

ACTUARIAL VALUATION REPORT

as of

JUNE 30, 2012



New York State Teachers' Retirement System

**Office of the Actuary
July 15, 2013**

NEW YORK STATE TEACHERS' RETIREMENT SYSTEM

Actuarial Valuation Report as of June 30, 2012

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NEW YORK STATE TEACHERS' RETIREMENT SYSTEM

Actuarial Valuation Report as of June 30, 2012

A. INTRODUCTION

This report presents the results of the annual actuarial valuation of assets and liabilities of the New York State Teachers' Retirement System as of June 30, 2012. The purpose of this report is to summarize the determination of the Employer Contribution Rate which will be applied to member salaries earned during the July 1, 2013 to June 30, 2014 fiscal year and to review the funded status of the Retirement System. Use of the valuation results contained herein for purposes other than those stated above may not be appropriate.

B. EMPLOYER CONTRIBUTION RATE

The Employer Contribution Rate to be applied to member salaries for the July 1, 2013 to June 30, 2014 fiscal year and collected in the fiscal year ending June 30, 2015 consists of four components. These components may be described as follows:

The **Normal Rate** represents the annual cost of accruing active member benefits as well as incorporating actuarial gains and losses. The active member component includes the cost of benefits accruing on account of retirement, withdrawal, disability, death (except for benefits funded by the group life insurance rate) and the cost-of-living benefit provided during retirement.

The **Expense Rate** is a one-year term rate representing the administrative cost of the Retirement System and is set during the budget process.

The **Group Life Insurance Rate** is a one-year term rate representing the cost of the first \$50,000 of member death benefits.

The **Excess Benefit Plan Rate** is a one-year term rate representing the cost of benefit payments in excess of the Internal Revenue Code Section 415 limits.

The actuarially computed Employer Contribution Rate to be applied to the member salaries for the fiscal year ending June 30, 2014 is **16.25%**. The Employer Contribution Rates determined by the actuarial valuations as of June 30, 2012 and June 30, 2011 and the changes between the two are summarized below:

	As of <u>6/30/2012</u>	As of <u>6/30/2011</u>	<u>Change</u>
Normal Rate	15.85%	11.44%	+4.41%
Expense Rate	0.27	0.27	0.00
Group Life Insurance Rate	0.13	0.13	0.00
Excess Benefit Plan Rate	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>
Employer Contribution Rate	16.25%	11.84%	+4.41%

The actuarial assumptions in use for the June 30, 2012 actuarial valuation were developed primarily based upon Retirement System experience and were adopted by the Retirement Board on October 27, 2011.

As in prior years, the actual employer contributions made by participating employers during the fiscal year ending June 30, 2012 were equal to the employer contributions determined in accordance with the annual actuarial valuation. Additional payments are made by certain participating employers as required by statute for participation in early retirement incentives.

C. GAIN/LOSS IN THE EMPLOYER CONTRIBUTION RATE

The Employer Contribution Rate of 16.25% represents a 441 basis point increase over the prior year's rate of 11.84%.

NORMAL RATE

The Normal Rate component of the Employer Contribution Rate has increased by 441 basis points over the prior year's rate. This change may be broken down as follows:

<u>Salary/Service:</u>	This gain is due to salary and service data coming in lower than expected.	-0.52
<u>Net Investment Loss:</u>	The investment return on the actuarial value of assets was approximately 0.5% which was less than the 8.0% expected return.	+4.80
<u>New Entrants:</u>	New entrants joined the Retirement System with a long-term expected normal rate of approximately 7.5% for Tier 5 and approximately 4.4% for Tier 6 which compares favorably to the current normal rate of 15.85%.	-0.02
<u>Withdrawal:</u>	Fewer members withdrew than expected.	+0.01
<u>Mortality:</u>	Members are living slightly longer than expected and receiving benefits for a longer period.	+0.02
<u>Retirement:</u>	There were fewer retirements than expected.	-0.04
<u>Pension Payments:</u>	Actual payments to retirees were greater than expected.	+0.18
<u>Cost of Living Adjustment:</u>	The actual COLA increase of 1.40% was lower than the expected increase of 1.625%.	-0.02
<u>TOTAL CHANGE IN THE NORMAL RATE</u>		+4.41%

OTHER COMPONENTS

The **Expense Rate** is set during the budget process and is unchanged from the previous year.

The **Group Life Insurance Rate** is unchanged from the previous year. Although the premiums collected have generally been more than sufficient to cover payments over the past several years, this rate is being held constant in anticipation of rising payouts in the future due to Tier 2, 3, 4 ,5 and 6 post-retirement death benefits and the inactive death benefit.

The **Excess Benefit Plan Rate** remains unchanged from the previous year. This rate represents the retirement benefits paid in excess of the Internal Revenue Code Section 415 limits. These payments are made exclusively from the Excess Benefit Plan. This fund was established in accordance with the Excess Benefit Plan which received final IRS approval in August 2001. It is anticipated that the current fund balance is sufficiently large to cover at least two years' worth of payments, allowing us to keep this component equal to 0.00% in this year's Employer Contribution Rate.

D. EMPLOYER CONTRIBUTION RATE HISTORY

The following chart summarizes the Employer Contribution Rate for the last 20 years:

<i>Salary Year</i>	<i>Employer Contribution Rate</i>	<i>Salary Year</i>	<i>Employer Contribution Rate</i>
1994-1995	7.24%	2004-2005	5.63%
1995-1996	6.37	2005-2006	7.97
1996-1997	3.57	2006-2007	8.60
1997-1998	1.25	2007-2008	8.73
1998-1999	1.42	2008-2009	7.63
1999-2000	1.43	2009-2010	6.19
2000-2001	0.43	2010-2011	8.62
2001-2002	0.36	2011-2012	11.11
2002-2003	0.36	2012-2013	11.84
2003-2004	2.52	2013-2014	16.25

The complete Employer Contribution Rate history is presented in Appendix 13.

E. EMPLOYER CONTRIBUTION RATE INCREASE

The Employer Contribution Rate has increased this year from 11.84% to 16.25%, representing an increase of approximately 37%. The Normal Rate component equals 15.85%, an increase of approximately 39% over the prior year's Normal Rate of 11.44%. The rate of return on the System's market value of assets for the fiscal year ending June 30, 2012 was 2.8%, and the System's five-year market value rate of return now stands at 1.1%. While the asset smoothing method did help to dampen the initial impact of the large 2009 investment loss on the Employer Contribution Rate, this loss continues to exert an upward pressure on the rate. Actuarial losses on account of investments is the primary reason for the increase in the rate in recent years, and for the large increase in this year's rate.

F. MEMBER DATA

The member data for the valuation was determined as of June 30, 2012. Compared with the previous year, the total number of members decreased slightly from 427,278 to 427,085; the number of active members decreased from 280,435 to 277,273; the number of retired members increased from 141,633 to 144,438; and the number of beneficiaries receiving monthly benefits increased from 5,210 to 5,374.

The number of retirements decreased from 8,423 during the 2010-2011 fiscal year to 6,033 during the 2011-2012 fiscal year. Two early retirement incentives were offered during the summer of 2010, leading to the larger-than-normal number of retirements during the 2010-2011 fiscal year. With no early retirement incentive offered, 2011-2012 represented a return to a more "normal" retirement year, with approximately 6,000 retirements. The number of retirements over each of the last ten years is as follows:

<i>Fiscal Year</i>	<i>Total Number of Retirements</i>	<i>Fiscal Year</i>	<i>Total Number of Retirements</i>
2002-2003*	10,173	2007-2008	6,330
2003-2004	7,287	2008-2009	5,644
2004-2005	7,182	2009-2010	5,501
2005-2006	7,281	2010-2011*	8,423
2006-2007	6,900	2011-2012	6,033

*Denotes an early retirement incentive offered during that fiscal year.

Historical member statistics, including statistics specific to retired members, appear in the appendices to this report. Additional member statistics may also be found in the Retirement System's most recent Comprehensive Annual Financial Report.

G. FUNDED STATUS

As of June 30, 2012, the actuarial value of plan assets was equal to \$82.87 billion. The accrued pension benefit liability calculated in accordance with the Entry Age Normal Cost Method was equal to \$92.25 billion. These two values produced a funded ratio of 89.8% as of June 30, 2012. If the market value of plan assets is used instead of the actuarial value of plan assets, the funded ratio as of June 30, 2012 would be equal to 95.5%.

In accordance with Governmental Accounting Standards Board (GASB) Statement No. 50 "Pension Disclosures", the plan liabilities have been calculated in accordance with the Entry Age Normal Cost Method, for purposes of this funded ratio calculation. The Retirement System is funded in accordance with the Aggregate Cost Method. GASB requires that the Entry Age Normal Cost Method be used to calculate the accrued liability for purposes of presenting the funded ratio calculation for plans funded in accordance with the Aggregate Cost Method.

A history of the Retirement System's funded status is provided in Appendix 4 of this report.

H. ACTUARIAL EXPERIENCE

Each year the Retirement System completes an experience study in order to regularly monitor the reasonableness and appropriateness of the actuarial assumptions used in the actuarial valuation. These assumptions are used to estimate the probability a member will cease teaching due to retirement, withdrawal, disability, or death. In addition, the assumptions are used to estimate future salary increases, future investment earnings, and the probability of death for retired members and beneficiaries. A summary of the results of the most recent experience study is contained in Appendix 10. The current actuarial assumptions were adopted by the Retirement Board on October 27, 2011, and first effective with the actuarial valuation of the Retirement System's assets and liabilities as of June 30, 2011.

The Retirement Board, in consultation with Retirement System staff and the external investment consultant, annually reviews the asset allocation policy to determine if any changes to the policy are appropriate. According to the System's external investment consultant, the System's asset allocation as of June 30, 2012 produces a long-term (10 year) expected annual geometric rate of return of 7.3%, and an expected annual arithmetic rate of return of 8.2%.

The Retirement System's asset allocation, including targets and ranges, can be found in Appendix 11. Historical rate of return information can be found at the end of Appendix 10. Detailed investment information is available in the System's Comprehensive Annual Financial Report.

I. NEW LEGISLATION

The following legislation affecting the Retirement System was signed into law during the 2012 Legislative Session:

Tier 6:

Chapter 18 of the Laws of 2012 created a new tier of membership (Tier 6) for members who join on or after April 1, 2012. The Tier 6 benefit formula is slightly less generous than that of Tier 5. Tier 6 members must attain age 63 in order to retire with an unreduced benefit, instead of age 62 as in Tier 5. Tier 6 members retiring before age 63 are subject to a reduction of 6.5% per year for each year retirement precedes age 63. Tier 6 members are required to contribute at a rate between 3% and 6% of salary throughout active membership. The Tier 6 benefit provisions are described in more detail in Appendix 17 of this report. The New Entrant (Employer) Normal Rate under the Tier 6 benefit structure is approximately 4.4% of pay.

Tier 6 was first incorporated into the actuarial valuation as of June 30, 2012.

J. STABLE CONTRIBUTION OPTION

Chapter 57 of the Laws of 2013, enacted on March 29, 2013, provided the Retirement System with the ability to offer a seven-year Stable Contribution Option (SCO) to public school districts and BOCES in New York State. Eligible employers have the choice of either continuing

to pay the actuarially required contribution (ARC) or electing to participate in the SCO and thereby pay a stable contribution rate for up to seven years and defer payment of the difference between the ARC and the SCO to later years. At a special Retirement Board Meeting held on April 9, 2013, the Retirement Board voted to make the SCO available to eligible employers in accordance with Chapter 57.

The following chart summarizes the provisions under the SCO:

Year	Stable Rate¹ (per statute)	Applicable Payroll (school year)
One	14.0%	2013-14
Two	14.0%	2014-15
Three	16.0% ²	2015-16
Four	16.0%	2016-17
Five	18.0% ²	2017-18
Six	18.0%	2018-19
Seven	18.0%	2019-20

¹ Rates shown are base rates as per statute. The actual rate will include a small additional charge to account for the group life insurance rate (currently 0.13%).

² The law grants the Retirement System's Board discretion to increase the rate by up to 2.0% in year three (to a maximum of 16.0%) and year five (to a maximum of 18.0%) if necessary to meet fiduciary obligations.

In Year One of the SCO, eligible employers who opt into the program will pay 14.13% of salary. This rate will apply to fiscal year 2013-14 member salaries and will be collected in the fall of 2014. In Year Two, the SCO rate will again be 14.0% plus the applicable group life insurance rate. In subsequent years, the SCO rate will be a rate as adopted by the Retirement Board in accordance with the statute which provides that in Year Three and Year Five the rate may be increased by up to 2.0%. Additionally, the rate may be decreased in any year, but never below 14.0%.

Beginning in Year Six, repayment of the deferred amounts (difference between the ARC and the SCO rate) will begin over a five-year period. Interest will be calculated annually based on the monthly average yield on 10-year U.S. Treasury securities as of August 1 of the deferral year, plus one percent. Beginning in Year Eight (2020-21) employers will return to paying the ARC as calculated by the Retirement System. Also in Year Eight, employers who participated in the SCO program for the duration will be required to make an additional deferral payment

representing the beginning of a five-year payback for the differences between the ARC and the SCO rate in Years Six and Seven of the program.

Employers electing to participate in the SCO may opt out of the plan at any time. Those opting out will resume payment of the ARC and will be required to begin repaying any deferred amounts plus interest, over a period not to exceed five years.

Should the Retirement System's funded status fall below 80%, the SCO will terminate and all participating employers will resume paying the actuarially required contribution. In addition, employers will be required to repay any deferred amounts plus interest, over a period not to exceed five years. The window period in which eligible employers may opt into the SCO runs from July 1, 2013 to June 30, 2014.

K. SENSITIVITY ANALYSIS

Included in Appendix 12 is a Sensitivity Analysis. The purpose of this exhibit is to illustrate what the Employer Contribution Rate would have been had various actuarial assumptions been altered. The chart also gives the reader a feel for the significance of the assumptions on the valuation results, and the potential impact of modifying them.

L. FUTURE EXPECTATIONS

The next Employer Contribution Rate will be determined based upon the actuarial valuation as of June 30, 2013. The capital markets had a strong return during the fiscal year, with our main domestic equity index (S&P 1500) returning 21.1% for the fiscal year ending June 30, 2013, and the international equity index (ACWI ex-US) returning 13.6% for the year. The market value rate of return for the Retirement System's entire portfolio, though still only estimated, should be in the neighborhood of 13%. The System's five-year rate of return will grow significantly from last year's 1.1% to approximately 5%.

With respect to the June 30, 2013 actuarial valuation, although the Retirement System's rate of return for the year will certainly exceed 8%, the five-year rate of return, though increasing, will still be below 8%. This will create further upward pressure on the rate. Although it's still very early in the process and salary/service data is not yet available, it's likely

that the next rate will represent an increase over the current 16.25% rate, although likely a much lower percentage increase than was required last year.

The SCO program, a potentially significant development for Retirement System funding, is thought to not likely have a significant impact. While discussions were ongoing, the Retirement System hired Cheiron, an actuarial consulting firm, to work with the Retirement System to analyze and evaluate the options being considered. Their analysis and report showed no material increase in the Retirement System's probability of poor funded ratios (30% or lower) occurring in the future, even if all eligible employers were to opt into the SCO. The 80% funded ratio floor provides an additional fail-safe against poor experience going forward. Additionally based on informal surveys and discussions to this point it appears that the vast majority of eligible Retirement System employers will elect NOT to opt into the SCO, primarily due to not wanting to defer costs into the future. This exercise and analysis has underscored the fact that the Retirement System is well funded primarily due to the employers' adherence to contributing the ARC each year. Deviating from this practice would not be in anyone's best interest in the long run.

M. CERTIFICATION

This actuarial valuation relies on member data provided by the participating employers to the Retirement System's administrative staff. The administrative and actuarial staffs review this data for reasonability as well as reconcile it against prior data. In addition, the valuation relies on financial data provided by the Retirement System's Finance Department. All data is reviewed by the Retirement System's independent auditors as part of the annual audit.

The benefits recognized in this actuarial valuation are prescribed by New York State statute (Article 11 of the Education Law and Articles 11, 14, 15, 18, 19, and 20 of the Retirement and Social Security Law), and are summarized in Appendix 17. All benefits are included in the actuarial valuation. The actuarial methods, calculations, and actuarial assumptions are in accordance with standards of practice prescribed by the Actuarial Standards Board and generally accepted actuarial principles and procedures. The assumptions used in determining the liabilities and costs are internally consistent and reasonably related to actual and anticipated future experience of the Retirement System. The undersigned meet the qualification standards of the American Academy of Actuaries to render the actuarial opinion contained in this report.



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New York State Teachers' Retirement System
Office of the Actuary
July 15, 2013

APPENDIX 1

RECONCILIATION OF THE ACTUARIAL VALUE OF ASSETS

From June 30, 2011 to June 30, 2012

	Actuarial Value* (in thousands)
1. Actuarial Value of Assets as of June 30, 2011	\$86,721,387
2. Contributions and Transfers	
Employer contributions	1,276,933
Member contributions	141,830
Net transfers (in/out)	<u>4,188</u>
Subtotal	1,422,951
3. Net Investment Income/(Loss)	450,443
4. Distributions	
Benefit payments	5,893,195
Return of member contributions	<u>19,732</u>
Subtotal	5,912,927
5. Actuarial Value of Assets as of June 30, 2012 ¹	<u>\$82,681,854</u>
6. Market Value of Assets as of June 30, 2012	\$88,056,264

*Totals may not add due to rounding.

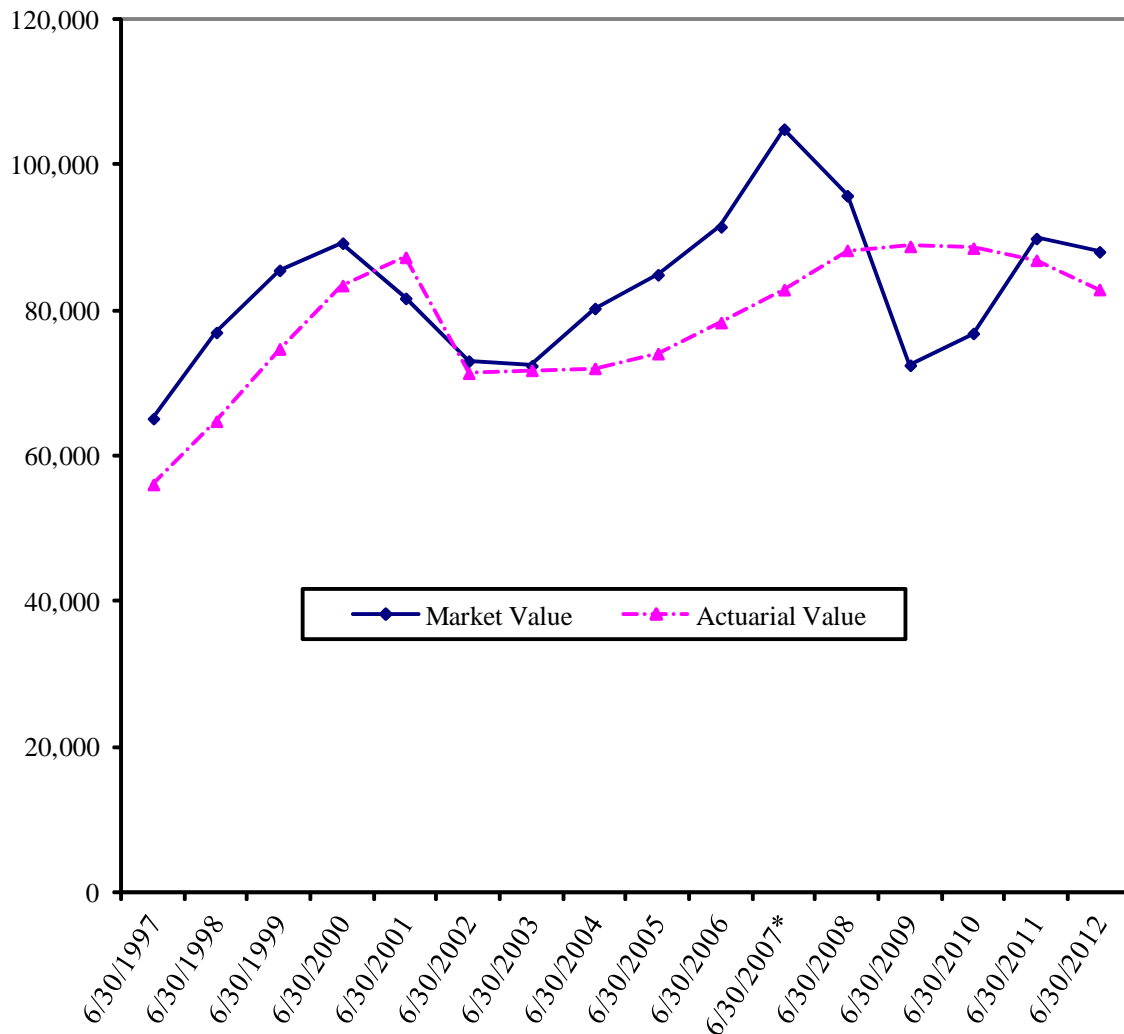
¹ Actuarial value of assets used in determining the Normal Rate, and excludes the net asset value of the Group Life Insurance Fund.

APPENDIX 2

COMPARISON OF MARKET VALUE TO ACTUARIAL VALUE OF ASSETS
(in Millions)

Fiscal Year Ending	Market Value	Actuarial Value	Fiscal Year Ending	Market Value	Actuarial Value
6/30/1997	\$ 65,152.4	\$ 56,085.3	6/30/2005	\$ 84,908.5	\$ 74,074.3
6/30/1998	76,980.5	64,778.9	6/30/2006	91,492.2	78,335.8
6/30/1999	85,514.4	74,721.1	6/30/2007*	104,912.9	82,858.9
6/30/2000	89,247.3	83,421.8	6/30/2008	95,769.3	88,254.7
6/30/2001	81,664.2	87,295.3	6/30/2009	72,471.8	88,805.5
6/30/2002	73,041.2	71,374.4	6/30/2010	76,844.9	88,544.4
6/30/2003	72,391.5	71,780.4	6/30/2011	89,889.7	86,892.2
6/30/2004	80,276.2	72,044.4	6/30/2012	88,056.3	82,871.4

Market Value vs. Actuarial Value
(in Millions)



*Effective June 30, 2007, the Retirement System's asset valuation method was changed.

APPENDIX 3

ACTUARIAL PRESENT VALUE OF FUTURE BENEFITS

as of June 30, 2012 and June 30, 2011
(in Thousands)

Each year an actuarial valuation determines the actuarial present value of future benefits, which is the current value of retirement and ancillary benefit payments that the Retirement System can expect to pay in the future to current retirees and members. The results of the two most recent actuarial valuations are displayed in the following table.

	2012	2011
Present Value of Benefits Currently Being Paid:		
Service Retirement Benefits.....	\$50,434,852	\$49,049,453
Disability Retirement Benefits.....	279,173	272,752
Death Benefits.....	2,697	3,945
Survivor Benefits.....	686,872	637,374
Cost-of-Living Allowance.....	<u>4,634,175</u>	<u>4,536,243</u>
Total Present Value of Benefits Presently Being Paid	56,037,769	54,499,768
Present Value of Benefits Payable in the Future to Current Active Members:		
Service Retirement Benefits.....	48,417,710	47,911,909
Disability Retirement Benefits.....	220,231	217,523
Termination Benefits.....	1,797,499	1,793,953
Death and Survivor Benefits.....	438,738	438,029
Cost-of-Living Allowance.....	<u>1,021,289</u>	<u>1,020,253</u>
Total Active Member Liabilities	51,895,466	51,381,667
Present Value of Benefits Payable in the Future to Current Inactive (Vested) Members:		
Retirement Benefits.....	228,637	208,241
Death Benefits.....	291	236
Cost-of-Living Allowance.....	<u>4,823</u>	<u>4,435</u>
Total Vested Liabilities	233,751	212,911
Unclaimed Funds.....	9,740	9,211
Total Actuarial Present Value of Future Benefits	\$108,176,726	\$106,103,558

Note: Totals may not sum due to rounding

APPENDIX 4

FUNDING PROGRESS

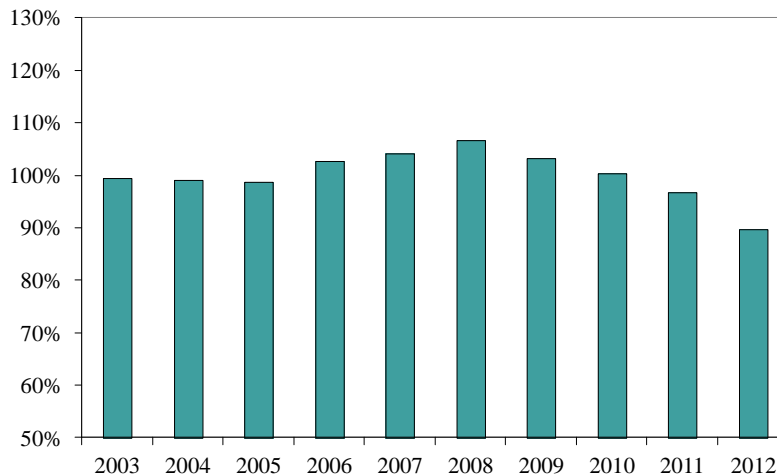
The portion of the actuarial present value of future benefits that is attributed to service rendered as of the valuation date is known as the actuarial accrued liability. In order to effectively assess the funding progress of a retirement system, it is necessary to compare the actuarial value of assets and the actuarial accrued liabilities over a period of time.

The Retirement System's funding method has allowed the accumulation of assets appropriate for the funding of its liabilities in a systematic and reasonable manner.

Analysis of Funding Progress (in Millions)

Fiscal Year Ending	Actuarial Value of Assets ¹	Actuarial Accrued Liability ²	Percent Funded
2003	\$71,780.4	\$72,209.4	99.4%
2004	72,044.4	72,604.9	99.2
2005	74,074.3	74,961.1	98.8
2006	78,335.8	76,353.0	102.6
2007	82,858.9	79,537.2	104.2
2008	88,254.7	82,777.5	106.6
2009	88,805.5	86,062.0	103.2
2010	88,544.4	88,318.8	100.3
2011	86,892.2	89,824.9	96.7
2012	82,871.4	92,250.9	89.8

Percent Funded



¹ Effective June 30, 2007, the Retirement System's asset valuation method was changed.

² Effective June 30, 2006, the Actuarial Accrued Liability is calculated under the Entry Age Normal Cost Method as required by Governmental Accounting Standards Board (GASB) Statement No. 50 – *Pension Disclosures*. NYSTRS is funded in accordance with the Aggregate Cost Method. GASB now requires that the Entry Age Normal Cost Method be used to calculate the accrued liability for purposes of presenting the funded percentage.

APPENDIX 5

EMPLOYER CONTRIBUTION RATE

2012 Valuation

8.00% Interest

Normal Rate	15.85%
Group Life Insurance Rate	0.13
Excess Benefit Plan Rate	0.00
Expense Rate	0.27
Computed Contribution Rate as of June 30, 2012	16.25%

NORMAL RATE CALCULATION

2012 Valuation

8.00% Interest

Liabilities**Active Tier 1**

Service Pension	\$1,260,071,634
Disability Pension	808
Vested Pension	5,834
Active Death over \$50,000	13,158,037
Death Benefit After 10-Yr Withdrawal over \$50,000	0
Annuity Savings Fund	8,644,501
COLA	19,796,242
Total	\$1,301,677,056

Active Tier 2

Service Pension	\$1,600,637,092
Post Retired Death over \$50,000	1,383,809
Disability Pension	22,196
Post Disabled Death over \$50,000	478
Vested Pension	150,533
Active Death over \$50,000	5,147,737
Death Benefit After 10-Yr Withdrawal over \$50,000	31
COLA	29,400,943
Total	\$1,636,742,819

Active Tier 3

Service Pension	\$5,433,128,611
Post Retired Death over \$50,000	4,097,830
Disability Pension	2,534,854
Post Disabled Death over \$50,000	44,924
Refund on Active Death	4,080,081
Active Death over \$50,000	15,584,584
Refund on Quit	219,838
Vested Pension	15,997,507
Death Benefit After 10-Yr Withdrawal over \$50,000	3,309
Refund on Death after Vested Withdrawal	1,729
COLA	117,294,774
Total	\$5,592,988,041

NORMAL RATE CALCULATION (Cont'd.)2012 Valuation
8.00% Interest**Liabilities (Cont'd.)****Active Tier 4**

Service Pension	\$39,344,710,461
Post Retired Death over \$50,000	65,822,308
Disability Pension	214,398,364
Post Disabled Death over \$50,000	6,373,009
Refund on Active Death	35,360,440
Active Death over \$50,000	273,853,168
Refund on Quit	150,434,817
Vested Pension	1,586,043,567
Death Benefit After 10-Yr Withdrawal over \$50,000	2,999,189
Refund on Death after Vested Withdrawal	1,456,557
COLA	837,323,816
Total	\$42,518,775,696

Active Tier 5

Service Pension	\$398,399,124
Post Retired Death over \$50,000	934,396
Disability Pension	3,204,912
Post Disabled Death over \$50,000	92,492
Refund on Active Death	1,556,461
Active Death over \$50,000	4,432,297
Refund on Quit	18,980,770
Vested Pension	19,574,942
Death Benefit After 10-Yr Withdrawal over \$50,000	56,621
Refund on Death after Vested Withdrawal	50,801
COLA	9,362,754
Total	\$456,645,570

Active Tier 6

Service Pension	\$3,580,502
Post Retired Death over \$50,000	3,659
Disability Pension	32,078
Post Disabled Death over \$50,000	448
Refund on Active Death	20,880
Active Death over \$50,000	34,428
Refund on Quit	218,975
Vested Pension	158,530
Death Benefit After 10-Yr Withdrawal over \$50,000	274
Refund on Death after Vested Withdrawal	577
COLA	141,680
Total	\$4,192,031

APPENDIX 5 (Cont'd.)

NORMAL RATE CALCULATION (Cont'd.)

2012 Valuation

8.00% Interest

Liabilities (Cont'd.)

Retirees

Retired Pension	\$50,286,956,157
Retired Annuity	147,895,631
Disability Pension	278,340,305
Disability Annuity	833,157
Beneficiary Pension	672,112,983
Beneficiary Annuity	8,550,049
DBA Pension	5,754,318
DBA Annuity	454,877
Escalation	4,975,200
Post Retired Death over \$50,000	1,739,697
COLA	4,000,624,822
Catch-Up & Prior §532 Supp	628,574,900
Total	<u>\$56,036,812,096</u>

Vesteds

Inactive Vested	\$228,637,009
Death Benefit After 10-Yr Withdrawal over \$50,000	290,903
Active Vested	364,834,946
Death Benefit After 10-Yr Withdrawal over \$50,000	1,095,358
COLA	12,518,121
Total	<u>\$607,376,337</u>

TIAA

Service Pension	\$3,702,886
Disability Pension	37,962
Vested Pension	49,372
Active Death over \$50,000	9,119
COLA	273,012
Total	<u>\$4,072,351</u>

Miscellaneous

Incurred Death but not Paid	\$7,704,192
Unclaimed Non-Member Funds	9,740,235
Total	<u>\$17,444,427</u>

Total Liabilities \$108,176,726,424

APPENDIX 5 (Cont'd.)

NORMAL RATE CALCULATION (Cont'd.)

2012 Valuation
8.00% Interest

Assets for Valuation

Current Total Assets		\$86,303,987,073
Less:	Expense Fund	<u>52,478,419</u>
	Sub-total	\$86,251,508,654
Less:	5 Year Smoothing Adjustment	<u>3,380,095,311</u>
	Assets for Valuation Purposes	\$82,871,413,343
Less:	Group Life Insurance Fund Net Asset Value	<u>189,559,252</u>
	Assets for Normal Rate Valuation Purposes	\$82,681,854,091

Receivables

Assets receivable from Normal Rate in 2012-2013 fiscal year (2011-2012 paybase)(2010 Normal Rate)(1.08) ^{-7/24} (14,640,764,045)(0.1071)(1.08) ^{-7/24}		\$1,533,220,498
Assets receivable from Normal Rate in 2013-2014 fiscal year (2012-2013 paybase)(2011 Normal Rate)(1.08) ^{-1 7/24} (14,531,000,000)(0.1144)(1.08) ^{-1 7/24}		\$1,505,043,930
Assets receivable from the amortization of Article 18		\$0
Present Value of Future Member Contributions		
(Tier 4 Present Value of Future Employee Contributions)(1.08) ^{-7/24} (365,078,238)(1.08) ^{-7/24}		\$356,974,629
(Tier 5 Present Value of Future Employee Contributions)(1.08) ^{-7/24} (154,092,510)(1.08) ^{-7/24}		\$150,672,132
(Tier 6 Present Value of Future Employee Contributions)(1.08) ^{-7/24} (2,032,240)(1.08) ^{-7/24}		\$1,987,131
Assets receivable from Retirement Incentive Payments		
Chapter 105 of the Laws of 2010		
Receivable in 2012-2013 (11,207,434)(1.08) ^{-7/24}		\$10,958,664
Receivable in 2013-2014 (10,960,294) (1.08) ^{-1 7/24}		\$9,923,157
Receivable in 2014-2015 (10,960,294) (1.08) ^{-2 7/24}		\$9,188,108
Receivable in 2015-2016 (10,960,294) (1.08) ^{-3 7/24}		<u>\$8,507,508</u>
	Total Receivables	\$3,586,475,757

APPENDIX 5 (Cont'd.)

NORMAL RATE CALCULATION (Cont'd.)

2012 Valuation

8.00% Interest

Present Value of Future Salaries

	<u>Total PVFS</u>		
Tier 1	\$611,110,169		
Tier 2	820,394,858		
Tier 3	3,297,884,293		
Tier 4	132,749,479,454		
Tier 5	3,828,644,667		
Tier 6	47,461,381		
	<hr/>		
	\$141,354,974,822	$\times (1.08)^{-7/24} =$	\$138,217,330,941

Normal Rate

$$\frac{\text{Total Liabilities - (Assets + Receivables)}}{\text{Present Value of Future Salaries}} = 15.8507\%$$
$$\frac{\$21,908,396,576}{\$138,217,330,941} = 15.85\% \text{ (rounded)}$$

APPENDIX 5 (Cont'd.)

GROUP LIFE INSURANCE FUND

2012 Valuation

8.00% Interest

A) Calculation of June 30, 2012 Balance

Actuarial Value as of July 1, 2011		\$224,836,561
Interest	[224,836,561 x .08]	\$17,986,925
October 15, 2011 actual premium	\$19,148,184	
October 15, 2011 deferred premium	<u>(\$20,117,500)</u>	
Premium Gain/(Loss)		(\$969,316)
Interest	[(969,316) x (1.08 ^{8 5/12} - 1)]	(\$54,308)
Death Benefits paid in 2011-2012		(\$14,599,742)
Interest	[(14,599,742) x (1.08 ⁵ - 1)]	(\$572,755)
October 15, 2014 deferred premium [from B]		\$18,710,900
Interest discount	[18,710,900 x (1.08 ^{-(2 + 3 5/12)} - 1)]	<u>(\$3,025,393)</u>
Actuarial Value as of June 30, 2012		\$242,312,872

B) Calculation of Required Premium, GLIF Rate and Deferred Premium

Death benefits	[14,599,742 x 1.08 ^{2+9 5/12}]	\$18,098,941
Interest	[(17,986,925) x 1.08 ^{2+3 5/12}]	(\$21,456,211)
Premium Loss/(Gain)	[969,316 x 1.08 ³]	\$1,221,059
Adjustment to the GLIF reserve		<u>\$20,847,111</u>
Total required premium		\$18,710,900
GLIF Rate	= $\frac{\text{Required premium}}{\text{Estimated 2013-2014 paybase}}$	
	= $\frac{\$18,710,900}{\$14,393,000,000}$	
	= 0.13%	
October 15, 2014 deferred premium	[14,393,000,000 x 0.0013]	= \$18,710,900

C) Summary of Deferred Premiums

	<u>Deferred Premium</u>	<u>Present Value as of 6/30/2012</u>
Due October 15, 2012	\$19,908,200	\$19,466,299
Due October 15, 2013	\$19,441,500	\$17,601,814
Due October 15, 2014	\$18,710,900	<u>\$15,685,507</u>
		\$52,753,620

D) GLIF Net Asset Value (A - C)

$$\$242,312,872 - \$52,753,620 = \$189,559,252$$

APPENDIX 5 (Cont'd.)

EXCESS BENEFIT PLAN FUND*

2012 Valuation

Balance as of July 1, 2012 (Cash Basis)	\$4,496,808
less Final Adjustment for the 2012 Fiscal Year	\$101,180
plus Employer contribution (paid 10/15/2012) [0.0000 X \$14,640,764,045 (6/30/2010 Excess Benefit Plan rate of 0.00% times 2011 - 2012 paybase)]	\$0
less Annual Estimated Payments	<u>\$600,000</u>
Expected Balance as of June 30, 2013	\$3,795,628
plus Employer contribution (payable 10/15/2013) [0.0000 X \$14,531,000,000 (6/30/2011 Excess Benefit Plan rate of 0.00% times est'd. 2012 - 2013 paybase)]	\$0
less Annual Estimated Payments	<u>\$600,000</u>
Expected Balance as of June 30, 2014	\$3,195,628

* Fund is in a zero-interest checking account

APPENDIX 5 (Cont'd.)

The Administrative Rate and Employer Contributions¹

The administrative portion (Rate) of the employer contribution rate is adopted annually by the Retirement Board in the amount necessary to defray Retirement Administration related expenses for the following fiscal year. The first step in determining the rate is to divide the projected Retirement Administration related expenses by the projected member salary base. Consideration is also given to the overall status of the fund balance.

There will be no change to the Rate in 2014-15 and it is anticipated to be sustained for the next three to five years at 0.27% of member salary base.

Employer Contributions to the Administrative Fund

Member Salary Base		Rate (%)	Employer Contributions (Net of Billing Adjustments)		Increase/Decrease in Contributions to the Administrative Fund
Year	Amount		Year Collected	Amount	Percent
2014-15	\$14,285,000,000 *	0.27 *	2015-16	\$38,570,000 *	(0.75%) *
2013-14	14,393,000,000 *	0.27	2014-15	38,861,000 *	(0.95%) *
2012-13	14,531,000,000 *	0.27	2013-14	39,234,000 *	(0.75%) *
2011-12	14,640,764,000	0.27	2012-13	39,530,000	(0.68%)
2010-11	14,732,895,000	0.27	2011-12	39,802,000	(15.98%)
2009-10	14,792,116,000	0.32	2010-11	47,373,000	2.99%
2008-09	14,366,387,000	0.32	2009-10	45,998,000	5.00%

*Estimated.

Estimated Member Salary Base

The member salary base is actuarially determined; it increases as new members join the System and as members receive pay increases from their employers. Annual retirements and other forms of separation from service mitigate this increase. The member salary base is projected to decrease from 2013 through 2015.

The Proposed Administrative Rate Calculation (2014 – 15)

Several factors are considered when anticipating expenses used in calculating the administrative rate, which include general price increases, an estimated 10% increase in ERS and capital asset additions.

$$\frac{\text{Projected 2014-15 Retirement Administration Related Expenses}}{\text{Estimated 2013-14 Member Salary Base}} = \frac{\$42,820,865}{\$14,393,000,000} = 0.29\%$$

$$\text{Proposed Administrative Rate for 2014-15 Collections:} = 0.27\%$$

¹ From the NYSTRS 2013-14 Operating Budget Report.

APPENDIX 5 (Cont'd.)

**ASSET VALUATION METHOD
DEVELOPMENT OF SMOOTHING ADJUSTMENT**

<u>FYE</u>	<u>Market Value</u>	<u>Contributions</u>	<u>Benefit Payments</u>	<u>Average Market Value¹</u>
6/30/2007	103,651,575,130	1,176,264,166	4,722,377,152	
6/30/2008	94,458,424,385	1,306,481,575	4,980,254,119	102,086,872,519
6/30/2009	71,249,898,676	1,357,000,550	5,217,944,754	92,810,660,731
6/30/2010	75,829,228,763	1,260,000,256	5,399,946,740	69,442,425,487
6/30/2011	88,414,049,393	1,072,744,659	5,751,514,083	73,713,332,522
6/30/2012	86,303,987,073	1,479,186,529	5,979,984,123	86,471,814,456

<u>FYE</u>	<u>Actual Gain²</u>	<u>3.0% Expected Gain³</u>	<u>Unexpected Gain⁴</u>	<u>Smoothing Adjustment⁵</u>
6/30/2007	14,721,967,106			
6/30/2008	(7,781,949,313)	3,062,606,176	(10,844,555,489)	
6/30/2009	(21,516,277,258)	2,784,319,822	(24,300,597,080)	
6/30/2010	6,776,647,973	2,083,272,765	4,693,375,208	
6/30/2011	15,395,104,554	2,211,399,976	13,183,704,578	
6/30/2012	659,956,804	2,594,154,434	(1,934,197,630)	3,380,095,311

¹ Average Market Value = Market Value_(previous yr) - (.5 x Benefit Payments) + ((8.5/12) x Contributions)

² Actual Gain = Net Appreciation (Realized and Unrealized)

³ Expected Gain = 3.0% x Average Market Value

⁴ Unexpected Gain = Actual Gain - Expected Gain

⁵ Smoothing Adjustment = (.20 x Unexpected Gain 6/30/2009)
+ (.40 x Unexpected Gain 6/30/2010)
+ (.60 x Unexpected Gain 6/30/2011)
+ (.80 x Unexpected Gain 6/30/2012)

APPENDIX 6

MEMBER RECONCILIATION

ACTIVE MEMBERS:

	Male	Female	Total
June 30, 2011	66,797	213,638	280,435
Changes During Year:			
Added	2,293	6,828	9,121
Withdrawn	1,507	4,558	6,065
Retired	1,358	4,675	6,033
Died	69	116	185
June 30, 2012	66,156	211,117	277,273

MEMBERS RETIRED FOR:

	Service*			Disability			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
June 30, 2011	50,092	89,481	139,573	520	1,540	2,060	50,612	91,021	141,633
Changes During Year:									
Retired	1,332	4,583	5,915	26	92	118	1,358	4,675	6,033
Died	1,213	1,756	2,969	29	74	103	1,242	1,830	3,072
Lump Sum	34	122	156	0	0	0	34	122	156
Restored to Active Membership	0	0	0	0	0	0	0	0	0
June 30, 2012	50,177	92,186	142,363	517	1,558	2,075 **	50,694	93,744	144,438

BENEFICIARIES OF DECEASED:

	Service Annuitants			Disability Annuitants			Active Members			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
June 30, 2011	1,027	3,746	4,773	84	166	250	30	157	187	1,141	4,069	5,210
Changes During Year:												
Added	100	319	419	5	6	11	0	0	0	105	325	430
Died	70	178	248	2	7	9	0	9	9	72	194	266
June 30, 2012	1,057	3,887	4,944	87	165	252	30	148	178	1,174	4,200	5,374

SUMMARY:

	Male	Female	Total
Active Members	66,156	211,117	277,273
Retired Members	50,694	93,744	144,438
Beneficiaries	1,174	4,200	5,374
Total	118,024	309,061	427,085

*Also includes vested retirees

**Includes 39 males and 43 females retired for disability who receive a service benefit

APPENDIX 7

DISTRIBUTION OF ACTIVE MEMBERS

Distribution by Age as of June 30, 2012

<u>Age</u>	<u>Male</u>	<u>Female</u>	<u>Total Members</u>
15-19	8	28	36
20-24	1,671	5,528	7,199
25-29	7,548	23,666	31,214
30-34	10,022	29,556	39,578
35-39	10,217	28,192	38,409
40-44	10,255	29,902	40,157
45-49	8,309	27,196	35,505
50-54	7,270	27,242	34,512
55-59	5,955	23,023	28,978
60-64	3,522	13,268	16,790
65-69	1,027	2,757	3,784
70-74	229	578	807
75-79	88	132	220
80-84	25	46	71
85 or older	<u>10</u>	<u>3</u>	<u>13</u>
Total	66,156	211,117	277,273

Average Male age is 42 years 2 months

Average Female age is 43 years 0 months

APPENDIX 7 (Cont'd.)

Distribution of Active Members by Age and New York State Service as of June 30, 2012

Male			
<u>Age</u>	<u>Less Than 10 Years New York State Service</u>	<u>10 or more Years New York State Service</u>	<u>Total New York State Service</u>
15-19	8	0	8
20-24	1,671	0	1,671
25-29	7,547	1	7,548
30-34	8,667	1,355	10,022
35-39	4,664	5,553	10,217
40-44	3,136	7,119	10,255
45-49	2,293	6,016	8,309
50-54	1,884	5,386	7,270
55-59	1,494	4,461	5,955
60-64	978	2,544	3,522
65-69	426	601	1,027
70-74	127	102	229
75-79	49	39	88
80-84	15	10	25
85 or older	5	5	10
Total	32,964	33,192	66,156

Female			
<u>Age</u>	<u>Less Than 10 Years New York State Service</u>	<u>10 or more Years New York State Service</u>	<u>Total New York State Service</u>
15-19	28	0	28
20-24	5,528	0	5,528
25-29	23,663	3	23,666
30-34	25,813	3,743	29,556
35-39	14,392	13,800	28,192
40-44	12,295	17,607	29,902
45-49	10,754	16,442	27,196
50-54	9,107	18,135	27,242
55-59	5,340	17,683	23,023
60-64	2,551	10,717	13,268
65-69	718	2,039	2,757
70-74	191	387	578
75-79	57	75	132
80-84	19	27	46
85 or older	1	2	3
Total	110,457	100,660	211,117

APPENDIX 7 (Cont'd.)

Distribution of Active Members by Total Service as of June 30, 2012

<u>Years of Service</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>
0-4	19,492	61,563	81,055
5-9	12,817	45,968	58,785
10-14	13,411	42,458	55,869
15-19	8,502	24,817	33,319
20-24	5,035	16,940	21,975
25-29	3,880	12,591	16,471
30-34	2,018	5,128	7,146
35 or more	<u>1,001</u>	<u>1,652</u>	<u>2,653</u>
Total	66,156	211,117	277,273

Average Male has 11 Years of Total Service

Average Female has 11 Years of Total Service

APPENDIX 8

HISTORICAL MEMBER STATISTICS

Active Members and Annuitants 1925-2012

<u>As of June 30</u>	<u>Active Members</u>	<u>Retirees & Beneficiaries</u>
1925	29,057	1,815
1930	39,663	2,732
1935	45,031	3,919
1940	48,193	4,771
1945	52,359	5,637
1950	56,504	6,374
1955	71,273	7,897
1960	99,555	10,796
1965	129,543	16,043
1970	186,914	22,700
1975	227,038	35,252
1980	203,330	46,812
1985	178,516	57,366
1990	195,194	69,127
1995	199,398	82,459
2000	224,986	100,839
2005	260,356	125,325
2010	285,774	141,716
2012	277,273	149,812

Number of Active Members by Tier

<u>As of June 30</u>	<u>Tier 1</u>	<u>Tier 2</u>	<u>Tier 3</u>	<u>Tier 4</u>	<u>Tier 5</u>	<u>Tier 6</u>	<u>Total</u>
1993	70,180	17,448	26,788	78,475	--	--	192,891
1994	67,423	17,212	26,121	84,935	--	--	195,691
1995	64,093	17,012	25,206	93,087	--	--	199,398
1996	58,850	16,596	24,546	100,926	--	--	200,918
1997	53,502	16,186	23,861	110,167	--	--	203,716
1998	49,266	15,860	23,302	120,652	--	--	209,080
1999	50,859	15,776	20,726	128,906	--	--	216,267
2000	47,234	15,700	20,159	141,893	--	--	224,986
2001	41,169	15,472	19,914	157,795	--	--	234,350
2002	35,601	15,121	19,674	172,438	--	--	242,834
2003	28,327	14,463	19,083	185,374	--	--	247,247
2004	22,986	13,947	18,835	198,747	--	--	254,515
2005	17,901	13,210	18,535	210,710	--	--	260,356
2006	13,621	12,084	18,173	220,532	--	--	264,410
2007	10,838	10,178	17,743	231,286	--	--	270,045
2008	8,630	8,171	17,007	241,093	--	--	274,901
2009	6,943	6,752	16,111	250,532	--	--	280,338
2010	5,582	5,706	14,942	255,966	3,578	--	285,774
2011	3,814	4,137	12,690	247,530	12,264	--	280,435
2012	2,756	3,253	11,180	239,199	19,969	916	277,273

APPENDIX 9

RETIREMENT STATISTICS

RETIREMENT STATISTICS 2011-12 MEMBERS RETIRED FOR:

	Service*	Disability
Number Retired.....	5,915	118
Age at Retirement:		
Average.....	60 yrs., 9 mos.	51 yrs., 0 mos.
Median.....	60 yrs., 8 mos.	51 yrs., 9 mos.
Years of Service:		
Average.....	26 yrs., 3 mos.	18 yrs., 0 mos.
Median.....	28 yrs., 0 mos.	16 yrs., 8 mos.
**Benefit:		
Average.....	\$45,759	\$24,992
Median.....	\$46,699	\$23,716
Final Average Salary (FAS):		
Average.....	\$82,461	\$69,753
Median.....	\$81,999	\$67,448
***Benefit as % of FAS:		
Average.....	49.77%	35.05%
Median.....	55.33%	33.33%

2011-12 MEMBERS RETIRED FOR SERVICE* WITH:

	Less Than 20 Yrs. N.Y.	Between 20 Yrs. N.Y. and 35 Yrs. Total	35 Yrs. Total or More
Number Retired.....	1,357	3,491	1,067
Age at Retirement:			
Average.....	60 yrs., 10 mos.	60 yrs., 5 mos.	61 yrs., 7 mos.
Median.....	60 yrs., 7 mos.	60 yrs., 7 mos.	61 yrs., 0 mos.
Years of Service:			
Average.....	12 yrs., 0 mos.	28 yrs., 0 mos.	39 yrs., 2 mos.
Median.....	12 yrs., 0 mos.	29 yrs., 2 mos.	39 yrs., 0 mos.
**Benefit:			
Average.....	\$8,939	\$48,637	\$83,168
Median.....	\$6,408	\$48,678	\$78,968
Final Average Salary (FAS):			
Average.....	\$47,932	\$87,970	\$108,349
Median.....	\$41,891	\$86,138	\$101,960
***Benefit as % of FAS:			
Average.....	17.45%	54.16%	76.51%
Median.....	16.96%	58.00%	78.00%

*Also includes vested retirees.

**The Maximum, even though the member may have chosen an option.

***The average and median of individual benefits as percentages of final average salary.

APPENDIX 9 (Cont'd.)

RETIREMENT STATISTICS ALL RETIREES AS OF JUNE 30, 2012 RETIRED FOR:

	Service*	Disability
Number Retired.....	142,445	1,993
Age at Retirement:		
Average.....	58 yrs., 4 mos.	49 yrs., 6 mos.
Median.....	57 yrs., 2 mos.	50 yrs., 3 mos.
Years of Service:		
Average.....	28 yrs., 4 mos.	18 yrs., 8 mos.
Median.....	30 yrs., 6 mos.	18 yrs., 4 mos.
**Benefit:		
Average.....	\$38,902	\$18,419
Median.....	\$38,634	\$16,734
Final Average Salary (FAS):		
Average.....	\$64,944	\$49,829
Median.....	\$64,666	\$48,664
***Benefit as % of FAS:		
Average.....	55.28%	36.08%
Median.....	60.89%	33.33%

ALL RETIREES AS OF JUNE 30, 2012 RETIRED FOR SERVICE* WITH:

	Less Than 20 Yrs. N.Y.	Between 20 Yrs. N.Y. and 35 Yrs. Total	35 Yrs. Total or More
Number Retired.....	23,340	84,206	34,899
Age at Retirement:			
Average.....	58 yrs., 7 mos.	58 yrs., 1 mo.	58 yrs., 9 mos.
Median.....	56 yrs., 10 mos.	56 yrs., 9 mos.	58 yrs., 2 mos.
Years of Service:			
Average.....	14 yrs., 1 mo.	28 yrs., 7 mos.	37 yrs., 4 mos.
Median.....	14 yrs., 1 mo.	30 yrs., 0 mos.	36 yrs., 8 mos.
**Benefit:			
Average.....	\$7,621	\$37,936	\$62,155
Median.....	\$5,766	\$37,023	\$58,955
Final Average Salary (FAS):			
Average.....	\$34,941	\$65,546	\$83,556
Median.....	\$28,340	\$64,360	\$79,935
***Benefit as % of FAS:			
Average.....	21.47%	56.83%	74.16%
Median.....	20.09%	59.56%	73.56%

*Also includes vested retirees.

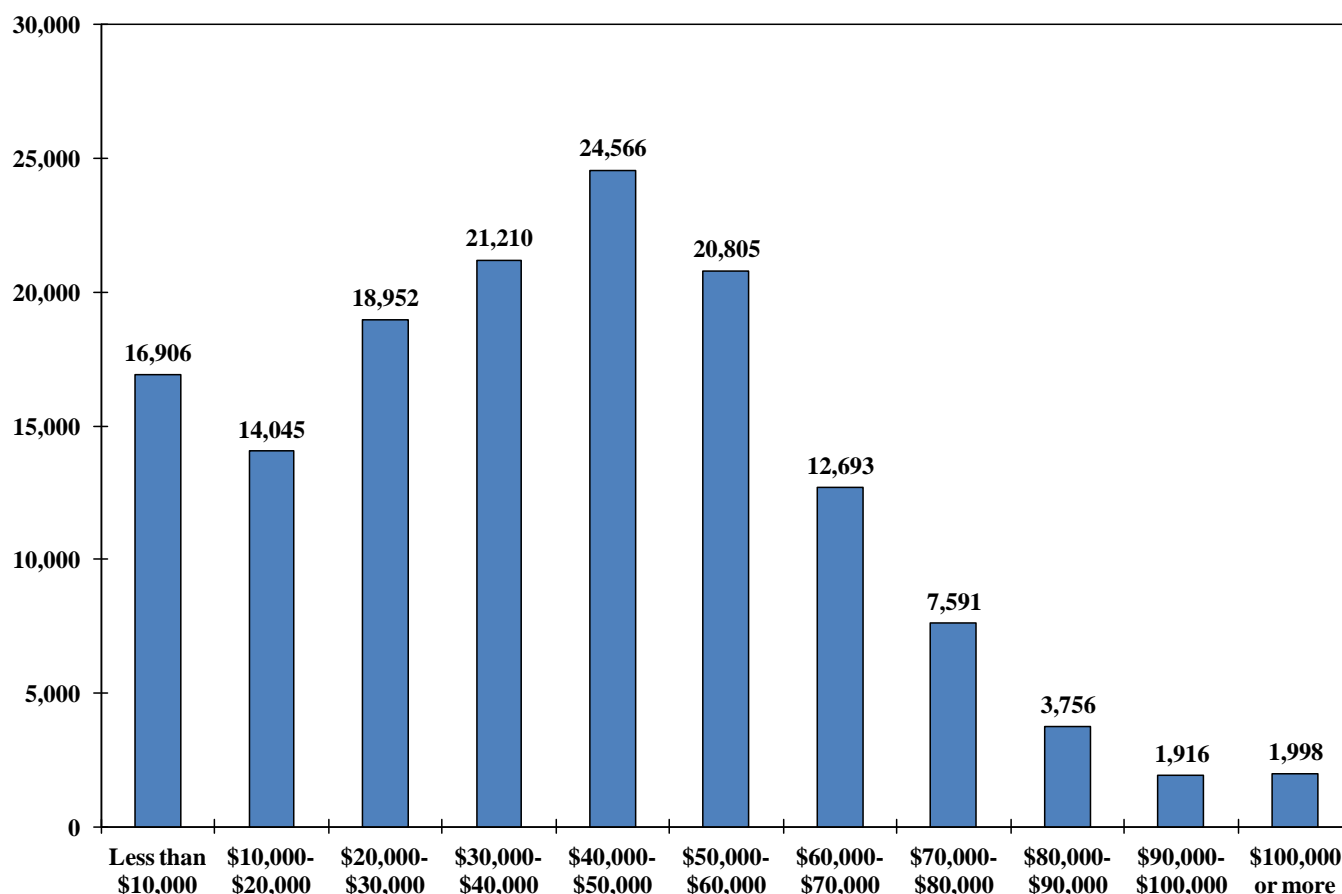
**The Maximum, even though the member may have chosen an option.

***The average and median of individual benefits as percentages of final average salary.

Retired Members' Characteristics¹ By Year of Retirement

Retired in Fiscal Year Ended	Number of Retired Members	Average Age at Retirement (yrs.- mos.)	Average Service at Retirement (yrs.- mos.)	Average Final Average Salary	Average Maximum Annual Benefit
2003	10,173	57-4	30-1	\$70,427	\$44,898
2004	7,287	57-7	28-8	72,799	45,063
2005	7,182	57-10	28-6	72,126	45,394
2006	7,281	58-4	28-2	71,840	43,914
2007	6,900	58-7	28-1	74,185	44,204
2008	6,330	58-11	27-8	77,066	45,779
2009	5,644	59-6	27-7	78,050	46,061
2010	5,501	60-0	27-5	79,615	46,489
2011	8,423	60-3	28-7	85,010	51,200
2012	6,033	60-9	26-3	82,461	45,759

Distribution of the Annual Benefit² of All Retired Members



¹ Averages are for service and vested retirees.

² Maximum annual retirement benefit as of June 30, 2012 including supplementation and COLA.

APPENDIX 10

2008 – 2012 EXPERIENCE STUDY
 NUMBER OF SERVICE RETIREMENTS
 TIER 1 AND TIERS 2, 3, 4, 5 AT LEAST AGE 62 OR WITH 30 YEARS OF SERVICE
 EXPOSURE BASED ON ACTIVE TEACHERS
 ASSUMPTIONS ADOPTED OCTOBER 2011

AGE	MALE				FEMALE			
	EXPOSURES	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED	EXPOSURES	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED
50	6	0	0.00	N/A	18	0	0.00	N/A
51	43	0	0.00	N/A	70	0	0.00	N/A
52	318	0	0.00	N/A	645	1	0.00	N/A
53	860	0	0.00	N/A	1,795	5	0.00	N/A
54	1,508	69	0.00	N/A	3,168	100	0.00	N/A
55	2,282	725	711.43	1.019	4,617	1,522	1,439.46	1.057
56	2,270	627	577.09	1.086	4,525	1,259	1,129.44	1.115
57	2,294	500	429.03	1.165	4,769	989	780.61	1.267
58	2,375	552	477.92	1.155	5,181	1,142	896.72	1.274
59	2,247	592	489.79	1.209	5,226	1,193	925.91	1.288
60	2,053	575	463.02	1.242	4,963	1,159	945.84	1.225
61	1,707	511	388.96	1.314	4,402	1,097	900.96	1.218
62	3,013	747	636.90	1.173	9,943	2,412	2,207.01	1.093
63	2,085	452	371.30	1.217	6,658	1,463	1,210.76	1.208
64	1,472	261	198.36	1.316	4,683	947	748.57	1.265
65	1,060	235	184.73	1.272	3,424	771	686.72	1.123
66	752	160	148.82	1.075	2,368	556	449.47	1.237
67	523	97	60.43	1.605	1,706	363	275.59	1.317
68	363	61	45.88	1.330	1,255	241	212.83	1.132
69	272	39	25.89	1.506	897	191	141.62	1.349
70	218	36	29.28	1.230	616	132	104.17	1.267
71	162	19	21.52	0.883	440	92	76.28	1.206
72	136	23	11.36	2.025	327	43	40.53	1.061
73	108	13	6.58	1.976	261	38	32.94	1.154
74	85	11	11.94	0.921	207	32	24.59	1.301
75	64	11	10.60	1.038	171	32	26.24	1.220
76	248	29	248.00	0.117	476	87	476.00	0.183
TOTAL	28,524	6,345	5,548.83	1.143	72,811	15,867	13,732.26	1.155

APPENDIX 10 (Cont'd.)

2008-2012 EXPERIENCE STUDY
 NUMBER OF SERVICE RETIREMENTS
 TIERS 2,3,4 LESS THAN AGE 62 AND WITH LESS THAN 30 YEARS OF SERVICE
 EXPOSURE BASED ON ACTIVE TEACHERS
 ASSUMPTIONS ADOPTED OCTOBER 2011

<u>AGE</u>	<u>EXPOSURES</u>	<u>MALE</u>			<u>FEMALE</u>			<u>RATIO OF ACTUAL TO EXPECTED</u>	
		<u>ACTUAL</u>	<u>EXPECTED</u>	<u>EXPECTED</u>	<u>EXPOSURES</u>	<u>ACTUAL</u>	<u>EXPECTED</u>	<u>EXPECTED</u>	
50	6,159	1	0.00	N/A	23,252	1	0.00	N/A	
51	6,153	2	0.00	N/A	23,052	3	0.00	N/A	
52	5,922	2	0.00	N/A	22,601	4	0.00	N/A	
53	5,566	2	0.00	N/A	21,966	6	0.00	N/A	
54	5,106	34	0.00	N/A	21,400	117	0.00	N/A	
55	4,726	150	163.65	0.917	20,809	848	877.79	0.966	
56	4,392	155	131.73	1.177	19,456	777	716.66	1.084	
57	3,888	132	112.06	1.178	17,766	725	624.76	1.160	
58	3,419	155	129.69	1.195	15,477	762	619.44	1.230	
59	2,976	143	102.86	1.390	12,977	725	548.49	1.322	
60	2,574	151	121.37	1.244	10,725	697	520.06	1.340	
61	2,084	142	111.21	1.277	8,416	654	528.10	1.238	
TOTAL	52,965	1,069	872.57	1.225	217,897	5,319	4,435.30	1.199	

APPENDIX 10 (Cont'd.)

2008-2012 EXPERIENCE STUDY
 NUMBER OF SERVICE RETIREMENTS
 TIER 5 LESS THAN AGE 62 AND WITH LESS THAN 30 YEARS OF SERVICE
 EXPOSURE BASED ON ACTIVE TEACHERS
 ASSUMPTIONS ADOPTED OCTOBER 2011

AGE	MALE				FEMALE			
	EXPOSURES	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED	EXPOSURES	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED
50	26	0	0.00	N/A	111	0	0.00	N/A
51	29	0	0.00	N/A	99	0	0.00	N/A
52	27	0	0.00	N/A	104	0	0.00	N/A
53	25	0	0.00	N/A	91	0	0.00	N/A
54	28	0	0.00	N/A	89	0	0.00	N/A
55	28	0	0.48	0.000	59	0	1.24	0.000
56	34	0	0.51	0.000	51	0	0.94	0.000
57	21	0	0.30	0.000	65	0	1.14	0.000
58	21	0	0.40	0.000	43	0	0.86	0.000
59	19	0	0.33	0.000	42	0	0.89	0.000
60	18	0	0.42	0.000	36	0	0.87	0.000
61	16	0	0.43	0.000	19	0	0.60	0.000
TOTAL	292	0	2.87	0.000	809	0	6.54	0.000

APPENDIX 10 (Cont'd.)

2008-2012 EXPERIENCE STUDY
 NUMBER OF DEATHS AMONG ACTIVE MEMBERS
 EXPOSURE BASED ON ACTIVE TEACHERS
 ASSUMPTIONS ADOPTED OCTOBER 2011

CENTRAL AGE	MALE			FEMALE		
	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED
20	0	0.14	0.000	1	0.28	3.571
25	8	3.66	2.186	4	7.38	0.542
30	13	8.29	1.568	21	15.68	1.339
35	14	12.90	1.085	19	21.39	0.888
40	13	17.10	0.760	25	30.12	0.830
45	25	21.16	1.181	41	43.50	0.943
50	28	23.51	1.191	81	60.32	1.343
55	38	33.09	1.148	105	83.09	1.264
60	43	38.24	1.124	77	72.79	1.058
65	20	18.17	1.101	24	25.96	0.924
70	10	8.08	1.238	10	8.51	1.175
75	7	2.94	2.381	5	2.63	1.901
TOTAL	219	187.28	1.169	413	371.65	1.111

APPENDIX 10 (Cont'd.)

2008-2012 EXPERIENCE STUDY
 NUMBER OF DISABILITY RETIREMENTS
 EXPOSURE BASED ON ACTIVE TEACHERS
 ASSUMPTIONS ADOPTED OCTOBER 2011

CENTRAL AGE	MALE			FEMALE		
	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED
30	0	0.25	0.000	0	1.28	0.000
35	5	1.42	3.521	9	8.08	1.114
40	11	5.18	2.124	20	27.61	0.724
45	14	14.56	0.962	43	61.77	0.696
50	29	32.44	0.894	102	139.60	0.731
54	18	18.46	0.975	61	82.48	0.740
TOTAL	77	72.31	1.065	235	320.82	0.732

APPENDIX 10 (Cont'd.)

2008-2012 EXPERIENCE STUDY
 COMPARISON OF SALARY SCALE TO ACTUAL SALARY INCREASES
 ASSUMPTIONS ADOPTED OCTOBER 2011

MALE

CENTRAL <u>AGE</u>	<u>ACTUAL SALARIES</u>	<u>EXPECTED SALARIES</u>	<u>RATIO OF ACTUAL TO EXPECTED</u>
20	22,801,946	20,544,078	1.110
25	885,171,485	871,217,618	1.016
30	2,189,546,767	2,213,365,634	0.989
35	2,978,124,320	3,013,221,511	0.988
40	3,229,632,070	3,263,956,119	0.989
45	2,728,153,593	2,754,308,600	0.991
50	2,528,608,328	2,551,898,998	0.991
55	2,712,844,380	2,743,125,981	0.989
60	1,784,258,930	1,810,167,229	0.986
65	428,652,314	436,583,766	0.982
70	74,231,306	75,791,567	0.979
75	27,739,511	28,364,039	0.978
TOTAL	19,589,764,950	19,782,545,140	0.990

APPENDIX 10 (Cont'd.)

2008-2012 EXPERIENCE STUDY
 COMPARISON OF SALARY SCALE TO ACTUAL SALARY INCREASES
 ASSUMPTIONS ADOPTED OCTOBER 2011

FEMALE

CENTRAL <u>AGE</u>	<u>ACTUAL SALARIES</u>	<u>EXPECTED SALARIES</u>	<u>RATIO OF ACTUAL TO EXPECTED</u>
20	92,245,760	77,464,855	1.191
25	2,930,372,953	2,903,306,450	1.009
30	6,030,262,644	6,113,800,548	0.986
35	6,966,821,600	7,038,782,710	0.990
40	7,543,194,622	7,609,451,852	0.991
45	7,229,813,041	7,295,711,920	0.991
50	7,662,500,079	7,734,707,206	0.991
55	8,364,418,755	8,449,905,884	0.990
60	5,248,438,456	5,314,558,585	0.988
65	1,119,514,784	1,135,405,446	0.986
70	196,386,619	198,840,209	0.988
75	52,468,571	53,244,186	0.985
TOTAL	53,436,437,884	53,925,179,851	0.991

APPENDIX 10 (Cont'd.)

2008-2012 EXPERIENCE STUDY
 NUMBER OF WITHDRAWALS
 EXPOSURE BASED ON ACTIVE TEACHERS
 ASSUMPTIONS ADOPTED OCTOBER 2011

CENTRAL AGE	MALE			FEMALE		
	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED
20	408	390.19	1.046	1,054	1,284.27	0.821
25	2,951	2,833.93	1.041	9,679	9,318.62	1.039
30	2,386	2,121.81	1.125	8,122	7,862.34	1.033
35	1,504	1,419.51	1.060	5,985	5,933.79	1.009
40	1,150	1,150.60	0.999	4,535	4,550.91	0.997
45	982	963.24	1.019	4,004	3,818.93	1.048
50	914	861.04	1.062	3,538	3,382.78	1.046
54	322	327.61	0.983	1,130	1,116.09	1.012
TOTAL	10,617	10,067.93	1.055	38,047	37,267.73	1.021

APPENDIX 10 (Cont'd.)

2008-2012 EXPERIENCE STUDY
 NUMBER OF DEATHS AMONG MEMBERS RETIRED FOR DISABILITY
 MORTALITY ADOPTED OCTOBER 2011

CENTRAL AGE	MALE			FEMALE		
	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED
30	0	0.00	N/A	0	0.00	N/A
35	3	0.43	6.977	5	1.41	3.546
40	4	1.68	2.381	5	3.52	1.420
45	4	4.55	0.879	18	15.78	1.141
50	10	11.98	0.835	31	40.11	0.773
55	17	15.75	1.079	73	72.79	1.003
60	19	24.12	0.788	68	72.89	0.933
65	21	22.83	0.920	34	45.70	0.744
70	14	17.13	0.817	28	24.62	1.137
75	14	14.40	0.972	21	21.01	1.000
80	12	15.41	0.779	28	24.45	1.145
85	12	9.67	1.241	14	22.34	0.627
90	2	3.79	0.528	13	16.39	0.793
95	0	0.31	0.000	7	5.91	1.184
100	0	0.00	N/A	3	3.11	0.965
105	0	0.00	N/A	1	1.09	0.917
110	0	0.00	N/A	0	0.00	N/A
TOTAL	132	142.05	0.929	349	371.12	0.940

APPENDIX 10 (Cont'd.)

2008-2012 EXPERIENCE STUDY
 NUMBER OF DEATHS AMONG MEMBERS RETIRED FOR SERVICE
 MORTALITY ADOPTED OCTOBER 2011

CENTRAL AGE	MALE			FEMALE		
	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED
55	25	22.68	1.102	58	51.41	1.128
60	208	204.81	1.016	273	321.69	0.849
65	400	445.73	0.897	519	529.61	0.980
70	545	547.67	0.995	561	585.57	0.958
75	906	849.47	1.067	770	781.18	0.986
80	1,226	1,203.99	1.018	1,205	1,249.58	0.964
85	1,238	1,227.45	1.009	1,647	1,619.11	1.017
90	789	769.51	1.025	1,837	1,803.95	1.018
95	342	325.04	1.052	1,319	1,172.04	1.125
100	56	53.06	1.055	486	364.30	1.334
105	4	2.31	1.732	61	40.77	1.496
110	0	0.00	N/A	1	0.34	2.941
TOTAL	5,739	5,651.72	1.015	8,737	8,519.55	1.026

APPENDIX 10 (Cont'd.)

2008-2012 EXPERIENCE STUDY
 NUMBER OF DEATHS AMONG BENEFICIARIES
 MORTALITY ADOPTED OCTOBER 2011

CENTRAL AGE	MALE			FEMALE		
	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED
5	0	0.00	N/A	0	0.00	N/A
10	0	0.00	N/A	0	0.00	N/A
15	0	0.00	N/A	0	0.00	N/A
20	0	0.00	N/A	0	0.00	N/A
25	0	0.00	N/A	0	0.00	N/A
30	0	0.00	N/A	0	0.00	N/A
35	0	0.03	0.000	0	0.00	N/A
40	0	0.04	0.000	0	0.03	0.000
45	1	0.08	12.500	1	0.07	14.286
50	0	0.16	0.000	1	0.18	5.556
55	1	0.48	2.083	0	0.95	0.000
60	1	1.71	0.585	4	3.82	1.047
65	6	4.46	1.345	15	10.46	1.434
70	5	8.01	0.624	34	22.95	1.481
75	26	19.12	1.360	59	48.64	1.213
80	48	44.58	1.077	123	110.59	1.112
85	91	72.66	1.252	220	213.73	1.029
90	103	94.65	1.088	302	274.13	1.102
95	40	62.06	0.645	187	167.28	1.118
100	14	10.33	1.355	62	43.65	1.420
105	0	0.00	N/A	7	6.75	1.037
110	0	0.00	N/A	1	0.67	1.493
TOTAL	336	318.37	1.055	1,016	903.90	1.124

APPENDIX 10 (Cont'd.)

Investment Rate of Return¹
on
Market and Actuarial Value of Assets
as of June 30, 2012

Annualized rates of return over the last:

	<u>Based Upon Market Value of Assets</u>	<u>Based Upon Actuarial Value of Assets²</u>
1 Year:	2.8%	0.5%
3 Years:	12.4%	2.8%
5 Years:	1.1%	4.9%
10 Years:	6.6%	6.9%
15 Years:	6.2%	7.3%
20 Years:	8.3%	
25 Years:	8.5%	

Annualized inflation over the last:

	<u>Inflation Assumption</u>		<u>COLA Benefit</u>	
	<u>Actual</u>	<u>Expected</u>	<u>Actual</u>	<u>Expected³</u>
1 Year:	2.65%	3.0%	1.4%	1.625%
3 Years:	2.55%	3.0%	1.3%	1.625%
5 Years:	2.24%	3.0%	1.4%	1.625%

¹ The interest rate for valuation purposes is a level 8.0%.

² Effective June 30, 2007, the Retirement System's asset valuation method was changed.

³ The annual percentage for estimating future COLA benefit payments is 1.625%. The COLA percentage is one-half of the increase in the CPI with a floor of 1.0% and a cap of 3.0%. Therefore the estimate of inflation for the COLA benefit is the result of analyzing available CPI data with percentages bounded between 2.0% and 6.0%, and reduced by 50%. The COLA benefit was first initiated in 2001.

APPENDIX 11

ASSET ALLOCATION

The table below displays the Retirement System's asset allocation targets and ranges as of June 30, 2012.

	Target	Range
Domestic Equity	37%	32-42%
International Equity	18%	14-22%
Real Estate	10%	6-14%
Private Equity	<u>7%</u>	4-12%
<i>Total Equities</i>	72%	
Domestic Fixed Income	18%	13-23%
Global Bonds	2%	0-3%
Mortgages	8%	5-11%
Cash Equivalents	<u>0%</u>	0-5%
<i>Total Fixed Income</i>	28%	

APPENDIX 12

SENSITIVITY ANALYSIS

Valuation results are highly dependent on the actuarial assumptions used to project future events. If actual experience emerges differently from the assumptions used in the valuation process, actuarial gains or losses will result, and future Employer Contribution Rates will be higher or lower. In this section, results of a sensitivity analysis are presented in order to illustrate how deviations in specific assumptions would have changed the current Employer Contribution Rate of 16.25%.

It is important to note that the results displayed here, with the exception of those for the investment return, are the consequence of altering each assumption individually without accounting for possible correlation between assumptions. Therefore, these results are presented in order to provide an illustration as to the degree of impact that a variation in key assumptions could have on valuation results. There is no guarantee that future experience will be consistent with either our current or the following alternative set of assumptions.

<u>Assumption</u>	<u>Adjustment Made</u>	<u>Calculated Employer Contribution Rate</u>
Current Assumptions		16.25%
Investment Return¹	Decrease from 8.0% to 7.75%	18.27%
Investment Return¹	Decrease from 8.0% to 7.5%	20.32%
Investment Return¹	Decrease from 8.0% to 7.0%	24.62%
Salary Scale	Decrease of 10%	14.99%
Salary Scale	Increase of 10%	17.52%
Service Retirement Rates	Decrease of 10%	15.28%
Service Retirement Rates	Increase of 10%	17.15%
Healthy Annuitant Mortality	Decrease of 10%	17.50%
Healthy Annuitant Mortality	Increase of 10%	15.09%
Active Mortality	Decrease of 10%	16.26%
Active Mortality	Increase of 10%	16.24%

¹ In the event that a change to the long term investment return assumption would be warranted, it is likely that a related change to the salary scale assumption would also be necessary in order for these assumptions to remain consistent with overall inflation. Therefore, for the results presented here, the salary scale assumption was decreased by one-half of the reduction in the investment return assumption.

APPENDIX 13

HISTORY OF THE EMPLOYER CONTRIBUTION RATE

<u>Salary Year</u>	<u>Employer Contribution Rate</u>	<u>Salary Year</u>	<u>Employer Contribution Rate</u>	<u>Salary Year</u>	<u>Employer Contribution Rate</u>
1921-22	5.10 %	1956-57	10.90 %	1991-92	6.64 %
1922-23	5.10	1957-58	11.20	1992-93	8.00
1923-24	5.20	1958-59	13.40	1993-94	8.41
1924-25	5.20	1959-60	14.00	1994-95	7.24
1925-26	5.20	1960-61	18.35	1995-96	6.37
1926-27	5.20	1961-62	18.55	1996-97	3.57
1927-28	5.20	1962-63	19.55	1997-98	1.25
1928-29	5.30	1963-64	21.13	1998-99	1.42
1929-30	5.50	1964-65	17.67	1999-00	1.43
1930-31	5.50	1965-66	17.70	2000-01	0.43
1931-32	5.50	1966-67	17.72	2001-02	0.36
1932-33	5.50	1967-68	18.50	2002-03	0.36
1933-34	5.50	1968-69	18.80	2003-04	2.52
1934-35	5.60	1969-70	18.60	2004-05	5.63
1935-36	5.70	1970-71	18.80	2005-06	7.97
1936-37	5.80	1971-72	18.80	2006-07	8.60
1937-38	5.93	1972-73	18.80	2007-08	8.73
1938-39	6.03	1973-74	18.80	2008-09	7.63
1939-40	6.13	1974-75	18.80	2009-10	6.19
1940-41	6.23	1975-76	19.40	2010-11	8.62
1941-42	6.33	1976-77	19.40	2011-12	11.11
1942-43	6.43	1977-78	20.40	2012-13	11.84
1943-44	6.53	1978-79	21.40	2013-14	16.25
1944-45	7.10	1979-80	22.49		
1945-46	7.20	1980-81	23.49		
1946-47	7.50	1981-82	23.49	Average	10.86 %
1947-48	7.80	1982-83	23.49		
1948-49	8.00	1983-84	22.90		
1949-50	8.40	1984-85	22.80		
1950-51	8.80	1985-86	21.40		
1951-52	9.60	1986-87	18.80		
1952-53	9.90	1987-88	16.83		
1953-54	9.90	1988-89	14.79		
1954-55	10.30	1989-90	6.87		
1955-56	10.40	1990-91	6.84		

HISTORY OF THE MEMBER CONTRIBUTION RATE

<u>Year of Membership</u>	<u>Required Contribution</u>
1921	4%
1948	5% (new members - 1948 and after)
1948	Voluntary 4% <u>could</u> be contributed (all members eligible)
1951	If member elected special retirement allowance: 4% went to 6.5%, 5% went to 8% (all members eligible)
1957	If member elected 1/120th plan: 6.5% went to 9%, 8% went to 11% (all members eligible)
1968	0%
1976	3% (new members - 1976 and after)
2000	3% employee contribution ceases after ten years of service or membership
2010	3.5% throughout career for members joining 1/1/2010 – 3/31/2012
2012	Throughout career for members joining on or after 4/1/2012: <ul style="list-style-type: none"> - 3.0% if salary less than or equal to \$45,000 - 3.5% if salary greater than \$45,000 and less than or equal to \$55,000 - 4.5% if salary greater than \$55,000 and less than or equal to \$75,000 - 5.75% if salary greater than \$75,000 and less than or equal to \$100,000 - 6.0% if salary greater than \$100,000 and less than or equal to \$179,000

As of August 1, 1921, when the Retirement System was established, members contributed 4% of salary. These contributions were used to fund a separate annuity, over and above the regular pension. New members on or after July 1, 1948 were required to contribute 5% of salary. Additional contributions, not in excess of 4% of salary, were permitted during the five-year period beginning July 1, 1948.

Under the provisions of a law passed in 1950, members could elect before July 1, 1951, or within one year of their date of membership, if later, to contribute towards a special service retirement allowance that would allow them to retire up to five years earlier. If their rate of contribution had been 4%, their new rate would be 6.5%. If their rate of contribution had been 5%, their new rate would be 8%. In 1956, an amendment was passed which provided additional benefits for service in excess of 25 years, but not in excess of 35 years, for those members who elected to contribute an additional 2.5% or 3% of their salaries. This increased the rate of contribution to 9% or 11% depending on whether the member's rate of contribution had been 6.5% or 8%.

Throughout the 1960's the advent of the "take-home pay" program effectively reduced the required contribution rate to zero for many members. As of July 1, 1968, all members were no longer required to make contributions, nor permitted to make voluntary contributions unless they had been making them previously.

HISTORY OF THE MEMBER CONTRIBUTION RATE (Cont'd.)

The law that created Tier 3 in 1976 reinstated member contributions and required members who joined the System after July 26, 1976 to contribute 3% of their annual salary. This money, however, helps fund the member's pension and does not fund a separate annuity as before. Effective October 1, 2000, however, in accordance with Chapter 126 of the Laws of 2000, the 3% required member contribution ceases upon the attainment of the earlier of 10 years of service credit or 10 years of membership. In accordance with Tier 5, enacted in 2009, members joining on or after January 1, 2010 and prior to April 1, 2012 must contribute 3.5% of salary throughout their working career towards the funding of their pension. Tier 6, enacted in 2012, requires members joining on or after April 1, 2012 to contribute between 3.0% and 6.0% of salary throughout their working career towards the funding of their pension. The contribution percentage for Tier 6 members can vary during their working career depending on the salary received.

APPENDIX 15

ACTUARIAL COST AND ASSET VALUATION METHODS

1. Actuarial Cost Method

The cost method used to determine the liabilities and normal cost in this valuation is the Aggregate Cost Method. This funding method is required by statute, specifically Section 517 of the New York State Education Law.

Each year a normal rate percentage is developed as a level percentage of total member compensation. This percentage equals the portion of the actuarial present value of projected benefits which exceeds the actuarial value of assets divided by one percent of the present value of future compensation of the active members, as of the valuation date.

The cost of active member death benefits up to \$50,000, Retirement System administrative expenses, and benefits in excess of the IRC §415 limits are each determined using a one-year term cost method.

Each year, actuarial gains and losses will occur because actual experience will vary from the actuarial assumptions. All gains and losses are automatically amortized as part of the normal rate, over the expected future working lifetime of active members.

2. Asset Valuation Method

The actuarial value of assets is determined by recognizing each year's realized and unrealized appreciation, in excess of (or less than) an assumed inflationary gain of 3%, at a rate of 20% per year, until fully recognized after five years.

APPENDIX 16

PRESENT ACTUARIAL ASSUMPTIONS

Actuarial assumptions have been developed based upon actual member experience. Various actuarial and graduation techniques are applied to experience data and tables are developed. An experience study is performed annually and assumptions are revised when warranted. The current actuarial assumptions were adopted by the Retirement Board on October 27, 2011.

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APPENDIX 16 (Cont'd.)

Mortality Rates
for Active Members

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
20	0.000042	20	0.000040
21	0.000092	21	0.000050
22	0.000107	22	0.000057
23	0.000136	23	0.000068
24	0.000139	24	0.000072
25	0.000147	25	0.000086
26	0.000156	26	0.000102
27	0.000163	27	0.000117
28	0.000178	28	0.000118
29	0.000191	29	0.000119
30	0.000200	30	0.000142
31	0.000229	31	0.000148
32	0.000242	32	0.000163
33	0.000260	33	0.000175
34	0.000279	34	0.000176
35	0.000291	35	0.000186
36	0.000313	36	0.000202
37	0.000330	37	0.000212
38	0.000352	38	0.000222
39	0.000373	39	0.000239
40	0.000394	40	0.000257
41	0.000430	41	0.000277
42	0.000453	42	0.000300
43	0.000513	43	0.000334
44	0.000576	44	0.000361
45	0.000616	45	0.000388
46	0.000656	46	0.000411
47	0.000683	47	0.000432
48	0.000702	48	0.000465
49	0.000721	49	0.000482
50	0.000747	50	0.000511
51	0.000787	51	0.000544
52	0.000800	52	0.000587
53	0.000835	53	0.000622
54	0.000869	54	0.000658

APPENDIX 16 (Cont'd.)

Mortality Rates
for Active Members
(cont'd.)

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
55	0.000937	55	0.000683
56	0.001093	56	0.000724
57	0.001293	57	0.000762
58	0.001416	58	0.000816
59	0.001588	59	0.000895
60	0.001747	60	0.000954
61	0.001897	61	0.001051
62	0.002111	62	0.001114
63	0.002412	63	0.001199
64	0.002892	64	0.001303
65	0.003396	65	0.001458
66	0.003811	66	0.001625
67	0.004599	67	0.001782
68	0.005510	68	0.002011
69	0.006500	69	0.002252
70	0.007502	70	0.002532
71	0.008523	71	0.003019
72	0.009511	72	0.003310
73	0.010552	73	0.003811
74	0.011521	74	0.004123
75	0.012798	75	0.004599

APPENDIX 16 (Cont'd.)

Disability Retirement Rates
for Active Members

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
30	0.000005	30	0.000005
31	0.000010	31	0.000018
32	0.000015	32	0.000032
33	0.000020	33	0.000046
34	0.000027	34	0.000054
35	0.000033	35	0.000080
36	0.000038	36	0.000090
37	0.000045	37	0.000089
38	0.000061	38	0.000113
39	0.000085	39	0.000174
40	0.000109	40	0.000220
41	0.000152	41	0.000300
42	0.000210	42	0.000387
43	0.000272	43	0.000440
44	0.000340	44	0.000482
45	0.000405	45	0.000545
46	0.000490	46	0.000589
47	0.000602	47	0.000675
48	0.000747	48	0.000773
49	0.000917	49	0.000992
50	0.001051	50	0.001222
51	0.001180	51	0.001430
52	0.001290	52	0.001575
53	0.001380	53	0.001675
54	0.001440	54	0.001725

APPENDIX 16 (Cont'd.)

Withdrawal Rates
for Active Members

Males

<u>Age</u>	<u>0 Years of Service</u>	<u>1 Year of Service</u>	<u>2 Years of Service</u>	<u>3 Years of Service</u>	<u>4 Years of Service</u>	<u>5 Years of Service</u>	<u>6 Years of Service</u>	<u>7 Years of Service</u>	<u>8 Years of Service</u>	<u>9 Years of Service</u>	<u>10 or more Years of Service</u>
20	0.259944	0.093433	0.064593	0.048649	0.037015	0.022000	0.012711	0.010469	0.009177	0.008490	0.007368
21	0.259944	0.093433	0.064593	0.048649	0.037015	0.022000	0.012711	0.010469	0.009177	0.008490	0.007368
22	0.259944	0.093433	0.064593	0.048649	0.037015	0.022000	0.012711	0.010469	0.009177	0.008490	0.007368
23	0.259944	0.093433	0.064593	0.048649	0.037015	0.022000	0.012711	0.010469	0.009177	0.008490	0.007368
24	0.272583	0.093433	0.064593	0.048649	0.037015	0.022000	0.012711	0.010469	0.009177	0.008490	0.007368
25	0.285222	0.100846	0.064593	0.048649	0.037015	0.022000	0.012711	0.010469	0.009177	0.008490	0.007368
26	0.297861	0.108259	0.070858	0.048649	0.037015	0.022000	0.012711	0.010469	0.009177	0.008490	0.007368
27	0.310500	0.115672	0.077123	0.051379	0.037015	0.022000	0.012711	0.010469	0.009177	0.008490	0.007368
28	0.323138	0.123086	0.083389	0.054108	0.039868	0.024169	0.012711	0.010469	0.009177	0.008490	0.007368
29	0.335777	0.130499	0.089654	0.056838	0.042721	0.026338	0.013989	0.010469	0.009177	0.008490	0.007368
30	0.348416	0.137912	0.095919	0.059567	0.044623	0.028507	0.016544	0.011635	0.009177	0.008490	0.007368
31	0.344014	0.138382	0.095492	0.062415	0.045574	0.030677	0.019100	0.013968	0.011002	0.008490	0.007368
32	0.339612	0.138851	0.095065	0.065263	0.046525	0.032846	0.021655	0.016300	0.012828	0.008884	0.007368
33	0.335210	0.139321	0.094638	0.068111	0.047476	0.035015	0.024210	0.018633	0.014653	0.010462	0.007368
34	0.330808	0.139790	0.094211	0.070958	0.048426	0.037184	0.026766	0.020965	0.016479	0.012040	0.007368
35	0.326406	0.140260	0.093783	0.073806	0.049377	0.039353	0.029321	0.023297	0.018304	0.013303	0.007368
36	0.325430	0.138801	0.094647	0.074514	0.051198	0.040652	0.030587	0.024116	0.018515	0.014313	0.007506
37	0.324454	0.137343	0.095511	0.075223	0.053018	0.041951	0.031853	0.024934	0.018726	0.015323	0.007645
38	0.323478	0.135885	0.096374	0.075931	0.054839	0.043250	0.033119	0.025753	0.018936	0.016333	0.007783
39	0.322502	0.134426	0.097238	0.076640	0.056659	0.044548	0.034386	0.026571	0.019147	0.017343	0.007922
40	0.321526	0.132968	0.098101	0.077348	0.058480	0.045847	0.035652	0.027390	0.019358	0.018353	0.008061
41	0.315621	0.136402	0.101321	0.077187	0.058465	0.044883	0.035483	0.029326	0.020588	0.018597	0.008304
42	0.309716	0.139835	0.104541	0.077025	0.058451	0.043919	0.035314	0.031262	0.021819	0.018842	0.008547
43	0.303810	0.143269	0.107761	0.076864	0.058437	0.042954	0.035145	0.033198	0.023049	0.019087	0.008790
44	0.297905	0.146703	0.110981	0.076702	0.058423	0.041990	0.034976	0.035134	0.024280	0.019331	0.009033
45	0.292000	0.150136	0.114201	0.076541	0.058409	0.041026	0.034807	0.037070	0.025510	0.019576	0.009276
46	0.290773	0.154527	0.116641	0.080859	0.059296	0.043021	0.036045	0.039363	0.026291	0.019590	0.008957
47	0.289546	0.158918	0.119082	0.085177	0.060184	0.045016	0.037284	0.041656	0.027071	0.019603	0.008638
48	0.288320	0.163308	0.121523	0.089495	0.061071	0.047011	0.038522	0.043949	0.027851	0.019617	0.008319
49	0.287093	0.167699	0.123964	0.093813	0.061959	0.049007	0.039760	0.046242	0.028631	0.019631	0.008000
50	0.285866	0.172090	0.126404	0.098131	0.062847	0.051002	0.040998	0.048535	0.029412	0.019645	0.007681
51	0.284639	0.176480	0.128845	0.102449	0.063734	0.052997	0.042236	0.050828	0.030192	0.019658	0.007362
52	0.283413	0.180871	0.131286	0.106767	0.064622	0.054992	0.043475	0.053121	0.030972	0.019672	0.007043
53	0.282186	0.185262	0.133727	0.111085	0.065509	0.056988	0.044713	0.055414	0.031753	0.019686	0.006724
54	0.280959	0.189652	0.136168	0.115403	0.066397	0.058983	0.045951	0.057707	0.032533	0.019699	0.006405

APPENDIX 16 (Cont'd.)

Withdrawal Rates
for Active Members

Females

<u>Age</u>	<u>0 Years of Service</u>	<u>1 Year of Service</u>	<u>2 Years of Service</u>	<u>3 Years of Service</u>	<u>4 Years of Service</u>	<u>5 Years of Service</u>	<u>6 Years of Service</u>	<u>7 Years of Service</u>	<u>8 Years of Service</u>	<u>9 Years of Service</u>	<u>10 or more Years of Service</u>
20	0.246985	0.093652	0.057894	0.046566	0.049651	0.040533	0.040279	0.031433	0.030269	0.029859	0.023495
21	0.246985	0.093652	0.057894	0.046566	0.049651	0.040533	0.040279	0.031433	0.030269	0.029859	0.023495
22	0.252705	0.093652	0.057894	0.046566	0.049651	0.040533	0.040279	0.031433	0.030269	0.029859	0.023495
23	0.264144	0.100160	0.057894	0.046566	0.049651	0.040533	0.040279	0.031433	0.030269	0.029859	0.023495
24	0.275583	0.106668	0.057894	0.046566	0.049651	0.040533	0.040279	0.031433	0.030269	0.029859	0.023495
25	0.287022	0.113175	0.065741	0.046566	0.049651	0.040533	0.040279	0.031433	0.030269	0.029859	0.023495
26	0.298461	0.119683	0.073589	0.051834	0.049651	0.040533	0.040279	0.031433	0.030269	0.029859	0.023495
27	0.309900	0.126190	0.081437	0.057103	0.049651	0.040533	0.040279	0.031433	0.030269	0.029859	0.023495
28	0.321339	0.132698	0.089285	0.062371	0.049651	0.040533	0.040279	0.031433	0.030269	0.029859	0.023495
29	0.332779	0.139205	0.097132	0.067640	0.057959	0.048790	0.044087	0.031433	0.030269	0.029859	0.023495
30	0.344218	0.145713	0.104980	0.072908	0.063498	0.057047	0.047896	0.033283	0.031649	0.029859	0.023495
31	0.337149	0.143990	0.102994	0.076587	0.066267	0.065304	0.051704	0.036984	0.034408	0.029859	0.023495
32	0.330080	0.142268	0.101008	0.080267	0.069037	0.068562	0.055512	0.040686	0.038771	0.030520	0.023495
33	0.323011	0.140545	0.099023	0.083946	0.071806	0.071482	0.059321	0.044387	0.043134	0.033165	0.023495
34	0.315943	0.138822	0.097037	0.087625	0.074576	0.072579	0.063129	0.048088	0.047165	0.035810	0.023495
35	0.308874	0.137100	0.095051	0.091304	0.077345	0.071809	0.066937	0.051790	0.051195	0.038455	0.022675
36	0.301485	0.131968	0.093169	0.085419	0.072583	0.067681	0.061670	0.048941	0.041891	0.036339	0.021034
37	0.294097	0.126836	0.091287	0.079533	0.067822	0.063553	0.056403	0.046092	0.038337	0.034223	0.019393
38	0.286709	0.121704	0.089405	0.073647	0.063060	0.059425	0.051135	0.043243	0.034782	0.032107	0.017752
39	0.279321	0.116572	0.087522	0.067761	0.058298	0.055298	0.047553	0.040394	0.031227	0.029991	0.016111
40	0.271932	0.111440	0.085640	0.061875	0.053536	0.051170	0.043971	0.037545	0.027672	0.027875	0.014471
41	0.272086	0.112626	0.084583	0.062068	0.053566	0.048726	0.041349	0.035634	0.027143	0.026346	0.013501
42	0.272240	0.113812	0.083526	0.062260	0.053596	0.046282	0.038726	0.033722	0.026614	0.024818	0.012531
43	0.272393	0.114998	0.082468	0.062452	0.053626	0.043838	0.036103	0.031810	0.026085	0.023289	0.011560
44	0.272547	0.116185	0.081411	0.062644	0.053656	0.041395	0.033481	0.029899	0.025555	0.021760	0.010590
45	0.272700	0.117371	0.080354	0.062837	0.053686	0.038951	0.030858	0.027987	0.025026	0.020231	0.009620
46	0.276387	0.119587	0.083107	0.064476	0.053600	0.040789	0.031262	0.028348	0.025804	0.020103	0.009440
47	0.280073	0.121803	0.085860	0.066116	0.053514	0.042628	0.031667	0.028708	0.026581	0.019974	0.009259
48	0.283759	0.124019	0.088614	0.067756	0.053428	0.044466	0.032071	0.029069	0.027359	0.019846	0.009079
49	0.287445	0.126235	0.091367	0.069395	0.053342	0.046304	0.032476	0.029429	0.028136	0.019717	0.008899
50	0.291131	0.128450	0.094120	0.071035	0.053256	0.048143	0.032880	0.029790	0.028914	0.019589	0.008718
51	0.294817	0.130666	0.096873	0.072674	0.053170	0.049981	0.033284	0.030151	0.029691	0.019461	0.008538
52	0.298503	0.132882	0.099627	0.074314	0.053084	0.051820	0.033689	0.030511	0.030469	0.019332	0.008357
53	0.302189	0.135098	0.102380	0.075954	0.052997	0.053658	0.034093	0.030872	0.031246	0.019204	0.008177
54	0.305876	0.137314	0.105133	0.077593	0.052911	0.055496	0.034498	0.031232	0.032024	0.019075	0.007996

APPENDIX 16 (Cont'd.)

Service Retirement Rates
 For Tier 1 Members and Tier 2, 3, and 4 Members
 at Least Age 62 or with 30 Years of Service
 and Tier 5 Members at Least Age 62

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
55	0.311756	55	0.311774
56	0.254224	56	0.249599
57	0.187021	57	0.163685
58	0.201230	58	0.173078
59	0.217976	59	0.177174
60	0.225532	60	0.190579
61	0.227859	61	0.204671
62	0.211386	62	0.221966
63	0.178082	63	0.181851
64	0.134752	64	0.159849
65	0.174277	65	0.200559
66	0.197891	66	0.189809
67	0.115544	67	0.161544
68	0.126412	68	0.169583
69	0.095163	69	0.157879
70	0.134313	70	0.169101
71	0.132847	71	0.173372
72	0.083523	72	0.123957
73	0.060934	73	0.126204
74	0.140439	74	0.118774
75	0.165500	75	0.153458

APPENDIX 16 (Cont'd.)

Service Retirement Rates
 For Tier 2, 3, and 4 Members Less Than Age 62
 and with Less Than 30 Years of Service

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
55	0.034627	55	0.042183
56	0.029994	56	0.036835
57	0.028821	57	0.035166
58	0.037932	58	0.040023
59	0.034563	59	0.042266
60	0.047151	60	0.048490
61	0.053363	61	0.062749

APPENDIX 16 (Cont'd.)

Service Retirement Rates
 For Tier 5 Members Less Than Age 62
 and with Less Than 30 Years of Service

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
55	0.017313	55	0.021092
56	0.014997	56	0.018418
57	0.014411	57	0.017583
58	0.018966	58	0.020012
59	0.017281	59	0.021133
60	0.023575	60	0.024245
61	0.026682	61	0.031375

APPENDIX 16 (Cont'd.)

Service Retirement Rates
For Tier 5 Members Less Than Age 62
and with 30 Years of Service

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
55	0.017313	55	0.021092
56	0.014997	56	0.018418
57	0.311756	57	0.311774
58	0.254224	58	0.249599
59	0.187021	59	0.163685
60	0.201230	60	0.173078
61	0.217976	61	0.177174

APPENDIX 16 (Cont'd.)

Service Retirement Rates
For Tier 6 Members

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
55	0.017313	55	0.021092
56	0.014997	56	0.018418
57	0.014411	57	0.017583
58	0.018966	58	0.020012
59	0.017281	59	0.021133
60	0.023575	60	0.024245
61	0.026682	61	0.031375
62	0.026682	62	0.031375
63	0.311756	63	0.311774
64	0.254224	64	0.249599
65	0.187021	65	0.163685
66	0.201230	66	0.173078
67	0.217976	67	0.177174
68	0.225532	68	0.190579
69	0.227859	69	0.204671
70	0.211386	70	0.221966
71	0.178082	71	0.181851
72	0.134752	72	0.159849
73	0.174277	73	0.200559
74	0.197891	74	0.189809
75	0.115544	75	0.161544

APPENDIX 16 (Cont'd.)

Mortality Rates for Service
and Deferred Annuitants and Beneficiaries
(Also used in calculating the benefits pursuant to
Subdivision b.3 of Section 512 of the Education Law)

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
1	0.000485	1	0.000435
2	0.000327	2	0.000283
3	0.000272	3	0.000212
4	0.000212	4	0.000158
5	0.000194	5	0.000143
6	0.000186	6	0.000134
7	0.000178	7	0.000126
8	0.000164	8	0.000112
9	0.000159	9	0.000107
10	0.000161	10	0.000107
11	0.000167	11	0.000109
12	0.000174	12	0.000113
13	0.000183	13	0.000118
14	0.000196	14	0.000127
15	0.000208	15	0.000137
16	0.000219	16	0.000144
17	0.000232	17	0.000152
18	0.000244	18	0.000155
19	0.000255	19	0.000155
20	0.000266	20	0.000154
21	0.000279	21	0.000152
22	0.000290	22	0.000154
23	0.000304	23	0.000158
24	0.000315	24	0.000164
25	0.000328	25	0.000171
26	0.000349	26	0.000182
27	0.000357	27	0.000189
28	0.000367	28	0.000200
29	0.000385	29	0.000211
30	0.000415	30	0.000231

APPENDIX 16 (Cont'd.)

Mortality Rates for Service
and Deferred Annuity and Beneficiaries
(Also used in calculating the benefits pursuant to
Subdivision b.3 of Section 512 of the Education Law)
(cont'd.)

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
31	0.000466	31	0.000275
32	0.000525	32	0.000314
33	0.000590	33	0.000349
34	0.000656	34	0.000380
35	0.000722	35	0.000409
36	0.000786	36	0.000437
37	0.000845	37	0.000464
38	0.000889	38	0.000494
39	0.000929	39	0.000528
40	0.000968	40	0.000576
41	0.001011	41	0.000631
42	0.001061	42	0.000695
43	0.001119	43	0.000764
44	0.001187	44	0.000839
45	0.001264	45	0.000904
46	0.001336	46	0.000970
47	0.001414	47	0.001038
48	0.001496	48	0.001122
49	0.001583	49	0.001213
50	0.001673	50	0.001330
51	0.001890	51	0.001490
52	0.002030	52	0.001668
53	0.002220	53	0.001875
54	0.002433	54	0.002116
55	0.002538	55	0.002355
56	0.002780	56	0.002509
57	0.003056	57	0.002672
58	0.003370	58	0.002843
59	0.003709	59	0.003041
60	0.004093	60	0.003267

APPENDIX 16 (Cont'd.)

Mortality Rates for Service
and Deferred Annuity and Beneficiaries
(Also used in calculating the benefits pursuant to
Subdivision b.3 of Section 512 of the Education Law)
(cont'd.)

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
61	0.004551	61	0.003527
62	0.005047	62	0.003826
63	0.005638	63	0.004168
64	0.006278	64	0.004561
65	0.007004	65	0.005012
66	0.007867	66	0.005529
67	0.008804	67	0.006122
68	0.009816	68	0.006803
69	0.011014	69	0.007584
70	0.012307	70	0.008480
71	0.013835	71	0.009459
72	0.015565	72	0.010631
73	0.017524	73	0.011914
74	0.019741	74	0.013446
75	0.022362	75	0.015125
76	0.025213	76	0.017127
77	0.028581	77	0.019517
78	0.032405	78	0.022155
79	0.036746	79	0.025174
80	0.041671	80	0.028627
81	0.047254	81	0.032576
82	0.053580	82	0.037089
83	0.060435	83	0.042242
84	0.068492	84	0.048122
85	0.077205	85	0.055103
86	0.086987	86	0.063094
87	0.098446	87	0.072230
88	0.111338	88	0.082248
89	0.125188	89	0.094083
90	0.141337	90	0.107017

APPENDIX 16 (Cont'd.)

Mortality Rates for Service
and Deferred Annuitants and Beneficiaries
(Also used in calculating the benefits pursuant to
Subdivision b.3 of Section 512 of the Education Law)
(cont'd.)

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
91	0.158600	91	0.121632
92	0.178646	92	0.133966
93	0.199938	93	0.147979
94	0.223410	94	0.162252
95	0.250439	95	0.176070
96	0.270403	96	0.187908
97	0.288938	97	0.199611
98	0.311066	98	0.209895
99	0.325777	99	0.221434
100	0.339933	100	0.231938
101	0.358628	101	0.244834
102	0.371685	102	0.254498
103	0.383040	103	0.266044
104	0.392003	104	0.279055
105	0.397886	105	0.293116
106	0.400000	106	0.307811
107	0.400000	107	0.322725
108	0.400000	108	0.337441
109	0.400000	109	0.351544
110	0.400000	110	0.364617

APPENDIX 16 (Cont'd.)

Mortality Rates for
Disabled Annuitants

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
30	0.021045	30	0.037191
31	0.022268	31	0.039790
32	0.025123	32	0.041804
33	0.030890	33	0.042036
34	0.035471	34	0.044687
35	0.040060	35	0.046087
36	0.045043	36	0.047456
37	0.051671	37	0.048137
38	0.057059	38	0.049542
39	0.060136	39	0.050006
40	0.066075	40	0.051448
41	0.072010	41	0.053712
42	0.081075	42	0.056153
43	0.088267	43	0.058391
44	0.095107	44	0.059102
45	0.098034	45	0.060023
46	0.098073	46	0.061115
47	0.096203	47	0.061499
48	0.092171	48	0.062033
49	0.090039	49	0.061267
50	0.088106	50	0.059644
51	0.085180	51	0.059103
52	0.082046	52	0.058019
53	0.077567	53	0.057648
54	0.069299	54	0.056312
55	0.059562	55	0.053003
56	0.050222	56	0.050651
57	0.043923	57	0.044260
58	0.040994	58	0.039761
59	0.040370	59	0.036583

APPENDIX 16 (Cont'd.)

Mortality Rates for
Disabled Annuitants
(cont'd.)

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
60	0.040254	60	0.034142
61	0.039865	61	0.033041
62	0.039284	62	0.031701
63	0.038507	63	0.032287
64	0.037749	64	0.032367
65	0.038009	65	0.032588
66	0.039816	66	0.034360
67	0.042679	67	0.034616
68	0.045317	68	0.034773
69	0.045826	69	0.035903
70	0.049085	70	0.036463
71	0.050661	71	0.037256
72	0.052953	72	0.038447
73	0.055112	73	0.040345
74	0.058231	74	0.042217
75	0.060057	75	0.045375
76	0.062590	76	0.048144
77	0.063405	77	0.051458
78	0.065189	78	0.052913
79	0.069245	79	0.055751
80	0.075091	80	0.060605
81	0.086987	81	0.070429
82	0.098446	82	0.080934
83	0.111338	83	0.090446
84	0.125188	84	0.100878
85	0.141337	85	0.120011
86	0.158600	86	0.138088
87	0.178646	87	0.147979
88	0.199938	88	0.162252
89	0.223410	89	0.176070

APPENDIX 16 (Cont'd.)

Mortality Rates for
Disabled Annuitants
(cont'd.)

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
90	0.250439	90	0.187908
91	0.270403	91	0.199611
92	0.288938	92	0.209895
93	0.311066	93	0.221434
94	0.325777	94	0.231938
95	0.339933	95	0.244834
96	0.358628	96	0.254498
97	0.371685	97	0.266044
98	0.383040	98	0.279055
99	0.392003	99	0.293116
100	0.397886	100	0.307811
101	0.400000	101	0.322725
102	0.400000	102	0.337441
103	0.400000	103	0.351544
104	0.400000	104	0.364617
105	0.400000	105	0.376246
106	0.400000	106	0.386015
107	0.400000	107	0.393507
108	0.400000	108	0.398308
109	0.400000	109	0.400000
110	0.400000	110	0.400000

APPENDIX 16 (Cont'd.)

Salary Scale

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
20	1.1203	20	1.1198
21	1.1201	21	1.1177
22	1.1198	22	1.1162
23	1.1184	23	1.1139
24	1.1152	24	1.1101
25	1.1091	25	1.1035
26	1.1018	26	1.0954
27	1.0909	27	1.0857
28	1.0841	28	1.0770
29	1.0777	29	1.0720
30	1.0748	30	1.0684
31	1.0718	31	1.0660
32	1.0691	32	1.0644
33	1.0665	33	1.0636
34	1.0646	34	1.0630
35	1.0627	35	1.0626
36	1.0615	36	1.0622
37	1.0611	37	1.0614
38	1.0593	38	1.0602
39	1.0576	39	1.0591
40	1.0561	40	1.0582
41	1.0545	41	1.0572
42	1.0532	42	1.0562
43	1.0524	43	1.0553
44	1.0517	44	1.0546
45	1.0504	45	1.0539
46	1.0485	46	1.0530
47	1.0469	47	1.0523
48	1.0456	48	1.0516
49	1.0448	49	1.0506

APPENDIX 16 (Cont'd.)

Salary Scale
(cont'd.)

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
50	1.0440	50	1.0497
51	1.0433	51	1.0485
52	1.0428	52	1.0474
53	1.0422	53	1.0461
54	1.0415	54	1.0449
55	1.0401	55	1.0442
56	1.0388	56	1.0435
57	1.0382	57	1.0424
58	1.0374	58	1.0416
59	1.0372	59	1.0413
60	1.0364	60	1.0410
61	1.0352	61	1.0402
62	1.0347	62	1.0393
63	1.0338	63	1.0386
64	1.0316	64	1.0383
65	1.0294	65	1.0376
66	1.0263	66	1.0367
67	1.0249	67	1.0352
68	1.0250	68	1.0341
69	1.0254	69	1.0329
70	1.0259	70	1.0328
71	1.0247	71	1.0326
72	1.0241	72	1.0325
73	1.0241	73	1.0322
74	1.0239	74	1.0309
75	1.0238	75	1.0308

Valuation Rate of Interest Assumption

The interest rate for valuation purposes is a level 8.0%. This valuation rate of interest is made up of a 3.0%¹ annual rate of inflation and a 5.0% real rate of return.

The valuation rate of interest assumption represents our best estimate of the anticipated annual rate of return on plan assets over a very long-term horizon.

The valuation rate of interest assumption is developed based upon the Retirement System's specific asset allocation, and capital market assumptions, based upon recommendations from Hewitt Ennis Knupp, the System's investment consultant. Using expected returns and standard deviations for each asset class, and including anticipated correlation between the classes, a long-term anticipated rate of return is developed. As of June 30, 2012, Hewitt Ennis Knupp has estimated the geometric annual rate of return to be 7.3%, and the arithmetic annual rate of return to be 8.2%, given the System's asset allocation. This analysis is performed annually, and intended to be over a 10-year time horizon. Additionally, Hewitt Ennis Knupp performed an asset/liability study in 2011 in which stochastic simulation was used to project over one thousand future investment outcomes over a 40-year period based on the Retirement System's asset allocation. The resulting distribution of the 40-year annualized returns had a mean of 8.1% and a median of 8.2%.

For a complete explanation of the reasons behind the System's valuation rate of interest assumption, please see pages 24 through 28 of the Report on the 2011 Recommended Actuarial Assumptions.

Projected COLA Assumption

The annual percentage for estimating future COLA benefit payments is 1.625%.²

¹ The average annual rate of increase in the Consumer Price Index (CPI) for 1925 – 2012 was 3.02%.

² The COLA percentage is one-half of the increase in the CPI with a floor of 1.0% and a cap of 3.0%. Therefore the estimate of inflation for the COLA benefit is the result of analyzing available CPI data with percentages bounded between 2.0% and 6.0%, and reduced by 50%.

SUMMARY OF BENEFIT PROVISIONS

1. Membership

Membership is mandatory for all full-time New York State public school teachers, outside New York City, except those employed under the Comprehensive Employment and Training Act (CETA). Membership is optional for teachers employed on other than a full-time basis and for certain employees of the State University of New York, community colleges, and the State Education Department. Generally, the membership of any person credited with less than 5 years of service will terminate when seven years have elapsed since (s)he last rendered at least 20 days of credited service in a school year.

Tiers are determined by a member's most recent date of membership in the Retirement System as follows:

Tier 1:	Membership prior to 7/1/1973;
Tier 2:	Membership 7/1/1973 – 7/26/1976;
Tier 3:	Membership 7/27/1976 – 8/31/1983;
Tier 4:	Membership 9/1/1983 – 12/31/2009;
Tier 5:	Membership 1/1/2010 – 3/31/2012;
Tier 6:	Membership on or after 4/1/2012.

Tier 3 members are entitled to receive the benefits of either Tier 3 or Tier 4, however, they may not mix the provisions of the two tiers. For valuation purposes, Tier 3 members are assumed to receive the Tier 4 benefit at retirement, as that is generally always the larger benefit.

2. Service Retirement

The service retirement benefits are payable for life generally as follows:

Tier 1:

Non-Contributory Plan

For Tier 1 members with a date of membership prior to July 1, 1970 the benefit is generally calculated as:

For New York State service *prior to 7/1/1959 and all out-of-state service:*

$\frac{1}{30}$ th of final average salary (FAS) per year for each of the first 25 years of service, plus $\frac{1}{30}$ th of FAS per year for each of the next 10 years of service, plus $\frac{1}{30}$ th of FAS per year for each year of NYS service in excess of 35, *plus*

For New York State service *subsequent to 7/1/1959:*

$\frac{1}{30}$ th of final average salary (FAS) per year for each of the first 25 years of NYS service, plus $\frac{1}{30}$ th of FAS per year for each of the next 10 years of NYS service, plus $\frac{1}{30}$ th of FAS per year for each year of NYS service in excess of 35.

APPENDIX 17 (Cont'd.)

Non-Contributory Plan members generally may retire at:

- Age 55 with 20 years of total service or
- Any age with 35 years of total service.

Career Plan

If 20 or more years of NYS service: 2% of final average salary (FAS) per year of NYS service after July 1, 1959, plus 1.8% of FAS per year of NYS service prior to that date, plus 1% of FAS per year of out-of-state service. Out-of-state service is allowed only up to a maximum of 10 years, and only to the extent that it does not raise the total service credit to greater than 35 years. The maximum pension permitted is 75% of FAS.

If less than 20 years of NYS service, the above formula is used except the benefit is reduced by 5% for each year of service less than 20, subject to a maximum reduction of 50%.

Career Plan members generally may retire at:

- Age 55 with 2 years of NYS service or
- Any age with 35 years of total service.

The provisions of Article 19 of the Retirement and Social Security Law, effective July 11, 2000, provides to eligible Tier 1 and 2 members additional service credit of one-twelfth of a year of service for each year of retirement credit as of the date of retirement or death, up to a maximum of two additional years. The maximum pension, as a result of Article 19, can be 79% of FAS.

Tier 2: Computed under the Tier 1 Career Plan formula, but may be reduced for early retirement, as noted below.

Tier 2 members generally may retire at:

- Age 62 with 5 years of service,
- Age 55 with 30 years of service, or
- Age 55 with 5 years of service, with benefit reduced by 6% for each of the first 2 years under age 62 and 3% for each of the next 5 years.

Tier 3: $1\frac{2}{3}\%$ of FAS per year of NYS service (if less than 20 years) or 2% of FAS per year of NYS service (if 20 to 30 years). There is no additional benefit for more than 30 years of service. At age 62 the benefit is reduced by 50% of the primary Social Security benefit accrued while in NYS public employment. A member may be eligible for automatic cost-of-living adjustments.

Tier 3 members generally may retire at:

- Age 62 with 5 years of service,
- Age 55 with 30 years of service, or
- Age 55 with 5 years of service, with benefit reduced by 1/15th for each of the first 2 years under age 62 and 1/30th for each of the next 5 years.

APPENDIX 17 (Cont'd.)

Tier 4: $1\frac{2}{3}\%$ of FAS per year of NYS service (if less than 20 years), or 2% of FAS per year of NYS service (if 20 to 30 years), plus $1\frac{1}{2}\%$ of FAS per year of NYS service in excess of 30 years.

Tier 4 members generally may retire at:

- Age 62 with 5 years of service,
- Age 55 with 30 years of service, or
- Age 55 with 5 years of service, with benefit reduced by 6% for each of the first 2 years under age 62 and 3% for each of the next 5 years.

Tier 5: $1\frac{2}{3}\%$ of FAS per year of NYS service (if less than 25 years), or 2% of FAS per year of NYS service (if 25 to 30 years), plus $1\frac{1}{2}\%$ of FAS per year of NYS service in excess of 30 years.

Tier 5 members generally may retire at:

- Age 62 with 10 years of service,
- Age 57 with 30 years of service, or
- Age 55 with 10 years of service, with benefit reduced by $6\frac{2}{3}\%$ for each of the first 2 years under age 62 and 5% for each of the next 5 years.

Tier 6: $1\frac{2}{3}\%$ of FAS per year of NYS service (if less than 20 years), 1.75% of FAS per year of NYS service (if credited with 20 years) or 35% plus 2% per year of NYS service in excess of 20 years (if beyond 20 years).

Tier 6 members generally may retire at:

- Age 63 with 10 years of service,
- Age 55 with 10 years of service, with benefit reduced by 6.5% for each year under age 63.

3. Disability Retirement

Generally a member with at least 10 years of service may qualify for a disability retirement benefit of the smaller of 1) $1\frac{2}{3}\%$ of FAS per year of projected service to age 60 or 2) $\frac{1}{3}$ of FAS; but the benefit shall not be less than $1\frac{2}{3}\%$ of FAS per year of completed service.

4. Death Benefits

a) Active Service

The Tier 1 death benefit is generally equal to the greater of 1) 3 times annual salary after 36 years of service (proportionately reduced for less than 36 years) or 2) for members who are at least age 55 with 20 years of service, the pension reserve calculated under a prior, lower service retirement formula.

APPENDIX 17 (Cont'd.)

The death benefit for Tier 2, 3, 4, 5 and 6 members is generally equal to one of the following two options based on the member's election at entry: 1) 3 times annual salary after 3 years of service (proportionately reduced for service under 3 years) or 2) the greater of (1) above or the Tier 1 death benefit.

b) Not in Active Service

The death benefit for members of all tiers with at least ten years of service credit who die when not in active service is equal to one-half the active member death benefit.

5. Deferred Retirement

Tiers 1-4:

A member with at least 5 years of credited service who ceases teaching has a vested right to receive a deferred service retirement benefit. A member with at least five, but less than ten years of service credit, has the choice of receiving a refund of their member contributions with interest or a deferred service retirement benefit. A member with ten or more years of service credit will receive the deferred service retirement benefit.

Tiers 5 and 6:

A member with at least 10 years of credited service who ceases teaching has a vested right to receive a deferred service retirement benefit. Members with less than 10 years of credited service who cease teaching may receive a refund of their member contributions with interest.

6. Member Contributions

Certain Tier 1 and 2 members may elect to contribute in order to receive an additional benefit upon retirement. Tier 3 and 4 members are required to contribute 3% of pay to fund a portion of their benefit. Effective October 1, 2000, such contributions cease upon the attainment of the earlier of 10 years of service credit or 10 years of membership. Tier 5 members are required to contribute 3.5% of their salary throughout their active membership.

Tier 6 members are required to contribute throughout their active membership. From 4/1/2012 through 3/31/2013, all Tier 6 members are required to contribute 3.5%. Beginning 4/1/2013 members are required to contribute in accordance with the following schedule:

<u>Salary</u>	<u>Contribution Rate</u>
\$45,000 and less	3.00%
More than \$45,000 to \$55,000	3.50%
More than \$55,000 to \$75,000	4.50%
More than \$75,000 to \$100,000	5.75%
More than \$100,000 to \$179,000 (the limit currently equal to the NYS governor's salary)	6.00%

APPENDIX 17 (Cont'd.)

For purposes of administration, a Tier 6 member's contribution rate in any given year is based on regular compensation earned two years prior. During the member's first three years of membership, he/she will contribute a percentage based on a salary projection provided by the employer.

7. Cost-of-Living Adjustment (COLA)

A permanent, annually-adjusted cost-of-living benefit is provided to both current and future retired members. This benefit was first paid commencing September 2001, and is increased every September thereafter, to retired members who meet one of the following eligibility criteria:

- Age 62 and retired for 5 years,
- Age 55 and retired for 10 years, or
- Retired for 5 years under a disability retirement.

The annual COLA percentage is equal to 50% of the increase in the annual CPI; not to exceed 3% nor be lower than 1%. It is applied to the first \$18,000 of annual benefit. Additionally, commencing September 2000, members retired before 1997 are eligible for a "Catch-Up" supplemental benefit upon satisfaction of the above eligibility criteria.