2017)
- Lower projected benefit amounts being accrued by active members

LRS is well funded compared to its peers. This is due to:

- Stakeholders working together to keep LRS well-funded since inception
- A history of appropriating and contributing the recommended contribution requirements
- Assumptions that in aggregate are more conservative than peers
- A funding policy that aggressively pays down unfunded liability
- An ad hoc cost-of-living adjustment that supports the health of the system
- Modest changes in benefits when compared to peers

Continued focus on these measures will be needed to maintain the solid status of LRS well into the future.

More details can be found later in this report. We encourage readers to start with Sections 1 and 2 and refer to other sections for additional details as needed.

Section 1: Principal Results

This report, prepared as of December 31, 2015, presents the results of the actuarial valuation of the system. The principal results of the valuation and a comparison with the preceding year's results are summarized below.

Table 1: Summary of Principal Results

Valuation results as of	12/31/2015	12/31/2014
Active Members		
Number	170	170
Reported Compensation	$ 3,561,167	$ 3,559,791
Valuation Compensation*	$ 3,708,690	$ 3,758,630
Retired Members and Survivors of Deceased Members Currently Receiving Benefits		
Number	300	300
Annual Allowances	$ 2,338,872	$ 2,347,498
Assets		
Actuarial Value (AVA)	$ 28,265,441	$ 29,012,219
Market Value	$ 26,745,706	$ 28,977,047
Actuarial Accrued Liability (AAL)	$ 28,556,728	$ 24,067,461
Unfunded Accrued Liability (AAL-AVA)	$ 291,287	$ (4,944,758)
Funded Ratio (AVA/AAL)**	99.0%	120.5%
Results for Fiscal Year Ending	**6/30/2018**	**6/30/2017**
Actuarially Determined Employer Contribution (ADEC) of employer, as a percentage of payroll		
Normal Cost	16.71%	21.40%
Disability Benefit	0.64%	0.55%
Accrued Liability	0.92%	-21.49%
Total	18.27%	0.46%
Impact of Experience Study	N/A	16.59%
Impact of Legislative Changes	N/A	1.17%
Final ADEC	N/A	18.22%
Appropriations Act for Fiscal Year Ending	**6/30/2017**	**6/30/2016**
Employer Contribution Rate as a percentage of payroll		
Normal Cost	16.71%	21.40%
Disability Benefit	0.64%	0.55%
Accrued Liability	0.87%	-20.15%
Total	18.22%	1.80%
Preliminary Reserve for Undistributed Gains/(Losses)	(0.05)%	1.34%

* Reported compensation adjusted to reflect the assume rate of pay increase prior to the valuation date.
** The Funded Ratio on a Market Value of Assets basis is 93.7% at December 31, 2015.

Section 2: The Valuation Process

The following diagram summarizes the inputs and results of the actuarial valuation process.

A more detailed description of the valuation process is provided in Appendix A.

Valuation Input: Membership Data

As with any estimate, the actuary collects information that we know now. Under the actuarial valuation process, current information about LRS members is collected annually by the Retirement Systems Division staff at the direction of the actuary. Membership data will assist the actuary in estimating benefits that could be paid in the future. Information about benefit provisions and assets held in the trust as of the valuation date is also collected.

The member information the actuary collects includes data elements such as current service, salary and benefit group identifier for members that have not separated service, and actual benefit amounts and form of payment for members that have separated service. Data elements such as gender and date of birth are used to determine when a benefit might be paid and for how long.

Section 2: The Valuation Process

Valuation Input: Membership Data (continued)

The table below provides a summary of the membership data used in this valuation compared to the prior valuation.

Number as of	12/31/2015	12/31/2014
Active members	170	170
Terminated members and survivors of deceased members entitled to benefits but not yet receiving benefits	90	93
Retired members and survivors of deceased members currently receiving benefits	300	300
Total	560	563
Active Reported Compensation	3,561,167	3,559,791
Active Valuation Compensation	3,708,690	3,758,630
Annual Retirement Allowances	2,338,872	2,347,498

Commentary: Overall, the active membership has remained relatively stable. The number of retired members and survivors of deceased members currently receiving benefits remained the same from the previous valuation date.

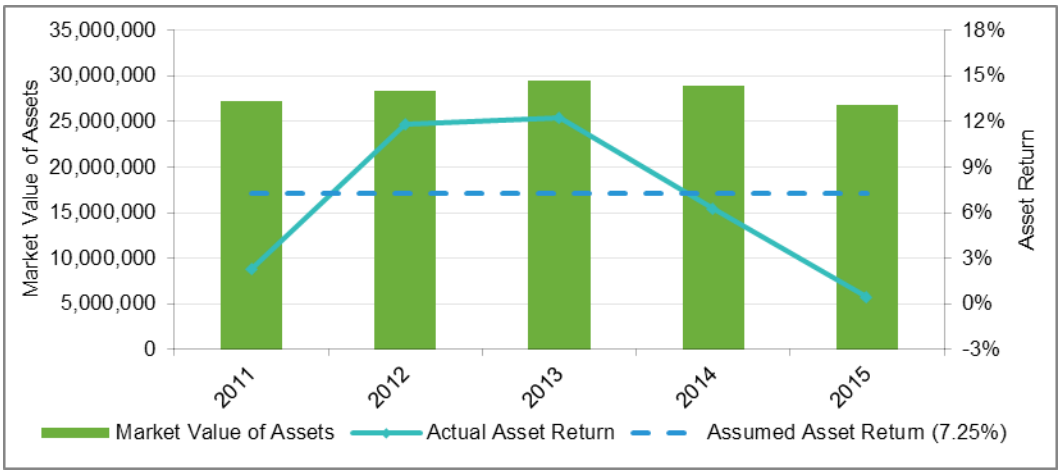
Section 2: The Valuation Process

Valuation Input: Asset Data

LRS assets are held in trust and are invested for the exclusive benefit of plan members. The Market Value of Assets is $26.7 million as of December 31, 2015 and $29.0 million as of December 31, 2014. The investment return for the market value of assets for calendar year 2015 was 0.42%.

Graph 1: Market Value of Assets and Asset Returns

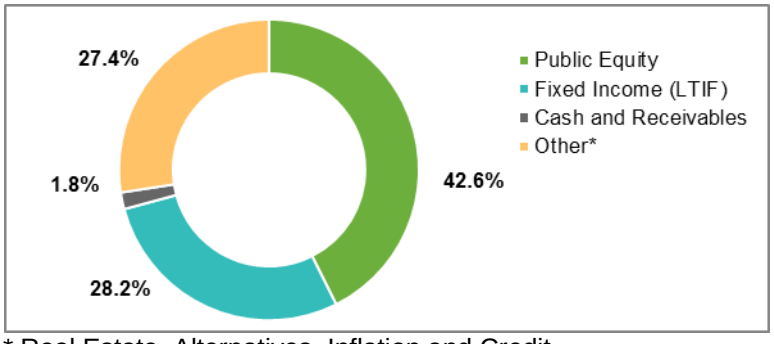
The graph below provides a history of the market value of assets and asset returns over the past five years.



Commentary: Returns were less than the 7.25% assumed rate of return, resulting in higher contributions and lower funded ratio than anticipated, all else being equal.

Graph 2: Allocation of Investments by Category

The graph below provides the breakdown of the market value of assets at December 31, 2015 by asset category.



* Real Estate, Alternatives, Inflation and Credit

Commentary: Based on historical market returns, the current asset allocation, the current investment policy, and the expectation of future asset returns, as reviewed in the last experience study, the 7.25% discount rate used in this valuation is reasonable and appropriate.

A detailed summary of the market value of assets is provided in Section 4 of this report.

Section 2: The Valuation Process

Valuation Input: Benefit Provisions

Benefit provisions are described in North Carolina General Statues, Chapter 120.

The valuation reflects the following change in benefit provisions from the prior year's valuation.

- One-time pension supplement in the amount of 1.6% of the annualized benefit in effect on September 1, 2016 to be paid on or before October 31, 2016.

Highlights of the benefit provisions are described below.

- An unreduced retirement allowance is payable to members who retire from service after attaining age 65 and five years of creditable service
- The unreduced retirement allowance is equal to 4.02% of a member's highest annual compensation multiplied by the number of years of creditable service
- A reduced retirement allowance is payable to members who retire from service:
  - after attaining age 50 and 20 years of creditable service; or
  - after attaining age 60 and five years of creditable service
- Ancillary benefits are also payable upon the death or disability of a member
- LRS does not provide for explicit cost of living increases as part of the benefit package. Instead, increases may be provided if certain financial conditions are met and/or the legislature passes a budget that provides for a cost-of-living adjustment

Commentary: Many Public Sector Retirement Systems in the United States have undergone pension reform where the benefits of members (current retirees and active or future members) have been reduced. Because of the well-funded status of LRS due to the legislature contributing the actuarially determined employer contribution when such contribution is required, benefit cuts have not been needed in North Carolina. Instead, we have seen a modest expansion of benefits in recent years based on sound plan design.

A detailed summary of the benefit provisions is provided in Appendix C of this report.

Valuation Input: Actuarial Assumptions

Actuarial assumptions bridge the gap between the information that we know with certainty as of the valuation date (age, gender, service, pay, and benefits of the members) and what may happen in the future. The actuarial assumptions of LRS are reviewed at least every five years. Based on this review, the actuary will make recommendations on the demographic and economic assumptions.

Demographic assumptions describe future events that relate to people such as retirement rates, termination rates, disability rates, and mortality rates. Economic assumptions describe future events that relate to the assets of LRS such as the interest rate, salary increases, the real return, and payroll growth.

The latest assumptions were adopted for use with the December 31, 2015 actuarial valuation, based on the experience study prepared as of December 31, 2014 and adopted by the Board of Trustees on January 21, 2016.

Section 2: The Valuation Process

Valuation Input: Funding Methodology

The Funding Methodology is the payment plan for LRS and is composed of the following three components:

- Actuarial Cost Methods allocate costs to the actuarial accrued liability (i.e. the amount of money that should be in the fund) for past service and normal cost (i.e. the cost of benefits accruing during the year) for current service.
  - The Board of Trustees has adopted Entry age Normal as its actuarial cost method
  - Develops normal costs that stay level as a percent of payroll
- Asset Valuation Methods smooth or average the market value returns over time to alleviate contribution volatility that results from market returns.
  - Asset return in excess of or less than the expected return on market value of assets reflected over a five-year period
  - Assets corridor: not greater than 120% of market value and not less than 80% of market value
- Amortization Methods determine the payment schedule for unfunded actuarial accrued liability (i.e. the difference between the actuarial accrued liability and actuarial value of assets)
  - Payment level: the payment is determined as a level dollar amount, similar to a mortgage payment
  - Payment period: a 12-year closed amortization period was adopted for fiscal year ending 2018. A new amortization base is created each year based on the prior year's experience.

When compared to other Public Sector Retirement Systems in the United States, the funding policy for LRS is quite aggressive in that the policy pays down the pension debt over a much shorter period of time (12 years) compared to the national average of around 24 years. As such it is a best practice in the industry.

The actuarial assumptions, actuarial cost method, amortization method and asset valuation method were updated since the prior year's valuation in accordance with the latest experience study prepared as of December 31, 2014 and adopted by the Board of Trustees on January 21, 2016. A detailed summary of the actuarial assumptions and methods is provided in Appendix D of this report.

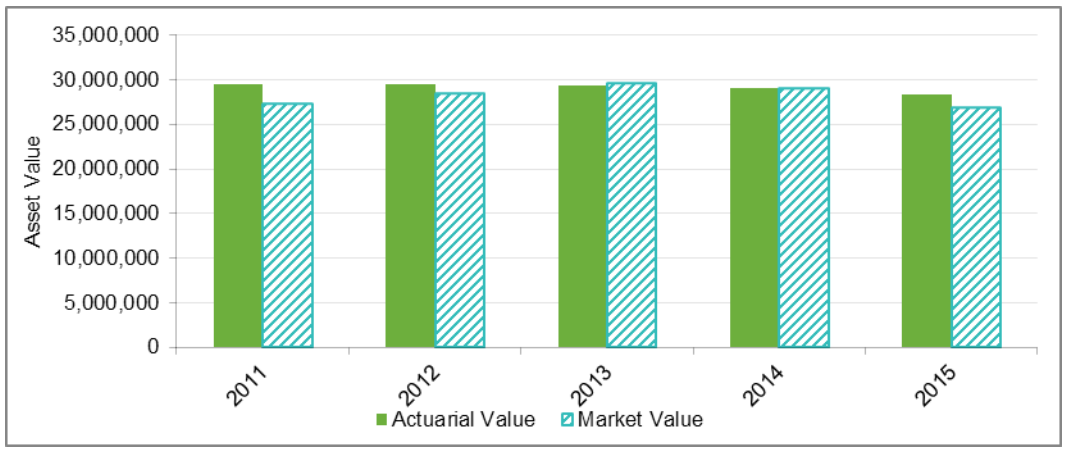
Section 2: The Valuation Process

Valuation Results: Actuarial Value of Assets

In order to reduce the volatility that investment gains and losses can have on required contributions and funded status of LRS, the Board adopted an asset valuation method to determine the Actuarial Value of Assets used for funding purposes. The Actuarial Value of Assets is $28.3 million as of December 31, 2015 and $29.0 million as of December 31, 2014.

Graph 3: Actuarial Value and Market Value of Assets

The graph below provides a history of the market value and actuarial value of assets over the past five years.



Commentary: The market value of assets is lower than the actuarial value of assets, which is used to determine employer contributions. This indicates that there are unrecognized asset losses to be recognized in future valuations.

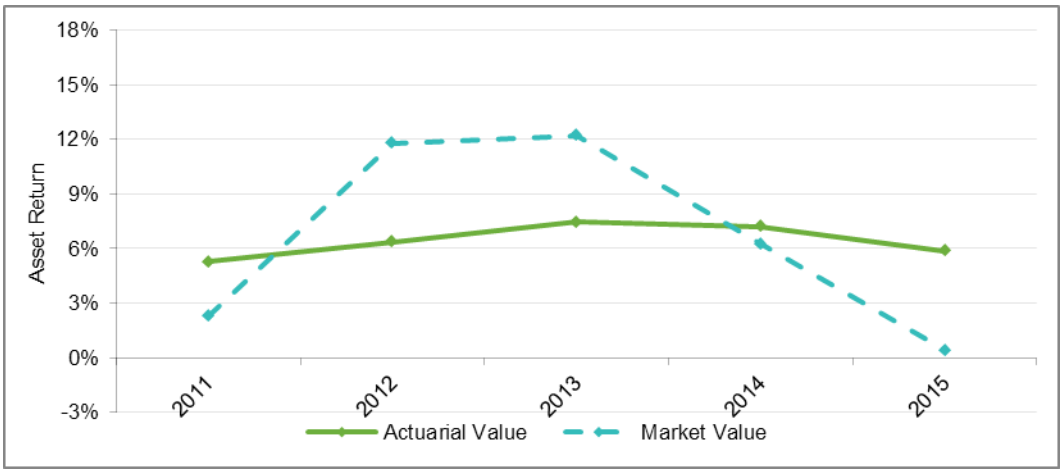
The actuarial value of assets would have been $28.3 million as of December 31, 2015 under the asset method used in the prior valuation.

Section 2: The Valuation Process

Valuation Results: Actuarial Value of Assets (continued)

Graph 4: Asset Returns

The graph below provides a history of the market value and actuarial value of asset returns over the past five years.



Commentary: The investment return for the market value of assets for calendar year 2015 was 0.42%. The actuarial value of assets smoothes investment gains and losses. The new asset valuation method adopted with the experience study assumptions re-set the actuarial value of assets to the market value of assets at December 31, 2014, effective for the December 31, 2015 valuation. Lower than expected market returns in 2015 resulted in an actuarial value of asset return for calendar year 2015 is 5.88% and an asset loss of $0.38 million during 2015.

The actuarial value of asset return for calendar year 2015 prior to the asset valuation method change was 5.86%, which would have resulted in an asset loss of $0.39 million during 2015.

A detailed summary of the Actuarial Value of Assets is provided in Section 4 of this report.

Section 2: The Valuation Process

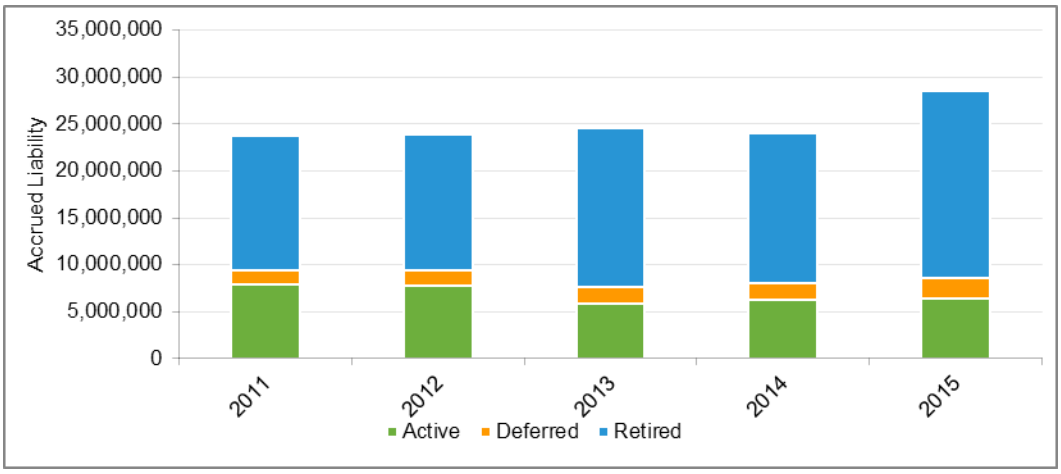
Valuation Results: Actuarial Accrued Liability

Using the provided membership data, benefit provisions, and actuarial assumptions, the future benefit payments of LRS are estimated. These projected future benefit payments are discounted into today's dollars using the assumed rate of investment return assumption to determine the Present Value of Future Benefits (PVFB) of LRS. The PVFB is an estimate of the current value of the benefits promised to all members as of a valuation date.

Once the PVFB is developed, an actuarial cost method is used to allocate the PVFB. Under the actuarial cost method, the PVFB is allocated to past, current and future service, respectively known as the actuarial accrued liability (AAL), normal cost (NC) and present value of future normal costs (PVFNC). The AAL is also referred to as the amount of money LRS should ideally have in the trust. The NC is also referred to as the cost of benefits accruing during the year.

Graph 5: Actuarial Accrued Liability

The graph below provides a history of the actuarial accrued liability over the past five years.



Commentary: The AAL increased from $24.1 million to $28.6 million during 2015. LRS is an open plan, which means that new members enter the plan each year. In an open plan, liabilities are expected to grow from one year to next as more benefits accrue and the membership approaches retirement. Assumption changes increased the AAL by $4.8 at December 31, 2014. The AAL prior to legislative changes was $0.7 million lower than expected, which resulted in a demographic gain of $0.7 million during 2015. Legislation increased the AAL by 0.1 million.

A detailed summary of the AAL is provided in Section 5 of this report.

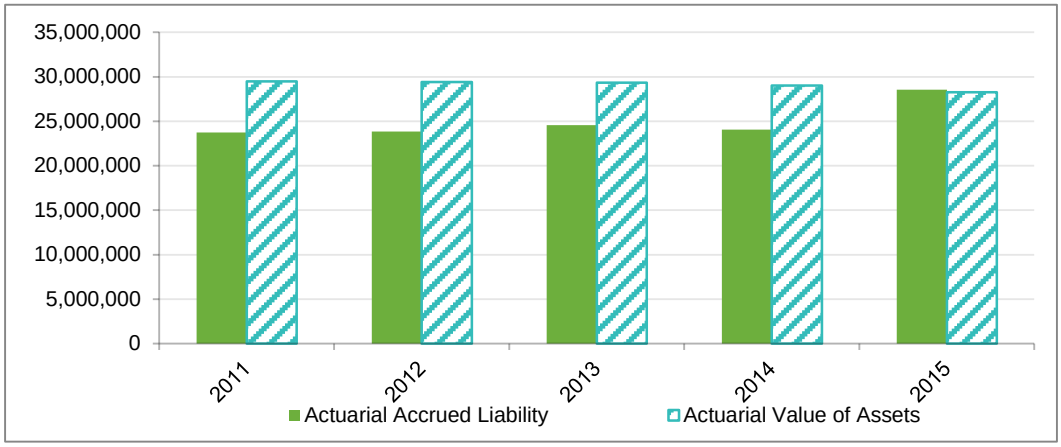
Section 2: The Valuation Process

Valuation Results: Funded Ratio

The funded ratio is a measure of the progress that has been made in funding the plan as of the valuation date. It is the ratio of how much money LRS actually has in the fund to the amount LRS should have in the fund.

Graph 6: Actuarial Accrued Liability and Actuarial Value of Assets

The graph below provides a history of the actuarial accrued liability and actuarial value of assets over the past five years.



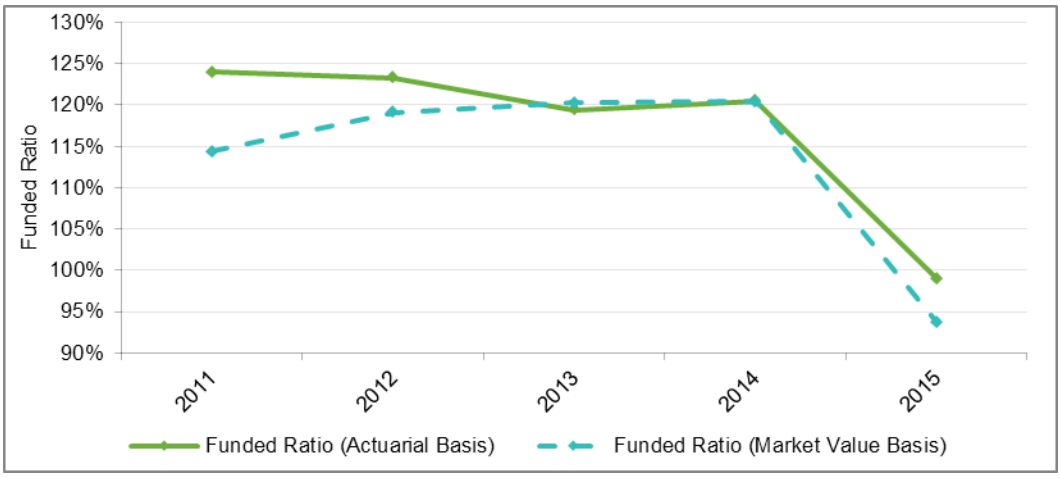
Commentary: The actuarial value of assets basis is used for computing contributions to alleviate contribution volatility. The difference in the actuarial accrued liability and the actuarial value of assets is the amount of pension debt to be paid off in 12 years.

Section 2: The Valuation Process

Valuation Results: Funded Ratio (continued)

Graph 7: Funded Ratios

The graph below provides a history of the funded ratio on a market and actuarial basis over the past five years.



Commentary: The ratio of assets to liabilities shows the health of the plan on an accrued basis. The funded ratio on an actuarial basis decreased from 120.5% at December 31, 2014 to 99.0% at December 31, 2015.

Section 2: The Valuation Process

Valuation Results: Employer Contributions

G.S. 120-4.20 provides that the contributions of employers shall consist of a normal contribution and an accrued liability contribution.

The December 31, 2014 valuation suggested that the preliminary total employer contribution rate be set at 0.46% of payroll for the fiscal year ending June 30, 2017. Subsequently, the 2016 Appropriations Act (Session Laws 2016-94) set contributions at 18.22% of payroll effective for the fiscal year ending June 30, 2017, in order to account for the experience study and recent legislation signed into law. As a result of this December 31, 2015 valuation, the preliminary actuarially determined employer contribution rate is 18.27% of payroll for the fiscal year ending June 30, 2018, subject to the impact of any future legislative changes effective during that fiscal year. On this basis, there is no preliminary reserve from undistributed gains that could be used for a cost-of-living adjustment or other benefit improvements.

A detailed summary of the actuarially determined employer contribution rates is provided in Section 6 of this report.

Valuation Results: Accounting Information

The Governmental Account Standards Board (GASB) issues statements which establish financial reporting standards for defined benefit pension plans and accounting for pension expenditures and expenses for governmental employers.

The valuation has been prepared in accordance with the parameters of Statement No. 67 of the GASB and all applicable Actuarial Standards of Practice. The Net Pension Liability (Asset) under GASB 67 for the fiscal year ending June 30, 2016, is $2,233,000 (compared to $(4,504,000) for fiscal year ending June 30, 2015). The required financial reporting information for the Retirement System under GASB No. 67 can be found in Section 7 of this report.

Section 3: Membership Data

The Retirement Systems Division provided membership data as of the valuation date for each member of LRS. The membership data assists the actuary in estimating benefits that could be paid in the future. The tables below provide a summary of the membership data used in this valuation. Detailed tabulations of data are provided in Appendix B.

Table 2: Active Member Data

	Member Count	Average Age	Average Service	Reported Compensation
Male	132	57.60	5.97	$ 2,776,127
Female	38	62.73	6.86	785,040
Total	170	58.75	6.17	$ 3,561,167

Table 3: Vested Terminated Member Data

	Member Count	Average Age	Average Service	Deferred Retirement Allowance
Male	33	55.75	9.58	$ 280,917
Female	9	53.47	9.54	71,284
Total	42	55.26	9.57	$ 352,201

The table above includes terminated members entitled to retirement benefits but not yet receiving benefits.

Section 3: Membership Data

Table 4: Non-Vested Terminated Member Data

	Member Count	Average Age	Average Service	Accumulated Contributions
Male	42	56.30	2.86	$ 232,510
Female	6	56.69	1.89	23,850
Total	48	56.35	2.74	$ 256,360

The table above includes non-vested terminated members who have not received a refund of contributions.

Table 5: Data for Members Currently Receiving Benefits

	Member Count	Average Age	Annual Retirement Allowances
Retired Members (Healthy at Retirement)			
Male	185	76.97	$ 1,509,840
Female	51	76.08	436,946
Total	236	76.78	$ 1,946,786
Survivors of Deceased Members			
Male	2	65.79	$ 20,319
Female	62	77.69	371,767
Total	64	77.32	$ 392,086
Grand Total	300	76.90	$ 2,338,872

Section 4: Asset Data

Assets are held in trust and are invested for the exclusive benefit of LRS members. The tables below provide the details of the Market Value of Assets for the current and prior years' valuations.

Table 6: Market Value of Assets

Asset Data as of	12/31/2015	12/31/2014
Beginning of Year Market Value of Assets	$ 28,977,047	$ 29,541,619
Contributions	216,730	226,130
Benefit Payments	(2,564,144)	(2,564,190)
Investment Income	116,073	1,773,488
Net Increase/(Decrease)	(2,231,341)	(564,572)
End of Year Market Value of Assets	$ 26,745,706	$ 28,977,047
Estimated Net Investment Return on Market Value	0.42%	6.25%

Table 7: Allocation of Investments by Category of the Market Value of Assets

Asset Data as of	12/31/2015	12/31/2014
Allocation by Dollar Amount		
Public Equity	$ 11,387,201	$ 12,742,571
Fixed Income (LTIF)	7,544,319	8,641,356
Cash and Receivables	475,149	443,988
Other*	7,339,037	7,149,132
Total Market Value of Assets	$ 26,745,706	$ 28,977,047
Allocation by Percentage of Asset Value		
Public Equity	42.6%	44.0%
Fixed Income (LTIF)	28.2%	29.8%
Cash and Receivables	1.8%	1.5%
Other*	27.4%	24.7%
Total Market Value of Assets	100.0%	100.0%

* Real Estate, Alternatives, Inflation and Credit

Section 4: Asset Data

In order to reduce the volatility that investment gains and losses can have on the required contributions and funded status of LRS, the Board adopted an asset valuation method to determine the Actuarial Value of Assets used for funding purposes. The table below provides the calculation of the Actuarial Value of Assets at the valuation date.

Table 8: Actuarial Value of Assets

Asset Data as of	12/31/2015
Beginning of Year Market Value of Assets	$ 28,977,047
Contributions	216,730
Benefit Payments	(2,564,144)
Net Cash Flow	(2,347,414)
Expected Investment Return	2,015,742
Expected End of Year Market Value of Assets	28,645,375
End of Year Market Value of Assets	26,745,706
Excess of Market Value over Expected Market Value of Assets	(1,899,669)
80% of 2015 Asset Gain/(Loss)	(1,519,735)
60% of 2014 Asset Gain/(Loss)	N/A
40% of 2013 Asset Gain/(Loss)	N/A
20% of 2012 Asset Gain/(Loss)	N/A
Total Deferred Asset Gain/(Loss)	(1,519,735)
Preliminary End of Year Actuarial Value of Assets	28,265,441
Final End of Year Actuarial Value of Assets (not less than 80% and not greater than 120% of Market Value)	28,265,441
Estimated Net Investment Return on Actuarial Value	5.88%

Commentary: The actuarial value of assets smooths investment gains/losses, resulting in less volatility in the employer contribution. The asset valuation method was changed during the experience study from a method that calculated the actuarial value of assets as 20% of the market value of assets plus 80% of the expected actuarial value of assets to a method that recognizes asset returns in excess of or less than the expected return on the market value of assets over a five-year period.

The new asset valuation method re-set the actuarial value of assets to the market value of assets at December 31, 2014, effective for the December 31, 2015 valuation. Lower than expected market returns in 2015 resulted in an actuarial value of asset return for calendar year 2015 of 5.88% and an asset loss of $0.38 million during 2015.

The actuarial value of assets would have been $28,295,619 as of December 31, 2015 under the asset method used in the prior valuation.

Section 5: Liability Results

Using the provided membership data, benefit provisions, and actuarial assumptions, the future benefit payments of LRS are estimated. These projected future benefit payments are discounted into today's dollars using the assumed rate of investment return assumption to determine the Present Value of Future Benefits. The Present Value of Future Benefits is allocated to past, current and future service, respectively known as the actuarial accrued liability, normal cost and present value of future normal costs. The table below provides these liability numbers for the current and prior years' valuations.

Table 9: Liability Summary

Valuation Results as of	12/31/2015	12/31/2014
(a) Present Value of Future Benefits		
(1) Active Members	$ 12,020,392	$ 13,546,857
(2) Terminated Members	2,221,225	1,679,451
(3) Members Currently Receiving Benefits	19,944,862	16,051,662
(4) Total	$ 34,186,479	$ 31,277,970
(b) Present Value of Future Normal Costs	$ 5,629,751	$ 7,210,509
(c) Actuarial Accrued Liability: (a4) - (b)	$ 28,556,728	$ 24,067,461
(d) Actuarial Value of Assets	$ 28,265,441	$ 29,012,219
(e) Unfunded Accrued Liability: (c) - (d)	$ 291,287	$ (4,944,758)

Section 5: Liability Results

The table below provides a reconciliation of the prior year's unfunded actuarial accrued liability to the current year's unfunded actuarial accrued liability.

Table 10: Reconciliation of Unfunded Actuarial Accrued Liability

(in millions)	
Unfunded Actuarial Accrued Liability (UAAL) as of 12/31/2014	$ (4.9)
Impact of Experience Study	4.7
Normal Cost during 2015	0.9
Reduction due to Actual Contributions during 2015	(0.2)
Interest on UAAL, Normal Cost, and Contributions	0.0
Asset (Gain)/Loss	0.4
Actuarial Accrued Liability (Gain)/Loss	(0.7)
Impact of Legislative Changes	0.1
Unfunded Actuarial Accrued Liability (UAAL) as of 12/31/2015	$ 0.3

Commentary: The change in assumptions and methods due to the experience study increased the unfunded actuarial accrued liability (UAAL), or pension debt, by $4.7 million at December 31, 2014. During 2015, the UAAL decreased faster than expected due to liability gains primarily due to lower reported compensation than assumed based on the assumptions adopted with the experience study. These gains were offset by asset losses. Additionally, the one-time pension supplement increased the UAAL by $0.1 million.

Section 6: Actuarially Determined Employer Contribution

The actuarially determined employer contribution consists of a normal cost rate and an accrued liability rate. The normal cost rate is the employer's portion of the cost of benefits accruing during the year after reducing for the member contribution. The accrued liability rate is the payment toward the unfunded accrued liability in order to pay off the unfunded accrued liability over 12 years. The Disability benefit rate is the Normal Cost rate necessary to provide the disability benefit on a one-year term basis.

The table below provides the calculation of the actuarially determined employer contribution for the current and prior years' valuations.

Table 11: Calculation of the Actuarially Determined Employer Contribution (ADEC)

Valuation Date ADEC for Fiscal Year Ending	12/31/2015 6/30/2018	12/31/2014 6/30/2017
Normal Cost Rate Calculation		
(a) Normal Cost	$ 842,368	$ 1,067,629
(b) Valuation Compensation	$ 3,708,690	$ 3,758,630
(c) Total Normal Cost Rate: (a) / (b)	22.71%	28.40%
(d) Employee Contribution Rate	7.00%	7.00%
(e) Expense Assumption	1.00%	N/A
(f) Employer Normal Cost Rate: (c) - (d) + (e)	16.71%	21.40%
Disability Benefit Rate Calculation		
(g) Disability Benefit Normal Cost	$ 23,855	$ 20,578
(h) Valuation Compensation	$ 3,708,690	$ 3,758,630
(i) Total Normal Cost Rate: (g) / (h)	0.64%	0.55%
Accrued Liability Rate Calculation		
(j) Unfunded Accrued Liability	$ 291,287	$ (4,944,758)
(k) Total Amortization Payments*	$ 34,108	$ (807,868)
(l) Valuation Compensation	$ 3,708,690	$ 3,758,630
(m) Accrued Liability Rate: (k) / (l)	0.92%	(21.49%)
Total ADEC (f) + (i) + (m)	18.27%	0.46%
Impact of Experience Study	N/A	16.59%
Impact of Legislative Changes	N/A	1.17%
Final ADEC	N/A	18.22%

*See Table 14 for more detail on the total amortization payments at December 31, 2015. The amortization payment at December 31, 2014 is based on an eight-year level dollar open amortization method.

Section 6: Actuarially Determined Employer Contribution

The table below provides a reconciliation of the actuarially determined employer contribution.

Table 12: Reconciliation of the Change in the ADEC

Fiscal year ending June 30, 2017 Preliminary ADEC (based on December 31, 2014 valuation)	0.46%
Impact of Experience Study	16.59%
Impact of Legislative Changes*	0.00%
Fiscal year ending June 30, 2017 Final ADEC	17.05%
Change Due to Demographic (Gain)/Loss	(0.12%)
Change Due to Investment (Gain)/Loss	1.34%
Change Due to Member Contributions Less (Greater) than Expected	0.00%
Fiscal year ending June 30, 2018 Preliminary ADEC (based on December 31, 2015 valuation)	18.27%

* The impact of the legislative changes does not reflect the cost of the one-time supplement to be paid in October 2016, as the entire cost of this supplement was funded in the appropriated contribution for fiscal year ending June 30, 2017 and is not reflected in the ADEC for fiscal year ending June 30, 2018.

Section 6: Actuarially Determined Employer Contribution

Amortization methods determine the payment schedule for the unfunded actuarial accrued liability. LRS adopted a 12-year closed amortization period for fiscal year ending 2018. A new amortization base is created each year based on the prior year's experience. The tables below provide the calculation of the new amortization base and the amortization schedule for the current year's valuation.

Table 13: Calculation of the New Amortization Base

Calculation as of	12/31/2015
(a) Unfunded Actuarial Accrued Liability*	$ 249,266
(b) Prior Years' Outstanding Balances	$ 0
(c) New Amortization Base: (a) - (b)	$ 249,266
(d) New Amortization Payment	$ 34,108

* The unfunded actuarial accrued liability at December 31, 2015 does not reflect the cost of the one-time pension supplement to be paid on or before October 31, 2016, as the entire cost of this supplement was funded in the appropriated contribution for fiscal year ending June 30, 2017.

Table 14: Amortization Schedule for Unfunded Accrued Liability

Date Established	Original Balance	12/31/2015 Outstanding Balance	Annual Payment
December 31, 2015	$ 249,266	$ 249,266	$ 34,108

Commentary: This is the payment schedule for the pension debt of LRS.

Section 6: Actuarially Determined Employer Contribution

The table below provides the cost of benefit enhancements for the current and prior years' valuation.

Table 15: Cost of Benefit Enhancements

Calculation as of	12/31/2015	12/31/2014
Increase in ADEC for a 1% COLA*	0.77%	0.75%

* The 1% COLA calculated at the December 31, 2015 valuation would be effective July 1, 2017. The COLA would be paid in full to retired members and survivors of deceased members on the retirement roll on July 1, 2016 and would be prorated for retired members and survivors of deceased members who commence benefits after July 1, 2016 but before June 30, 2017.

Section 7: Accounting Results

The section contains the accounting information for Governmental Accounting Standards Board (GASB) Statement No. 67 for fiscal year ending June 30, 2016 based on a valuation date of December 31, 2015.

Please note that GASB Statement No. 67 (*Financial Reporting for Pension Plans)* is applicable for fiscal years ending 2014 and later.

The June 30, 2016 total pension liability presented in this section was determined by an actuarial valuation as of December 31, 2015, based on the assumptions, methods and plan provisions described in this report. The actuarial cost method used to develop the total pension liability is the Entry Age Normal Cost method, as required by GASB Statement No. 67.

GASB Statement No. 67 set forth certain items of information to be disclosed in the financial statements of the Plan. The tables below provide a distribution of the number of employees by type of membership.

Table 16: Number of Active and Retired Members as of December 31, 2015

Group	Number
Retired members and survivors of deceased members currently receiving benefits	300
Terminated members and survivors of deceased members entitled to benefits but not yet receiving benefits	90
Active members	170
Total	560

Section 7: Accounting Results

GASB Statement No. 67 set forth certain items of information to be disclosed in the financial statements of the Plan. The tables below provide the schedule of changes in Net Pension Liability (Asset).

Table 17: Schedule of Changes in Net Pension Liability (Asset)

Calculation as of	June 30, 2016
Total Pension Liability	
Service Cost	$ 822,000
Interest	1,708,000
Changes of Benefit Terms	22,000
Difference between Expected and Actual Experience	(520,000)
Change of Assumptions	5,151,000
Benefit Payments, including Refund of Member Contributions	(2,430,000)
Net Change in Total Pension Liability	$ 4,753,000
Total Pension Liability - Beginning of Year	$ 23,952,000
Total Pension Liability - End of Year	$ 28,705,000
Plan Fiduciary Net Position	
Employer Contributions	$ 65,000
Member Contributions	253,000
Net Investment Income	181,000
Benefit Payments, including Refund of Member Contributions	(2,430,000)
Administrative Expenses	(53,000)
Other	0
Net Change in Fiduciary Net Position	$ (1,984,000)
Plan Fiduciary Net Position - Beginning of Year	$ 28,456,000
Plan Fiduciary Net Position - End of Year	$ 26,472,000

Table 18: Net Pension Liability (Asset)

Calculation as of	June 30, 2016	June 30, 2015
Total Pension Liability	$ 28,705,000	$ 23,952,000
Plan Fiduciary Net Position	26,472,000	28,456,000
Net Pension Liability (Asset)	$ 2,233,000	$ (4,504,000)
Plan Fiduciary Net Position as a Percentage of the Total Pension Liability	92.22%	118.80%

Section 7: Accounting Results

The table below is the sensitivity of the net pension liability to changes in the discount rate.

Table 19: Sensitivity of the Net Pension Liability (Asset) at June 30, 2016 to Changes in the Discount Rate

	1% Decrease	Current	1% Increase
Discount Rate	6.25%	7.25%	8.25%
Net Pension Liability (Asset)	4,827,000	2,233,000	5,000

The discount rate used to measure the total pension liability was 7.25%. The projection of cash flows used to determine the discount rate assumed that System contributions will continue to follow the current funding policy. Based on those assumptions, the System's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Please see Appendix E for additional detail.

The table below provides the methods and assumptions used to calculate the actuarially determined contribution rate.

Table 20: Additional Information for GASB Statement No. 67

Valuation Date	12/31/2015
Actuarial Cost Method	Entry Age
Amortization Method	Level dollar closed
Amortization Period	12 years
Asset Valuation Method	Asset returns in excess of or less than the expected return on market value of assets reflected over a five-year period (not greater than 120% of market value and not less than 80% of market value)
Actuarial Assumptions	
Investment Rate of Return*	7.25%
Projected Salary Increases**	5.50%
*Includes Inflation of	3.00%
**Includes Inflation and Productivity of	3.50%
Cost-of-living Adjustments	N/A

Appendix A: Valuation Process and Glossary of Actuarial Terms

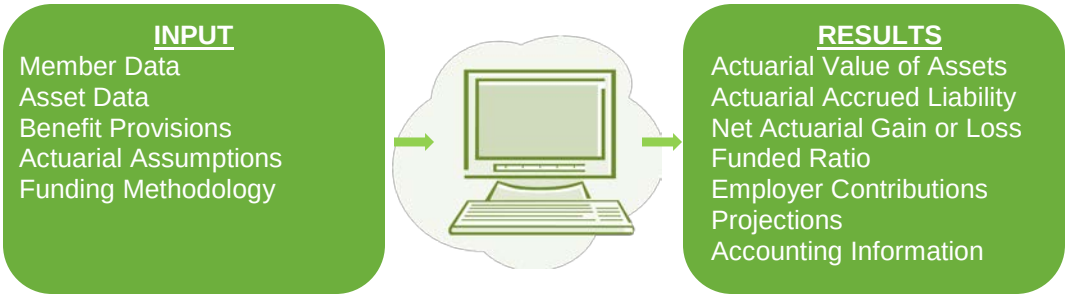
Purpose of an Actuarial Valuation

The majority of Public Sector Retirement Systems in the State of North Carolina are defined benefit (DB) retirement systems. Under a DB Retirement System, the amount of benefits payable to a member upon retirement, termination, death or disability is defined in various contracts and legal instruments and is based, in part, on the member's years of credited service and final compensation. The amount of contribution needed to fund these benefits cannot be known with certainty. A primary responsibility of the Board of Trustees of a Retirement System is to establish and monitor a funding policy for the contributions made to the Retirement System.

While somewhat uncommon, in some jurisdictions, contributions are made by the plan sponsor as benefits come due. This is known as pay-as-you-go financing. More commonly, contributions for benefits are made in advance during the course of active employment of the members. This is known as actuarial pre-funding. For example, the State of North Carolina mandates for the Teachers' and State Employees' Retirement System (the "State Plan") that "on account of each member there shall be paid into the pension accumulation fund by employers an amount equal to a certain percentage of the actual compensation of each member to be known as the 'normal contribution'…" and further "the normal rate of contribution shall be determined by the actuary after each valuation."

The Actuarial Valuation Process

The following diagram summarizes the inputs and results of the actuarial valuation process. A narrative of the process follows the diagram. The reader may find it worthwhile to refer to the diagram from time to time.



Under the actuarial valuation process, current information about Retirement System members is collected annually by staff at the direction of the actuary, namely member data, asset data and information on benefit provisions. Member data is collected for each member of the Retirement System. The member data will assist the actuary in estimating benefits that could be paid in the future. The member information the actuary collects to estimate the amount of benefit includes elements such as current service, salary and benefit group identifier for members that have not separated service; for those that have, the actual benefit amounts are collected. The actuary collects information such as gender and date of birth to determine when a benefit might be paid and for how long. The actuary collects summary information about assets as of the valuation date and information on cash flows for the year ending on the valuation date. Information about

Appendix A: Valuation Process and Glossary of Actuarial Terms

benefit provisions as of the valuation date is also collected. To bridge the gap between the information collected and potential benefits to be paid in the future, the actuary must make assumptions about future activities. These assumptions are recommended by the actuary to the Boards based on the results of an experience review. An experience review is a review of the Retirement System over a period of time, typically five years, where the actuary analyzes the demographic and economic assumptions of the Retirement System. Based on this review, the actuary will make recommendations on the demographic assumptions, such as when members will be projected to retire, terminate, become disabled and/or die in the future, as well as the economic assumptions, such as what rate of return is projected to be earned by the fund based on the Retirement System investment policy and what level of future salary increases is expected for members. To maintain the assumptions, the Board should adopt a prudent policy of having an experience review being performed every five years. The next experience review for the North Carolina Retirement Systems will be based on the five-year period ending on December 31, 2019 and will be presented during 2020. Using these assumptions, the actuary is able to use the member data, asset data and benefit provision information collected to project the benefits that will be paid from the Retirement System to current members. These projected future benefit payments are based not only on service and pay through the valuation date but includes future pay and service, which has not yet been earned by the members but is expected to be earned.

These projected future benefit payments are discounted into today's dollars using the assumed rate of investment return assumption to determine the Present Value of Future Benefits (PVFB) of the Retirement System. The PVFB is an estimate of the value of the benefits promised to all members as of a valuation date. If the Retirement System held assets equal to the PVFB and all the assumptions were realized, there would be sufficient funds to pay off all the benefits to be paid in the future for members in the Retirement System as of the valuation date.

The PVFB is a large sum of money, typically much larger than the amount of Retirement System assets held in the trust. The next step is for the actuary to apply the Funding Policy as adopted by the Board to determine the employer contributions to be made to the Retirement System so that the gap between the PVFB and assets is systematically paid off over time. The Funding Policy is adopted by the Board based on discussions with the actuary. When the Board develops a funding policy, a balance between contributions which are responsive to the needs of the Retirement System yet stable should be struck. There are many different funding policies for the Board to consider, and the actuary is responsible for discussing the various features of the funding policies under consideration. Funding Policies are generally reviewed during an experience review, but it is not uncommon to review a funding policy in between, particularly during period where large increases or decreases in contributions are expected. The Funding Policy is composed of three components: the actuarial cost method, the asset valuation method, and the amortization method.

Once the PVFB is developed, an actuarial cost method is used to allocate the PVFB. Under the actuarial cost method, the PVFB is allocated to past, current and future service, respectively known as the actuarial accrued liability (AAL), normal cost (NC) and present value of future normal costs (PVFNC). The actuary computes the liability components (PVFB, NC, AAL, and PVFNC) for each participant in the Retirement

Appendix A: Valuation Process and Glossary of Actuarial Terms

System at the valuation date. These liability components are then totaled for the Retirement System. There are many actuarial cost methods. Different actuarial methods will produce different contribution patterns, but do not change the ultimate cost of the benefits. The entry age normal cost method is the most prevalent method used for public sector plans in the United States, because the expected normal cost is calculated in such a way that it will tend to stay level as a percent of pay over a member's career. Most of the North Carolina Retirement Systems use the entry age normal cost method.

The actuarial accrued liability (AAL) is also referred to as the amount of money the Retirement System should ideally have in the trust. The unfunded actuarial accrued liability (UAAL) is the portion of actuarial accrued liability that is not covered by the assets of the Retirement System. The UAAL can be a negative number, which means that the Retirement System has more assets than actuarial accrued liability. We refer to this condition as overfunded liability in this summary. Having UAAL does not indicate that the Retirement System is in failing actuarial health. UAAL is a common occurrence. Currently, many Retirement Systems in the United States have UAAL as a result of the Great Recession of 2008. Another related statistic of the Retirement System is the funded ratio. The funded ratio is the percent of the actuarial accrued liabilities covered by the actuarial value of assets. The assets used for these purposes are an actuarial value of assets (AVA), not market. The actuarial value of assets is based on the asset valuation method as recommended by the actuary and adopted by the Board. An actuarial value of assets is a smoothed, or averaged, value of assets, which is used to limit employer contribution volatility. Typically, assets are smoothed, or averaged, over a period of 3 to 5 years, although longer periods are becoming more common. By averaging returns, the UAAL is not as volatile, which we will see later results in contributions that are not as volatile as well. The North Carolina Retirement Systems use an actuarial value of assets with a smoothing period of 5 years.

While having UAAL is common, it is acceptable only if it is systematically being paid off. The method by which the UAAL is paid off is known as the amortization method. The concept is similar to that of a mortgage payment. The Board adopts the amortization method used to pay off the UAAL over a period of time. The amortization method is composed of the amortization period, the amount of payment increase, whether the period is open or closed and by the amount of amortization schedules. The amortization period is the amount of time over which the UAAL will be paid off. This is generally a period of thirty years or less, but actuaries are beginning to recommend shorter periods. The payments can be developed to stay constant from year to year like a mortgage, but often they are developed to increase each year at the same level payroll increases. Amortization type can be closed or open. Under a closed period, the UAAL is expected to be paid off over the amortization period. This is similar to a typical mortgage. Under an open period, the amortization period remains unchanged year after year. The concept is similar to re-mortgaging annually. In many instances, an amortization schedule is developed, whereby the UAAL is amortized over a closed period from the point the UAAL is incurred. Finally, some amortization methods are defined by a schedule of payments, where a new schedule of payments is added with each valuation. Regardless of the amortization type or period, the funding policy should generate a contribution that pays off the UAAL, which results in the funded ratio trending to 100% over time. Caution should be used when an open method is used, because typically an open amortization policy does not result in the UAAL being paid off. North Carolina pays off a much larger

Appendix A: Valuation Process and Glossary of Actuarial Terms

amount of UAAL compared to other states. While many states struggle to pay a 30-year level percent of pay UAAL contribution, which doesn't even reduce the amount of UAAL, North Carolina pays down the UAAL with level dollar payments over 12 years. This aggressive payment of UAAL results in North Carolina being home to many of the best funded Public Retirement Systems in the United States.

To satisfy the requirements of the State of North Carolina, the actuary calculates the total annual contribution to the Retirement System as the normal cost plus a contribution towards UAAL. Said another way, this contribution is sufficient to pay for the cost of benefits accruing during the year (normal cost) plus the mortgage payment (UAAL payment). The total contribution is reduced by the amount of member contributions, if any, to arrive at the employer contribution. For the aggressive North Carolina contribution policy to be effective, the amounts that Buck calculates need to be contributed. With very limited exception, North Carolina has contributed the amounts that Buck has calculated, which has resulted in the North Carolina Retirements Systems being among the best funded in the United States.

An actuarial valuation report is produced annually, which contains the contribution for the fiscal year as well as the funded ratio of the Retirement System. The primary purpose of performing an actuarial valuation annually is to replace the estimated activities from the previous valuation, which were based on assumptions, with the actual experience of the Retirement System for the prior year. The experience gain (loss) is the difference between the expected and the actual UAAL of the Retirement System. An experience loss can be thought of as the amount of additional UAAL over and above the amount that was expected from the prior year due to deviation of actual experience from the assumption. Similarly, an experience gain can be thought of as having less UAAL than that which was expected from the prior year assumptions. As an example, if the Retirement System achieves an asset return of 15% when the assumption was a 7.25% return, an actuarial gain is said to have happened, which typically results in lower contributions and higher funded ratio, all else being equal. Alternatively, a return of 2% under the same circumstances would result in an actuarial loss, requiring an increase in contributions and a funded ratio that is lower than anticipated. Experience gains and losses are common within the valuation process. Typically gains and losses offset each other over time. To the extent that does not occur, the reasons for the gains and losses should be understood, and appropriate recommendations should be made by the actuary after an experience review to adjust the assumptions.

The actuarial valuation report will contain histories of key statistics from prior actuarial valuation reports. In particular, a history of the funded ratio of the Retirement System is an important exhibit. Trustees should understand the reason for the trend of the funded ratio of the Retirement System over time. The actuary will discuss the reasons for changes in the funded ratio of the Retirement System with each valuation report. To the extent that there are unexplained changes in funded ratio corrective action should be explored and the actuary will make recommendations as to whether there should be changes in the assumptions, funding policy, or some other portion of the actuarial valuation process.

In addition to historical information, projections of contributions and funded ratio based on current assumptions can sometimes be found in an actuarial valuation report. Projections of contributions can allow the employer to plan their budget accordingly.

Appendix A: Valuation Process and Glossary of Actuarial Terms

Surprises in Retirement System contributions to be paid by the employer serve no one. A one-year projection based on "bad" asset returns can provide ample time for the employer to plan, or allow for a discussion of changing the funding policy to occur. Contribution surprises are a primary contributor to employers considering pension reform. It is important to keep the employer apprised of future contribution requirements. A projection of funded ratio can serve the Trustees by illustrating the trend of the funded ratio over time. The funded ratio, under a prudent funding policy, should trend to 100% over a period of less than 30 years. (It is worthwhile to note that while 30 years has served as an industry standard for the longest period over which 100% funding should be achieved, that period is coming under scrutiny by the actuarial community and will likely be shortened.) If a projection of funded ratio does not trend to 100% over time, consideration should be given to fixing the funding policy to achieve this goal. For the North Carolina Retirement Systems, projections are generally performed for the January Board meetings. While the projection period has tended to be limited to five years, a longer projection would show the funded ratio trend to 100% much faster than other Public Retirement Systems.

The actuarial report will contain schedules of information about the census, plan and asset information submitted by Retirement System staff upon which the actuarial valuation is based. It is important that the Board of Trustees review that information and determine if the information is consistent with their understanding of the Retirement System. If after questioning staff, the Board of Trustees is not comfortable that the information provided is correct, the actuary should be notified to determine if the actuarial valuation report should be corrected.

Finally, the valuation report and/or presentation should contain sufficient information in an understandable fashion to allow the Board to take action and adopt the contribution rate for the upcoming year. It should also allow stakeholders to understand key observations over the past year that resulted in contributions increasing (or decreasing) and where contributions are headed. The actuary is always open to making the results understandable. Buck works with the North Carolina Retirement Division to make your reports and presentations understandable and actionable. If something doesn't make sense – speak up!!

Appendix A: Valuation Process and Glossary of Actuarial Terms

Glossary

Note that the first definitions given are the "official" definitions of the term. For some terms there is a second definition, in italics, which is the unofficial definition.

Actuarial Accrued Liability (AAL). The portion of the Present Value of Projected Benefits (PVFB) allocated to past service. Also difference between (i) the actuarial present value of future benefits, and (ii) the present value of future normal cost. Sometimes referred to as "accrued liability" or "past service liability." *The amount of money that should be in the Fund. The funding target.*

Actuarial Assumptions. Estimates of future plan experience with respect to rates of mortality, disability, retirement, investment income and salary increases. Demographic ("people") assumptions (rates of mortality, separation, and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic ("money") assumptions (salary increases and investment income) consist of an underlying rate appropriate in an inflation-free environment plus a provision for a long-term average rate of inflation. *Estimates of future events used to project what we know now- current member data, assets, and benefit provisions – into an estimate of future benefits.*

Actuarial Cost Method. A mathematical budgeting procedure for allocating the dollar amount of the Present Value of Projected Benefits (PVFB) between the normal costs to be paid in the future and the actuarial accrued liability. Sometimes referred to as the "actuarial funding method."

Actuarial Methods. The collective term for the Actuarial Cost Method, the Amortization Payment for UAAL Method, and the Asset Valuation Method used to develop the contribution requirements for the Retirement System. *The Funding Policy*.

Actuarial Equivalent. Benefits whose actuarial present values are equal.

Actuarial Present Value. The amount of funds presently required to provide a payment or series of payments in the future. It is determined by discounting the future payments at a predetermined rate of interest, taking into account the probability of payment.

Actuarial Value of Assets (AVA). A smoothed value of assets which is used to limit contribution volatility. Also known as the funding value of assets. *Smoothed value of assets.*

Appendix A: Valuation Process and Glossary of Actuarial Terms

Amortization Payment for UAAL. Payment of the unfunded actuarial accrued liability by means of periodic contributions of interest and principal, as opposed to a lump sum payment. The components of the amortization payment for UAAL includes:

- Amortization Period Length – Generally amortization periods of up to 15 to 20 years (and certainly not longer than 25) are allowed. Similar to a mortgage, the shorter the amortization period, the higher the payment and the faster the UAAL is paid off.
- Amortization payment increases – Future payments can be level dollar, like a mortgage, or as a level percent of pay. Most Retirement Systems amortize UAAL as a level percent of pay which when combined with the employer normal cost that is developed as a level percent of pay can result in contributions that are easier to budget.
- Amortization type Amortization schedule can be closed or open. A closed amortization schedule is similar to a mortgage – at the end of the amortization period the UAAL is designed to be paid off. An open amortization period is similar to refinancing the UAAL year after year.
- Amortization schedule UAAL can be amortized over a single amortization period, or it can be amortized over a schedule.

The amortization payment for UAAL can be thought of as the UAAL mortgage payment.

Asset Valuation Method. The components of how the actuarial value of assets is to be developed.

Experience Gain Loss. A measure of the difference between actual experience and experience anticipated by a set of actuarial assumptions during the period between two actuarial valuation dates, in accordance with the actuarial cost method being used. *The experience Gain (Loss) represents how much the actuary missed the mark in a given year.*

Funded Ratio. The percent of the actuarial accrued liabilities covered by the actuarial value of assets. Also known as the funded status. *The ratio of how much money you actually have in the fund to the amount you should have in the fund.*

Normal Cost. The annual cost assigned, under the actuarial funding method, to current and subsequent plan years. Sometimes referred to as “current service cost.” An amortization payment toward the unfunded actuarial accrued liability is paid in addition to the normal cost to arrive at the total contribution in a given year. *The cost of benefits accruing during the year*.

Present Value of Future Normal Cost (PVFNC). The portion of the Present Value of Projected Benefits (PVFB) allocated to future service. *The value in today’s dollars of the amount of contribution to be made in the future for benefits accruing for members in the Retirement System as of the valuation date. Note that in practice, this number is rarely discussed.*

Appendix A: Valuation Process and Glossary of Actuarial Terms

Present Value of Future Benefits (PVFB). The projected future benefit payments of the plan are discounted into today's dollars using an assumed rate of investment return assumption to determine the Present Value of Future Benefits (PVFB) of the Retirement System. The PVFB is the discounted value of the projected benefits promised to all members as of a valuation date, including future pay and service for members which has not yet been earned. *If the Retirement System held assets equal to the PVFB and all the assumptions were realized, there would be sufficient funds to pay off all the benefits to be paid in the future for members in the Retirement System as of the valuation date.*

Reserve Account. An account used to indicate that funds have been set aside for a specific purpose and are not generally available for other uses.

Unfunded Actuarial Accrued Liability (UAAL). The difference between the actuarial accrued liability (AAL) and actuarial value of assets (AVA). The UAAL is sometimes referred to as "unfunded accrued liability." *Funding shortfall, or prefunded amount if negative.*

Valuation Date. The date that the actuarial valuation calculations are performed as of. *Also known as the "snapshot date".*

Appendix B: Detailed Tabulations of Member Data

Table B-1: The Number and Average Reported Compensation of Active Members Distributed by Age and Service as of December 31, 2015

	Years of Service										
Age	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & Up	Total
Under 25	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
25 to 29	1	0	0	0	0	0	0	0	0	0	1
	2,181	0	0	0	0	0	0	0	0	0	2,181
30 to 34	0	8	1	0	0	0	0	0	0	0	9
	0	20,659	20,659	0	0	0	0	0	0	0	20,659
35 to 39	0	3	2	0	0	0	0	0	0	0	5
	0	20,659	20,659	0	0	0	0	0	0	0	20,659
40 to 44	0	7	2	1	0	0	0	0	0	0	10
	0	20,659	20,659	20,659	0	0	0	0	0	0	20,659
45 to 49	0	10	6	4	0	0	0	0	0	0	20
	0	20,659	20,659	27,779	0	0	0	0	0	0	22,083
50 to 54	1	3	4	0	1	0	0	0	0	0	9
	4,165	20,659	21,406	0	20,659	0	0	0	0	0	19,158
55 to 59	0	8	6	3	0	0	0	0	0	0	17
	0	20,458	20,659	20,659	0	0	0	0	0	0	20,564
60 to 64	0	21	8	4	2	0	0	0	0	0	35
	0	20,003	20,659	22,850	37,883	0	0	0	0	0	21,500
65 to 69	0	15	14	1	3	0	1	0	0	0	34
	0	20,659	20,972	20,659	24,363	0	20,659	0	0	0	21,115
70 & Up	0	6	10	4	5	1	3	0	1	0	30
	0	20,362	21,770	20,659	20,659	20,659	20,659	0	20,659	0	20,970
Total	2	81	53	17	11	1	4	0	1	0	170
	3,173	20,447	21,008	22,850	24,801	20,659	20,659	0	20,659	0	20,948

Appendix B: Detailed Tabulations of Member Data

Table B-2: The Number and Reported Compensation of Active Members Distributed by Age as of December 31, 2015

	Men		Women	
Age	Number	Compensation	Number	Compensation
25	1	$ 2,181		
31	2	41,318		
33	4	82,636		
34	2	41,318	1	$ 20,659
35	1	20,659		
37	1	20,659	1	20,659
38	1	20,659		
39	1	20,659		
41	2	41,318		
42	4	82,636		
43	1	20,659	1	20,659
44	2	41,318		
45	4	111,114		
46	2	41,318	1	20,659
47	6	123,954		
48	2	41,318	1	20,659
49	4	82,636		
51	2	41,318		
52	2	41,318		
53	2	27,813		
54	2	41,318	1	20,659
55	3	61,977		
56	1	20,659	1	20,659
57	2	39,707	3	61,977
58	4	82,636		
59	3	61,977		
60	4	87,013	2	41,316
61	6	114,562		
62	7	144,613	1	20,659
63	4	117,084		
64	5	103,295	6	123,954
65	3	73,089	3	61,977
66	8	165,272	2	41,318
67	7	148,994	1	20,659
68	1	20,659	1	20,659
69	6	123,954	2	41,318
70	4	80,853		
71	2	41,318	5	103,295
72	2	41,318	2	41,318
73	1	20,659	1	20,659

Appendix B: Detailed Tabulations of Member Data

Table B-2: The Number and Reported Compensation of Active Members Distributed by Age as of December 31, 2015 (continued)

	Men		Women	
Age	Number	Compensation	Number	Compensation
74	2	$ 41,318		
75	2	41,318		
76	1	20,659	1	$ 20,659
77	2	41,318		
78	1	20,659		
79	1	31,771		
80			1	20,659
84	1	20,659		
85	1	20,659		
Total	132	$ 2,776,127	38	$ 785,040

Appendix B: Detailed Tabulations of Member Data

Table B-3: The Number and Reported Compensation of Active Members Distributed by Service as of December 31, 2015

	Men		Women	
Service	Number	Compensation	Number	Compensation
0	2	$ 6,346		
1	20	409,785	4	$ 82,636
2	3	61,977	2	41,318
3	37	764,382	12	247,908
4	3	48,204		
5	30	633,870	4	82,636
7	7	144,612	3	61,975
8	1	20,659		
9	3	66,358	5	103,295
10	1	25,040		
11	7	148,994	1	20,659
12			1	20,659
13	5	131,773	2	41,318
15	6	169,514	1	20,659
16	1	20,659		
17	1	20,659		
18	1	20,659		
19			1	20,659
21			1	20,659
25	2	41,318		
27	1	20,659	1	20,659
36	1	20,659		
Total	132	$ 2,776,127	38	$ 785,040

Appendix B: Detailed Tabulations of Member Data

Table B-4: The Number and Deferred Retirement Allowance of Terminated Vested Members Distributed by Age as of December 31, 2015

	Men		Women	
Age	Number	Allowance	Number	Allowance
38	1	$ 8,997		
41	1	4,983		
45			1	$ 4,983
49	1	6,644	1	4,983
50	1	9,966		
51	2	15,217	1	4,983
52	3	19,655		
53	2	18,271	1	8,651
54	1	6,345		
55	2	22,706		
56	4	30,313	4	42,701
57	2	15,200		
58	1	11,834	1	4,983
59	3	30,037		
60	4	27,129		
61	1	10,520		
63	2	11,627		
66	1	15,494		
69	1	15,979		
Total	33	$ 280,917	9	$ 71,284

Appendix B: Detailed Tabulations of Member Data

Table B-5: The Number and Accumulated Contributions of Non-Vested Terminated Members Distributed by Age as of December 31, 2015

	Men		Women	
Age	Number	Contributions	Number	Contributions
33	1	$ 2,227		
36	1	4,176		
39	1	6,327		
40	1	4,542		
42	1	3,318		
44	3	12,526		
46	2	11,590		
47			1	$ 8,081
49	2	13,774		
50	1	6,908		
51	2	9,705	1	555
53	2	11,853		
54	1	5,776		
55	1	4,215		
56	1	6,908		
58	2	14,653	1	5,233
59	2	15,016	1	1,480
60	3	14,579	1	3,589
62	1	3,850		
63	2	14,167		
64	2	12,013		
65	1	4,542	1	4,912
66	2	10,011		
67	2	11,061		
68	1	3,559		
69	1	3,205		
73	1	3,559		
77	1	7,471		
83	1	10,979		
Total	42	$ 232,510	6	$ 23,850

Appendix B: Detailed Tabulations of Member Data

Table B-6: The Number and Annual Retirement Allowances of Retired Members and Survivors of Deceased Members Distributed by Age as of December 31, 2015

	Men		Women	
Age	Number	Allowances	Number	Allowances
46	1	$ 10,231		
49			2	$ 14,968
53			2	6,601
54			1	5,192
59			1	1,904
61	2	14,634	1	7,169
62	1	7,870		
63	3	42,226	3	14,016
64	4	23,683		
65	2	8,208		
66	4	43,073	4	25,354
67	10	72,168	3	24,874
68	2	21,739	3	8,777
69	7	108,947	3	22,451
70	8	69,654	8	62,228
71	8	54,533	2	9,141
72	7	59,583	4	34,786
73	12	73,754	6	44,512
74	10	71,491	5	30,230
75	10	83,018	2	5,055
76	2	8,203	6	59,385
77	3	22,762	3	30,884
78	9	73,449	3	16,811
79	10	71,388	2	26,993
80	6	59,867	5	36,771
81	12	136,003	3	31,165
82	2	14,988	3	17,149
83	8	57,140	4	20,560
84	7	29,431	5	57,880
85	5	38,457	5	38,235
86	6	57,222	4	18,097
87	3	15,025	1	13,406
88	3	13,981	5	16,835
89	6	49,993	1	756
90	6	37,167	3	13,176

Appendix B: Detailed Tabulations of Member Data

Table B-6: The Number and Annual Retirement Allowances of Retired Members and Survivors of Deceased Members Distributed by Age as of December 31, 2015 (continued)

	Men		Women	
Age	Number	Allowances	Number	Allowances
91	3	$ 43,058	3	$ 26,678
92	1	2,703	1	770
93	2	33,417	2	42,193
94	1	638	1	2,323
95	1	455		
96			2	16,027
97			1	5,361
Total	187	$ 1,530,159	113	$ 808,713

Appendix B: Detailed Tabulations of Member Data

Table B-7: The Number and Annual Retirement Allowances of Retired Members and Survivors of Deceased Members Distributed by Annuity Type as of December 31, 2015

	Men		Women	
Annuity Type	Number	Allowances	Number	Allowances
Maximum	79	$ 693,719	46	$ 409,842
Option 1	3	13,068		
Option 2	90	672,897	5	27,104
Option 3	13	130,156		
Option 4				
Option 5-2				
Option 5-3				
Option 6-2				
Option 6-3				
Other				
Survivors of Deceased Members	2	20,319	62	371,767
Total	187	$ 1,530,159	113	$ 808,713

Appendix C: Summary of Main Benefit and Contribution Provisions

All members of the General Assembly are eligible for membership.

"Compensation" means salary and expense allowance paid for service as a legislator in the General Assembly, exclusive of travel and per diem. "Highest annual compensation" means the 12 consecutive calendar months of compensation during a member's final legislative term for the highest position that a member held as a member of the General Assembly. "Creditable service" includes all service rendered as a member of the General Assembly.

BENEFITS

Service Retirement Allowance

Conditions for Allowance	A service retirement allowance is payable to any member who retires from service and: (a) has attained age 50 and completed 20 or more years of creditable service; or (b) has attained age 60 and completed five or more years of creditable service.
Unreduced Allowance	An unreduced annual service retirement allowance is payable to a member who has attained age 65 and completed five years of creditable service. The Service Retirement Allowance is equal to 4.02% of a member's highest annual compensation multiplied by the number of years of creditable service.
Reduced Allowance	A reduced annual service retirement allowance is payable to a member who retires from service after attaining age 60 and completing five years of creditable service. The reduced amount is an allowance as computed above reduced by 1/4% for each month that the member's retirement date precedes the date upon which the member would have attained age 65 had he remained in service. OR A reduced annual service retirement allowance is payable to a member who retires from service after attaining age 50 and completing 20 years of creditable service.

Appendix C: Summary of Main Benefit and Contribution Provisions

	The reduced amount is an allowance as computed above reduced by 5/12 of 1% for each month that the member's retirement date precedes the date upon which the member would have attained age 60, plus 1/4% for each month that the member's retirement date precedes the date upon which the member would have attained age 65.
Maximum Amount	The maximum annual service retirement allowance (on an unreduced basis) is 75% of the member's highest annual compensation.
Disability Retirement Allowance	
Condition for Allowance	Any member who becomes permanently and totally disabled prior to the attainment of age 60 and who has completed at least five years of creditable service may be retired by the Board of Trustees on a disability retirement allowance.
Amount of Allowance	The disability retirement allowance is computed as an unreduced service retirement allowance based on the number of years of creditable service the member would have had had he remained in service to age 60.
Deferred Allowance	Any member who separates from service after completing five years of creditable service and who leaves his total accumulated contributions in the system may receive a deferred allowance, beginning at age 50, computed in the same way as a service retirement allowance on the basis of his creditable service and compensation to the date of separation.
Return of Contributions	Upon the withdrawal of a member without a retirement allowance and upon his request, the member's contributions are returned, together with accumulated regular interest. Upon the death of a member before retirement, his contributions, together with the full accumulated regular interest thereon, are paid to his estate or to person(s) designated by the member unless the designated beneficiary, if eligible, elects the survivor's alternate benefit described below. The current interest rate on member contributions is 4%.

Appendix C: Summary of Main Benefit and Contribution Provisions

Survivor's Alternate Benefit	Upon the death of a member in service who has met conditions (a) or (b) below, his designated beneficiary may elect to receive a benefit equal to that which would have been payable under the provisions of Option 2 had the member retired on the first day of the month following his death and elected such option, in lieu of the member's accumulated contributions, provided the member had not instructed the Board of Trustees in writing that he did not wish the alternate benefit to apply. (a) attainment of age 60 and completion of five years of creditable service; (b) completion of 12 years of creditable service.
Lump Sum Death Benefit	Upon the death of a member in active service after completing one year of creditable service, a lump sum payment equal to the deceased members highest annual compensation to a maximum of $15,000 is made to his designated beneficiary or estate.
Death After Retirement	Upon the death of a beneficiary who did not retire under an effective election of Option 2 or Option 3, an amount equal to the excess if any, of his accumulated contributions at retirement over the retirement allowance payments received is paid to a designated person or to the beneficiary's estate. Upon the death of the survivor of a beneficiary who retired under an effective election of Option 2 or Option 3, an amount equal to the excess, if any, of the beneficiary's accumulated contributions at retirement over the total retirement allowance payments received is paid to such other person designated by the beneficiary or to the beneficiary's estate.
Optional Arrangements at Retirement	In lieu of the full retirement allowance, any member may elect to receive a reduced retirement allowance equal in value to the full allowance, with the provision that: Option 1 - A member retiring prior to July 1, 1993, may elect that at his death within 10 years from his retirement date, an amount equal to his accumulated contributions at retirement, less 1/120 for each month he has received a retirement

Appendix C: Summary of Main Benefit and Contribution Provisions

	allowance, is paid to his estate, or to a person(s) designated by the member, or Option 2 - At the death of the member his allowance shall be continued throughout the life of such other person as the member shall have designated at the time of his retirement, or Option 3 - At the death of the member one-half of his allowance shall be continued throughout the life of such other person as the member shall have designated at the time of his retirement.
Post-Retirement Increases in Allowance	Future increases in allowances may be granted at the discretion of the State.
Contributions	
Member Contributions	Each member contributes 7% of his annual compensation.
Employer Contributions	The State makes annual contributions consisting of a normal contribution and an accrued liability contribution. The normal contribution covers the liability on account of current service and is determined by the actuary after each valuation. The accrued liability contribution covers the liability on account of service rendered before the establishment of the retirement system and the liability on account of increases in benefits for service rendered prior to the effective date of any amendment.
Changes Since Prior Valuation	A one-time pension supplement in the amount of 1.6% of the annualized benefit in effect on September 1, 2016 was granted to be paid on or before October 31, 2016.

Appendix D: Actuarial Assumptions and Methods

Assumptions are based on the experience investigation prepared as of December 31, 2014 and adopted by the Board of Trustees on January 21, 2016 for use with the December 31, 2015 annual actuarial valuation.

Interest Rate: 7.25% per annum compounded annually.

Inflation: Both general and wage inflation are assumed to be 3.00% per annum.

Real Wage Growth: 0.50% per annum.

Annual Rate of Salary Increase: 5.50%.

Separations Before Retirement: Representative values of the assumed annual rates of separation are as follows:

		Annual Rate of		
Age	Disability	Base Mortality*		Withdrawal
		Male	Female	
25	.0001	.0005	.0002	.0500
30	.0004	.0005	.0002	.0500
35	.0010	.0005	.0003	.0500
40	.0029	.0006	.0004	.0500
45	.0049	.0010	.0007	.0500
50	.0084	.0017	.0011	.0500
55	.0144	.0028	.0017	.0500
60		.0047	.0024	.0500
64		.0074	.0034	.0500

* Base mortality rates as of 2014

Service Retirement: Representative values of the assumed annual rates of service retirement are as follows:

	Service					
Age	5	10	15	20	25	30
60	.100	.100	.100	.100	.100	.100
65	.250	.250	.250	.250	.250	.250
70	.150	.150	.150	.150	.150	.150
75	1.000	1.000	1.000	1.000	1.000	1.000

Appendix D: Actuarial Assumptions and Methods

Post-Retirement Mortality Rates: Representative values of the assumed post-retirement mortality rates are as follows:

Annual Rate of Death after Retirement
(Retired Members and Survivors of Deceased Members)

	Retirees (Healthy at Retirement)		Survivors of Deceased Members		Retirees (Disabled at Retirement)	
Age	Male	Female	Male	Female	Male	Female
55	.0057	.0036	.0057	.0036	.0234	.0145
60	.0078	.0052	.0078	.0052	.0266	.0170
65	.0110	.0080	.0110	.0080	.0317	.0209
70	.0168	.0129	.0168	.0129	.0403	.0282
75	.0268	.0209	.0268	.0209	.0543	.0410
80	.0447	.0348	.0447	.0348	.0766	.0610

Deaths After Retirement (Members Healthy at Retirement): Mortality rates are based on the RP-2014 Total Data Set for Healthy Annuitants Mortality Table. The RP-2014 annuitant tables have no rates prior to age 50. The RP-2014 Total Data Set Employee Mortality Table (with no adjustments) is used for ages less than 50.

Death After Retirement (Members Disabled at Retirement): Mortality rates are based on the RP-2014 Total Data Set for Disabled Annuitants Mortality Table.

Deaths Prior to Retirement: Mortality rates are based on the RP-2014 Total Data Set Employee Mortality Table.

Mortality Projection: All mortality rates are projected from 2014 using generational improvement with Scale MP-2015.

Timing of Assumptions: All withdrawals, deaths, disabilities, retirements and salary increases are assumed to occur July 1 of each year.

Liability for Inactive Members: The liability for members who terminated prior to five years of creditable service is estimated to be 100% of the member's accumulated contributions. The liability for members who terminated after completing five years of creditable service is estimated based on the member's current age and the service and reported compensation at termination of employment.

Administrative Expenses: 1.00% of payroll.

Reported Compensation: Calendar year compensation as furnished by the system's office.

Valuation Compensation: Reported compensation adjusted to reflect the assumed rate of pay as of the valuation date.

Appendix D: Actuarial Assumptions and Methods

Actuarial Cost Method: Entry age normal cost method. Entry age is established on an individual basis.

Amortization Period: 12-year closed, level-dollar amount. The first amortization base was created for the contribution payable for fiscal year ending 2018.

Asset Valuation Method: Actuarial value, as developed in Table 8. Actuarial value of assets is based upon a smoothed market value method. Under this method, asset returns in excess of or less than the expected return on market value of assets will be reflected in the actuarial value of assets over a five-year period. The calculation of the Actuarial Value of Assets is based on the following formula:

$MV - 80\% \times G/(L)_1 - 60\% \times G/(L)_2 - 40\% \times G/(L)_3 - 20\% \times G/(L)_4$

MV = the market value of assets as of the valuation date

$G/(L)_i$ = the asset gain or (loss) for the i-th year preceding the valuation date

Changes Since Prior Valuation: The withdrawal rates, the retirement rates, the mortality assumption, the annual rate of salary increase, the administrative expense assumption, the asset valuation method, the actuarial cost method, and the amortization method were changed based on the experience study prepared as of December 31, 2014 and adopted by the Board of Trustees on January 21, 2016.

Appendix E: GASB 67 Fiduciary Net Position Projection

Table E-1: Projection of Fiduciary Net Positions (continued)
(in thousands)

Calendar Year	Beginning Fiduciary Position	Member Contributions	Employer Contributions	Benefit Payments	Administrative Expenses	Investment Earnings	Ending Fiduciary Position
2016	$ 26,746	$ 260	$ 693	$ 2,566	$ 38	$ 1,881	$ 26,976
2017	26,976	235	656	2,524	35	1,895	27,203
2018	27,203	226	653	2,515	33	1,912	27,446
2019	27,446	212	662	2,544	31	1,929	27,674
2020	27,674	198	662	2,562	29	1,945	27,888
2021	27,888	179	664	2,594	27	1,958	28,068
2022	28,068	163	650	2,651	24	1,968	28,174
2023	28,174	151	603	2,689	22	1,973	28,190
2024	28,190	138	572	2,696	20	1,972	28,156
2025	28,156	129	525	2,754	19	1,966	28,003
2026	28,003	117	496	2,771	17	1,953	27,781
2027	27,781	108	460	2,761	16	1,935	27,507
2028	27,507	99	441	2,744	15	1,915	27,203
2029	27,203	92	407	2,740	14	1,893	26,841
2030	26,841	87	337	2,723	13	1,864	26,393
2031	26,393	80	263	2,699	12	1,829	25,854
2032	25,854	76	190	2,671	11	1,788	25,226
2033	25,226	71	123	2,622	11	1,742	24,529
2034	24,529	67	85	2,583	10	1,691	23,779
2035	23,779	63	76	2,535	9	1,638	23,012
2036	23,012	60	69	2,472	9	1,584	22,244
2037	22,244	57	61	2,412	8	1,531	21,473
2038	21,473	53	54	2,343	8	1,476	20,705
2039	20,705	50	48	2,277	7	1,423	19,942
2040	19,942	47	43	2,208	7	1,371	19,188
2041	19,188	44	41	2,127	7	1,317	18,456
2042	18,456	43	35	2,058	6	1,268	17,738
2043	17,738	40	31	2,002	6	1,217	17,018
2044	17,018	37	25	1,945	6	1,166	16,295
2045	16,295	33	22	1,881	5	1,116	15,580
2046	15,580	30	17	1,825	4	1,066	14,864
2047	14,864	27	14	1,761	4	1,016	14,156
2048	14,156	23	13	1,695	3	967	13,461
2049	13,461	21	9	1,635	3	918	12,771
2050	12,771	18	7	1,573	3	871	12,091
2051	12,091	15	7	1,508	2	823	11,426
2052	11,426	14	5	1,444	2	778	10,777
2053	10,777	12	5	1,376	2	733	10,149
2054	10,149	11	3	1,318	2	690	9,533
2055	9,533	9	3	1,256	1	647	8,935
2056	8,935	8	3	1,181	1	605	8,369
2057	8,369	7	1	1,132	1	566	7,810
2058	7,810	5	1	1,082	1	528	7,261
2059	7,261	3	1	1,028	0	489	6,726
2060	6,726	2	0	971	0	454	6,211
2061	6,211	1	1	914	0	418	5,717
2062	5,717	1	0	855	0	384	5,247
2063	5,247	1	0	798	0	352	4,802
2064	4,802	1	0	743	0	321	4,381
2065	4,381	1	0	690	0	293	3,985

Appendix E: GASB 67 Fiduciary Net Position Projection

Table E-1: Projection of Fiduciary Net Positions (continued)

(in thousands)

Calendar Year	Beginning Fiduciary Position	Member Contributions	Employer Contributions	Benefit Payments	Administrative Expenses	Investment Earnings	Ending Fiduciary Position
2066	$ 3,985	$ 1	$ 0	$ 645	$ 0	$ 266	$ 3,607
2067	3,607	0	0	595	0	240	3,252
2068	3,252	0	0	548	0	217	2,921
2069	2,921	0	0	502	0	193	2,612
2070	2,612	0	0	459	0	173	2,326
2071	2,326	0	0	418	0	154	2,062
2072	2,062	0	0	379	0	135	1,818
2073	1,818	0	0	343	0	120	1,595
2074	1,595	0	0	308	0	105	1,392
2075	1,392	0	0	276	0	91	1,207
2076	1,207	0	0	246	0	79	1,040
2077	1,040	0	0	218	0	68	890
2078	890	0	0	192	0	58	756
2079	756	0	0	167	0	48	637
2080	637	0	0	145	0	41	533
2081	533	0	0	125	0	34	442
2082	442	0	0	106	0	28	364
2083	364	0	0	90	0	24	298
2084	298	0	0	75	0	19	242
2085	242	0	0	62	0	15	195
2086	195	0	0	50	0	13	158
2087	158	0	0	40	0	9	127
2088	127	0	0	32	0	8	103
2089	103	0	0	25	0	7	85
2090	85	0	0	19	0	5	71
2091	71	0	0	15	0	4	60
2092	60	0	0	11	0	4	53
2093	53	0	0	8	0	3	48
2094	48	0	0	6	0	4	46
2095	46	0	0	4	0	3	45
2096	45	0	0	3	0	3	45
2097	45	0	0	2	0	3	46
2098	46	0	0	1	0	3	48
2099	48	0	0	1	0	4	51
2100	51	0	0	1	0	4	54
2101	54	0	0	0	0	3	57
2102	57	0	0	0	0	4	61
2103	61	0	0	0	0	4	65
2104	65	0	0	0	0	5	70
2105	70	0	0	0	0	5	75
2106	75	0	0	0	0	6	81
2107	81	0	0	0	0	5	86
2108	86	0	0	0	0	7	93
2109	93	0	0	0	0	6	99
2110	99	0	0	0	0	8	107
2111	107	0	0	0	0	7	114
2112	114	0	0	0	0	9	123
2113	123	0	0	0	0	9	132
2114	132	0	0	0	0	9	141
2115	141	0	0	0	0	10	151

Appendix E: GASB 67 Fiduciary Net Position Projection

Table E-2: Actuarial Present Value of Projected Benefit Payments
(in thousands)

Calendar Year	Beginning Fiduciary Position	Benefit Payments	Funded Benefit Payments	Unfunded Benefit Payments	Present Value of Benefit Payments		
					Funded Payments at 7.25%	Unfunded Payments at 2.71%	Using Single Discount Rate of 7.25%
2016	$ 26,746	$ 2,566	$ 2,566	$ 0	$ 2,478	$ 0	$ 2,478
2017	26,976	2,524	2,524	0	2,272	0	2,272
2018	27,203	2,515	2,515	0	2,111	0	2,111
2019	27,446	2,544	2,544	0	1,991	0	1,991
2020	27,674	2,562	2,562	0	1,870	0	1,870
2021	27,888	2,594	2,594	0	1,765	0	1,765
2022	28,068	2,651	2,651	0	1,682	0	1,682
2023	28,174	2,689	2,689	0	1,591	0	1,591
2024	28,190	2,696	2,696	0	1,487	0	1,487
2025	28,156	2,754	2,754	0	1,416	0	1,416
2026	28,003	2,771	2,771	0	1,329	0	1,329
2027	27,781	2,761	2,761	0	1,235	0	1,235
2028	27,507	2,744	2,744	0	1,144	0	1,144
2029	27,203	2,740	2,740	0	1,065	0	1,065
2030	26,841	2,723	2,723	0	987	0	987
2031	26,393	2,699	2,699	0	912	0	912
2032	25,854	2,671	2,671	0	842	0	842
2033	25,226	2,622	2,622	0	770	0	770
2034	24,529	2,583	2,583	0	708	0	708
2035	23,779	2,535	2,535	0	647	0	647
2036	23,012	2,472	2,472	0	589	0	589
2037	22,244	2,412	2,412	0	536	0	536
2038	21,473	2,343	2,343	0	485	0	485
2039	20,705	2,277	2,277	0	440	0	440
2040	19,942	2,208	2,208	0	397	0	397
2041	19,188	2,127	2,127	0	357	0	357
2042	18,456	2,058	2,058	0	322	0	322
2043	17,738	2,002	2,002	0	292	0	292
2044	17,018	1,945	1,945	0	265	0	265
2045	16,295	1,881	1,881	0	239	0	239
2046	15,580	1,825	1,825	0	216	0	216
2047	14,864	1,761	1,761	0	194	0	194
2048	14,156	1,695	1,695	0	174	0	174
2049	13,461	1,635	1,635	0	157	0	157
2050	12,771	1,573	1,573	0	141	0	141
2051	12,091	1,508	1,508	0	126	0	126
2052	11,426	1,444	1,444	0	112	0	112
2053	10,777	1,376	1,376	0	100	0	100
2054	10,149	1,318	1,318	0	89	0	89
2055	9,533	1,256	1,256	0	79	0	79
2056	8,935	1,181	1,181	0	69	0	69
2057	8,369	1,132	1,132	0	62	0	62
2058	7,810	1,082	1,082	0	55	0	55
2059	7,261	1,028	1,028	0	49	0	49
2060	6,726	971	971	0	43	0	43
2061	6,211	914	914	0	38	0	38
2062	5,717	855	855	0	33	0	33
2063	5,247	798	798	0	29	0	29
2064	4,802	743	743	0	25	0	25
2065	4,381	690	690	0	22	0	22

Appendix E: GASB 67 Fiduciary Net Position Projection

Table E-2: Actuarial Present Value of Projected Benefit Payments (continued)

(in thousands)

Calendar Year	Beginning Fiduciary Position	Benefit Payments	Funded Benefit Payments	Unfunded Benefit Payments	Present Value of Benefit Payments		
					Funded Payments at 7.25%	Unfunded Payments at 2.71%	Using Single Discount Rate of 7.25%
2066	$ 3,985	$ 645	$ 645	$ 0	$ 19	$ 0	$ 19
2067	3,607	595	595	0	16	0	16
2068	3,252	548	548	0	14	0	14
2069	2,921	502	502	0	12	0	12
2070	2,612	459	459	0	10	0	10
2071	2,326	418	418	0	9	0	9
2072	2,062	379	379	0	7	0	7
2073	1,818	343	343	0	6	0	6
2074	1,595	308	308	0	5	0	5
2075	1,392	276	276	0	4	0	4
2076	1,207	246	246	0	4	0	4
2077	1,040	218	218	0	3	0	3
2078	890	192	192	0	2	0	2
2079	756	167	167	0	2	0	2
2080	637	145	145	0	2	0	2
2081	533	125	125	0	1	0	1
2082	442	106	106	0	1	0	1
2083	364	90	90	0	1	0	1
2084	298	75	75	0	1	0	1
2085	242	62	62	0	0	0	0
2086	195	50	50	0	0	0	0
2087	158	40	40	0	0	0	0
2088	127	32	32	0	0	0	0
2089	103	25	25	0	0	0	0
2090	85	19	19	0	0	0	0
2091	71	15	15	0	0	0	0
2092	60	11	11	0	0	0	0
2093	53	8	8	0	0	0	0
2094	48	6	6	0	0	0	0
2095	46	4	4	0	0	0	0
2096	45	3	3	0	0	0	0
2097	45	2	2	0	0	0	0
2098	46	1	1	0	0	0	0
2099	48	1	1	0	0	0	0
2100	51	1	1	0	0	0	0
2101	54	0	0	0	0	0	0
2102	57	0	0	0	0	0	0
2103	61	0	0	0	0	0	0
2104	65	0	0	0	0	0	0
2105	70	0	0	0	0	0	0
2106	75	0	0	0	0	0	0
2107	81	0	0	0	0	0	0
2108	86	0	0	0	0	0	0
2109	93	0	0	0	0	0	0
2110	99	0	0	0	0	0	0
2111	107	0	0	0	0	0	0
2112	114	0	0	0	0	0	0
2113	123	0	0	0	0	0	0
2114	132	0	0	0	0	0	0
2115	141	0	0	0	0	0	0

Appendix F: Data for Section 2 Graphs

The tables below provide the numbers associated with the graphs in Section 2 of this report.

Graph 1: Market Value of Assets and Asset Returns

	Market Value of Assets	Asset Return
2011	$ 27,183,483	2.28%
2012	28,414,270	11.81%
2013	29,541,619	12.21%
2014	28,977,047	6.25%
2015	26,745,706	0.42%

Graph 3: Actuarial Value and Market Value of Assets

	Actuarial Value of Assets	Market Value of Assets
2011	$ 29,468,021	$ 27,183,483
2012	29,415,872	28,414,270
2013	29,318,253	29,541,619
2014	29,012,219	28,977,047
2015	28,265,441	26,745,706

Graph 4: Asset Returns

	Asset Returns (Actuarial Value)	Asset Returns (Market Value)
2011	5.27%	2.28%
2012	6.37%	11.81%
2013	7.45%	12.21%
2014	7.22%	6.25%
2015	5.88%	0.42%

Appendix F: Data for Section 2 Graphs

Graph 5: Actuarial Accrued Liability

	Liability for Active Members	Liability for Deferred Members	Liability for Retired Members	Total Liability
2011	$ 7,855,092	$ 1,542,238	$ 14,359,221	$ 23,756,551
2012	7,790,758	1,652,463	14,408,568	23,851,789
2013	5,879,560	1,695,813	16,981,822	24,557,195
2014	6,336,348	1,679,451	16,051,662	24,067,461
2015	6,390,641	2,221,225	19,944,862	28,556,728

Graph 6: Actuarial Accrued Liability and Actuarial Value of Assets

	Actuarial Accrued Liability	Actuarial Value of Assets
2011	$ 23,756,551	$ 29,468,021
2012	23,851,789	29,415,872
2013	24,557,195	29,318,253
2014	24,067,461	29,012,219
2015	28,556,728	28,265,441

Graph 7: Funded Ratios

	Funded Ratio (Actuarial Basis)	Funded Ratio (Market Value Basis)
2011	124.0%	114.4%
2012	123.3%	119.1%
2013	119.4%	120.3%
2014	120.5%	120.4%
2015	99.0%	93.7%