

North Carolina Firefighters' and Rescue Squad Workers' Pension Fund

Report on the Actuarial Valuation
Prepared as of December 31, 2013

October 2014



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October 9, 2014

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Retirement System of North Carolina
325 North Salisbury Street
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Members of the Board:

We submit herewith our report on the actuarial valuation of the North Carolina Firefighters' and Rescue Squad Workers' Pension Fund (referred to as "FRSWPF" or the "Firefighter and Rescue Squad Worker Plan") prepared as of December 31, 2013.

The primary purpose of the valuation report is to determine the required member and employer contribution rates, to describe the current financial condition of FRSWPF, 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. No one may make any representations or warranties based on any statements or conclusions contained in this report without Buck Consultants' written consent.

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 was based on the same actuarial assumptions as used in the previous valuation, except that the valuation reflected adjustments intended to estimate the impact of a full audit of the census data for lapsed members, including the development of a select and ultimate lapse assumption based on the full audit. We assumed that approximately 1,800 members who are not expected to return to active membership and receive full roster credit will be removed from future valuations, and we assumed that the select and ultimate assumption will equate to a 20% reduction in accrued

liability and normal cost for the remaining lapsed population not removed (approximately 10,500 members). Such assumptions are subject to revision based upon completion of the full audit. We believe that these assumptions are reasonable and comply with the requirements of GASB Nos. 25, 27, and 67. We prepared this report in accordance with the requirements of these standards.

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.

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,


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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, 2013, the Retirement Systems defined benefit plans cover about 900,000 current and prior public servants in the state of North Carolina. During the fiscal year ending June 30, 2014, the Systems paid \$5.2 billion in pensions to about 250,000 retirees. And as of June 30, 2014, the Systems' assets were valued at \$90 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 Firefighters' and Rescue Squad Workers' Pension Fund ("FRSWPF") provides benefits to all paid and volunteer certified firefighters and rescue squad workers. FRSWPF has approximately \$371 million in assets and over 55,000 members as of December 31, 2013. This actuarial valuation report is our annual analysis of the financial health of FRSWPF. This report, prepared as of December 31, 2013, presents the results of the actuarial valuation of the Retirement System.

Purpose

Beginning with this December 31, 2013 valuation, an actuarial valuation will be performed on FRSWPF annually as of the end of the calendar year. The prior actuarial valuation was performed as of June 30, 2012. The 18-month gap between valuations puts this valuation on the same timing as the actuarial valuations for all other North Carolina Retirement Systems. The actuary determines the amount of contributions to be made to FRSWPF 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 FRSWPF,
- 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, 2013 valuation as compared to the June 30, 2012 valuation were:

- Annualized market value returns of 12.42% compared to 7.25% assumed
- Recent legislation signed into law including:
 - In-service distributions of pensions allowed for all members after attaining age 55 and 20 years of service as an eligible firefighter or eligible rescue squad worker.
- Adjustments to actuarial assumptions intended to estimate the impact of a full audit of the census data for lapsed members, including the development of a select and ultimate lapse assumption based on the full audit
- No significant changes in funding methodology from the prior year's valuations

When compared to the June 30, 2012 actuarial valuation, the above resulted in:

- Higher funded ratio (88.3% in the December 31, 2013 valuation compared to 83.9% in the June 30, 2012 valuation)
- Lower employer required contribution (\$13,240,552 for fiscal year ending June 30, 2016 compared to \$14,620,362 for fiscal year ending June 30, 2014)

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

- Stakeholders working together to keep FRSWPF 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 over a 12-year period
- Modest changes in benefits when compared to peers

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

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

Section 1: 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 FRSWPF members is collected annually by the Retirement Systems Division staff at the direction of the actuary. This 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, 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 1: The Valuation Process

Valuation Input: Membership Data (continued)

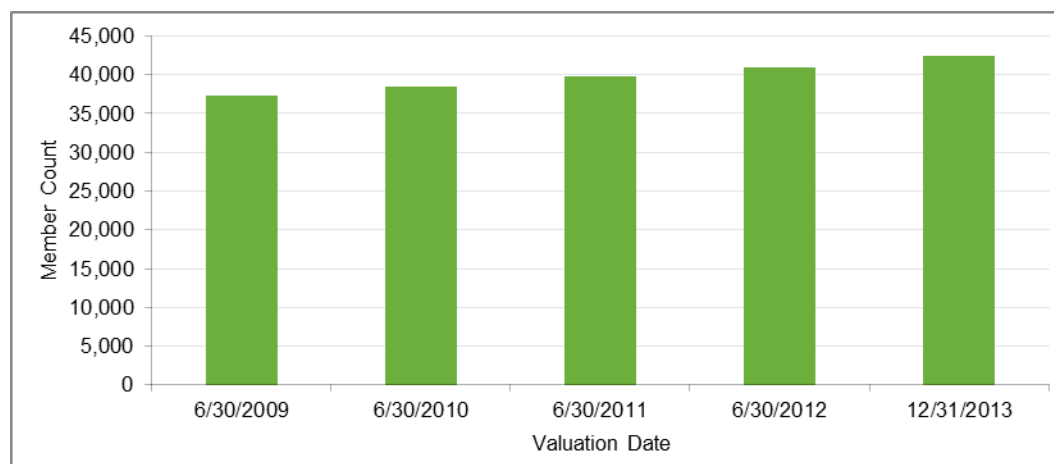
The table below provides a summary of the membership data used in this valuation compared to the prior valuation.

Number as of	12/31/2013	6/30/2012
Active members	42,464	40,870
Terminated members and survivors of deceased members entitled to benefits but not yet receiving benefits	156	154
Retired members and survivors of deceased members currently receiving benefits	<u>12,445</u>	<u>11,912</u>
Total	55,065	52,936

Commentary: The number of active members increased by 3.9% from the previous valuation date. The increase in the active population could result in more benefits accruing, but also more contributions supporting the system. The number of retired members and survivors of deceased members currently receiving benefits increased by 4.5% from the previous valuation date. The increase in retiree population is consistent with expectations.

Graph 1: Active Members

The graph below provides a history of the number of active members over the past five years.



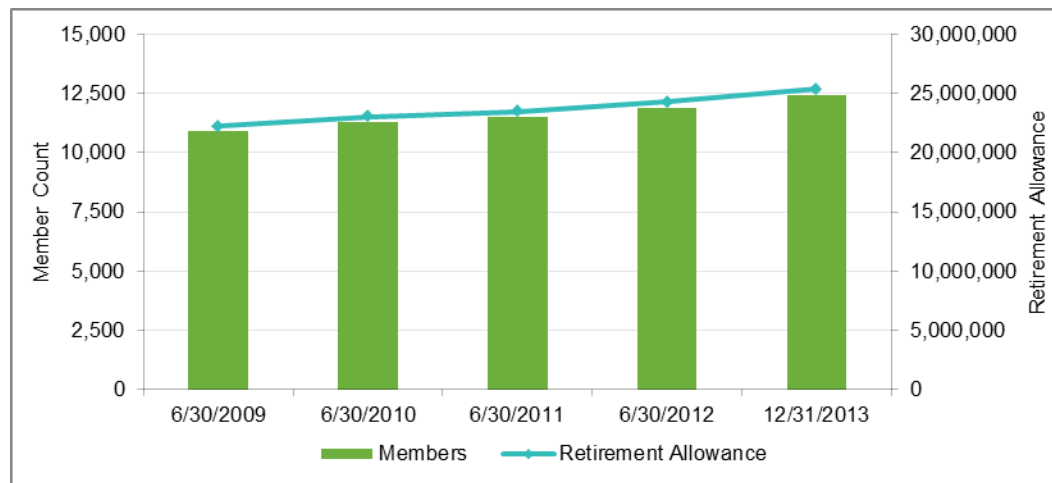
Commentary: While we have seen a steady increase in the number of active members submitted for the annual valuation, more and more of these members are not accruing a benefit. As a result, an audit of the census data is being conducted in order to develop a lapse assumption to reflect that some members are reported as active but are not currently accruing benefits.

Section 1: The Valuation Process

Valuation Input: Membership Data (continued)

Graph 2: Retired Members and Survivors of Deceased Members

The graph below provides a history of the number of retired members and survivors of deceased members and benefit amounts payable over the past five years.



Commentary: The number of retired members and survivors of deceased members and the benefits paid to these members has been increasing steadily, as expected based on plan assumptions.

A detailed summary of the membership data used in this valuation is provided in Section 3 and Appendix B of this report.

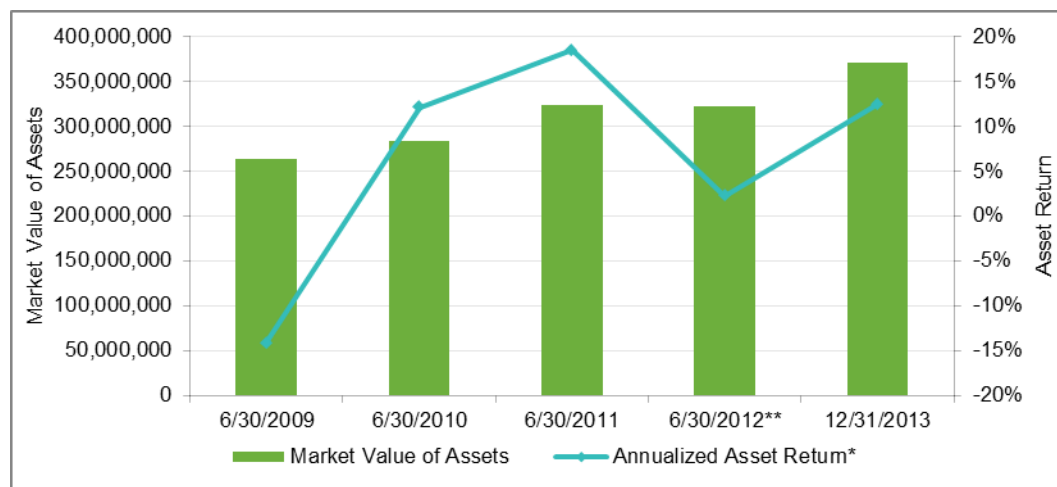
Section 1: The Valuation Process

Valuation Input: Asset Data

FRSWPF assets are held in trust and are invested for the exclusive benefit of plan members. The Market Value of Assets is \$371 million as of December 31, 2013 and \$322 million as of June 30, 2012. The investment return for the market value of assets for the 18-month period between the two valuation dates was 19.20%.

Graph 3: Market Value of Asset and Annualized Asset Returns

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



* Equals the asset return for the year preceding the valuation date except for the asset return at 12/31/2013 which equals the annualized asset return between 6/30/2012 and 12/31/2013

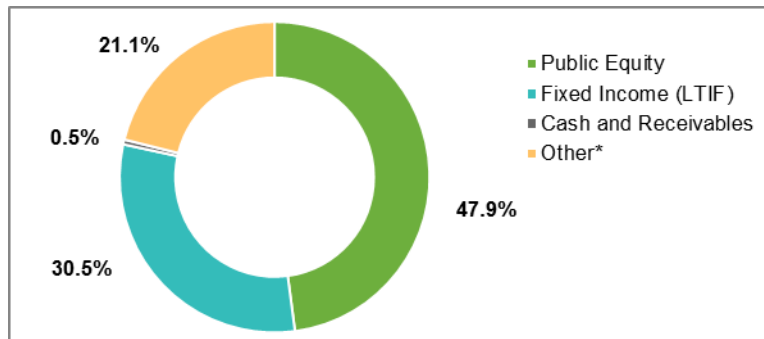
** The market value of assets as of June 30, 2012 includes employer contributions receivable of \$4,318,042 as appropriated for fiscal year ending June 30, 2012 but received after such date.

Section 1: The Valuation Process

Valuation Input: Asset Data (continued)

Graph 4: Allocation of Investments by Category

The graph below provides the breakdown of the market value of assets at December 31, 2013 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. The discount rate will be reviewed at the next experience study to be presented to the Board in October 2015.

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

Section 1: The Valuation Process

Valuation Input: Benefit Provisions

Benefit provisions are described in North Carolina General Statutes, Chapter 58.

There were the following changes in benefit provisions from the prior year's valuation:

- In-service distributions of pensions allowed for all members after attaining age 55 and 20 years of service as an eligible firefighter or eligible rescue squad worker

Highlights of the benefit provisions are described below.

- An unreduced retirement allowance is payable to members who retire from service after attaining age 55 and 20 years of service as an eligible firefighter or eligible rescue squad worker.
- The unreduced retirement allowance is equal to \$170 per month.

Commentary: Most 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 the Retirement System due to the legislature contributing the actuarially required contribution, benefit cuts have not been needed in North Carolina.

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, and benefits of the members) and what may happen in the future. The actuarial assumptions of the Retirement System 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 Retirement System's assets such as the interest rate and the real return.

The valuation was based on the same actuarial assumptions as used in the previous valuation, except that the valuation reflected adjustments intended to estimate the impact of a full audit of the census data for lapsed members, including the development of a select and ultimate lapse assumption based on the full audit. Note that subsequent to the issuance of the June 30, 2012 actuarial valuation, the employer contributions and liabilities were also adjusted downward to reflect these lapse assumptions for purposes of estimating the annual required contribution for fiscal year ending June 30, 2015. For this December 31, 2013 valuation, we assumed that approximately 1,800 members who are not expected to return to active membership and receive full roster credit will be removed from future valuations, and we assumed that the select and ultimate assumption will equate to a 20% reduction in accrued liability and normal cost for the remaining lapsed population not removed (approximately 10,500 members). Such assumptions are subject to revision based upon completion of the full audit.

Section 1: The Valuation Process

Other than the adjustments previously described, the latest assumptions were adopted for use with the December 31, 2009 actuarial valuation, based on the experience study prepared as of December 31, 2009 and adopted by the Board of Trustees on October 21, 2010. The next experience study will be prepared as of December 31, 2014 and presented to the Board in October 2015. Assumptions and methods based on the next experience study, as adopted by the Board, will be used with the December 31, 2015 valuation. This policy of reviewing assumptions every five years is a best practice.

Valuation Input: Funding Methodology

The Funding Methodology is the payment plan for FRSWPF 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 stays level
- Asset Valuation Methods smooth or average the market value returns over time to alleviate contribution volatility that results from market returns.
 - 20% of market value plus 80% of the expected actuarial value
 - 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 2012. A new amortization base is created each year based on the prior years' experience.

When compared to other Public Sector Retirement Systems in the United States, the funding policy for FRSWPF 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.

There were no significant changes in funding method from the prior year's valuation. A detailed summary of the actuarial assumptions and methods is provided in Appendix D of this report.

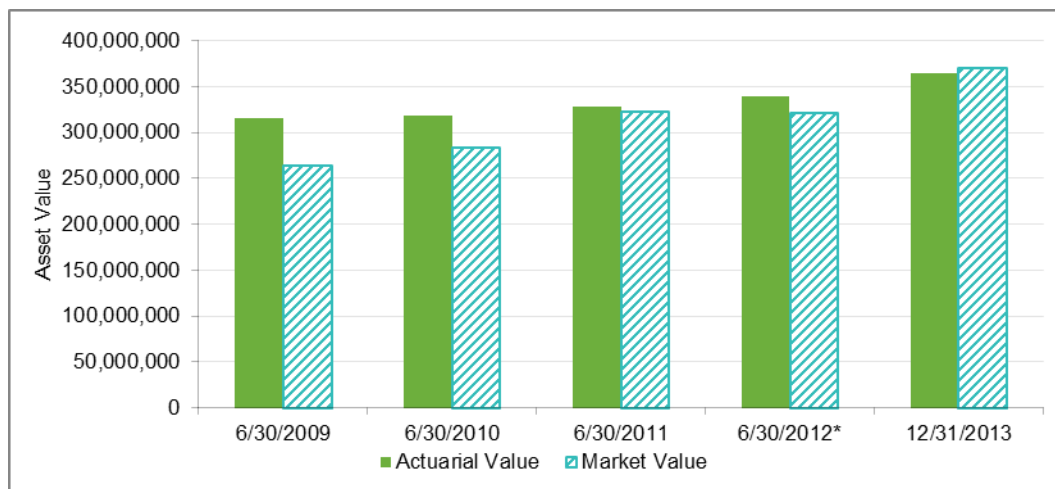
Section 1: The Valuation Process

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 FRSWPF, the Board adopted an asset valuation method to determine the Actuarial Value of Assets used for funding purposes. The Actuarial Value of Assets is \$365 million as of December 31, 2013 and \$339 million as of June 30, 2012.

Graph 5: 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.



* The Market Value and Actuarial Value of Assets as of June 30, 2012 include employer contributions receivable of \$4,318,042 as appropriated for fiscal year ending June 30, 2012 but received after such date.

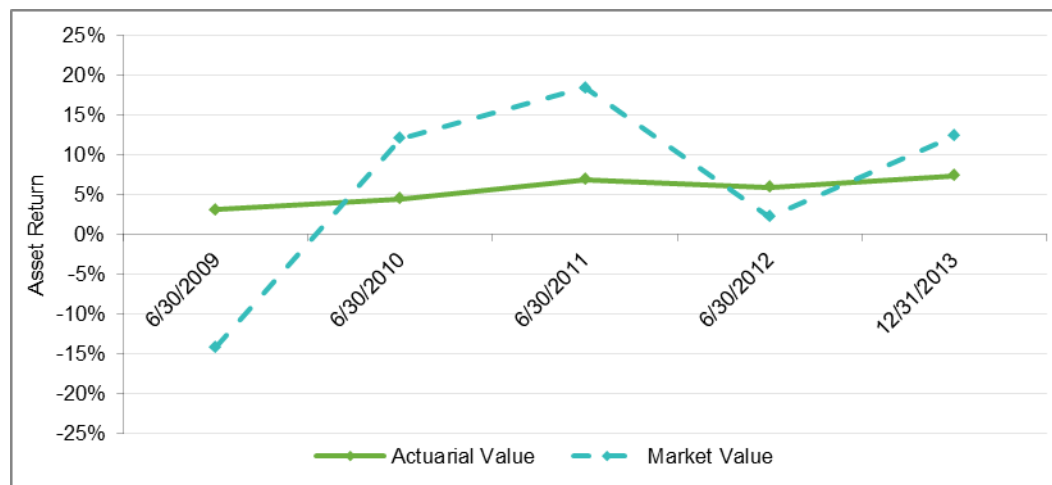
Commentary: For the first time in several years, the market value of assets is higher than the actuarial value of assets, which is used to determine employer contributions. This indicates that there are unrecognized asset returns to be recognized in future valuations, which will mitigate the impact of asset returns that are less than the assumed return of 7.25%. As a result, the upward pressure on contributions that we have seen since the Great Recession has been reversed, as seen in the projections of potentially higher funded ratios and lower employer contributions later in this report.

Section 1: The Valuation Process

Valuation Results: Actuarial Value of Assets (continued)

Graph 6: Asset Returns

The graph below provides a history of the market value and actuarial value of asset returns over the past five years (annualized for the 18-month period ending December 31, 2013).



Commentary: The investment return for the market value of assets for the 18-month period between June 30, 2012 to December 31, 2013 was 19.20% (12.42% annualized). The actuarial value of assets smooths investment gains and losses. Higher than expected market returns resulted in an actuarial value of asset return for the 18-month period between June 30, 2012 to December 31, 2013 of 11.35% (7.43% annualized), which is higher than the assumed rate of 7.25%. Therefore, FRSWPF experienced an asset gain of \$1.6 million.

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

Section 1: The Valuation Process

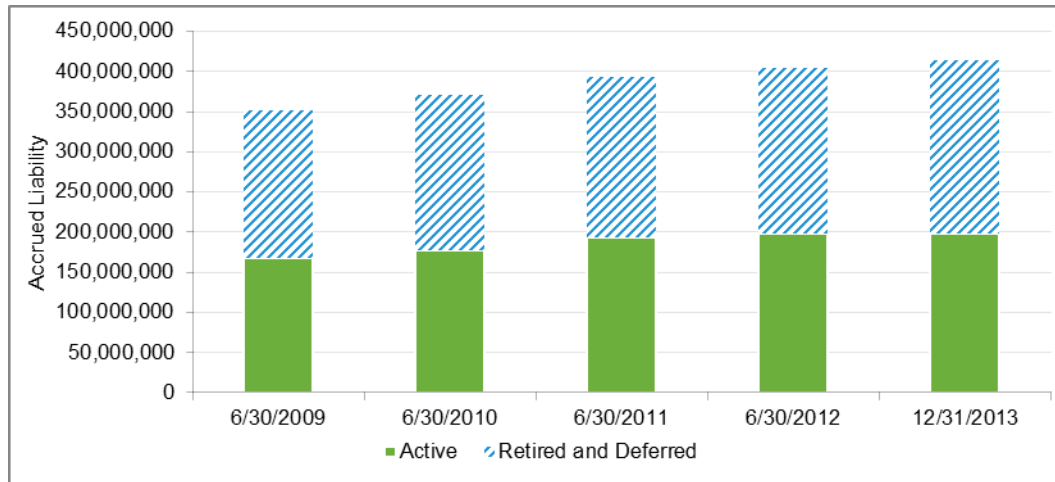
Valuation Results: Actuarial Accrued Liability

Using the provided membership data, benefit provisions, and actuarial assumptions, the Retirement System's future benefit payments 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 the Retirement System. 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 the Retirement System should ideally have in the trust. The NC is also referred to as the cost of benefits accruing during the year.

Graph 7: Actuarial Accrued Liability

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



Commentary: The AAL increased from \$404 million to \$413 million from June 30, 2012 to December 31, 2013. FRSWPF 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. The AAL prior to legislative and assumption changes was \$3.6 million lower than expected, which resulted in a demographic gain of \$3.6 million during 2013. Legislation increased the AAL by \$8.7 million. Assumption changes intended to estimate the impact of a full audit of the census data for lapsed members decreased the AAL by \$16.0 million.

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

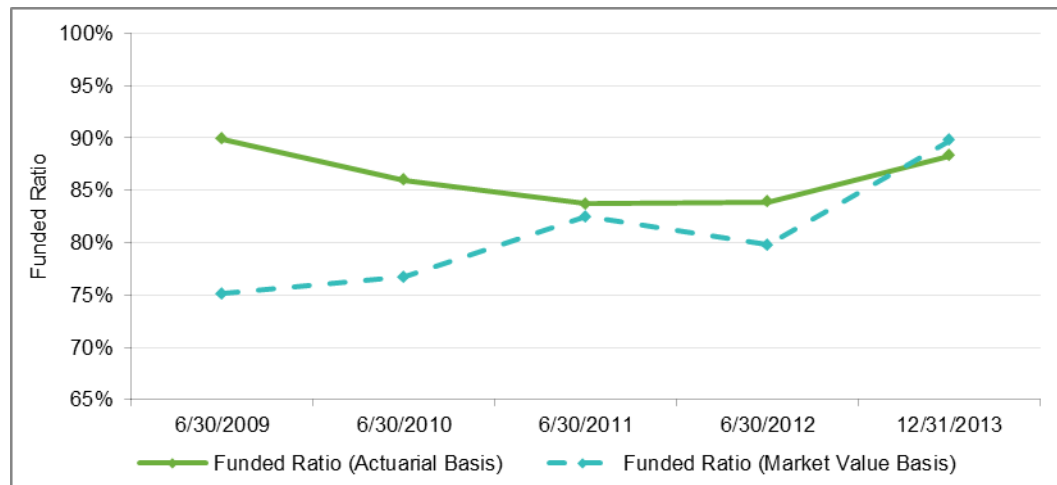
Section 1: The Valuation Process

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 the Retirement System actually has in the fund to the amount the Retirement System should have in the fund.

Graph 8: 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 actuarial value of assets basis is used for computing contributions to alleviate contribution volatility. The funded ratio on an actuarial basis increased from 83.9% at June 30, 2012 to 88.3% at December 31, 2013.

Section 1: The Valuation Process

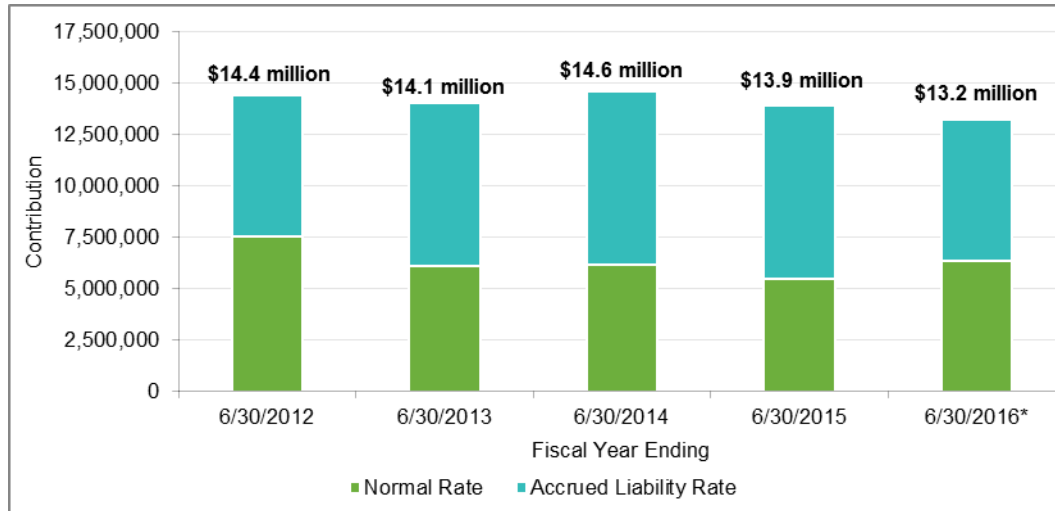
Valuation Results: Employer Contributions

The retirement act provides that the contributions of employers shall consist of a normal contribution and an accrued liability contribution.

Because a valuation was not performed at June 30, 2013, the preliminary total employer contribution was estimated to be \$15,100,000 for fiscal year ending June 30, 2015 based on the June 30, 2012 valuation. Based on the findings in Phase One of the audit of the census data for lapsed members, the total employer contribution was estimated to decrease by \$2,200,000. House Bill 1034 (Session Law 2014-64) increased the employer contribution by \$1,000,000. Subsequently, the 2014 Appropriations Act (Session Laws 2014-100) set contributions at \$13,900,000 effective for the fiscal year ending June 30, 2015. As a result of this December 31, 2013 valuation, the preliminary total employer contribution rate should be set at \$13,240,552 for the fiscal year ending June 30, 2016, subject to the impact of any future legislative changes effective during that fiscal year.

Graph 9: Employer Required Contributions

The graph below provides a history of employer required contributions over the past five years. The contributions are split into the normal contribution and the accrued liability contribution. The normal contribution is the employer's portion of the cost of benefits accruing after reducing for the member contribution. The accrued liability contribution is the payment toward the unfunded liability.



* Subject to the impact of future legislative changes effective during that fiscal year.

Commentary: The employer required contribution is the amount needed to pay for the cost of the benefits accruing and to pay off the pension debt over 12 years, offset for the \$10 monthly contribution the members make until the member attains 20 years of service. The 12-year period is a short period for Public Sector Retirement Systems in the United States, with most Systems using a period of 30 years or more to pay off the pension debt. The shorter period results in higher contributions and more benefit security.

Section 1: The Valuation Process

A detailed summary of the employer required contributions 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 Nos. 25, 27, and 67 of the GASB and all applicable Actuarial Standards of Practice. The annual required contribution (ARC) under GASB 25/27 for the fiscal year ending June 30, 2016 is \$13,240,552. The Net Pension Liability (Asset) under GASB 67 for the fiscal year ending June 30, 2014, is \$27,418,000 (compared to \$67,725,000 for fiscal year ending June 30, 2013). The required financial reporting information for the Retirement System under GASB Nos. 25, 27, and 67 can be found in Section 8 of this report.

Section 2: Principal Results

This report, prepared as of December 31, 2013, 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	12/31/2013	6/30/2012
Active Members Number	42,464	40,870
Retired Members and Survivors of Deceased Members Currently Receiving Benefits Number	12,445	11,912
Annual Allowances	\$ 25,387,800	\$ 24,300,480
Number of Deferred Disabled Members	156	154
Assets*		
Actuarial Value (AVA)	\$ 364,836,260	\$ 338,885,087
Market Value	\$ 371,122,130	\$ 322,225,386
Actuarial Accrued Liability (AAL)	\$ 413,053,513	\$ 403,816,903
Unfunded Accrued Liability (AAL-AVA)	\$ 48,217,253	\$ 64,931,816
Funded Ratio (AVA/AAL)	88.3%	83.9%
GASB 25/27 Results for Fiscal Year Ending	6/30/2016	6/30/2014**
Annual Required Contribution (ARC) of employer		
Normal Cost	\$ 6,354,036	\$ 6,177,501
Accrued Liability	<u>6,886,516</u>	<u>8,442,861</u>
Total	\$ 13,240,552	\$ 14,620,362
Impact of Legislative Changes	<u>N/A</u>	<u>0</u>
Final Employer ARC	N/A	\$ 14,620,362
Recommended Employer Contribution Rate		
Normal Cost	\$ 6,354,036	\$ 6,177,501
Accrued Liability	<u>6,886,516</u>	<u>8,442,861</u>
Total	\$ 13,240,552	\$ 14,620,362
Impact of Legislative Changes	<u>N/A</u>	<u>0</u>
Final Employer ARC	N/A	\$ 14,620,362

* The Market Value and Actuarial Value of Assets as of June 30, 2012 include employer contributions receivable of \$4,318,042 as appropriated for fiscal year ending June 30, 2012 but received after such date.

** The preliminary ARC for fiscal year ending June 30, 2015 was estimated to be \$15,100,000 based on the June 30, 2012 valuation. Based on findings of Phase One of the audit of the census data for lapsed members, the ARC was estimated to decrease by \$2,200,000. The impact of legislative changes increased the ARC by \$1,000,000. As such, the final employer ARC for fiscal year ending June 30, 2015 was \$13,900,000. See Section 6, Table 13 for more detail.

Section 3: Membership Data

The Retirement Systems Division provided membership data as of the valuation date for each member of the Retirement System. 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
Firefighters	39,000	39.65	11.48
Rescue Squad Workers	<u>3,464</u>	<u>42.84</u>	<u>11.70</u>
Total	42,464	39.91	11.50

Table 3: Data for Members Currently Receiving Benefits

	Member Count	Average Age	Annual Retirement Allowances
Firefighters	11,211	68.20	\$ 22,870,440
Rescue Squad Workers	<u>1,234</u>	<u>68.64</u>	<u>2,517,360</u>
Total	12,445	68.24	\$ 25,387,800

Table 4: Data for Disabled Members Eligible for Deferred Pensions

	Member Count	Average Age	Annual Retirement Allowances
Firefighters	147	50.71	\$ 299,880
Rescue Squad Workers	<u>9</u>	<u>52.89</u>	<u>18,360</u>
Total	156	50.84	\$ 318,240

Section 4: Asset Data

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

Table 5: Market Value of Assets

Asset Data as of	12/31/2013	6/30/2012
Beginning of Year Market Value of Assets	\$ 322,225,386	\$ 323,354,190
Contributions	27,469,616	17,171,291
Benefit Payments	(39,300,367)	(25,428,329)
Investment Income	<u>60,727,495</u>	<u>7,128,234</u>
Net Increase/(Decrease)	48,896,744	(1,128,804)
End of Year Market Value of Assets	\$ 371,122,130	\$ 322,225,386
Estimated Net Investment Return on Market Value (Annualized)	12.42%	2.25%

The contributions, benefit payments, investment income, and estimated net investment return as of December 31, 2013 are for the 18-month period from June 30, 2012 to December 31, 2013. The contributions and market value of assets as of June 30, 2012 include employer contributions receivable of \$4,318,042 as appropriated for fiscal year ending June 30, 2012 but received after such date.

Table 6: Allocation of Investments by Category of the Market Value of Assets

Asset Data as of	12/31/2013	6/30/2012
Allocation by Dollar Amount		
Public Equity	\$ 177,900,313	\$ 136,287,394
Fixed Income (LTIF)	113,242,630	117,287,969
Cash and Receivables	1,873,993	4,803,044
Other*	<u>78,105,194</u>	<u>63,846,979</u>
Total Market Value of Assets	\$ 371,122,130	\$ 322,225,386
Allocation by Percentage of Asset Value		
Public Equity	47.94%	42.30%
Fixed Income (LTIF)	30.51%	36.40%
Cash and Receivables	0.50%	1.49%
Other*	<u>21.05%</u>	<u>19.81%</u>
Total Market Value of Assets	100.00%	100.00%

* 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 FRSWPF, 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 7: Actuarial Value of Assets

Asset Data as of	12/31/2013
(a) Actuarial Value of Assets at 6/30/2012	\$ 338,885,087
(b) Contributions*	27,469,616
(c) Benefit Payments	<u>(39,300,367)</u>
(d) Net Cash Flow: (b) + (c)	(11,830,751)
(e) Expected Investment Return: [(a) x 10.875%] + [(d) x 5.4375%]	36,210,456
(f) Expected End of Year Actuarial Value of Assets: (a) + (d) + (e)	363,264,792
(g) End of Year Market Value of Assets	371,122,130
(h) Excess of Market Value over Expected Actuarial Value of Assets: (g) - (f)	7,857,338
(i) 20% Adjustment toward Market Value: (h) x 20%	1,571,468
(j) Preliminary End of Year Actuarial Value of Assets: (f) + (i)	364,836,260
(k) Final End of Year Actuarial Value of Assets: (j) not less than 80% of (g) and not greater than 120% of (g)	364,836,260
(l) Estimated Net Investment Return (Annualized)	7.43%

* Does not include employer contributions receivable of \$4,318,042 as appropriated for fiscal year ending June 30, 2012 but received after such date.

Commentary: The actuarial value of assets smooths investment gains/losses, resulting in less volatility in the employer contribution. Higher than expected returns resulted in a \$1.6 million asset gain recognition this year (item (i) above). The contributions, benefit payments, expected investment return, and estimated net investment return are for the 18-month period from June 30, 2012 to December 31, 2013.

Section 4: Asset Data

The valuation assumes that the funds will earn a 7.25% asset return. The table below provides a history of the Actuarial Value and Market Value of Asset returns.

Table 8: Historical Asset Returns (Annualized)

Year*	Actuarial Value of Asset Return	Market Value of Asset Return
2006	8.63%	7.24%
2007	9.98%	14.85%
2008	7.43%	(1.92%)
2009	3.09%	(14.15%)
2010	4.47%	12.09%
2011	6.88%	18.47%
2012	5.96%	2.25%
2013	7.43%	12.42%
Average	6.71%	5.91%
Range	6.89%	32.62%

* Asset returns are for the year ending on June 30 of the applicable year, except for the 2013 asset return, which is the annualized return for the 18-month period from June 30, 2012 to December 31, 2013.

Commentary: The average investment return recognized for purposes of determining the annual change in contribution each year is the actuarial value of assets return. Currently, the average actuarial return of 6.71% tracks average market return of 5.91% rather well. But the range of returns is markedly less – 6.89% versus 32.62%. This results in much lower employer contribution volatility using the actuarial value of assets versus market, while ensuring that the actuarial needs of FRSWPF are met.

Section 5: Liability Results

Using the provided membership data, benefit provisions, and actuarial assumptions, the Retirement System's future benefit payments 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 year's valuations.

Table 9: Liability Summary

Valuation Results as of	12/31/2013	6/30/2012
(a) Present Value of Future Benefits		
(1) Active Members	\$ 267,441,652	\$ 269,382,843
(2) Members Currently Receiving Benefits and Members with Deferred Benefits	<u>215,560,754</u>	<u>206,343,408</u>
(3) Total	\$ 483,002,406	\$ 475,726,251
(b) Present Value of Future Normal Costs		
(1) Employee Future Normal Costs	\$ 27,560,503	\$ 29,985,726
(2) Employer Future Normal Costs	<u>42,388,390</u>	<u>41,923,622</u>
(3) Total	\$ 69,948,893	\$ 71,909,348
(c) Actuarial Accrued Liability: (a3) - (b3)	\$ 413,053,513	\$ 403,816,903
(d) Actuarial Value of Assets	\$ 364,836,260	\$ 338,885,087
(e) Unfunded Accrued Liability: (c) - (d)	\$ 48,217,253	\$ 64,931,816

Section 5: Liability Results

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

Table 10: Reconciliation of Unfunded Actuarial Accrued Liability

(in millions)	
Unfunded Actuarial Accrued Liability (UAAL) as of 6/30/2012	\$ 64.9
Normal Cost from 6/30/2012 to 12/31/2013	16.0
Reduction due to Actual Contributions	(27.5)
Interest on UAAL, Normal Cost, and Contributions	7.3
Asset (Gain)/Loss	(1.6)
Actuarial Accrued Liability (Gain)/Loss	(3.6)
Impact of Assumption Changes*	(16.0)
Impact of Legislative Changes	<u>8.7</u>
Unfunded Actuarial Accrued Liability (UAAL) as of 12/31/2013	\$ 48.2

* The December 31, 2013 valuation reflects adjustments to assumptions intended to estimate the impact of a full audit of the census data for lapsed members.

Section 6: Annual Required Contribution

The annual required contribution consists of a normal cost contribution and an accrued liability contribution. The normal cost contribution is the employer's portion of the cost of benefits accruing during the year after reducing for the member contribution. The accrued liability contribution is the payment toward the unfunded accrued liability in order to pay off the unfunded accrued liability over 12 years.

The table below provides the calculation of the annual required contribution for the current and prior years' valuations.

**Table 11: Calculation of the Annual Required Contribution (ARC)
Payable per Active Member**

Valuation Date	12/31/2013	6/30/2012
ARC for Fiscal Year Ending	6/30/2016	6/30/2014
Normal Cost Rate Calculation		
(a) Employer Future Normal Cost	\$ 42,388,390	\$ 41,923,622
(b) Present Value of Future Active Member Count	297,734	321,821
(c) Normal Cost Rate: (a) / (b)	\$ 142.37	\$ 130.27
(d) Expenses Rate*	\$ <u>22.52</u>	\$ <u>20.88</u>
(e) Total Normal Cost Rate: (c) + (d)	\$ 164.89	\$ 151.15
Accrued Liability Rate Calculation		
(f) Total Annual Amortization Payments**	\$ 6,886,516	\$ 8,442,861
(g) Current Active Member Count***	38,535	40,870
(h) Accrued Liability Rate: (f) / (g)	\$ 178.71	\$ 206.58
Total ARC (e) + (h)	\$ 343.60	\$ 357.73

* Based on actual expenses during the previous year.

** See Table 15 for more detail.

*** The December 31, 2013 active member count reflects the adjustments intended to estimate the impact of a full audit of the census data for lapsed members.

Section 6: Annual Required Contribution

The tables below provide the calculation and reconciliation of the annual required contribution (ARC) for the current and prior years' valuations.

Table 12: Annual Required Contribution (ARC)

Valuation Date	12/31/2013	6/30/2012
ARC for Fiscal Year Ending	6/30/2016	6/30/2014
(a) Current Active Member Count*	38,535	40,870
(b) Normal Cost Rate	\$ 164.89	\$ 151.15
(c) Normal Cost Contribution: (a) x (b)	\$ 6,354,036	\$ 6,177,501
(d) Accrued Liability Contribution	<u>6,886,516</u>	<u>8,442,861</u>
(e) Total ARC: (c) + (d)	\$ 13,240,552	\$ 14,620,362

* The December 31, 2013 active member count reflects the adjustments intended to estimate the impact of a full audit of the census data for lapsed members.

Table 13: Reconciliation of the Change in the ARC

Fiscal year ending June 30, 2014 Preliminary ARC (based on June 30, 2012 valuation)	\$ 14,620,362
Impact of Legislative Changes	<u>0</u>
Fiscal year ending June 30, 2014 Final ARC	14,620,362
Change Due to One-Year Projection	<u>479,638</u>
Fiscal year ending June 30, 2015 Preliminary ARC (estimated based on June 30, 2012 Valuation)	15,100,000
Estimated Change due to Data Audit Phase One	(2,200,000)
Impact of Legislative Changes	<u>1,000,000</u>
Fiscal year ending June 30, 2015 Estimated Final ARC	13,900,000
Change Due to Demographic (Gain)/Loss	(211,412)
Change Due to Investment (Gain)/Loss	(215,028)
Change Due to Contributions Greater than ARC	<u>(233,008)</u>
Fiscal year ending June 30, 2016 Preliminary ARC (based on December 31, 2013 valuation)	13,240,552

Section 6: Annual Required Contribution

Amortization methods determine the payment schedule for the unfunded actuarial accrued liability. FRSWPF adopted a 12-year closed amortization period for fiscal year ending 2012. 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 14: Calculation of the New Amortization Base

Calculation as of	12/31/2013	6/30/2012
(a) Unfunded Actuarial Accrued Liability	\$ 48,217,253	\$ 64,931,816
(b) Prior Years' Outstanding Balances	\$ 59,591,323	\$ 61,118,744
(c) New Amortization Base: (a) - (b)	\$ (11,374,070)	\$ 3,813,072
(d) New Amortization Payment	\$ (1,556,345)	\$ 503,816

Table 15: Amortization Schedule for Unfunded Accrued Liability

Date Established	Original Balance	12/31/2013 Outstanding Balance	Annual Payment
June 30, 2010	\$ 51,963,371	\$ 47,633,903	\$ 6,865,854
June 30, 2011	8,122,313	7,978,550	1,073,191
June 30, 2012	3,813,072	3,978,870	503,816
December 31, 2013	(11,374,070)	(11,374,070)	(1,556,345)
Total		\$ 48,217,253	\$ 6,886,516

Section 6: Annual Required Contribution

The table below provides a history of the annual required contribution and the corresponding appropriated rate.

Table 16: History of Annual Required Contributions and Appropriated Rates

Valuation Date	Fiscal Year Ending	Preliminary ARC	Subsequent Changes to ARC	Final ARC	Appropriated Rate
12/31/2013	6/30/2016	\$13,240,552	N/A	N/A	N/A
6/30/2012*	6/30/2015	15,100,000	\$(1,200,000)**	\$13,900,000	\$13,900,000
6/30/2012	6/30/2014	14,620,362	0	14,620,362	14,626,599
6/30/2011	6/30/2013	14,074,371	0	14,074,371	15,446,599
6/30/2010	6/30/2012	15,870,645	(1,481,939)	14,388,706	14,397,713

* Because a valuation was not performed at June 30, 2013, the preliminary total employer contribution was estimated to be \$15,100,000 for fiscal year ending June 30, 2015 based on the June 30, 2012 valuation.

** Based on the findings in Phase One of the audit of the census data for lapsed members, the total employer contribution was estimated to decrease by \$2,200,000. House Bill 1034 (Session Law 2014-64) increased the employer contribution by \$1,000,000. Subsequently, the 2014 Appropriations Act (Session Laws 2014-100) set contributions at \$13,900,000 effective for the fiscal year ending June 30, 2015.

Section 7: Valuation Balance Sheet

The valuation balance sheet shows the assets and liabilities of FRSWPF. The items shown in the balance sheet are present values actuarially determined as of the relevant valuation date. The table below provides the valuation balance sheet for the current year and prior year.

Table 17: Valuation Balance Sheet

Balance Sheet as of	12/31/2013	6/30/2012
Assets		
Current Actuarial Value of Assets		
Annuity Savings Fund	\$ 40,526,406	\$ 38,594,195
Pension Accumulation Fund	<u>324,309,854</u>	<u>300,290,892</u>
Total*	\$ 364,836,260	\$ 338,885,087
Future Member Contributions to the Annuity Savings Fund	\$ 27,560,503	\$ 29,985,726
Prospective Contributions to the Pension Accumulation Fund		
Normal Contributions	\$ 42,388,390	\$ 41,923,622
Unfunded Accrued Liability Contributions	<u>48,217,253</u>	<u>64,931,816</u>
Total	\$ 90,605,643	\$ 106,855,438
Total Assets	\$ 483,002,406	\$ 475,726,251
Liabilities		
Annuity Savings Fund		
Past Member Contributions	\$ 40,526,406	\$ 38,594,195
Future Member Contributions	<u>27,560,503</u>	<u>29,985,726</u>
Total Contributions	\$ 68,086,909	\$ 68,579,921
Pension Accumulation Fund		
Benefits Currently in Payment	\$ 215,560,754	\$ 206,343,408
Benefits to be Paid to Current Active Members	<u>199,354,743</u>	<u>200,802,922</u>
Total Benefits Payable	\$ 414,915,497	\$ 407,146,330
Total Liabilities	\$ 483,002,406	\$ 475,726,251

* The June 30, 2012 assets include employer contributions receivable of \$4,318,042 as appropriated for fiscal year ending June 30, 2012 but received after such date.

Section 8: Accounting Results

The section contains the accounting information for Governmental Accounting Standards Board (GASB) Statement No. 25, 27 and 67 for fiscal year ending June 30, 2014 based on a valuation date of December 31, 2013.

Please note that GASB Statement No. 25 (*Financial Reporting for Defined Benefit Pension Plans*) is applicable for fiscal years ending prior to 2014 and has been replaced by GASB Statement No. 67 (*Financial Reporting for Pension Plans*) for fiscal years ending 2014 and later. Similarly, GASB Statement No. 27 (*Accounting for Pensions by State and Local Governmental Employers*) is applicable for fiscal years ending prior to 2015 and has been replaced by GASB Statement No. 68 (*Accounting and Financial Reporting for Pensions*) for fiscal years ending 2015 and later.

GASB Statement Nos. 25 and 27 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, and the schedule of funding progress.

**Table 18: Number of Active and Retired Members
as of December 31, 2013**

Group	Number
Retired members and survivors of deceased members currently receiving benefits	12,445
Terminated members and survivors of deceased members entitled to benefits but not yet receiving benefits	156
Active members	<u>42,464</u>
Total	55,065

Table 19: Schedule of Funding Progress

Actuarial Valuation Date	(a) Actuarial Value of Assets*	(b) Entry Age Actuarial Accrued Liability	(b) - (a) Unfunded Actuarial Accrued Liability (UAAL)	(a)/(b) Funded Ratio	(c) Covered Payroll	[(b) - (a)] / (c) UAAL as a Percentage of Covered Payroll
6/30/2007	\$ 305,869,434	\$ 322,453,973	\$ 16,584,539	94.9%	N/A	N/A
6/30/2008	316,973,296	339,022,147	22,048,851	93.5%	N/A	N/A
6/30/2009	315,697,259	351,324,586	35,627,327	89.9%	N/A	N/A
6/30/2010	318,272,616	370,235,987	51,963,371	86.0%	N/A	N/A
6/30/2011	327,984,054	391,837,082	63,853,028	83.7%	N/A	N/A
6/30/2012	338,885,087	403,816,903	64,931,816	83.9%	N/A	N/A
12/31/2013	364,836,260	413,053,513	48,217,253	88.3%	N/A	N/A

* The June 30, 2012 Actuarial Value of Assets includes employer contributions receivable as appropriated for fiscal year ending June 30, 2012 but received after such date.

Section 8: Accounting Results

The tables below provide a reconciliation of the preliminary employer annual required contribution to the final employer annual required contribution, the calculation of the annual pension cost and net pension obligation, and a three-year trend of the net pension obligation.

Table 20: Reconciliation of the Annual Required Contribution

Fiscal Year Ending	June 30, 2014
Preliminary Annual Required Contribution Rate	
Normal Cost	\$ 6,177,501
Accrued Liability	8,442,861
Total	\$ 14,620,362
Impact of Legislative Changes	0
Final Annual Required Contribution Rate	\$ 14,620,362

Table 21: Annual Pension Cost and Net Pension Obligation

Fiscal Year Ending	June 30, 2014
(a) Employer annual required contribution	\$ 14,620,362
(b) Interest on net pension obligation	61,771
(c) Adjustment to annual required contribution	(112,576)
(d) Annual pension cost: (a) + (b) + (c)	\$ 14,569,557
(e) Employer contributions made for fiscal year ending 6/30/2014	14,626,599
(f) Increase/(decrease) in net pension obligation: (d) - (e)	\$ (57,042)
(g) Net pension obligation beginning of fiscal year	852,017
(h) Net pension obligation end of fiscal year: (f) + (g)	\$ 794,975

Table 22: Trend Information for the Net Pension Obligation

Fiscal Year Ending	Annual Pension Cost (APC)	Percentage of APC Contributed	Net Pension Obligation
6/30/2012	\$ 14,238,152	101.1%	\$ 2,365,284
6/30/2013	13,933,332	110.9%	852,017
6/30/2014	14,569,557	100.4%	794,975

Section 8: Accounting Results

The tables below provide the annual required contribution (ARC) of the employer (determined in accordance with the parameters of GASB 25/27) and additional information as of the valuation date. The accrued liability rate of the ARC is based on the amortization schedule found in Table 15.

Table 23: Annual Required Contribution Based on the Valuation as of December 31, 2013

Fiscal Year Ending	June 30, 2016
Normal Cost	\$ 6,354,036
Accrued Liability	<u>6,886,516</u>
Total	\$ 13,240,552

Table 24: Additional Information for GASB Statement Nos. 25 and 27

Valuation Date	12/31/2013
Actuarial Cost Method	Entry Age
Amortization Method	Level dollar closed
Amortization Period	12 years
Asset Valuation Method	20% of market value plus 80% of expected actuarial value (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	N/A
*Includes Inflation of	3.50%
Cost-of-living Adjustments	N/A

Section 8: 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 25: Schedule of Changes in Net Pension Liability (Asset)

Calculation as of	June 30, 2014
Total Pension Liability	
Service Cost	\$ 5,710,000
Interest	29,394,000
Changes of Benefit Terms	8,770,000
Difference between Expected and Actual Experience	2,714,000
Change of Assumptions	(16,688,000)
Benefit Payments, including Refund of Member Contributions	(25,614,000)
Net Change in Total Pension Liability	\$ 4,286,000
Total Pension Liability - Beginning of Year	\$ 412,537,000
Total Pension Liability - End of Year	\$ 416,823,000
Plan Fiduciary Net Position	
Employer Contributions	\$ 14,627,000
Member Contributions	2,781,000
Net Investment Income	53,842,000
Benefit Payments, including Refund of Member Contributions	(25,614,000)
Administrative Expenses	(1,045,000)
Other	2,000
Net Change in Fiduciary Net Position	\$ 44,593,000
Plan Fiduciary Net Position - Beginning of Year	\$ 344,812,000
Plan Fiduciary Net Position - End of Year	\$ 389,405,000

Table 26: Net Pension Liability (Asset)

Calculation as of	June 30, 2014	June 30, 2013
Total Pension Liability	\$ 416,823,000	\$ 412,537,000
Plan Fiduciary Net Position	389,405,000	344,812,000
Net Pension Liability (Asset)	\$ 27,418,000	\$ 67,725,000
Plan Fiduciary Net Position as a Percentage of the Total Pension Liability	93.42%	83.58%

Section 8: Accounting Results

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

Table 27: Sensitivity of the Net Pension Liability at June 30, 2014 to Changes in the Discount Rate

	1% Decrease	Current	1% Increase
Discount Rate	6.25%	7.25%	8.25%
Net Pension Liability (Asset)	76,699,000	27,418,000	(13,861,000)

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.

Appendix A: Valuation Process and Glossary of Actuarial Terms

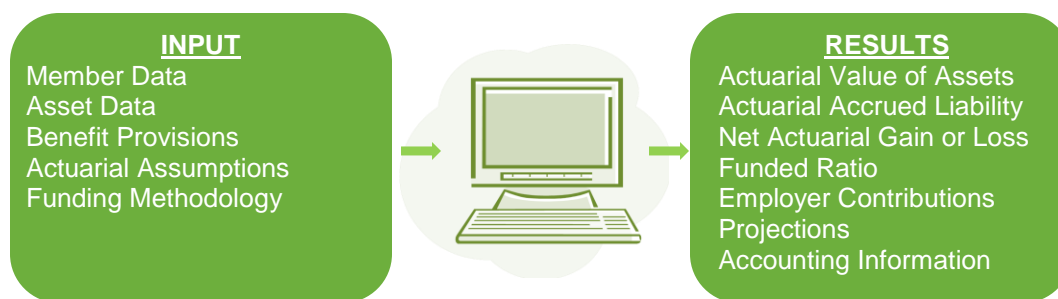
Purpose of an Actuarial Valuation

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, 2014 and will be presented during 2015. 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

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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; LGERS uses a method known as frozen initial liability, which is similar to entry age normal but allows for the individualized payments for local employers when they enter LGERS.

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

Appendix A: Valuation Process and Glossary of Actuarial Terms

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 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 Retirement 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.

Appendix A: Valuation Process and Glossary of Actuarial Terms

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. 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 up to 30 years 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 of Active Members Distributed by Age and Service as of December 31, 2013

Age	Years of Service										Total
	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	
Under 25	994	2,484	481	0	0	0	0	0	0	0	3,959
25 to 29	443	1,906	2,659	311	0	0	0	0	0	0	5,319
30 to 34	314	1,314	2,066	1,893	148	0	0	0	0	0	5,735
35 to 39	260	973	1,496	1,722	1,285	128	0	0	0	0	5,864
40 to 44	184	836	1,303	1,534	1,419	1,028	89	0	0	0	6,393
45 to 49	167	559	883	1,157	1,087	1,123	821	55	0	0	5,852
50 to 54	102	377	562	771	857	910	1,065	574	80	0	5,298
55 to 59	42	179	302	432	439	333	300	140	54	1	2,222
60 to 64	22	88	150	222	212	147	83	29	19	2	974
65 to 69	10	60	91	109	100	50	42	17	4	5	488
70 & Up	6	59	65	91	56	43	21	14	3	2	360
Total	2,544	8,835	10,058	8,242	5,603	3,762	2,421	829	160	10	42,464

Appendix B: Detailed Tabulations of Member Data

Table B-2: The Number of Active Members Distributed by Age as of December 31, 2013

Age	Number
16	14
17	51
18	105
19	262
20	413
21	603
22	685
23	823
24	1,003
25	1,025
26	1,027
27	1,099
28	1,077
29	1,091
30	1,086
31	1,190
32	1,201
33	1,131
34	1,127
35	1,157
36	1,158
37	1,198
38	1,159
39	1,192
40	1,223
41	1,237
42	1,269
43	1,362
44	1,302
45	1,249
46	1,217
47	1,157
48	1,109
49	1,120
50	1,140
51	1,064
52	1,109
53	1,052
54	933
55	722

Appendix B: Detailed Tabulations of Member Data

Table B-2: The Number of Active Members Distributed by Age as of December 31, 2013 (continued)

Age	Number
56	444
57	404
58	349
59	303
60	281
61	220
62	176
63	160
64	137
65	150
66	122
67	90
68	67
69	59
70	53
71	68
72	47
73	29
74	30
75	24
76	24
77	19
78	13
79	8
80	7
81	6
82	7
83	5
84	2
85	4
86	5
87	2
89	1
90	1
91	2
92	1
94	1
96	1
Total	42,464

Appendix B: Detailed Tabulations of Member Data

Table B-3: The Number of Active Members Distributed by Service as of December 31, 2013

Service	Number
0	2,544
1	2,249
2	2,154
3	2,374
4	2,058
5	2,108
6	2,127
7	2,113
8	1,906
9	1,804
10	1,700
11	1,687
12	1,698
13	1,693
14	1,464
15	1,323
16	1,286
17	1,240
18	863
19	891
20	862
21	782
22	775
23	669
24	674
25	577
26	694
27	459
28	390
29	301
30	223
31	212
32	162
33	137
34	95

Appendix B: Detailed Tabulations of Member Data

Table B-3: The Number of Active Members Distributed by Service as of December 31, 2013 (continued)

Service	Number
35	77
36	34
37	24
38	15
39	10
40	2
41	1
43	2
44	1
45	2
46	1
47	1
Total	42,464

Appendix B: Detailed Tabulations of Member Data

Table B-4: The Number and Annual Retirement Allowances of Retired Members Distributed by Age as of December 31, 2013

Age	Number	Allowances
48	1	\$ 2,040
55	242	493,680
56	411	838,440
57	511	1,041,420
58	484	987,360
59	590	1,203,600
60	564	1,150,560
61	583	1,188,300
62	575	1,173,000
63	573	1,167,920
64	529	1,078,261
65	492	1,001,666
66	544	1,109,760
67	565	1,150,962
68	408	832,317
69	435	887,400
70	442	901,680
71	464	946,560
72	354	721,344
73	366	746,640
74	343	696,660
75	284	579,360
76	278	567,120
77	251	511,530
78	260	530,400
79	268	546,720
80	228	465,120
81	202	412,080
82	172	350,880
83	166	337,620
84	149	303,960
85	118	240,720
86	115	234,600
87	116	236,640
88	99	201,960
89	81	165,240
90	55	112,200
91	37	75,480
92	27	55,080
93	19	38,760

Appendix B: Detailed Tabulations of Member Data

Table B-4: The Number and Annual Retirement Allowances of Retired Members Distributed by Age as of December 31, 2013 (continued)

Age	Number	Allowances
94	14	\$ 28,560
95	15	30,600
96	8	16,320
97	3	6,120
98	3	6,120
99	1	2,040
Total	12,445	\$ 25,374,800

Appendix B: Detailed Tabulations of Member Data

Table B-5: The Number and Annual Retirement Allowances of Disabled Members Eligible for Deferred Pensions Distributed by Age of December 31, 2013

Age	Number	Allowances
28	1	\$ 2,040
33	2	4,080
35	2	4,080
38	2	4,080
39	2	4,080
42	4	8,160
43	7	14,280
44	3	6,120
45	6	12,240
46	5	10,200
47	5	10,200
48	8	16,320
49	13	26,520
50	12	24,480
51	12	24,480
52	8	16,320
53	9	18,360
54	16	32,640
55	14	28,560
56	2	4,080
57	1	2,040
58	5	10,200
59	2	4,080
60	1	2,040
61	6	12,240
62	4	8,160
64	1	2,040
65	1	2,040
67	1	2,040
69	1	2,040
Total	156	\$ 318,240

Appendix C: Summary of Main Benefit and Contribution Provisions

All regular and volunteer firemen of the State of North Carolina whose qualifications are certified by their respective Boards of County Commissioners are eligible to be members of the Fund. All rescue squad workers who are eligible for membership in the North Carolina Association of Rescue Squads, Inc. are eligible to be members of the Fund. Credit for prior service (that is, service rendered prior to July 1, 1959) is granted to firemen who were eligible on July 1, 1959 and became members on or before June 30, 1961. Credit may also be given for certain special purchased service.

Benefits

Service Retirement Pension

Condition for Pension	A member who retires after he has attained age 55 and has credit for 20 years of service as a fireman or rescue squad worker in North Carolina is entitled to a monthly pension.
Amount of Pension	The amount of the pension is equal to \$170 per month.

Deferred Early Retirement Pension

Condition for Pension	A member whose service is terminated after he has credit for 20 years of service as a fireman or rescue squad worker in North Carolina but before he has attained age 55 is eligible to receive a deferred retirement pension, starting at age 55, provided he continues to make regular contributions until age 55 or until he has contributed for a total of 20 years, whichever event occurs earlier. Any member who is totally and permanently disabled while in the discharge of his official duties and leaves service as a result of such disability is eligible for a deferred retirement pension commencing at age 55 without continuing to make contributions. Any member who becomes totally and permanently disabled for any cause, other than line of duty, after 10 years of credited service under the Pension Fund may continue to make monthly contributions until he has paid \$2,400 into the Fund and receive a pension upon attainment of age 55.
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Amount of Pension	The deferred pension is \$170 per month.
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Return of Contributions	Upon the death or withdrawal of a member prior to retirement, his aggregate contributions are refunded in a lump sum.
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Appendix C: Summary of Main Benefit and Contribution Provisions

Upon the death of a retired member, the excess, if any, of his aggregate contributions over the total of the pension payments he has received is refunded.

Contributions

By Members

Each member contributes \$10 per month until retirement or until he has contributed for a total of 20 years, whichever event occurs earlier.

By State

The State makes annual contributions sufficient, with the members' contributions, to meet the cost of the benefits under the Fund.

Changes Since Prior Valuation

In-service distributions of pensions allowed for all members after attaining age 55 and 20 years of service as an eligible firefighter or eligible rescue squad worker.

Appendix D: Actuarial Assumptions and Methods

Interest Rate: 7.25% per annum, compounded annually.

Separations From Active Service: Representative values of the assumed annual rates of withdrawal and vesting, retirement, death and disability are as follows:

Annual Rates of					
Withdrawal			Retirement*		
Service	Firefighters	Rescue Squad Workers	Age	Firefighters and Rescue Squad Workers	Volunteer Firefighters
0	.030	.05	25		
1	.030	.05	30		
2	.030	.05	35		
3	.030	.05	40		
4	.030	.05	45		
5+	.015	.02	50		
			55	1.00	1.00
			60	1.00	1.00
			65	1.00	1.00
			69	1.00	1.00

* These rates apply only after 20 years of membership in the system.

Annual Rates of					
Age	Base Mortality*		Disability		
	Male	Female	Male	Female	
25	.0004	.0002	.0016	.0016	
30	.0006	.0004	.0030	.0030	
35	.0009	.0006	.0050	.0050	
40	.0012	.0009	.0068	.0068	
45	.0017	.0013	.0083	.0083	
50	.0024	.0020	.0120	.0120	
55	.0036	.0030	.0150	.0150	
60	.0059	.0047	.0200	.0200	
65	.0086	.0066			
69	.0109	.0083			

* Base mortality rates as of December 31, 2003.

Appendix D: Actuarial Assumptions and Methods

Representative values of the assumed post-retirement mortality rates as of December 31, 2003 prior to any mortality improvements are as follows:

Annual Rate of Death after Retirement

Age	Male Healthy Retirees	Female Healthy Retirees	Male Beneficiaries of Deceased Members	Female Beneficiaries of Deceased Members	Male Disabled Retirees	Female Disabled Retirees
55	.0064	.0044	.0061	.0044	.0277	.0176
60	.0099	.0077	.0090	.0077	.0342	.0229
65	.0165	.0125	.0149	.0125	.0407	.0296
70	.0273	.0207	.0246	.0207	.0483	.0401
75	.0469	.0341	.0422	.0341	.0596	.0558
80	.0805	.0563	.0720	.0563	.0775	.0771

Mortality Improvements: Representative values of the assumed mortality improvement rates (applied to pre-retirement mortality rates for active members and post-retirement mortality rates for healthy retirees and beneficiaries of deceased members after such tables have been set back or set forward) are as follows:

Age	Male Projection Scale	Female Projection Scale
25	0.010	0.014
30	0.005	0.010
35	0.005	0.011
40	0.008	0.015
45	0.013	0.016
50	0.018	0.017
55	0.019	0.008
60	0.016	0.005
65	0.014	0.005
70	0.015	0.005
75	0.014	0.008
80	0.010	0.007

Deaths After Retirement (Non-Disabled): According to the RP-2000 Mortality tables for retirees. These tables are set forward two years for all employees. These tables are also set forward one year for male beneficiaries of deceased members and set forward two years for female beneficiaries of deceased members. The base retiree RP-2000 tables have no rates prior to age 50. The active employee rates of RP-2000 are used for ages less than 50 prior to any adjustments for setbacks.

Death After Disability: According to the RP-2000 Mortality tables for disabled annuitants set back six years for males and set forward one year for females.

Appendix D: Actuarial Assumptions and Methods

Deaths Prior to Retirement: According to the RP-2000 Mortality tables for active employees. These tables are set forward two years for all employees. The base RP-2000 tables for active employees have no rates after age 70. A blend of active rates and retired rates are used from ages 70 to 80 prior to any set back and adjustments.

Mortality Projection (Non-Disabled): All mortality rates are projected from December 31, 2003 using Scale AA.

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

Future Expenses: Equal to prior year actual administrative expenses.

Actuarial Cost Method: Entry age normal cost method. Entry age is established on an individual basis. Gains and losses are reflected in the unfunded accrued liability.

Asset Valuation Method: Actuarial value, as developed in Schedule A. The actuarial value of assets recognizes a portion of the difference between the market value of assets (excluding receivable employer contributions) and the expected actuarial value of assets, based on the assumed valuation rate of return. The amount recognized each year is 20% of the difference between market value and expected actuarial value. The actuarial value of assets is not allowed to be greater than 120% of the market value of assets or less than 80% of the market value of assets. Receivable employer contributions are then added to the preliminary actuarial value of assets.

Changes Since Prior Valuation: The valuation reflected adjustments intended to estimate the impact of a full audit of the census data for lapsed members, including the development of a select and ultimate lapse assumption based on the full audit. We assumed that approximately 1,800 members who are not expected to return to active membership and receive full roster credit will be removed from future valuations, and we assumed that the select and ultimate assumption will equate to a 20% reduction in accrued liability and normal cost for the remaining lapsed population not removed (approximately 10,500 members). Such assumptions are subject to revision based upon completion of the full audit. In addition, due to legislation that allows in-service distributions to all members up retirement eligibility, assumed annual rates of retirement have been changed to 100% at all ages upon attainment of age 55 with 20 years of eligible service.

Appendix E: GASB 67 Fiduciary Net Position Projection

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

Year	Beginning Fiduciary Position	Member Contributions	Employer Contributions	Benefit Payments	Administrative Expenses	Investment Earnings	Ending Fiduciary Position
12/31/2013	\$ 371,122	\$ 4,624	\$ 13,262	\$ 27,087	\$ 899	\$ 26,547	\$ 387,569
12/31/2014	387,569	4,412	11,064	27,497	857	27,641	402,332
12/31/2015	402,332	4,227	10,890	28,055	821	28,679	417,252
12/31/2016	417,252	4,041	10,609	28,679	785	29,723	432,161
12/31/2017	432,161	3,861	10,350	29,195	750	30,772	447,199
12/31/2018	447,199	3,696	10,130	29,941	718	31,822	462,188
12/31/2019	462,188	3,524	9,916	30,641	685	32,872	477,174
12/31/2020	477,174	3,358	9,718	31,466	653	33,918	492,049
12/31/2021	492,049	3,188	2,740	32,245	620	34,715	499,827
12/31/2022	499,827	3,023	2,457	33,138	588	35,231	506,812
12/31/2023	506,812	2,856	2,285	33,999	555	35,697	513,096
12/31/2024	513,096	2,695	2,127	35,015	524	36,106	518,485
12/31/2025	518,485	2,527	3,502	36,090	491	36,501	524,434
12/31/2026	524,434	2,360	3,348	37,172	459	36,885	529,396
12/31/2027	529,396	2,193	3,055	38,209	426	37,192	533,201
12/31/2028	533,201	2,028	3,006	39,341	394	37,422	535,922
12/31/2029	535,922	1,862	2,916	40,591	362	37,565	537,312
12/31/2030	537,312	1,690	2,786	41,796	328	37,614	537,278
12/31/2031	537,278	1,521	2,654	43,103	296	37,556	535,610
12/31/2032	535,610	1,349	2,502	44,666	262	37,368	531,901
12/31/2033	531,901	1,161	2,309	45,685	226	37,051	526,511
12/31/2034	526,511	1,009	1,186	45,805	196	36,612	519,317
12/31/2035	519,317	914	715	45,909	178	36,067	510,926
12/31/2036	510,926	822	728	46,031	160	35,452	501,737
12/31/2037	501,737	731	641	46,131	142	34,776	491,612
12/31/2038	491,612	643	754	46,067	125	34,047	480,864
12/31/2039	480,864	564	751	46,005	110	33,268	469,332
12/31/2040	469,332	486	625	45,889	95	32,428	456,887
12/31/2041	456,887	413	553	45,737	80	31,527	443,563
12/31/2042	443,563	343	501	45,493	67	30,565	429,412
12/31/2043	429,412	279	441	45,240	54	29,545	414,383
12/31/2044	414,383	216	384	44,885	42	28,463	398,519
12/31/2045	398,519	160	333	44,316	31	27,331	381,996
12/31/2046	381,996	114	292	43,565	22	26,157	364,972
12/31/2047	364,972	76	124	42,704	15	24,946	347,399
12/31/2048	347,399	44	0	41,587	8	23,706	329,554
12/31/2049	329,554	22	0	40,263	4	22,458	311,767
12/31/2050	311,767	9	0	38,753	2	21,223	294,244
12/31/2051	294,244	4	19	37,179	1	20,010	277,097
12/31/2052	277,097	1	39	35,582	0	18,823	260,378
12/31/2053	260,378	0	31	33,966	0	17,669	244,112
12/31/2054	244,112	0	26	32,365	0	16,546	228,319
12/31/2055	228,319	0	29	30,782	0	15,458	213,024
12/31/2056	213,024	0	30	29,219	0	14,404	198,239
12/31/2057	198,239	0	29	27,680	0	13,388	183,976
12/31/2058	183,976	0	29	26,165	0	12,408	170,248
12/31/2059	170,248	0	29	24,679	0	11,466	157,064
12/31/2060	157,064	0	11	23,222	0	10,560	144,413
12/31/2061	144,413	0	0	21,796	0	9,693	132,310
12/31/2062	132,310	0	0	20,405	0	8,866	120,771

Appendix E: GASB 67 Fiduciary Net Position Projection

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

Year	Beginning Fiduciary Position	Member Contributions	Employer Contributions	Benefit Payments	Administrative Expenses	Investment Earnings	Ending Fiduciary Position
12/31/2063	\$ 120,771	\$ 0	\$ 0	\$ 19,049	\$ 0	\$ 8,078	\$ 109,800
12/31/2064	109,800	0	0	17,730	0	7,329	99,399
12/31/2065	99,399	0	1	16,448	0	6,621	89,573
12/31/2066	89,573	0	1	15,205	0	5,953	80,322
12/31/2067	80,322	0	0	14,002	0	5,324	71,644
12/31/2068	71,644	0	0	12,840	0	4,738	63,542
12/31/2069	63,542	0	1	11,719	0	4,189	56,013
12/31/2070	56,013	0	1	10,642	0	3,682	49,054
12/31/2071	49,054	0	1	9,611	0	3,214	42,658
12/31/2072	42,658	0	1	8,627	0	2,786	36,818
12/31/2073	36,818	0	0	7,692	0	2,395	31,521
12/31/2074	31,521	0	0	6,809	0	2,043	26,755
12/31/2075	26,755	0	0	5,981	0	1,726	22,500
12/31/2076	22,500	0	0	5,208	0	1,446	18,738
12/31/2077	18,738	0	0	4,494	0	1,199	15,443
12/31/2078	15,443	0	0	3,838	0	983	12,588
12/31/2079	12,588	0	0	3,243	0	797	10,142
12/31/2080	10,142	0	0	2,708	0	639	8,073
12/31/2081	8,073	0	0	2,233	0	506	6,346
12/31/2082	6,346	0	0	1,817	0	395	4,924
12/31/2083	4,924	0	0	1,459	0	305	3,770
12/31/2084	3,770	0	0	1,154	0	232	2,848
12/31/2085	2,848	0	0	899	0	174	2,123
12/31/2086	2,123	0	0	690	0	129	1,562
12/31/2087	1,562	0	0	521	0	94	1,135
12/31/2088	1,135	0	0	388	0	69	816
12/31/2089	816	0	0	283	0	49	582
12/31/2090	582	0	0	204	0	36	414
12/31/2091	414	0	0	144	0	25	295
12/31/2092	295	0	0	100	0	18	213
12/31/2093	213	0	0	68	0	13	158
12/31/2094	158	0	0	46	0	10	122
12/31/2095	122	0	0	30	0	7	99
12/31/2096	99	0	0	20	0	7	86
12/31/2097	86	0	0	13	0	6	79
12/31/2098	79	0	0	8	0	5	76
12/31/2099	76	0	0	5	0	5	76
12/31/2100	76	0	0	3	0	5	78
12/31/2101	78	0	0	2	0	6	82
12/31/2102	82	0	0	1	0	5	86
12/31/2103	86	0	0	1	0	7	92
12/31/2104	92	0	0	0	0	6	98
12/31/2105	98	0	0	0	0	7	105
12/31/2106	105	0	0	0	0	7	112
12/31/2107	112	0	0	0	0	8	120
12/31/2108	120	0	0	0	0	9	129
12/31/2109	129	0	0	0	0	9	138
12/31/2110	138	0	0	0	0	10	148
12/31/2111	148	0	0	0	0	11	159
12/31/2112	159	0	0	0	0	12	171

Appendix E: GASB 67 Fiduciary Net Position Projection

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

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 3.66%	Using Single Discount Rate of 7.25%
12/31/2013	\$ 371,122	\$ 27,087	\$ 27,087	\$ 0	\$ 26,155	\$ 0	\$ 26,155
12/31/2014	387,569	27,497	27,497	0	24,757	0	24,757
12/31/2015	402,332	28,055	28,055	0	23,551	0	23,551
12/31/2016	417,252	28,679	28,679	0	22,448	0	22,448
12/31/2017	432,161	29,195	29,195	0	21,307	0	21,307
12/31/2018	447,199	29,941	29,941	0	20,374	0	20,374
12/31/2019	462,188	30,641	30,641	0	19,441	0	19,441
12/31/2020	477,174	31,466	31,466	0	18,615	0	18,615
12/31/2021	492,049	32,245	32,245	0	17,786	0	17,786
12/31/2022	499,827	33,138	33,138	0	17,043	0	17,043
12/31/2023	506,812	33,999	33,999	0	16,304	0	16,304
12/31/2024	513,096	35,015	35,015	0	15,656	0	15,656
12/31/2025	518,485	36,090	36,090	0	15,046	0	15,046
12/31/2026	524,434	37,172	37,172	0	14,449	0	14,449
12/31/2027	529,396	38,209	38,209	0	13,849	0	13,849
12/31/2028	533,201	39,341	39,341	0	13,295	0	13,295
12/31/2029	535,922	40,591	40,591	0	12,790	0	12,790
12/31/2030	537,312	41,796	41,796	0	12,280	0	12,280
12/31/2031	537,278	43,103	43,103	0	11,807	0	11,807
12/31/2032	535,610	44,666	44,666	0	11,409	0	11,409
12/31/2033	531,901	45,685	45,685	0	10,880	0	10,880
12/31/2034	526,511	45,805	45,805	0	10,171	0	10,171
12/31/2035	519,317	45,909	45,909	0	9,505	0	9,505
12/31/2036	510,926	46,031	46,031	0	8,886	0	8,886
12/31/2037	501,737	46,131	46,131	0	8,303	0	8,303
12/31/2038	491,612	46,067	46,067	0	7,731	0	7,731
12/31/2039	480,864	46,005	46,005	0	7,199	0	7,199
12/31/2040	469,332	45,889	45,889	0	6,695	0	6,695
12/31/2041	456,887	45,737	45,737	0	6,222	0	6,222
12/31/2042	443,563	45,493	45,493	0	5,771	0	5,771
12/31/2043	429,412	45,240	45,240	0	5,351	0	5,351
12/31/2044	414,383	44,885	44,885	0	4,950	0	4,950
12/31/2045	398,519	44,316	44,316	0	4,557	0	4,557
12/31/2046	381,996	43,565	43,565	0	4,177	0	4,177
12/31/2047	364,972	42,704	42,704	0	3,817	0	3,817
12/31/2048	347,399	41,587	41,587	0	3,466	0	3,466
12/31/2049	329,554	40,263	40,263	0	3,129	0	3,129
12/31/2050	311,767	38,753	38,753	0	2,808	0	2,808
12/31/2051	294,244	37,179	37,179	0	2,512	0	2,512
12/31/2052	277,097	35,582	35,582	0	2,241	0	2,241
12/31/2053	260,378	33,966	33,966	0	1,995	0	1,995
12/31/2054	244,112	32,365	32,365	0	1,773	0	1,773
12/31/2055	228,319	30,782	30,782	0	1,572	0	1,572
12/31/2056	213,024	29,219	29,219	0	1,391	0	1,391
12/31/2057	198,239	27,680	27,680	0	1,229	0	1,229
12/31/2058	183,976	26,165	26,165	0	1,083	0	1,083
12/31/2059	170,248	24,679	24,679	0	952	0	952
12/31/2060	157,064	23,222	23,222	0	836	0	836
12/31/2061	144,413	21,796	21,796	0	731	0	731
12/31/2062	132,310	20,405	20,405	0	638	0	638

Appendix E: GASB 67 Fiduciary Net Position Projection

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

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 3.66%	Using Single Discount Rate of 7.25%
12/31/2063	\$ 120,771	\$ 19,049	\$ 19,049	\$ 0	\$ 556	\$ 0	\$ 556
12/31/2064	109,800	17,730	17,730	0	482	0	482
12/31/2065	99,399	16,448	16,448	0	417	0	417
12/31/2066	89,573	15,205	15,205	0	360	0	360
12/31/2067	80,322	14,002	14,002	0	309	0	309
12/31/2068	71,644	12,840	12,840	0	264	0	264
12/31/2069	63,542	11,719	11,719	0	225	0	225
12/31/2070	56,013	10,642	10,642	0	190	0	190
12/31/2071	49,054	9,611	9,611	0	160	0	160
12/31/2072	42,658	8,627	8,627	0	134	0	134
12/31/2073	36,818	7,692	7,692	0	111	0	111
12/31/2074	31,521	6,809	6,809	0	92	0	92
12/31/2075	26,755	5,981	5,981	0	75	0	75
12/31/2076	22,500	5,208	5,208	0	61	0	61
12/31/2077	18,738	4,494	4,494	0	49	0	49
12/31/2078	15,443	3,838	3,838	0	39	0	39
12/31/2079	12,588	3,243	3,243	0	31	0	31
12/31/2080	10,142	2,708	2,708	0	24	0	24
12/31/2081	8,073	2,233	2,233	0	18	0	18
12/31/2082	6,346	1,817	1,817	0	14	0	14
12/31/2083	4,924	1,459	1,459	0	10	0	10
12/31/2084	3,770	1,154	1,154	0	8	0	8
12/31/2085	2,848	899	899	0	6	0	6
12/31/2086	2,123	690	690	0	4	0	4
12/31/2087	1,562	521	521	0	3	0	3
12/31/2088	1,135	388	388	0	2	0	2
12/31/2089	816	283	283	0	1	0	1
12/31/2090	582	204	204	0	1	0	1
12/31/2091	414	144	144	0	1	0	1
12/31/2092	295	100	100	0	0	0	0
12/31/2093	213	68	68	0	0	0	0
12/31/2094	158	46	46	0	0	0	0
12/31/2095	122	30	30	0	0	0	0
12/31/2096	99	20	20	0	0	0	0
12/31/2097	86	13	13	0	0	0	0
12/31/2098	79	8	8	0	0	0	0
12/31/2099	76	5	5	0	0	0	0
12/31/2100	76	3	3	0	0	0	0
12/31/2101	78	2	2	0	0	0	0
12/31/2102	82	1	1	0	0	0	0
12/31/2103	86	1	1	0	0	0	0
12/31/2104	92	0	0	0	0	0	0
12/31/2105	98	0	0	0	0	0	0
12/31/2106	105	0	0	0	0	0	0
12/31/2107	112	0	0	0	0	0	0
12/31/2108	120	0	0	0	0	0	0
12/31/2109	129	0	0	0	0	0	0
12/31/2110	138	0	0	0	0	0	0
12/31/2111	148	0	0	0	0	0	0
12/31/2112	159	0	0	0	0	0	0