

# **ACTUARIAL VALUATION REPORT**

*as of*

*JUNE 30, 2021*



**New York State Teachers' Retirement System**

**Office of the Actuary  
July 26, 2022**

**NEW YORK STATE TEACHERS' RETIREMENT SYSTEM**

**Actuarial Valuation Report  
as of June 30, 2021**

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# NEW YORK STATE TEACHERS' RETIREMENT SYSTEM

## Actuarial Valuation Report as of June 30, 2021

### A. INTRODUCTION

This report presents to the New York State Teachers' Retirement System ("NYSTRS" or "the Retirement System") Retirement Board the results of the annual actuarial valuation of assets and liabilities of the Retirement System as of June 30, 2021. Employer contributions are made by participating employers in accordance with an actuarially determined employer contribution rate. The rate is determined by an actuarial valuation made each June 30<sup>th</sup>. Members contribute in accordance with a fixed-rate schedule as required by statute. NYSTRS' funding objective is to ensure that sufficient assets are being accumulated to pay all current and future benefits as they become due.

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, 2022 to June 30, 2023 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, 2022 to June 30, 2023 fiscal year and collected in the fiscal year ending June 30, 2024 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 actuarial gains and losses. The active member component includes the cost of benefits accruing on account of retirement, withdrawal, disability, death (except for the first \$50,000 of death benefits which are funded by the group life insurance rate) and the cost-of-living benefit provided during retirement. The Normal Rate is calculated in accordance with the Aggregate Actuarial Cost Method. The Aggregate Method is a reasonable and appropriate actuarial funding method for an ongoing plan and is designed to provide that sufficient assets are accumulated to pay current benefits as well as accrue assets that will be needed to pay future benefits.

The **Expense Rate** is a pay-as-you-go rate representing the administrative cost of the Retirement System for the fiscal year July 1, 2023 to June 30, 2024 and is set during the budget process.

The **Group Life Insurance Rate** is a pay-as-you-go rate representing the expected benefit payments of the first \$50,000 of member death benefits for the fiscal year July 1, 2023 to June 30, 2024.

The **Excess Benefit Plan Rate** is a pay-as-you-go rate representing the Excess Benefit Fund’s need for contributions to cover expected benefit payments in excess of the Internal Revenue Code Section 415 limits for the fiscal year July 1, 2023 to June 30, 2024.

The actuarially computed Employer Contribution Rate to be applied to the member salaries for the fiscal year ending June 30, 2023 is **10.29%**. The Employer Contribution Rates determined by the actuarial valuations as of June 30, 2021 and June 30, 2020 and the changes between the two are summarized below:

	<u>As of 6/30/2021</u>	<u>As of 6/30/2020</u>	<u>Change</u>
Normal Rate	9.89%	9.41%	0.48%
Expense Rate	0.26	0.26	0.00
Group Life Insurance Rate	0.13	0.13	0.00
Excess Benefit Plan Rate	<u>0.01</u>	<u>0.00</u>	<u>0.01</u>
Employer Contribution Rate	<b>10.29%</b>	<b>9.80%</b>	<b>0.49%</b>

The actuarial assumptions in use for the June 30, 2021 actuarial valuation were developed based upon Retirement System experience and established tables. New demographic and economic assumptions were adopted by the Retirement Board on October 28, 2021 and are first used in the actuarial valuation as of June 30, 2021 presented here. In accordance with Sections 501, 508 and 517 of the Education Law, the Retirement Board has the authority to adopt the actuarial assumptions as recommended by the Actuary.

The actual employer contributions made by participating employers during the fiscal year ending June 30, 2021 were equal to the employer contributions determined in accordance with the applicable annual actuarial valuation.

## C. GAIN/LOSS IN THE EMPLOYER CONTRIBUTION RATE

The Employer Contribution Rate of 10.29% represents a 49 basis point increase from the prior year's rate of 9.80%.

### NORMAL RATE

The Normal Rate component of the Employer Contribution Rate (ECR) of 9.89% represents a 48 basis point increase over the prior year's rate of 9.41%. This change can be broken down as follows in the chart below. Note that a positive entry represents an actuarial loss, which is an increase in the ECR. A negative entry represents an actuarial gain, which is a decrease in the ECR.

<b>Salary/Service:</b>	This gain is due to actual salary and service lower than expected.	-0.10
<b>Investment Experience</b>	The recognition of prior investment gains and losses over a five-year period in accordance with the asset valuation method resulted in a net investment gain.	-3.64
<b>New Entrants:</b>	New entrants join the Retirement System as Tier 6 members with a long-term expected normal rate of approximately 4.3% which results in downward pressure on the Normal Rate.	-0.08
<b>Withdrawal:</b>	Withdrawal experience produced a loss.	+0.02
<b>Mortality:</b>	Members are living slightly longer than expected and receiving benefits for a longer period.	+0.04
<b>Retirement:</b>	Retirement benefit amount and retirement age experience produced a loss.	+0.13
<b>Pension Payments:</b>	Actual payments to retirees were less than expected.	-0.07
<b>Cost of Living Adjustment:</b>	The actual COLA increase of 1.4% was higher than the expected increase of 1.3%.	+0.02
<b>Actuarial Assumption Changes:</b>	Increase due to revision of assumptions – full demographic and economic assumptions study was completed prior to this valuation.	+4.50
<b>Miscellaneous:</b>	Decrease due to other sources of gain and loss (e.g. programming adjustments, overlap of assumptions, disability, transfers, etc.)	-0.34
<b>TOTAL CHANGE IN THE NORMAL RATE</b>		<b>0.48%</b>

## **OTHER COMPONENTS**

The **Expense Rate** is set during the budget process. As of June 30, 2021, the expense rate remains at 0.26%.

The **Group Life Insurance Fund Rate** is unchanged from the previous year. Contributions collected have been more than sufficient to cover payments over the past several years, resulting in an accumulated Group Life Insurance Fund of approximately \$454 million as of June 30, 2021. The Group Life Insurance Rate is being held constant, however, in anticipation of rising payouts in the future due to the growth in the number of retirees eligible for the post-retirement death benefit (Tiers 2 through 6) and the inactive member death benefit (Tiers 2 through 6).

The **Excess Benefit Plan Rate** is increased to 0.01%. This rate represents the Excess Benefit Fund's need for contributions to cover 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. The fund has accumulated assets of approximately \$2.8 million as of June 30, 2021. The rate has been set to 0.01% this year to increase the fund balance.

## **D. EMPLOYER CONTRIBUTION RATE HISTORY**

The following chart summarizes the Employer Contribution Rate for the last 20 years. The complete Employer Contribution Rate history is presented in Appendix 15.

<i>Salary Year</i>	<i>Employer Contribution Rate</i>	<i>Salary Year</i>	<i>Employer Contribution Rate</i>
2003-2004	2.52 %	2013-2014	16.25 %
2004-2005	5.63	2014-2015	17.53
2005-2006	7.97	2015-2016	13.26
2006-2007	8.60	2016-2017	11.72
2007-2008	8.73	2017-2018	9.80
2008-2009	7.63	2018-2019	10.62
2009-2010	6.19	2019-2020	8.86
2010-2011	8.62	2020-2021	9.53
2011-2012	11.11	2021-2022	9.80
2012-2013	11.84	2022-2023	10.29 *

\* Pending adoption by the Retirement Board at its August 2022 Board Meeting.

## E. EMPLOYER CONTRIBUTION RATE CHANGE

The Employer Contribution Rate has increased this year from 9.80% to 10.29%, representing an increase of 5%, primarily attributable to the increase in the Normal Rate component which increased from 9.41% to 9.89%. The rate of return on the System’s market value of assets for the fiscal year ending June 30, 2021 was 29.0%. The System’s current five-year market value rate of return rose to 11.9%, an increase from last year’s 6.8%. The June 30, 2021 actuarial valuation resulted in an increase in the normal rate, however, due to the revision of the actuarial assumptions. The increase in the cost generated by the change in assumptions was largely offset by the System’s investment gain. These two items accounted for most of the change in the employer contribution rate.

The Normal Rate component of the Employer Contribution Rate is calculated in accordance with the Aggregate Actuarial Cost Method, as required by statute (New York State Education Law Section 517). Under the Aggregate Actuarial Cost Method gains and losses resulting from differences between actual and expected experience, as well as changes to assumptions or plan provisions, are not separately amortized but are spread as part of the normal cost calculation, over the expected future working lifetime of active members. The Aggregate Method is a reasonable and appropriate actuarial cost method to use for ongoing plan funding purposes and is consistent with the System’s goal of accumulating sufficient assets to pay benefits as they come due.

## F. MEMBER DATA

The member data for the annual actuarial valuation was determined as of June 30, 2021.

	<b>June 30, 2021</b>	<b>June 30, 2020</b>
Active Members and Members not yet receiving benefits	259,158	261,232
Retired Members receiving monthly benefits	169,068	166,008
Beneficiaries receiving monthly benefits	6,722	6,561
Total	434,948	433,801

The number of retirements over each of the last ten years is as follows:

<i>Fiscal Year</i>	<i>Number of Retirements</i>	<i>Fiscal Year</i>	<i>Number of Retirements</i>
2011-2012	6,033	2016-2017	6,396
2012-2013	6,330	2017-2018	6,416
2013-2014	6,547	2018-2019	6,890
2014-2015	6,161	2019-2020	7,642
2015-2016	6,245	2020-2021	7,617

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 Annual Report.

## **G. FUNDED STATUS**

As of June 30, 2021, the actuarial value of plan assets, including GLIF assets, was equal to \$130.2 billion. The accrued pension benefit liability calculated in accordance with the Entry Age Normal Cost Method, including GLIF liabilities, was equal to \$131.1 billion. These two values produced a funded ratio of 99.3% as of June 30, 2021. If the market value of plan assets is used instead of the actuarial value of plan assets, the funded ratio as of June 30, 2021 would be equal to 113.0%.

For purposes of this funded ratio calculation, the plan liabilities have been calculated in accordance with the Entry Age Normal Cost Method as required by Governmental Accounting Standards Board (GASB) Statement No. 67. The Retirement System is funded in accordance with the Aggregate Cost Method. GASB Statement No. 67 requires that the Entry Age Normal Cost Method be used to calculate the accrued liability for purposes of presenting the funded ratio calculation for all plans, regardless of the cost method being used for funding purposes. Both Aggregate and Entry Age Normal are appropriate contribution allocation procedures for purposes of ongoing plan funding and are widely accepted actuarial cost methods.

The funded ratios provided here are an appropriate measurement of the System's funded status. While the funded ratios will fluctuate from year to year, a funded ratio of 100% is desirable and indicative of a well-funded System. The primary reason for this healthy funded ratio is that the Retirement System has collected the actuarially required contribution annually from employers. This is the primary feature that separates well-funded Systems from poorly-funded ones. A funded ratio of 100% does not, however, imply that future contributions will not be required. It says that now the System has assets equal to the present value of its liabilities accrued to date.

The funded status measurement provided here is not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the System's benefit obligations such as in a plan termination situation.

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

## **H. ACTUARIAL EXPERIENCE**

Each year the Office of the Actuary completes an experience study to regularly monitor the reasonableness and appropriateness of the actuarial assumptions used in the actuarial valuation. Changes are recommended when warranted. Assumptions are typically revised every five years. 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, future projected COLA's, and the probability of death for retired members and beneficiaries. A listing of the actuarial assumptions is provided in Appendix 18. A summary of the results of the most recent five-year experience study is contained in Appendix 11. The current actuarial assumptions were adopted by the Retirement Board on October 28, 2021 and effective with the current actuarial valuation of the Retirement System's assets and liabilities as of June 30, 2021. Specific details regarding the development of these actuarial assumptions can be found in the report entitled "*Report on the 2021 Recommended Actuarial Assumptions*".

## **I. ASSET ALLOCATION**

The Retirement Board, in consultation with Retirement System staff and the System's external investment consultant Callan, annually reviews the asset allocation to determine if any changes are warranted. The only asset allocation change made between June 30, 2021 and the time of this report was a reduction of 1% in Real Estate Debt (decreasing the allocation percentage to 6%) and an increase of 1% in Private Debt (increasing the allocation percentage to 2%). The asset allocation target equity-to-fixed income split was not changed.

System asset values are frequently reviewed, and assets are periodically rebalanced in line with the asset allocation targets and ranges.

The Callan first quarter 2022 long-term capital market projections analysis estimates that the system's asset allocation will produce a long-term expected annual geometric rate of return of 7.3% on a 30-year time horizon, and a geometric annual rate of return of 6.7% on a 20-year time horizon.

The Retirement System's asset allocation, including targets and ranges, can be found in Appendix 13. Historical rate of return information can be found in Appendix 12. Detailed investment information is available in the System's Annual Report.

## **J. NEW LEGISLATION**

The following significant legislation affecting the Retirement System was signed into law during the 2021 Legislative Session:

### Extension of the COVID-19 Death Benefit:

Chapter 78 of the Laws of 2021 extended the COVID-19 Death Benefit that was enacted last year to December 31, 2022. The COVID-19 death benefit enables the beneficiary of an eligible active member who died of COVID-19 to elect to receive the accidental death benefit (annuity of 50% of salary) instead of the ordinary active death benefit (generally a lump sum of three times salary plus a refund of member contributions).

The following significant legislation affecting the Retirement System was signed into law during the 2022 Legislative Session and will be reflected in the June 30, 2022 actuarial valuation. None of these items have a material impact on plan costs.

### **Chapter 56 of the Laws of 2022** (effective April 9, 2022, enacted as part of the State budget)

#### 5-Year Vesting:

Reduces the number of years of credited service required for vesting from ten years to five years for Tier 5 and 6 members for purposes of eligibility for a service retirement benefit or a deferred-vested retirement benefit.

#### Tier 6 Employee Contribution Rate Temporary Change:

For employee contributions to be made during the two fiscal years ending June 30, 2023 and June 30, 2024, the employee contribution rate for Tier 6 members will be determined using only a member's annual base wages. Compensation earned for extracurricular programs, or any other pensionable earnings paid in addition to the annual base wages will not be included in the employee contribution rate determination, as it ordinarily would.

#### Temporary Waiver of the Earnings-After-Retirement Limit:

A retiree may be employed and earn compensation in a position at a school district or board of cooperative educational services (BOCES) without suspension or diminution of their retirement allowance. Earnings received from April 9, 2022 to June 30, 2023 will not be applied to the standard Section 212 earnings-after-retirement limit of \$35,000 in New York State public employment per

calendar year. Post-retirement employment with a charter school, community college, SUNY, or any other NYS public employment is not covered by this law and is still subject to the \$35,000 calendar year earnings limitation. Retirees who are age 65 or greater are not subject to any earnings-after-retirement limit.

## **K. ASSESSMENT OF RISK**

Included in Appendix 14 is an Assessment of Risk. The purpose of this exhibit is to provide various plan maturity measures, as well as illustrate the hypothetical Employer Contribution Rate with varying actuarial assumptions. The charts also illustrate 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 based upon the actuarial valuation as of June 30, 2022. The capital markets experienced negative returns during the fiscal year ending June 30, 2022. The System's main domestic equity index, the S&P1500, returned -11.0% for the fiscal year. The System's main international equity index, the ACWI ex-US, returned -19.4% for the fiscal year. The System's fixed income index, the Barclay's US Aggregate Float Adjusted Bond index, returned -10.4% for the fiscal year. The System's finalized investment rate of return for the fiscal year ending June 30, 2022 will not be available until October of 2022. Based on the performance of these benchmarks, however, the System will have a loss on investments for the fiscal year, and the System's five-year rate of return will substantially decrease from last year's 11.9%.

## **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 staff review this data for reasonability and completeness as well as reconcile it against prior data. In addition, the valuation relies on financial data provided by the Retirement System's Finance Department. Data is reviewed by the Retirement System's independent auditors as part of the annual audit. We believe the data to be reasonable and appropriate for purposes of this valuation.

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 19. All benefits are included in the actuarial valuation.

Future actuarial measurements such as the funded ratio and employer contribution rate may differ significantly from the current measurements presented in this report due to such factors as: future experience that differs significantly from that predicted by the actuarial assumptions; changes in the actuarial assumptions or methods; and changes in plan provisions or applicable law.

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 actuarial assumptions, as adopted by the Retirement Board and 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 are members of the American Academy of Actuaries and the Society of Actuaries and meet the qualification standards of the American Academy of Actuaries to render the actuarial opinion contained in this report.



Richard A. Young, ASA, EA, MAAA, FCA  
Chief Actuary



Melody Prangley, FSA, EA, MAAA, FCA  
Deputy Chief Actuary



New York State Teachers' Retirement System  
Office of the Actuary  
July 26, 2022

APPENDIX 1

**RECONCILIATION OF THE MARKET VALUE OF ASSETS**

From June 30, 2020 to June 30, 2021

Totals may not add, due to rounding.

	<u>Market Value (in thousands)</u>
1 Market Value of Assets as of June 30, 2020	\$120,479,505
2 Contributions and Transfers	
Employer Contributions	1,618,437
Member Contributions	159,874
Net Transfers in/(out)	10,025
	<u>1,788,336</u>
3 Net Investment Income/(Loss)	33,668,008
4 Distributions	
Benefit Payments	7,731,900
Administrative Expenses	55,492
	<u>7,787,392</u>
5 Market Value of Assets as of June 30, 2021	<u><u>\$148,148,457</u></u>

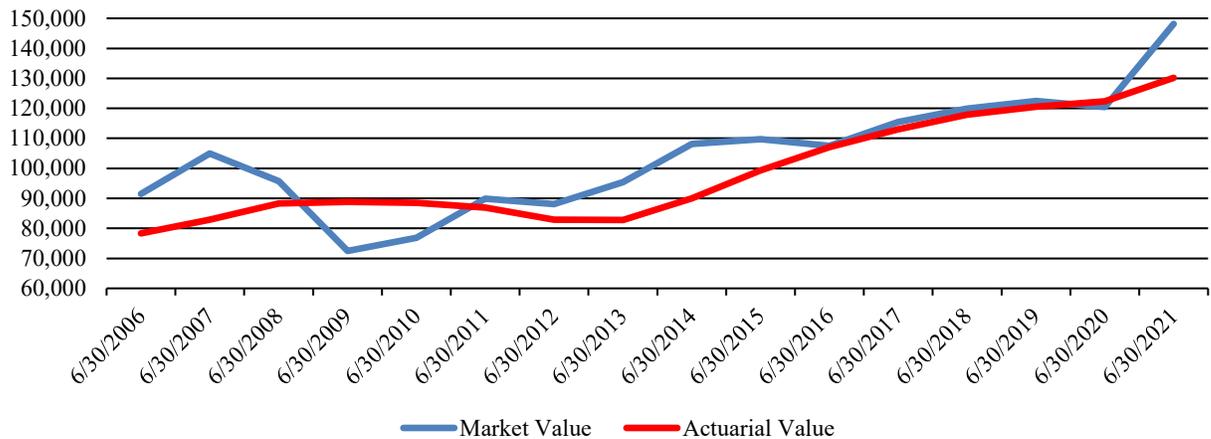
APPENDIX 2

**COMPARISON OF MARKET VALUE TO ACTUARIAL VALUE OF ASSETS**  
(In Millions)

Assets include GLIF assets. The Retirement System’s actuarial asset valuation method was changed effective with the June 30, 2007 and June 30, 2015 actuarial valuations.

Fiscal Year Ending	Market Value	Actuarial Value	Fiscal Year Ending	Market Value	Actuarial Value
6/30/2006	91,492.20	78,335.8	6/30/2014	108,155.1	90,007.1
6/30/2007	104,912.9	82,858.9	6/30/2015	109,718.9	99,301.8
6/30/2008	95,769.3	88,254.7	6/30/2016	107,506.1	107,039.2
6/30/2009	72,471.8	88,805.5	6/30/2017	115,468.4	113,059.7
6/30/2010	76,844.9	88,544.4	6/30/2018	119,915.5	117,859.5
6/30/2011	89,889.7	86,892.2	6/30/2019	122,477.5	120,586.9
6/30/2012	88,056.3	82,871.4	6/30/2020	120,479.5	122,400.5
6/30/2013	95,367.0	82,742.5	6/30/2021	148,148.5	130,173.8

**Market Value vs. Actuarial Value**  
(in Millions)



## APPENDIX 3

**ACTUARIAL PRESENT VALUE OF FUTURE BENEFITS**

(In Thousands)

The actuarial present value of future benefits (PVB) is the present value of retirement and ancillary benefit payments, excluding group life insurance benefits. The PVB is the present value of the benefit payments that the Retirement System is expected to pay in the future to current retirees and active and inactive (vested) members. The PVB is based upon both service and salary projected to retirement.

	<b>June 30, 2021</b>	<b>June 30, 2020</b>
Present Value of Benefits Currently Being Paid:		
Service Retirement Benefits	\$68,662,650	\$65,897,141
Disability Retirement Benefits	413,056	375,951
Death Benefits	2,523	2,083
Survivor Benefits	1,169,906	1,150,016
Cost-of-Living Allowance	<u>5,052,489</u>	<u>4,889,298</u>
Total Present Value of Benefits Presently Being Paid	75,300,623	72,314,489
Present Value of Benefits Payable in the Future to Current Active Members:		
Service Retirement Benefits	65,619,677	60,165,966
Disability Retirement Benefits	632,570	238,303
Termination Benefits	1,735,183	2,298,335
Death and Survivor Benefits	501,731	439,006
Cost-of-Living Allowance	<u>1,490,590</u>	<u>1,346,999</u>
Total Active Member Liabilities	69,979,750	64,488,609
Present Value of Benefits Payable in the Future to Current Inactive (Vested) Members:		
Retirement Benefits	492,184	426,494
Death Benefits	269	346
Cost-of-Living Allowance	<u>41,246</u>	<u>35,125</u>
Total Vested Liabilities	533,698	461,965
Unclaimed Funds	24,600	22,012
<b>Total Actuarial Present Value of Future Benefits</b>	<b>\$145,838,672</b>	<b>\$137,287,075</b>

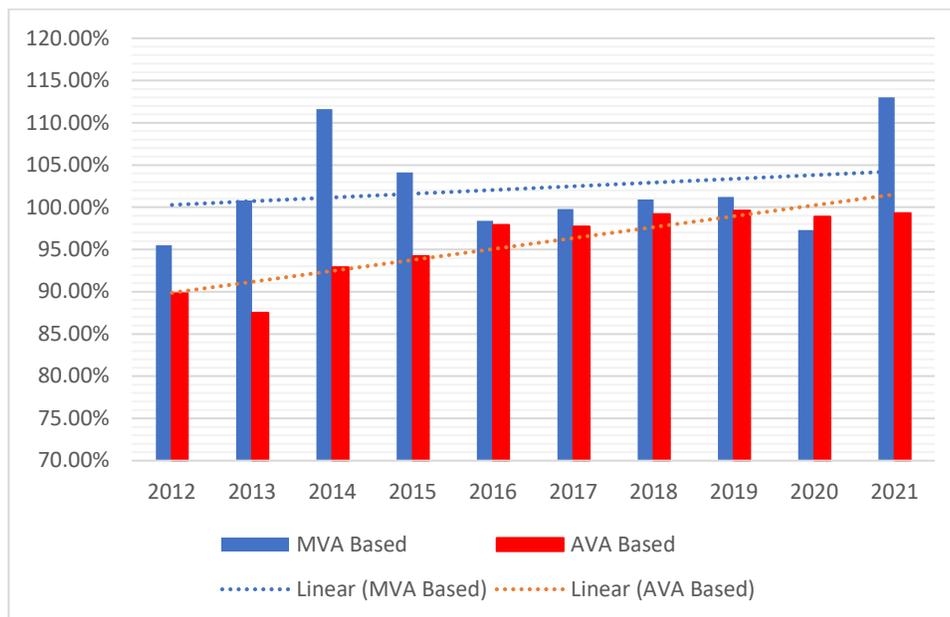
*Note: Totals may not sum due to rounding*

## FUNDING PROGRESS

The actuarial accrued liability is the portion of the actuarial present value of future benefits that is attributable to service rendered as of the valuation date. To assess the funding progress of a retirement system, a comparison between the actuarial value of assets and the actuarial accrued liabilities is made over time.

### Funding Progress (In Millions)

Fiscal Year Ended	Market Value of Assets (MVA)	Actuarial Value of Assets (AVA) <sup>1</sup>	Actuarial Accrued Liability	Percent Funded Based on:	
				MVA	AVA
2012	\$88,056.3	\$82,871.4	\$92,250.9	95.5%	89.8%
2013	95,367.0	82,742.5	94,583.8	100.8	87.5
2014	108,155.1	90,007.1	96,904.5	111.6	92.9
2015	109,718.9	99,301.8	105,401.8	104.1	94.2
2016	107,506.1	107,039.2	109,305.1	98.4	97.9
2017	115,468.4	113,059.7	115,672.5	99.8	97.7
2018	119,915.5	117,859.5	118,861.1	100.9	99.2
2019	122,477.5	120,586.9	121,049.3	101.2	99.6
2020	120,479.5	122,400.4	123,801.7	97.3	98.9
2021	148,148.5	130,173.8	131,077.4	113.0	99.3



<sup>1</sup> The Retirement System's asset valuation method was changed effective with the June 30, 2015 actuarial valuation.

APPENDIX 5

**EMPLOYER CONTRIBUTION RATE**

2021 Valuation

6.95% Interest

<b>Normal Rate</b>	9.89%
<b>Group Life Insurance Rate</b>	0.13
<b>Excess Benefit Plan Rate</b>	0.01
<b>Expense Rate</b>	0.26
<b>Computed Contribution Rate as of June 30, 2021</b>	10.29%

APPENDIX 5 (Cont'd)  
**NORMAL RATE CALCULATION**  
 2021 Valuation  
 6.95% Interest

## Liabilities

<b>Active Tier 1</b>		
Service Pension		\$74,904,754
Disability Pension		0
Vested Pension		0
Active Death over \$50,000		1,337,022
Death Benefit After 10-Yr Withdrawal over \$50,000		0
Annuity Savings Fund		1,789,224
COLA		586,167
	Total	\$78,617,167
 <b>Active Tier 2</b>		
Service Pension		\$88,940,033
Post Retired Death over \$50,000		78,125
Disability Pension		28,302
Post Disabled Death over \$50,000		96
Vested Pension		0
Active Death over \$50,000		403,526
Death Benefit After 10-Yr Withdrawal over \$50,000		0
COLA		1,043,712
	Total	\$90,493,794
 <b>Active Tier 3</b>		
Service Pension		\$660,293,086
Post Retired Death over \$50,000		388,262
Disability Pension		581,755
Post Disabled Death over \$50,000		2,544
Refund on Active Death		698,518
Active Death over \$50,000		1,892,495
Refund on Quit		2,417
Vested Pension		4,159,085
Death Benefit After 10-Yr Withdrawal over \$50,000		0
Refund on Death after Vested Withdrawal		0
COLA		10,869,172
	Total	\$678,887,334

APPENDIX 5 (Cont'd)  
**NORMAL RATE CALCULATION (Cont'd)**

2021 Valuation  
6.95% Interest

**Liabilities (Cont'd)**

**Active Tier 4**

Service Pension	\$59,155,993,000
Post Retired Death over \$50,000	36,159,652
Disability Pension	526,377,457
Post Disabled Death over \$50,000	2,513,134
Refund on Active Death	42,072,949
Active Death over \$50,000	300,340,708
Refund on Quit	10,586,799
Vested Pension	1,259,057,921
Death Benefit After 10-Yr Withdrawal over \$50,000	1,405,976
Refund on Death after Vested Withdrawal	409,385
COLA	1,262,749,400
Total	\$62,597,666,381

**Active Tier 5**

Service Pension	\$1,385,774,465
Post Retired Death over \$50,000	1,141,997
Disability Pension	25,346,234
Post Disabled Death over \$50,000	107,744
Refund on Active Death	4,996,210
Active Death over \$50,000	14,619,103
Refund on Quit	23,296,805
Vested Pension	70,503,314
Death Benefit After 10-Yr Withdrawal over \$50,000	246,340
Refund on Death after Vested Withdrawal	124,000
COLA	38,751,701
Total	\$1,564,907,913

**Active Tier 6**

Service Pension	\$3,625,449,382
Post Retired Death over \$50,000	3,907,787
Disability Pension	80,220,478
Post Disabled Death over \$50,000	343,888
Refund on Active Death	23,144,145
Active Death over \$50,000	56,563,118
Refund on Quit	167,110,789
Vested Pension	196,080,105
Death Benefit After 10-Yr Withdrawal over \$50,000	798,555
Refund on Death after Vested Withdrawal	497,129
COLA	132,987,342
Total	\$4,287,102,718

APPENDIX 5 (Cont'd)  
**NORMAL RATE CALCULATION (Cont'd)**

2021 Valuation  
6.95% Interest

**Liabilities (Cont'd)**

**Retirees**

Retired Pension	\$68,584,303,406
Retired Annuity	78,346,109
Disability Pension	412,637,705
Disability Annuity	418,295
Beneficiary Pension	1,157,641,212
Beneficiary Annuity	6,203,774
DBA Pension	5,856,550
DBA Annuity	204,914
Post Retired Death over \$50,000	2,046,375
COLA	4,879,126,820
Catch-Up, Prior §532 Supp & Escalation	173,361,697
Total	\$75,300,146,857

**Vesteds**

Inactive Vested	\$492,184,206
Death Benefit After 10-Yr Withdrawal over \$50,000	268,520
Active Vested	625,230,522
Death Benefit After 10-Yr Withdrawal over \$50,000	873,621
COLA	84,766,723
Total	\$1,203,323,592

**TIAA**

Service Pension	\$1,302,595
Disability Pension	15,559
Vested Pension	30,841
Active Death over \$50,000	17,008
COLA	81,147
Total	\$1,447,150

**Miscellaneous**

Incurred Death but not Paid	\$11,478,943
Unclaimed Non-Member Funds	24,599,871
Total	\$36,078,814

	\$145,838,671,720
--	-------------------

**Total Liabilities**

APPENDIX 5 (Cont'd)  
**NORMAL RATE CALCULATION (Cont'd)**

2021 Valuation  
6.95% Interest

**Assets for Valuation**

	Current Total Assets (excluding contributions receivable)	\$146,431,272,296
Less:	Expense Fund	62,806,524
Less:	Group Life Insurance Fund	453,669,551
Plus:	(Employer Contributions Receivable as of June 30, 2021 <sup>1</sup> ) x (1.0695) <sup>-7/24</sup>	
	= (1,581,828,057) x (1.0695) <sup>-7/24</sup>	1,551,130,048
Plus:	(Member Contributions Receivable as of June 30, 2021 <sup>1</sup> ) x (1.0695) <sup>-7/24</sup>	
	= (135,357,010) x (1.0695) <sup>-7/24</sup>	132,730,182

**Adjusted Market Value of Assets for Normal Rate** \$147,598,656,451

Less: 5 Year Smoothing Adjustment 17,878,506,606

**Actuarial Value of Assets for Normal Rate Valuation Purposes** \$129,720,149,845

**Receivables**

	Employer Contributions Receivable from Normal Rate in 2022-2023 Fiscal Year <sup>2</sup> (2021-2022 Salaries) x (2020 Normal Rate) x (1.0695) <sup>(1+7/24)</sup>	
	= (16,464,394,260) x (0.0941) x (1.0695) <sup>(1+7/24)</sup>	\$1,420,507,491
	Present Value of Future Member Contributions <sup>3</sup> (Tier 5 Present Value of Future Employee Contributions) x (1.0695) <sup>-7/24</sup>	
	= (276,289,172) x (1.0695) <sup>-7/24</sup>	270,927,320
	(Tier 6 Present Value of Future Employee Contributions) x (1.0695) <sup>-7/24</sup>	
	= (1,833,445,324) x (1.0695) <sup>-7/24</sup>	1,797,864,263
	<b>Total Receivables</b>	<b>\$3,489,299,074</b>

<sup>1</sup> Employer and Member Contributions Receivables are based on the 2020-2021 Member Paybase and are collected in 3 installments on September 15, October 15, and November 15 of 2021. The discount represents the time value of money to the measurement date.

<sup>2</sup> Employer Contributions Receivable is estimated based on projected 2021-2022 Member Salaries for the closed group population used to value the plan's liabilities and is collected in 3 installments on September 15, October 15, and November 15 of 2022. The discount represents the time value of money to the measurement date.

<sup>3</sup> The Present Values of Future Member Contributions are estimated for the closed group population used to value the plan's liabilities. These member contributions are collected in the years 2022-2023 and beyond and have an additional discount factor applied to adjust for the timing of the actual payments on September 15, October 15, and November 15 of each prospective year.

APPENDIX 5 (Cont'd)  
**NORMAL RATE CALCULATION (Cont'd)**

2021 Valuation  
 6.95% Interest

**Present Value of Future Salaries (PVFS)**

	Total PVFS <sup>1</sup>	
Tier 1	\$26,746,785	
Tier 2	35,037,746	
Tier 3	202,919,505	
Tier 4	102,025,392,249	
Tier 5	7,893,976,355	
Tier 6	35,473,040,089	
	\$145,657,112,729	
2021-2022 Discounted Salary	15,394,478,036	
Net PVFS	\$130,262,634,693	$\times (1.0695)^{-7/24} = \$127,734,671,234$

**Normal Rate**

Total Liabilities – (Assets + Receivables)

Present Value of Future Salaries

$$= \frac{\$12,629,222,801}{\$127,734,671,234}$$

$$= 9.887075\%$$

$$= 9.89\% \quad \text{(rounded)}$$

<sup>1</sup> The Present Value of Future Salaries includes billable salaries starting with the 2022-2023 salary year. The billable salaries for the years 2020-2021 and 2021-2022 are excluded from the PVFS because a Normal Rate applicable to the 2020-2021 and 2021-2022 billable salary years has already been determined. The expected contributions thereon are included in the assets as receivables. Contributions are expected to be received on September 15, October 15, and November 15 of 2021 and 2022, respectively. Therefore, the total PVFS is discounted 3.5 months to the measurement date.

**GROUP LIFE INSURANCE FUND  
(GLIF)**

2021 Valuation

6.95% Interest

<b>GLIF Balance as of June 30, 2020</b>	<b>\$348,660,803</b>
Benefit Payments During 2020-2021	19,836,074
Contributions During 2020-2021	22,065,122
GLIF Net Investment Income During 2020-2021	102,779,700
(Based on 2020-2021 Market Value of Assets Rate of Return of 29%)	
 <b>GLIF Balance as of June 30, 2021</b>	 <b>\$453,669,551</b>
Benefit Payments During 2021-2022	21,000,000
Contributions During 2021-2022	22,065,169
GLIF Net Investment Income During 2021-2022	31,888,098
(Based on estimated Market Value of Assets Rate of Return of 6.95%)	
 <b>Estimated GLIF Balance as of June 30, 2022</b>	 <b>\$486,622,818</b>

**Calculation of the GLIF Rate for the June 30, 2021 Actuarial Valuation:**

Expected Salaries for the 2021-2022 Fiscal Year	\$17,211,000,000
GLIF Rate	0.13%
Expected Contributions for the 2022-2023 Fiscal Year	\$22,374,300

Note that the GLIF Rate is currently maintained at 0.13%. This contribution rate, along with investment income, is expected to cover the expected GLIF benefit payment for the current year. In future years, when the expected GLIF benefit payments are larger than the GLIF Rate of 0.13%, the GLIF Balance will begin to be used.

**EXCESS BENEFIT PLAN FUND**

2021 Valuation

<b>Excess Benefit Plan Balance as of June 30, 2020</b>	<b>\$3,175,296</b>
Final Adjustment for the Fiscal Year Ending June 30, 2020	72,910
Benefit Payments During 2020-2021	405,000
Contributions During 2020-2021	4,344
Net Investment Income During 2020-2021 <sup>1</sup> (Including miscellaneous adjustments)	0
<b>Excess Benefit Plan Balance as of June 30, 2021</b>	<b>\$2,847,550</b>
Final Adjustment for the Fiscal Year Ending June 30, 2021	378,501
Benefit Payments During 2021-2022	500,000
Contributions During 2021-2022	0
Net Investment Income During 2021-2022 <sup>1</sup> (Including miscellaneous adjustments)	0
<b>Estimated GLIF Balance as of June 30, 2022</b>	<b>\$2,726,051</b>

**Calculation of the Excess Benefit Plan Rate for the June 30, 2021 Actuarial Valuation:**

Set the Excess Benefit Plan Rate at 0.01% to increase the balance in the fund.

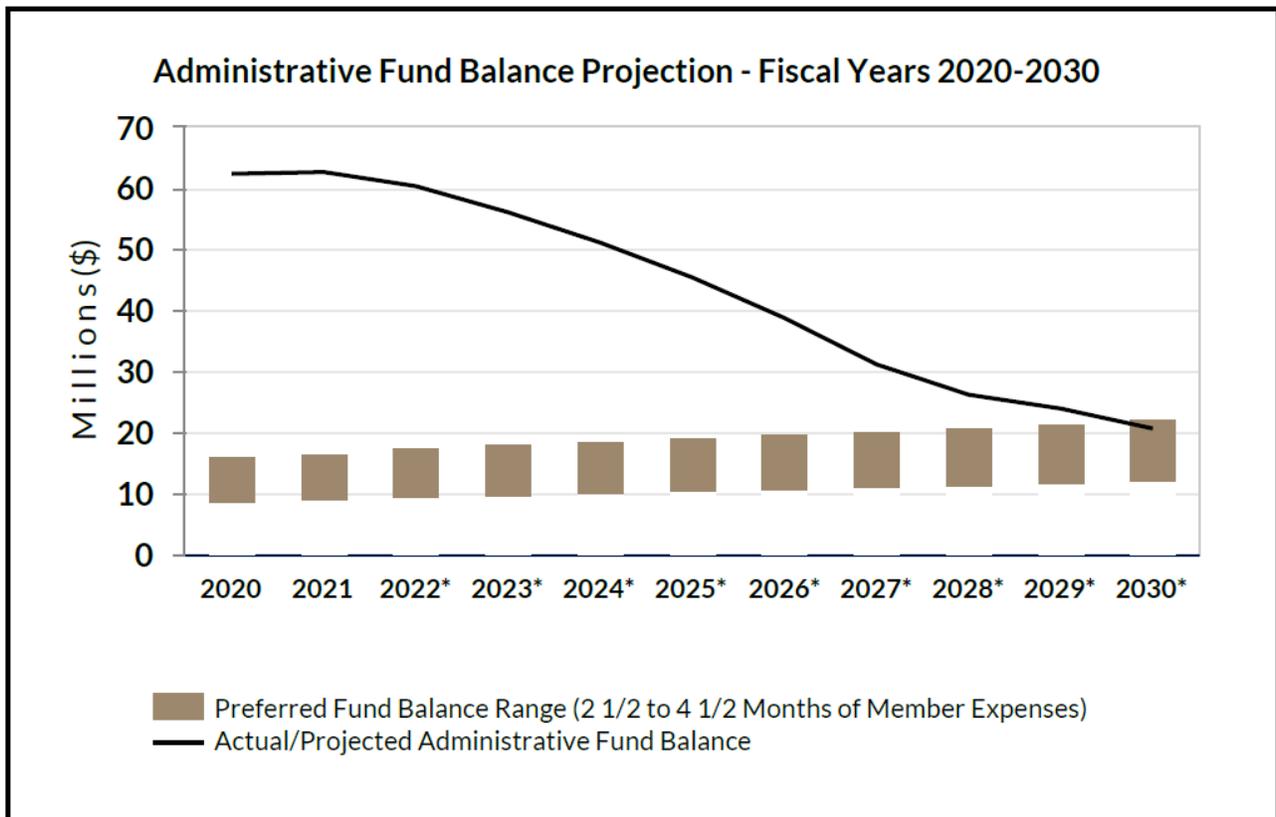
<sup>1</sup> Fund is in a zero-interest checking account.

**Administrative Rate and Employer Contributions<sup>1</sup>**

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 payroll. Consideration is also given to the overall status of the fund balance.

Based on the fall collection period for employer contributions, the preferred fund balance has been established to be 2 ½ to 4 ½ months of estimated member-related expenses. Since 2009, the fund balance has exceeded the preferred range due to prudent spending and cost containment initiatives. To bring the fund balance gradually back down within the preferred range, the administrative rate was lowered from 0.27% to 0.26% during the 2018-2019 fiscal year. The 2022-2023 fiscal year will be the fourth year that employer contributions will be collected at the 0.26% rate.

A forecast analysis of expenses was performed. This forecast projects maintaining the Administrative Rate at 0.26% through 2026. The administration fund balance projection includes long term projections, and therefore is likely to change over time. The Board will be kept informed as balances and rates become more accurate.



\*Projected fund balance.

**Collections Based on Member Payroll – Fiscal Years 2017 - 2024**

Annual Member Payroll (dollars in thousands)		Employer Contribution	Employer Contributions (dollars in thousands)		% Increase (Decrease) in Contributions
Year	Amount	Rate (%)	Year Collected	Amount	
2023-24	\$17,696,000 *	0.26% *	2024-25	\$46,010 *	1.40% *
2022-23	17,452,000 *	0.26	2023-24	45,375 *	1.40 *
2021-22	17,211,000 *	0.26	2022-23	44,749 *	1.40 *
2020-21	16,973,207	0.26	2021-22	44,130 **	1.63
2019-20	16,973,200	0.26	2020-21	43,421	(1.30)
2018-19	16,691,600	0.26	2019-20	43,994	2.76
2017-18	16,288,900	0.27	2018-19	42,812	2.76
2016-17	15,846,700	0.27	2017-18	41,664	2.66

\* Estimated

\*\* Reflects employer contributions based on actual member payroll.

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<sup>1</sup>This entire section comes from the NYSTRS 2022-23 Operating Budget Report

**ASSET VALUATION  
METHOD**

**Development of Smoothing Adjustment**

FYE	Market Value	Contributions	Benefit Payments	Average Market Value <sup>1</sup>
6/30/2016	105,357,811,418	2,726,314,201	6,780,291,815	
6/30/2017	113,516,789,802	2,165,955,433	6,984,647,124	103,399,706,288
6/30/2018	118,230,310,625	1,994,973,683	7,169,609,705	111,345,091,308
6/30/2019	120,617,512,667	1,738,012,513	7,381,558,565	115,770,623,539
6/30/2020	118,887,899,173	1,920,343,091	7,575,286,123	118,190,112,628
6/30/2021	146,431,272,296	1,653,676,471	7,787,392,208	116,165,557,236

FYE	Actual Gain/(Loss) <sup>2</sup>	Expected Gain/(Loss) <sup>3</sup>	Unexpected Gain/(Loss) <sup>4</sup>	Smoothing Adjustment <sup>5</sup>
6/30/2016	2,392,354,248			
6/30/2017	12,951,891,658	7,754,977,972	5,196,913,686	
6/30/2018	9,928,010,678	8,072,519,120	1,855,491,558	
6/30/2019	8,023,178,506	8,393,370,207	(370,191,701)	
6/30/2020	3,923,634,378	8,391,497,997	(4,467,863,619)	
6/30/2021	33,668,008,496	8,247,754,564	25,420,253,932	<b>17,878,506,606</b>

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

<sup>2</sup> Actual Gain/(Loss) = Net Investment Income

<sup>3</sup> Expected Gain/(Loss) = 7.5% x Average Market Value for fiscal years ending 6/30/2016 and 6/30/2017  
 Expected Gain/(Loss) = 7.25% x Average Market Value for fiscal years ending 6/30/2018 and 6/30/2019  
 Expected Gain/(Loss) = 7.10% x Average Market Value for fiscal years ending on or after 6/30/2020

<sup>4</sup> Unexpected Gain/(Loss) = Actual Gain/(Loss) - Expected Gain/(Loss)

<sup>5</sup> Smoothing Adjustment = (.20 x Unexpected Gain/(Loss) 6/30/2018)  
 + (.40 x Unexpected Gain/(Loss) 6/30/2019)  
 + (.60 x Unexpected Gain/(Loss) 6/30/2020)  
 + (.80 x Unexpected Gain/(Loss) 6/30/2021)

## HYPOTHETICAL LONG-TERM NORMAL RATE CALCULATION BASED ON NEW ENTRANT NORMAL RATE AS OF JUNE 30, 2021

The long-term expected normal rate has been determined based on the new entrant population for the year ending June 30, 2021. The new entrant population of **9,582 Tier 6 members** is defined to be members with the following characteristics:

1. date of membership between 7/1/2020 and 6/30/2021;
2. active as of 6/30/2021; and
3. no more than 1 year of NYS service as of 6/30/2021.

### New Entrant Normal Rate as of June 30, 2021

The New Entrant Normal Rates determined under the benefit structures of Tiers 4, 5 and 6 using the member data for the current class of new entrants and the actuarial assumptions in the **June 30, 2021** actuarial valuation are as follows:

Valuation Rate of Interest: <b>6.95%</b>	Valued as Tier 4 Benefit Structure	Valued as Tier 5 Benefit Structure	Valued as Tier 6 Benefit Structure
(1) Present Value of Future Benefits (PVB)	\$ 374,775,316	\$ 328,655,410	\$ 269,019,876
(2) Present Value of Future Member Contributions (PVFC)	48,745,830	105,571,813	139,543,397
(3) Present Value of Future Salaries (PVFS)	2,999,113,587	3,016,337,502	3,016,337,502
(4) Long Term Normal Cost of Benefit Structure as a Percent of Salary: (1) / (3)	12.5%	10.9%	8.9%
(5) Member's Share of the Normal Cost: (2) / (3)	1.6%	3.5%	4.6%
<b>(6) Employer's Share of the Normal Cost: (4) - (5)</b>	<b>10.9%</b>	<b>7.4%</b>	<b>4.3%</b>
Sensitivity Analysis <sup>1</sup> Valuation Rate of Interest: <b>5.95%</b>	Valued as Tier 4 Benefit Structure	Valued as Tier 5 Benefit Structure	Valued as Tier 6 Benefit Structure
(1) Present Value of Future Benefits (PVB)	\$ 468,835,412	\$ 413,734,912	\$ 338,428,629
(2) Present Value of Future Member Contributions (PVFC)	49,796,647	111,174,781	145,851,373
(3) Present Value of Future Salaries (PVFS)	3,158,243,143	3,176,422,320	3,176,422,320
(4) Long Term Normal Cost of Benefit Structure as a Percent of Salary: (1) / (3)	14.8%	13.0%	10.7%
(5) Member's Share of the Normal Cost: (2) / (3)	1.6%	3.5%	4.6%
<b>(6) Employer's Share of the Normal Cost: (4) - (5)</b>	<b>13.2%</b>	<b>9.5%</b>	<b>6.1%</b>

### History

As of June 30, 2021, and the 4 prior years, the long-term expected normal rates for new entrants determined under the benefit structures for Tiers 4, 5 and 6 are as follows:

Valuation Year	Employer Normal Rate from the Valuation	New Entrant Employer Normal Rate			Sensitivity Analysis <sup>1</sup>			Number of New Entrants <sup>2</sup>
		Tier 4	Tier 5	Tier 6	Tier 4	Tier 5	Tier 6	
2017 <sup>3</sup>	10.23%	10.6%	7.6%	4.7%	13.0%	9.8%	6.7%	11,061
2018 <sup>4</sup>	8.47%	9.4%	6.8%	4.2%	11.6%	8.8%	6.0%	11,759
2019 <sup>5</sup>	9.14%	9.6%	6.9%	4.4%	11.8%	9.0%	6.1%	11,529
2020	9.41%	9.7%	7.1%	4.4%	11.9%	9.1%	6.2%	9,797
2021 <sup>6</sup>	9.89%	10.9%	7.4%	4.3%	13.3%	9.5%	6.1%	9,582

These rates represent the employers' costs only, not the total cost of the benefit structure which is in part funded by member contributions and excludes the Expense, GLIF and Excess Benefit Fund rates.

<sup>1</sup> New Entrant Normal Rate determined using an interest rate that is 1.0% below the actuarial assumed rate of return and the valuation salary scale arithmetically reduced by 0.50%.

<sup>2</sup> Number of new entrants processed through the valuation.

<sup>3</sup> Actuarial assumed rate of return of 7.25%.

<sup>4</sup> Definition of new entrants changed to exclude new members who have more than one year of service because they are transfers in from another retirement system and are older with higher salary. Also, the Present Value of Future Salaries was changed to no longer exclude the current year's salary for the purposes of the New Entrant Normal Rate.

<sup>5</sup> Actuarial assumed rate of return revised from 7.25% to 7.10%.

<sup>6</sup> Actuarial assumed rate of return revised from 7.10% to 6.95%.

## APPENDIX 7

## MEMBER RECONCILIATION

## ACTIVE MEMBERS:

	Male	Female	Total
June 30, 2020	61,140	200,092	261,232
Changes During Year:			
Added	2,276	7,844	10,120
Withdrawn	1,141	3,262	4,403
Retired	1,614	6,003	7,617
Died	69	105	174
June 30, 2021	60,592	198,566	259,158

## MEMBERS RETIRED FOR:

	Service*			Disability**			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
June 30, 2020	49,207	114,697	163,904	437	1,667	2,104	49,644	116,364	166,008
Changes During Year:									
Retired	1,599	5,938	7,537	15	65	80	1,614	6,003	7,617
Died	1,773	2,579	4,352	38	90	128	1,811	2,669	4,480
Lump Sum	13	63	76	0	0	0	13	63	76
Restored to Active Membership	0	0	0	0	1	1	0	1	1
June 30, 2021	49,020	117,993	167,013	414	1,641	2,055	49,434	119,634	169,068

\*Also includes vested retirees.

\*\*Includes 15 males and 34 females retired for disability who receive a service benefit.

## BENEFICIARIES OF DECEASED:

	Service Annuitants			Disability Annuitants			Active Members			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
June 30, 2020	1,491	4,702	6,193	108	160	268	20	80	100	1,619	4,942	6,561
Changes During Year:												
Added	178	394	572	8	5	13	1	2	3	187	401	588
Died	130	289	419	3	4	7	0	1	1	133	294	427
June 30, 2021	1,539	4,807	6,346	113	161	274	21	81	102	1,673	5,049	6,722

## SUMMARY:

	Male	Female	Total
Active Members	60,592	198,566	259,158
Retired Members	49,434	119,634	169,068
Beneficiaries	1,673	5,049	6,722
Total	111,699	323,249	434,948

## APPENDIX 8

## DISTRIBUTION OF ACTIVE MEMBERS

## Distribution by Age as of June 30, 2021

Age as of Last Birthday	Male	Female	Total
15-19	24	64	88
20-24	1,454	5,366	6,820
25-29	4,711	15,838	20,549
30-34	6,420	21,853	28,273
35-39	7,613	25,392	33,005
40-44	9,701	30,374	40,075
45-49	10,066	29,782	39,848
50-54	9,916	31,129	41,045
55-59	6,104	21,244	27,348
60-64	2,924	12,378	15,302
65-69	1,144	3,876	5,020
70-74	378	1,010	1,388
75-79	101	199	300
80-84	24	51	75
85 or older	12	10	22
<b>Total</b>	<b>60,592</b>	<b>198,566</b>	<b>259,158</b>
 Average Age (Years – Months)	 44-4	 44-4	 44-4

## Distribution by Age and Tier of Membership as of June 30, 2021

Age as of Last Birthday	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6	Total
15-19	0	0	0	0	0	88	88
20-24	0	0	0	0	0	6,820	6,820
25-29	0	0	0	71	182	20,296	20,549
30-34	0	0	0	3,304	4,585	20,384	28,273
35-39	0	0	0	19,598	3,152	10,255	33,005
40-44	0	0	0	31,123	1,222	7,730	40,075
45-49	0	0	0	32,950	881	6,017	39,848
50-54	0	0	1	35,041	807	5,196	41,045
55-59	0	0	36	23,398	606	3,308	27,348
60-64	0	4	588	12,475	356	1,879	15,302
65-69	5	93	396	3,588	197	741	5,020
70-74	89	93	71	851	59	225	1,388
75-79	50	7	11	182	9	41	300
80-84	18	5	3	35	3	11	75
85 or older	7	0	0	11	2	2	22
<b>Total</b>	<b>169</b>	<b>202</b>	<b>1,106</b>	<b>162,627</b>	<b>12,061</b>	<b>82,993</b>	<b>259,158</b>
 Average Age (Years – Months)	 74-11	 69-11	 64-5	 48-9	 39-9	 35-11	 44-4

APPENDIX 8 (Cont'd)

Distribution of Active Members by Age and New York State Service as of June 30, 2021

Age as of Last Birthday	Male		Total
	< 10 Years NYS	10+ Years NYS	
15-19	24	0	24
20-24	1,454	0	1,454
25-29	4,711	0	4,711
30-34	5,973	447	6,420
35-39	3,855	3,758	7,613
40-44	2,644	7,057	9,701
45-49	1,881	8,185	10,066
50-54	1,543	8,373	9,916
55-59	1,130	4,974	6,104
60-64	746	2,178	2,924
65-69	431	713	1,144
70-74	191	187	378
75-79	51	50	101
80-84	13	11	24
85 or older	10	2	12
<b>Total</b>	<b>24,657</b>	<b>35,935</b>	<b>60,592</b>

Age as of Last Birthday	Female		Total
	< 10 Years NYS	10+ Years NYS	
15-19	64	0	64
20-24	5,366	0	5,366
25-29	15,837	1	15,838
30-34	20,193	1,660	21,853
35-39	13,319	12,073	25,392
40-44	10,012	20,362	30,374
45-49	8,313	21,469	29,782
50-54	7,975	23,154	31,129
55-59	5,015	16,229	21,244
60-64	2,687	9,691	12,378
65-69	991	2,885	3,876
70-74	331	679	1,010
75-79	68	131	199
80-84	13	38	51
85 or older	6	4	10
<b>Total</b>	<b>90,190</b>	<b>108,376</b>	<b>198,566</b>

APPENDIX 8 (Cont'd)

**Distribution of Active Members by Total Service as of June 30, 2021**

Years of Service	Male	Female	Total
0-4	15,379	52,973	68,352
5-9	8,781	35,287	44,068
10-14	7,336	26,946	34,282
15-19	9,941	31,657	41,598
20-24	10,475	29,587	40,062
25-29	5,975	14,716	20,691
30-34	2,113	5,930	8,043
35+	592	1,470	2,062
<b>Total</b>	<b>60,592</b>	<b>198,566</b>	<b>259,158</b>

Average Service (Years – Months)	13-5	12-4	12-7
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**Distribution of Active Members by Total Service and Tier of Membership as of June 30, 2021**

Age as of Last Birthday	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6	Total
0-4	25	15	16	3,851	2,663	61,782	68,352
5-9	10	26	45	17,667	5,341	20,979	44,068
10-14	13	21	92	29,955	4,006	195	34,282
15-19	11	23	72	41,423	41	28	41,598
20-24	11	10	139	39,888	7	7	40,062
25-29	6	15	147	20,519	3	1	20,691
30-34	19	13	119	7,891	0	1	8,043
35+	74	79	476	1,433	0	0	2,062
<b>Total</b>	<b>169</b>	<b>202</b>	<b>1,106</b>	<b>162,627</b>	<b>12,061</b>	<b>82,993</b>	<b>259,158</b>

Average Service (Years – Months)	29-6	26-3	29-3	18-0	7-4	2-8	12-7
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**Total and Average Earnings by Tier of Membership for Active Members as of June 30, 2021**

	Total Earnings	Average Earnings*	Average Earnings* of Full-Time Members
Tier 1	\$13,651,770	\$105,828	\$121,204
Tier 2	\$15,104,288	\$100,028	\$113,710
Tier 3	\$101,014,360	\$103,711	\$109,682
Tier 4	\$13,264,857,451	\$93,212	\$96,400
Tier 5	\$615,597,127	\$65,163	\$70,968
Tier 6	\$2,733,916,488	\$45,126	\$57,199
<b>Total</b>	<b>\$16,744,141,484</b>	<b>\$78,392</b>	<b>\$86,307</b>

\*Average earnings calculated using only those active members with earnings during the 2020 – 21 school year.

APPENDIX 9  
**HISTORICAL MEMBER STATISTICS**

**Active Members and Annuitants 1925-2021**

As of June 30	Active Members	Retirees & Beneficiaries
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
2015	267,715	158,458
2020	261,232	172,569
2021	259,158	175,790

**Number of Active Members by Tier**

As of June 30	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6	Total
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
2013	1,968	2,447	9,450	231,258	19,452	8,753	273,328
2014	1,439	1,810	7,753	222,545	19,124	17,368	270,039
2015	1,116	1,348	6,222	214,020	18,878	26,131	267,715
2016	832	974	4,920	204,912	18,540	36,172	266,350
2017	607	720	3,881	195,226	17,722	46,605	264,761
2018	446	546	2,993	186,581	16,499	57,525	264,590
2019	349	403	2,276	178,516	14,595	67,378	263,517
2020	249	282	1,638	170,306	13,040	75,717	261,232
2021	169	202	1,106	162,627	12,061	82,993	259,158

## RETIREMENT STATISTICS

## Members Retired in 2020-2021 for:

	Service*	Disability
<b>Number Retired</b>	<b>7,537</b>	<b>80</b>
Age at Retirement:		
Average	61 yrs. 5 mos.	50 yrs. 7 mos.
Median	61 yrs. 6 mos.	50 yrs. 5 mos.
Years of Service:		
Average	26 yrs. 3 mos.	19 yrs. 8 mos.
Median	28 yrs. 0 mos.	19 yrs. 7 mos.
Benefit**:		
Average	\$49,145	\$30,076
Median	\$50,322	\$29,292
Final Average Salary (FAS):		
Average	\$91,713	\$82,312
Median	\$92,370	\$81,431
Benefit as % of FAS***:		
Average	49.22%	35.79%
Median	53.33%	33.33%

## Members Retired in 2020-2021 for Service\* with:

	Less Than 10 Yrs. Svc.	10 or More Yrs. and Less Than 20 Yrs. Svc.	20 or More Yrs. and Less Than 30 Yrs. Svc.	30 or More Yrs. Svc.
<b>Number Retired</b>	<b>300</b>	<b>1,063</b>	<b>2,739</b>	<b>3,435</b>
Age at Retirement:				
Average	61 yrs. 10 mos.	62 yrs. 6 mos.	63 yrs. 1 mo.	59 yrs. 9 mos.
Median	61 yrs. 1 mo.	62 yrs. 6 mos.	62 yrs. 9 mos.	58 yrs. 9 mos.
Years of Service:				
Average	7 yrs. 3 mos.	15 yrs. 0 mos.	24 yrs. 1 mo.	33 yrs. 2 mos.
Median	7 yrs. 5 mos.	15 yrs. 1 mo.	24 yrs. 0 mos.	32 yrs. 2 mos.
Benefit**:				
Average	\$4,228	\$12,601	\$40,194	\$71,515
Median	\$3,469	\$9,373	\$38,928	\$68,202
Final Average Salary (FAS):				
Average	\$37,676	\$53,927	\$87,629	\$111,382
Median	\$35,013	\$43,546	\$86,738	\$105,626
Benefit as % of FAS***:				
Average	10.72%	22.79%	45.24%	63.94%
Median	10.19%	22.78%	45.11%	63.00%

\*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.

**All Retirees as of June 30, 2021 Retired for:**

	<b>Service*</b>	<b>Disability</b>
<b>Number Retired</b>	<b>167,062</b>	<b>2,006</b>
Age at Retirement:		
Average	59 yrs. 1 mo.	49 yrs. 7 mos.
Median	58 yrs. 1 mo.	50 yrs. 4 mo.
Age Attained as of June 30, 2021:		
Average	73 yrs. 6 mos.	66 yrs. 0 mos.
Median	73 yrs. 0 mos.	66 yrs. 8 mos.
Years of Service:		
Average	27 yrs. 8 mos.	18 yrs. 4 mos.
Median	30 yrs. 1 mo.	17 yrs. 6 mos.
Benefit**:		
Average	\$43,943	\$21,895
Median	\$44,371	\$20,128
Final Average Salary (FAS):		
Average	\$76,245	\$60,585
Median	\$74,290	\$57,459
Benefit as % of FAS***:		
Average	53.53%	35.40%
Median	60.00%	33.33%

**All Retirees as of June 30, 2021 Retired for Service\* with:**

	<b>Less Than 10 Yrs. Svc.</b>	<b>10 or More Yrs. and Less Than 20 Yrs. Svc.</b>	<b>20 or More Yrs. and Less Than 30 Yrs. Svc.</b>	<b>30 or More Yrs. Svc.</b>
<b>Number Retired</b>	<b>5,028</b>	<b>23,795</b>	<b>49,609</b>	<b>88,630</b>
Age at Retirement:				
Average	60 yrs. 5 mos.	59 yrs. 3 mos.	60 yrs. 4 mos.	58 yrs. 3 mos.
Median	59 yrs. 7 mos.	57 yrs. 11 mos.	60 yrs. 8 mos.	57 yrs. 2 mos.
Years of Service:				
Average	7 yrs. 4 mos.	14 yrs. 5 mos.	24 yrs. 7 mos.	34 yrs. 3 mos.
Median	7 yrs. 5 mos.	14 yrs. 5 mos.	25 yrs. 0 mos.	34 yrs. 0 mos.
Benefit**:				
Average	\$4,284	\$9,894	\$34,636	\$60,543
Median	\$3,662	\$7,699	\$32,190	\$56,730
Final Average Salary (FAS):				
Average	\$40,764	\$44,098	\$72,423	\$89,028
Median	\$37,190	\$37,215	\$68,258	\$83,944
Benefit as % of FAS***:				
Average	10.54%	21.79%	47.53%	67.85%
Median	10.17%	20.96%	48.00%	67.11%

\*Also includes vested retirees.

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

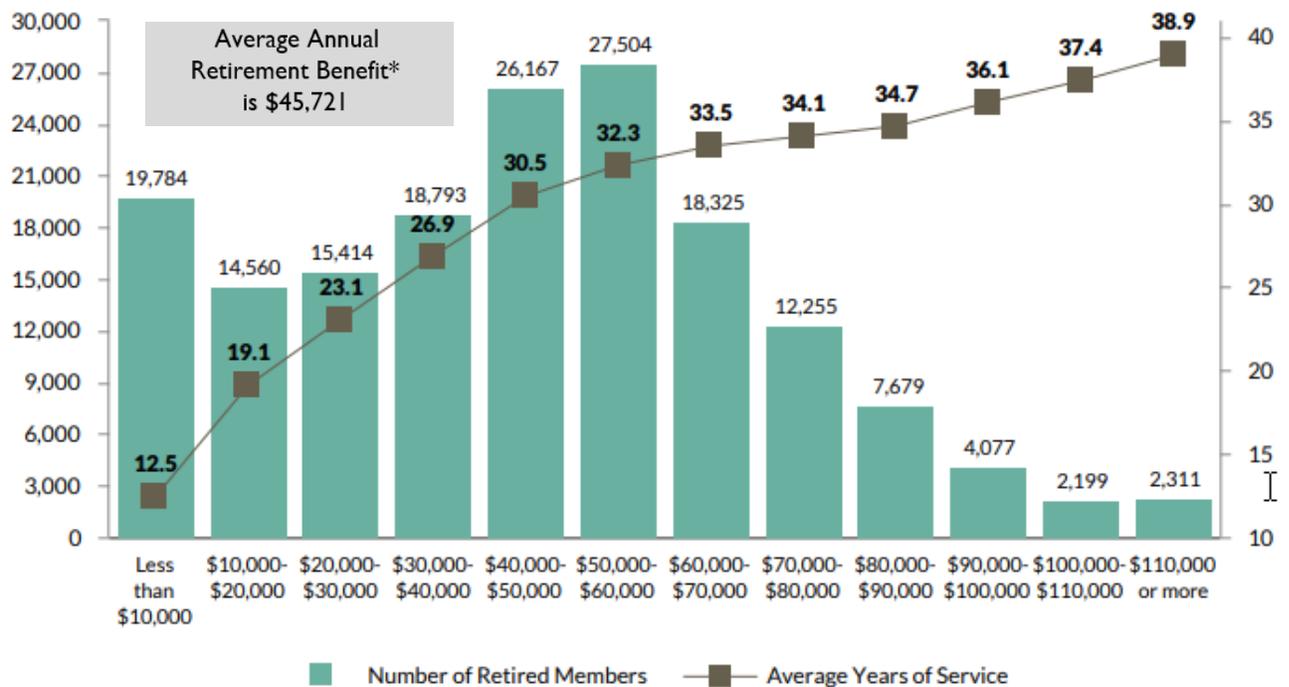
\*\*\*The average and median of individual benefits as percentages of final average salary.

**Retired Members' Characteristics\* 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
2012	6,033	60-9	26-3	\$82,461	\$45,759
2013	6,330	60-10	25-6	81,987	44,768
2014	6,547	61-0	25-4	84,545	44,978
2015	6,161	60-11	25-4	84,362	44,487
2016	6,245	61-2	25-0	84,308	44,215
2017	6,396	61-3	25-0	85,242	45,049
2018	6,416	61-1	25-1	86,910	45,725
2019	6,890	61-0	25-1	87,085	45,713
2020	7,642	61-4	25-8	90,228	48,273
2021	7,617	61-5	26-3	91,713	49,145

\*Averages are for service and vested retirees

**DISTRIBUTION OF THE ANNUAL BENEFIT\* OF ALL RETIRED MEMBERS**  
— as of June 30, 2021



\*Maximum annual retirement benefit including supplementation and COLA.

APPENDIX 11

2017 – 2021 Experience Study (Based on Appendix 18 Assumptions)

I. Active Member Mortality Rates

Age	Male			Female		
	Actual	Expected	A/E	Actual	Expected	A/E
20 – 24	0	1.11	0.00	1	1.90	0.53
25 – 29	11	3.86	2.85	8	7.83	1.02
30 – 34	6	8.26	0.73	12	17.52	0.68
35 – 39	10	15.53	0.64	29	31.64	0.92
40 – 44	19	22.89	0.83	46	45.89	1.00
45 – 49	53	33.65	1.58	61	68.52	0.89
50 – 54	43	44.78	0.96	89	94.52	0.94
55 – 59	45	49.08	0.92	102	119.74	0.85
60 – 64	41	43.17	0.95	96	110.3	0.87
65 – 69	19	23.86	0.80	74	53.08	1.39
70 – 74	8	9.01	0.89	24	18.82	1.28
75 – 79	2	3.50	0.57	5	8.44	0.59
	257	258.70	0.99	547	578.20	0.95

II. Disability Retirement Rates

Age	Male			Female		
	Actual	Expected	A/E	Actual	Expected	A/E
30 – 34	2	0.46	4.35	9	2.28	3.95
35 – 39	9	5.78	1.56	21	15.78	1.33
40 – 44	18	14.78	1.22	53	47.32	1.12
45 – 49	26	28.99	0.90	87	93.01	0.94
50 – 54	37	43.48	0.85	152	145.62	1.04
55 – 59	10	21.38	0.47	72	97.01	0.74
60 – 64	5	6.87	0.73	22	36.92	0.60
65 – 69	2	1.32	1.52	2	4.71	0.42
70 – 74	0	0.11	0.00	0	0.01	0.00
75 – 79	0	0	0.00	0	0.00	0.00
	109	123.17	0.88	418	442.95	0.94

APPENDIX 11 (Cont'd)

III. Withdrawal Rates

Service	Male			Female		
	Actual	Expected	A/E	Actual	Expected	A/E
0 – 4	6,786	6,324.55	1.07	21,989	20,549.31	1.07
5 – 9	1,186	1,081.34	1.10	5,009	4,656.87	1.08
10 – 14	611	543.49	1.12	2,948	2,708.41	1.09
15 – 19	387	380.40	1.02	1,210	1,135.10	1.07
20 – 24	193	183.73	1.05	486	461.11	1.05
25 – 29	70	68.18	1.03	116	123.16	0.94
30 +	20	21.91	0.91	45	30.80	1.46
	9,253	8,603.60	1.08	31,803	29,664.76	1.07

IV. Retirement Rates

With at Least 5 Years of Service and Less Than 20 Years of Service

Age	Male			Female		
	Actual	Expected	A/E	Actual	Expected	A/E
55 – 59	138	137.43	1.00	919	922.73	1.00
60 – 64	287	301.56	0.95	1,716	1,681.76	1.02
65 – 69	293	303.83	0.96	1,146	1,056.85	1.08
70 – 74	83	96.37	0.86	200	199.99	1.00
75 – 79	15	26.77	0.56	40	44.37	0.90
	816	865.96	0.94	4,021	3,905.70	1.03

With at Least 20 Years of Service and Less Than 30 Years of Service

Age	Male			Female		
	Actual	Expected	A/E	Actual	Expected	A/E
55 – 59	472	428.30	1.10	1,830	1,723.81	1.06
60 – 64	917	914.49	1.00	5,154	5,061.18	1.02
65 – 69	387	369.25	1.05	2,439	2,310.31	1.06
70 – 74	66	57.54	1.15	317	290.16	1.09
75 – 79	11	11.17	0.98	58	47.71	1.22
	1,853	1,780.75	1.04	9,798	9,433.17	1.04

APPENDIX 11 (Cont'd)

With at Least 30 Years of Service

Age	Male			Female		
	Actual	Expected	A/E	Actual	Expected	A/E
55 – 59	2,023	1,957.97	1.03	5,484	5,364.19	1.02
60 – 64	1,146	1,078.49	1.06	3,217	3,085.54	1.04
65 – 69	395	371.80	1.06	1,063	965.96	1.10
70 – 74	80	69.67	1.15	253	220.14	1.15
75 – 79	15	13.25	1.13	51	49.19	1.04
	3,659	3,491.18	1.05	10,068	9,685.02	1.04

V. Healthy Annuitant Mortality Rates

Age	Male			Female		
	Actual	Expected	A/E	Actual	Expected	A/E
54 & Under	0	0.00	0.00	3	0.00	0.00
55 – 59	40	27.77	1.44	86	71.80	1.20
60 – 64	112	99.34	1.13	251	241.69	1.04
65 – 69	398	350.83	1.13	698	658.32	1.06
70 – 74	917	844.34	1.09	1,169	1,098.45	1.06
75 – 79	1,180	1,227.66	0.96	1,457	1,466.18	0.99
80 – 84	1,599	1,558.37	1.03	1,877	1,776.71	1.06
85 – 89	2,182	1,986.25	1.10	2,644	2,435.12	1.09
90 – 94	1,609	1,468.39	1.10	2,789	2,796.36	1.00
95 - 99	495	466.09	1.06	1,609	1,551.58	1.04
100 - 104	65	60.62	1.07	384	377.15	1.02
105 +	5	3.81	1.31	43	41.40	1.04
	8,602	8,093.47	1.06	13,010	12,514.76	1.04

APPENDIX 11 (Cont'd)

VI. Survivor and Beneficiary Mortality Rates

Age	Male			Female		
	Actual	Expected	A/E	Actual	Expected	A/E
54 & Under	0	0.28	0.00	2	0.24	8.33
55 – 59	3	1.02	2.94	0	1.18	0.00
60 – 64	3	3.54	0.85	2	4.75	0.42
65 – 69	19	11.37	1.67	17	17.02	1.00
70 – 74	34	28.94	1.17	49	50.88	0.96
75 – 79	37	43.17	0.86	101	111.55	0.91
80 – 84	60	68.87	0.87	204	201.35	1.01
85 – 89	151	119.01	1.27	311	321.66	0.97
90 – 94	138	123.95	1.11	389	391.72	0.99
95 - 99	66	66.56	0.99	257	250.10	1.03
100 - 104	17	16.43	1.03	53	58.02	0.91
105 +	2	1.95	1.03	9	11.26	0.80
	530	485.09	1.09	1,394	1,419.73	0.98

VII. Disability Mortality Rates

Age	Male			Female		
	Actual	Expected	A/E	Actual	Expected	A/E
44 & Under	6	0.41	14.63	7	2.10	3.33
45 – 49	3	1.52	1.97	14	5.36	2.61
50 - 54	2	3.14	0.64	35	14.45	2.42
55 – 59	9	6.42	1.40	22	25.78	0.85
60 – 64	6	5.98	1.00	38	30.46	1.25
65 – 69	8	12.94	0.62	44	39.49	1.11
70 – 74	18	19.32	0.93	41	40.08	1.02
75 – 79	35	17.04	2.05	34	28.57	1.19
80 – 84	12	12.16	0.99	32	20.68	1.55
85 – 89	15	11.65	1.29	17	19.07	0.89
90 +	6	3.29	1.82	24	21.19	1.13
	120	93.87	1.28	308	247.23	1.25

APPENDIX 11 (Cont'd)  
VIII. Salary Scale (Dollars in Thousands)<sup>1</sup>

Duration	Previous Year's Salaries	Actual Salaries	Expected Salaries	Actual/Expected
1	\$1,713,287	\$2,340,618	\$1,898,151	1.233
2	1,767,040	1,889,069	1,910,877	0.989
3	1,738,467	1,831,378	1,857,205	0.986
4	1,660,331	1,734,004	1,756,963	0.987
5	1,570,676	1,638,113	1,652,037	0.992
6	1,520,244	1,584,451	1,593,216	0.994
7	1,528,468	1,587,673	1,598,624	0.993
8	1,638,481	1,700,103	1,711,721	0.993
9	1,881,206	1,951,857	1,963,603	0.994
10	2,184,576	2,261,873	2,278,513	0.993
11	2,481,774	2,573,089	2,586,257	0.995
12	2,825,661	2,923,288	2,941,230	0.994
13	3,105,156	3,208,878	3,228,121	0.994
14	3,359,616	3,465,518	3,487,281	0.994
15	3,600,669	3,711,601	3,731,733	0.995
16	3,901,029	4,013,699	4,036,395	0.994
17	4,063,303	4,174,192	4,198,205	0.994
18	4,132,895	4,243,111	4,263,907	0.995
19	4,064,154	4,171,096	4,188,110	0.996
20	3,809,254	3,886,140	3,920,865	0.991
21	3,388,930	3,457,281	3,484,837	0.992
22	3,039,478	3,096,826	3,122,759	0.992
23	2,684,726	2,733,650	2,755,871	0.992
24	2,376,077	2,418,429	2,437,142	0.992
25	2,078,735	2,111,559	2,130,704	0.991
26	1,892,987	1,919,261	1,938,987	0.990
27	1,743,729	1,767,819	1,785,055	0.990
28	1,639,617	1,663,727	1,677,328	0.992
29	1,557,356	1,576,580	1,592,396	0.990
30	1,284,432	1,253,071	1,312,561	0.955
31	984,902	975,525	1,005,979	0.970
32	765,623	752,465	781,701	0.963
33	543,704	532,096	554,796	0.959
34	380,556	374,628	388,167	0.965
35	273,598	271,093	278,933	0.972
36	196,232	190,121	199,980	0.951
37	139,565	135,957	142,161	0.956
38	104,604	101,753	106,518	0.955
39	79,700	75,053	81,159	0.925
40	259,770	249,017	264,549	0.941
<b>Total</b>	<b>\$77,960,610</b>	<b>\$80,545,664</b>	<b>\$80,844,600</b>	<b>0.996</b>

<sup>1</sup> Totals may not sum due to rounding.

APPENDIX 12

**RATES**

Investment Rate of Return on  
Market and Actuarial Value of Assets as of June 30, 2021

Annualized Rates of Return over the Last	Based Upon Market Value of Assets	Based Upon Actuarial Value of Assets <sup>1</sup>
1 Year	29.0%	11.7%
3 Years	12.6%	8.6%
5 Years	11.9%	8.9%
10 Years	10.1%	8.9%
15 Years	8.1%	8.5%
20 Years	7.8%	7.0%
25 Years	8.5%	8.9%
30 Years	9.2%	

<sup>1</sup> The Retirement System's asset valuation method was changed effective with the June 30, 2007 and June 30, 2015 actuarial valuations.

Inflation as of June 30, 2021

Annualized Inflation over the Last	Inflation Assumption		COLA Benefit	
	Actual	Expected <sup>2</sup>	Actual	Expected
1 Year	2.62%	2.2%	1.4%	1.3%
3 Years	2.01%	2.2%	1.1%	1.3%
5 Years	2.15%	2.2%	1.2%	1.3%

<sup>2</sup> The annual assumption for estimating future COLA benefit payments was set at 1.3% effective with the June 30, 2019 actuarial valuation, updated from 1.5%. The COLA increase 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 for the last 25 years with percentages bounded between 2.0% and 6.0% and reduced by 50%. The COLA benefit began in 2001.

APPENDIX 12 (Cont'd)

**RATES OF RETURN**

Annual Rates of Return through June 30, 2021

<u>Year Ending June 30th</u>	<u>Annual Rate of Return</u>	<u>Year Ending June 30th</u>	<u>Annual Rate of Return</u>
1983	37.1%	2006	11.8%
1984	-4.8%	2007	19.4%
1985	31.3%	2008	-6.3%
1986	28.4%	2009	-20.5%
1987	14.6%	2010	12.1%
1988	-1.5%	2011	23.2%
1989	16.8%	2012	2.8%
1990	11.4%	2013	13.7%
1991	8.3%	2014	18.2%
1992	13.0%	2015	5.2%
1993	13.6%	2016	2.3%
1994	1.8%	2017	12.5%
1995	19.3%	2018	9.0%
1996	18.8%	2019	7.1%
1997	22.0%	2020	3.5%
1998	21.5%	2021	29.0%
1999	14.0%		
2000	6.8%		
2001	-5.7%		
2002	-6.8%		
2003	4.0%		
2004	16.1%		
2005	10.6%		

APPENDIX 13

ASSET ALLOCATION

The table below displays the Retirement System’s asset allocation targets, ranges, and actual allocation percentages for the June 30, 2021 actuarial valuation. A slight revision to the asset allocation was adopted by the Retirement Board on July 28, 2021, moving 1% out of Real Estate Debt (decreasing its target to 6%) and into Private Debt (increasing its target to 2%). System asset values are frequently reviewed, and assets are periodically rebalanced in line with the asset allocation targets and ranges.

	<b>Target</b>	<b>Range</b>	<b>Actual</b>
<b>Equity</b>			
Domestic Equity	33%	29 – 37%	34.2%
International Equity	16%	12 – 20%	17.0%
Global Equity	4%	0 – 8%	3.5%
Real Estate Equity	11%	6 – 16%	10.2%
Private Equity	8%	3 – 13%	10.1%
<b>Total Equity</b>	<b>72%</b>		<b>75.0%</b>
<b>Debt</b>			
Domestic Fixed Income	16%	12 – 20%	12.9%
High-Yield Bonds	1%	0 – 3%	0.6%
Global Bonds	2%	0 – 3%	2.2%
Real Estate Debt	6%	2 – 10%	5.1%
Private Debt	2%	0.5 – 5%	0.8%
Cash Equivalents	1%	0 – 4%	3.4%
<b>Total Debt</b>	<b>28%</b>		<b>25.0%</b>

Changes to the Asset Allocation between June 30, 2020 and June 30, 2021

None.

## APPENDIX 14

### ASSESSMENT OF RISK

#### ACTUARIAL STANDARDS OF PRACTICE NO. 51

NYSTRS is exposed to the following significant risks that can impact the plan's future financial condition, including the plan's funded status and employer contribution rates.

1. **Investment risk** – the potential that investment returns on System assets will be different than expected. If future returns are less than expected, employers will be required to contribute greater amounts. The System currently has 72% of its targeted asset allocation in equity investments, and 28% in fixed income instruments.
2. **Longevity and other demographic risks** – the potential that mortality or other demographic experience will be different than expected. Increases in longevity, for example, imply that retirees are living longer than expected. Retirees living longer than expected translates into more years of benefit payments and increasing costs to the plan. Actuarial assumption studies were used to develop the actuarial assumptions used in the valuation. The System's actuarial valuation uses base annuitant mortality rates which are developed from Society of Actuary (SOA) tables as well as our own member experience. Generationally-applied mortality improvement developed by the SOA is then applied to these base rates to account for anticipated future mortality improvement. Another demographic risk concerns the ages at which members retire. Generally, the earlier members retire, the greater the expense for the plan, as more years of benefit payments will be required. Typically, these types of changes emerge slowly over time and assumptions are periodically revised to reflect them.
3. **Assumption Modification risk** – the potential that plan experience begins to deviate significantly from the actuarial assumptions, and the assumptions are modified to better reflect recent experience and better predict expected future experience. The most impactful of the actuarial assumptions is the assumed investment rate of return. Even a small change in the plan's assumed rate of return will have a large impact on the employer contribution rate.
4. **Contribution risk** – the potential that employers will fail to make the actuarially determined contribution. In accordance with statute and case law, employers are required to contribute at the actuarially determined employer contribution rate as adopted by the Retirement Board and have historically done so. If this rate were to quickly climb precipitously high, however, this would put a significant amount of stress on school district budgets.
5. **Interest rate risk** – the risk that interest rates in the economy, specifically inflation, will greatly increase. Only one part of the System's benefit structure is inflation-related; that is the System's COLA benefit. The COLA is greatly controlled, however, in that both the COLA percentage and the amount to which it is applied are both capped. The COLA percentage, defined as one-half of the increase in the CPI, cannot exceed 3%. Additionally, the COLA is only granted to the first \$18,000 of annual benefit. Because of these limitations the System is not at great risk of substantial increase in liability due to an increase in inflation.

## APPENDIX 14

6. **Benefit change risk** – the risk for the provisions of the plan to be changed such that the funding is changed materially. In addition to the actual payments to and from the plan being changed, future valuation measurements can also be impacted.

## A. Plan Maturity Measurements

1. *Asset Volatility Ratio*

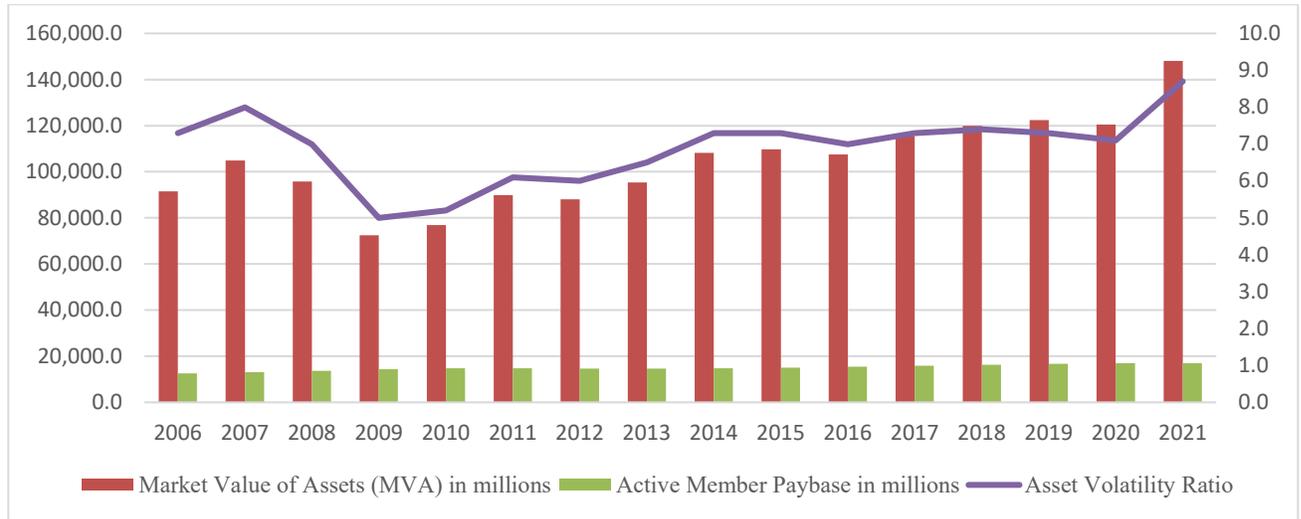
The asset volatility ratio is the market value of assets of the plan divided by the active member payroll. As a plan matures, its assets typically increase. The greater a plan's assets are relative to payroll, the more vulnerable the Plan is to investment volatility. NYSTRS' asset volatility ratio increased from 7.1 as of June 30, 2020 to 8.7 as of June 30, 2021 due to the substantial investment gain over the 2021 fiscal year. An asset volatility ratio of 8.7 implies that if the assets return 10% less than expected, there is an increase to the amount remaining to be funded equal to 87% of member pay base. This does NOT imply, however, that the employer contribution rate would increase by 87%. Asset gains and losses are smoothed in the valuation, and liabilities remaining to be funded are spread over the present value of future members' salaries, which have a mitigating effect.

Recent years of relatively good performance and experience have driven the ECR down to a relatively low point, leaving it susceptible to large increases following poor performance.

A higher asset volatility ratio is also indicative of a plan having a high level of assets, which is clearly a good result and preferable to having a low level of assets.

<b>Fiscal Year Ending June 30th</b>	<b>Market Value of Assets (in millions)</b>	<b>Active Member Paybase (in millions)</b>	<b>Asset Volatility Ratio</b>
2006	91,492.2	12,518.0	7.3
2007	104,912.9	13,083.0	8.0
2008	95,769.3	13,690.1	7.0
2009	72,471.8	14,366.4	5.0
2010	76,844.9	14,792.1	5.2
2011	89,889.7	14,732.9	6.1
2012	88,056.3	14,640.8	6.0
2013	95,367.0	14,647.8	6.5
2014	108,155.1	14,771.3	7.3
2015	109,718.9	15,021.4	7.3
2016	107,506.1	15,431.0	7.0
2017	115,468.4	15,846.7	7.3
2018	119,915.5	16,288.9	7.4
2019	122,477.5	16,691.6	7.3
2020	120,479.5	16,973.2	7.1
2021	148,148.5	16,973.2	8.7

APPENDIX 14 (Cont'd)

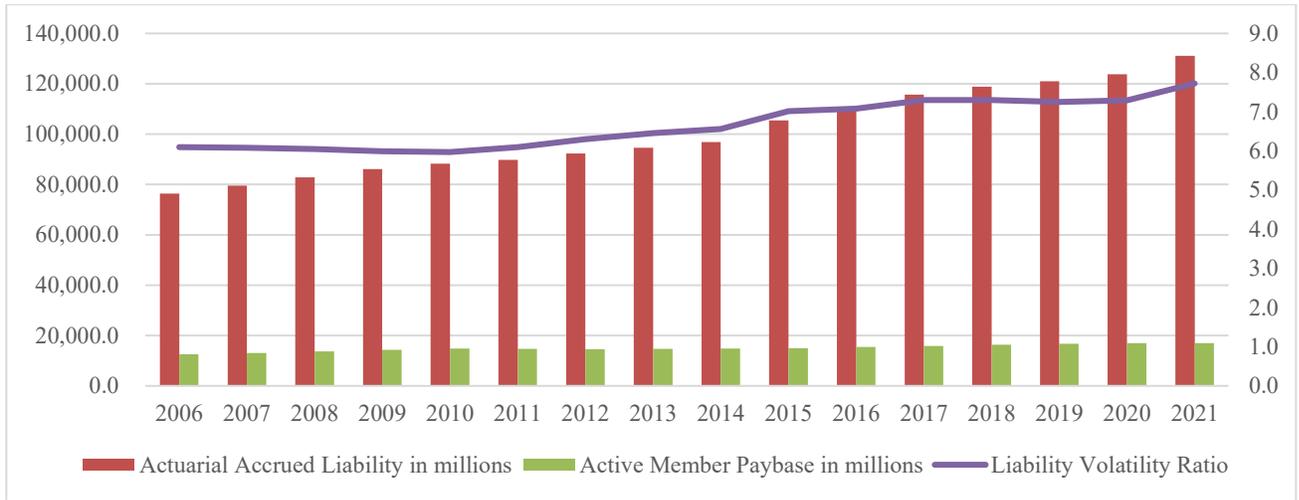


2. *Liability Volatility Ratio*

The liability volatility ratio is the actuarial accrued liability using the Entry Age Normal Actuarial funding method divided by the active member payroll. Changes in assumptions such as reducing the assumed rate of return and improving mortality assumptions can have a significant impact on a plan's liability. For plans with a high liability volatility ratio, these changes are more significant than for plans with low ratios. However, as plans naturally mature, it is expected that their liability volatility ratios will grow as well.

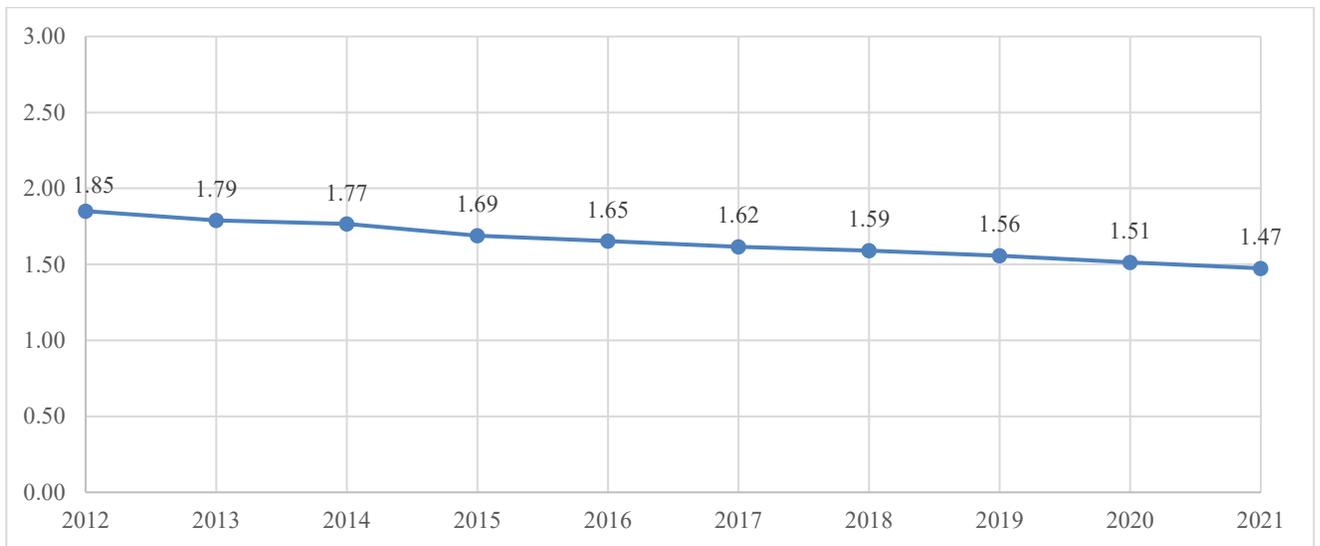
<b>Fiscal Year Ending June 30th</b>	<b>Actuarial Accrued Liability (in millions)</b>	<b>Active Member Paybase (in millions)</b>	<b>Liability Volatility Ratio</b>
2006	76,353.0	12,518.0	6.1
2007	79,537.2	13,083.0	6.1
2008	82,777.5	13,690.1	6.0
2009	86,062.0	14,366.4	6.0
2010	88,318.8	14,792.1	6.0
2011	89,824.9	14,732.9	6.1
2012	92,250.9	14,640.8	6.3
2013	94,583.8	14,647.8	6.5
2014	96,904.5	14,771.3	6.6
2015	105,401.8	15,021.4	7.0
2016	109,305.1	15,431.0	7.1
2017	115,672.5	15,846.7	7.3
2018	118,861.1	16,288.9	7.3
2019	121,049.3	16,691.6	7.3
2020	123,801.7	16,973.2	7.3
2021	131,077.4	16,973.2	7.7

APPENDIX 14 (Cont'd)



3. *Active-to-Retiree Ratio*

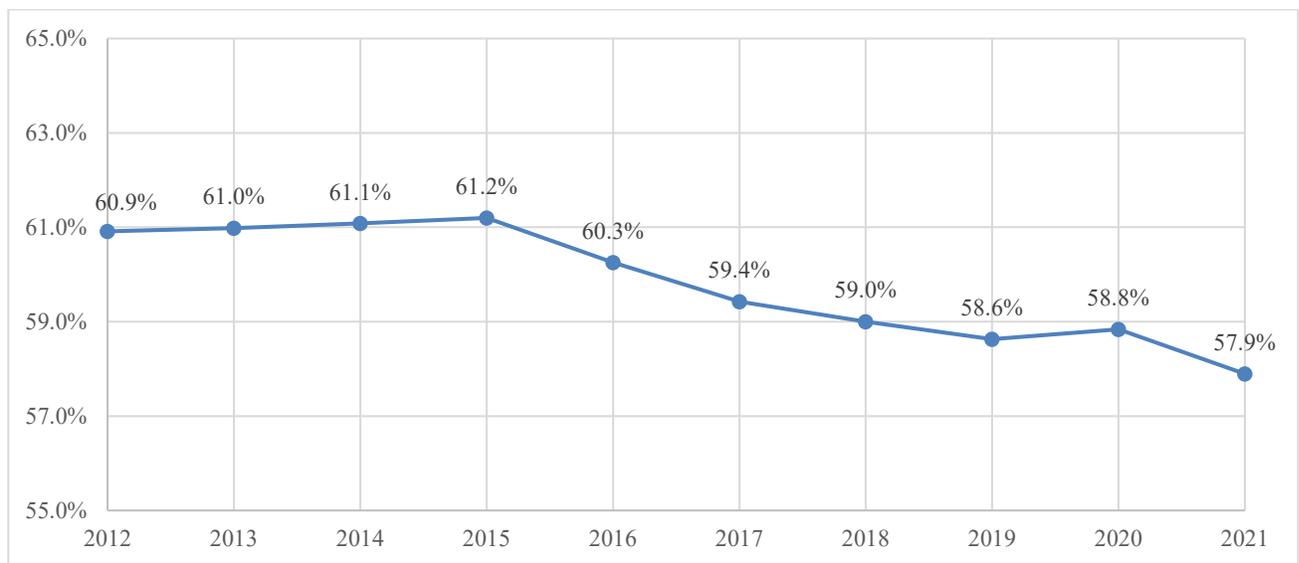
This is the ratio of active members to retired and inactive members. This ratio is typically very high in a plan’s early years and declines over time. As a plan matures, and life expectancies increase over time, the percentage of retirees increases, and this ratio decreases. However, in an actuarially advanced-funded System like ours this decrease is much less of a concern than for a system like Social Security, in which active worker contributions are directly paid to retirees, with no designed pre-funding of future benefits.



We can also compare the ratio of the retiree accrued liability to the System’s total accrued liability. A new pension plan begins with this ratio at zero and as the plan matures, this ratio would be expected to grow. The NYSTRS ratio has been between 58 and 61% over the last ten years.

APPENDIX 14 (Cont'd)

<b>Fiscal Year Ending June 30th</b>	<b>Accrued Liability (AL) for Retired Members and Beneficiaries (in millions)</b>	<b>Total AL for All Members (in millions)</b>	<b>Ratio of Retired AL to Total AL</b>
2012	56,197.6	92,250.9	60.9%
2013	57,681.9	94,583.8	61.0%
2014	59,190.2	96,904.5	61.1%
2015	64,504.9	105,401.8	61.2%
2016	65,858.4	109,305.1	60.3%
2017	68,736.2	115,672.5	59.4%
2018	70,128.9	118,861.1	59.0%
2019	70,969.1	121,049.3	58.6%
2020	72,839.6	123,801.7	58.8%
2021	75,887.8	131,077.4	57.9%



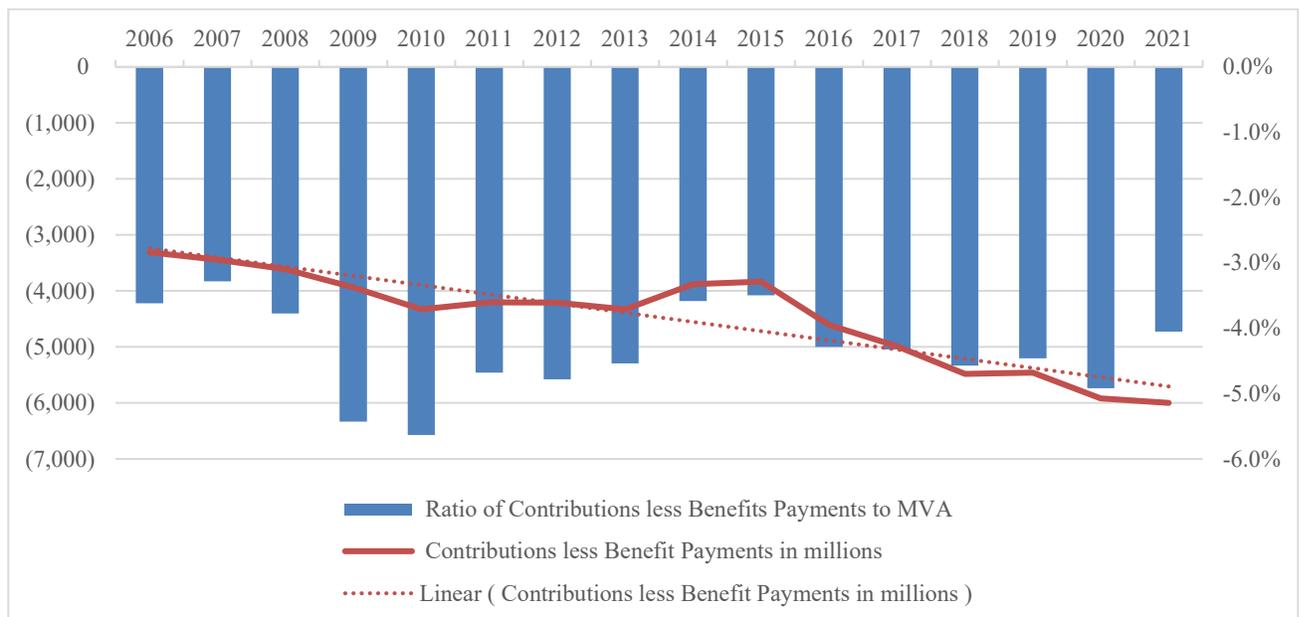
#### 4. Cash Flow Ratio

The net cash flow ratio is the ratio of the net cash flow in and out of the System divided by the market value of plan assets. Net cash flow for purposes of this ratio is defined as contributions in minus benefit payments and expenses out; it does not include investment income or appreciation. The System is in a negative cash flow position and has been for many years. Negative cash flow does not indicate a plan is in trouble or has been poorly managed. The objective of pre-funding is to create a negative cash flow and in fact it would be expected for a plan to mature into a negative cash flow. Additionally plans that are well-funded will have low contribution rates even as their benefit payroll is high. Many public sector plans have a negative cash flow.

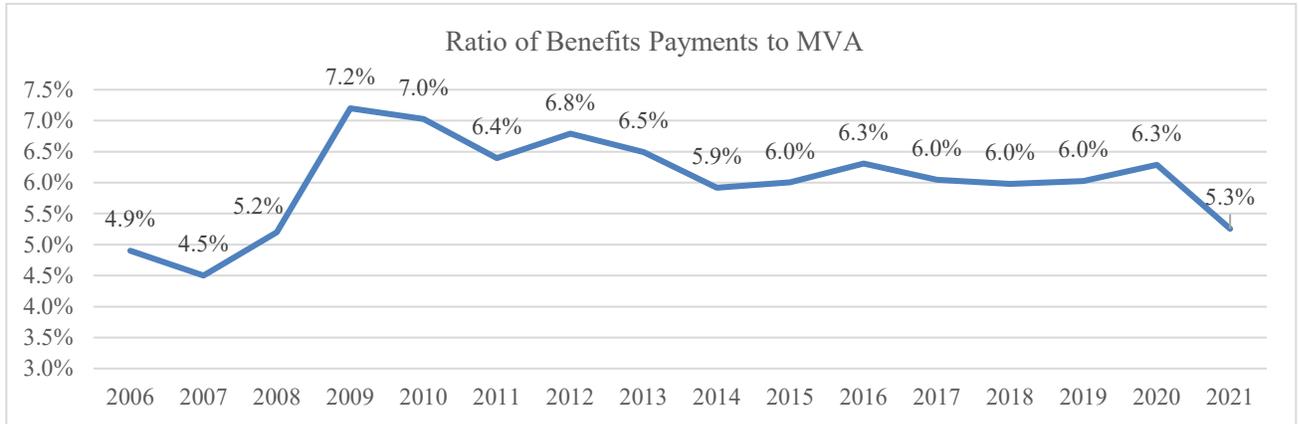
APPENDIX 14 (Cont'd)

Significantly negative cash flow makes a plan more sensitive to near term investment returns, particularly negative returns. When investments lose money and net cash flow is negative, it is more difficult for plans to recover from a poor investment return, as the invested asset base is lower. Therefore, plans will need an even higher return to recover.

<b>Fiscal Year Ending June 30th</b>	<b>Market Value of Assets (in millions)</b>	<b>Employer and Member Contributions (in millions)</b>	<b>Benefit Payments including Administrative Expenses (in millions)</b>	<b>Contributions less Benefit Payments (in millions)</b>	<b>Ratio of Contributions less Benefits Payments to MVA</b>
2006	91,492.2	1,174.6	4,484.7	(3,310)	-3.6%
2007	104,912.9	1,279.7	4,722.4	(3,443)	-3.3%
2008	95,769.3	1,368.4	4,980.3	(3,612)	-3.8%
2009	72,471.8	1,283.5	5,217.9	(3,934)	-5.4%
2010	76,844.9	1,070.9	5,399.9	(4,329)	-5.6%
2011	89,889.7	1,545.9	5,751.5	(4,206)	-4.7%
2012	88,056.3	1,771.3	5,980.0	(4,209)	-4.8%
2013	95,367.0	1,868.3	6,194.1	(4,326)	-4.5%
2014	108,155.1	2,522.5	6,399.2	(3,877)	-3.6%
2015	109,718.9	2,751.7	6,588.1	(3,836)	-3.5%
2016	107,506.1	2,175.2	6,780.3	(4,605)	-4.3%
2017	115,468.4	1,995.0	6,984.6	(4,990)	-4.3%
2018	119,915.5	1,688.8	7,169.6	(5,481)	-4.6%
2019	122,477.5	1,920.3	7,381.6	(5,461)	-4.5%
2020	120,479.5	1,653.7	7,575.3	(5,922)	-4.9%
2021	148,148.5	1,788.3	7,787.4	(5,999)	-4.0%



APPENDIX 14 (Cont'd)



APPENDIX 14 (Cont'd)

B. Risk Assessment Methods – 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 to illustrate how deviations in specific assumptions would have changed the current Employer Contribution Rate of 10.29%.

The results displayed here, except for those for the investment return, are the impact of altering each assumption individually, without accounting for possible correlation between assumptions. Therefore, these results are presented to provide an illustration of the impact that a change in a key assumption may have on valuation results.

Assumption	Adjustment	Adjusted Employer Contribution Rate
Current		10.29%
Valuation Rate of Interest <sup>1</sup>	Decrease from 6.95% to 6.70%	13.38%
Valuation Rate of Interest <sup>1</sup>	Decrease from 6.95% to 6.45%	16.56%
Valuation Rate of Interest <sup>1</sup>	Decrease from 6.95% to 5.95%	23.21%
Salary Scale	Decrease of 10%	9.33%
Salary Scale	Increase of 10%	11.23%
Service Retirement Rates	Decrease of 10%	9.58%
Service Retirement Rates	Increase of 10%	10.88%
Healthy Annuitant Mortality	Decrease of 10%	12.02%
Healthy Annuitant Mortality	Increase of 10%	8.70%
Active Mortality	Decrease of 10%	10.31%
Active Mortality	Increase of 10%	10.27%

<sup>1</sup> The sensitivity analysis assumes that the salary scale assumption would be decreased by one-half of the reduction in the investment return assumption. In a scenario in which there was a significant reduction in the System's assumed rate of return it's likely that future projected salaries would be impacted as well. For example, the salary scale is reduced by 0.125% when the assumed rate of return is reduced by 0.25%.

APPENDIX 15

**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	2014-15	17.53
1945-46	7.20	1980-81	23.49	2015-16	13.26
1946-47	7.50	1981-82	23.49	2016-17	11.72
1947-48	7.80	1982-83	23.49	2017-18	9.80
1948-49	8.00	1983-84	22.90	2018-19	10.62
1949-50	8.40	1984-85	22.80	2019-20	8.86
1950-51	8.80	1985-86	21.40	2020-21	9.53
1951-52	9.60	1986-87	18.80	2021-22	9.80
1952-53	9.90	1987-88	16.83	2022-23	10.29
1953-54	9.90	1988-89	14.79		
1954-55	10.30	1989-90	6.87		
1955-56	10.40	1990-91	6.84	<b>Average</b>	<b>10.90%</b>

APPENDIX 16

**HISTORY OF THE MEMBER CONTRIBUTION RATE**

Membership Year	Required Contribution
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"> <li>- 3.0% if salary less than or equal to \$45,000</li> <li>- 3.5% if salary greater than \$45,000 and less than or equal to \$55,000</li> <li>- 4.5% if salary greater than \$55,000 and less than or equal to \$75,000</li> <li>- 5.75% if salary greater than \$75,000 and less than or equal to \$100,000</li> <li>- 6.0% if salary greater than \$100,000 and less than or equal to \$179,000 (\$179,000 amended in 2019 to increase to \$200,000 in 2020, \$225,000 in 2021 and \$250,000 in 2022 and thereafter)</li> </ul>

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, separate from 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%.

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

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.

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 two years prior to the year of contribution.

**ACTUARIAL VALUATION INFORMATION**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 the first \$50,000 of member death benefits, Retirement System administrative expenses, and benefits in excess of the IRC §415 limits are each determined using the pay-as-you-go method, which is not considered to be an actuarial 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 calculation, over the expected future working lifetime of active members.

The average expected future working lifetime for our active population as determined by the actuarial valuation as of June 30, 2021 is 12.56 years.

2. Asset Valuation Method

The actuarial value of assets for the normal rate is determined by recognizing each year's net investment income/loss more than (or less than) 6.95% at a rate of 20% per year, until fully recognized after five years.

The actuarial value of assets for the expense, group life insurance, and excess benefit plan rates is equal to the fair market value of assets, excluding contributions receivable.

3. Actuarial Assumptions

The current actuarial assumptions were adopted by the Retirement Board on October 28, 2021 and were effective with the June 30, 2021 actuarial valuation. Specific details regarding the development of the actuarial assumptions can be found in the "*Report on the 2021 Recommended Actuarial Assumptions.*"

The withdrawal rates are the assumed rates of termination of employment from all causes other than death, disability, or retirement. The withdrawal rates vary by gender and service.

APPENDIX 17 (Cont'd)

**ACTUARIAL VALUATION INFORMATION (Cont'd)**

The healthy annuitant mortality rates are the assumed rates of death for service and deferred retired members and beneficiaries. The healthy annuitant mortality rates vary by gender and age. Future mortality improvement was projected on a generational basis using the Society of Actuaries Mortality Projection Scale MP-2020.

The salary scale is the assumed annual rate of increase in future compensation. The rates are based upon salary experience for members, vary by service, and are independent of the member's gender. Inflation, merit, and productivity increases are included in these rates. The assumed inflation component is 2.4%.

## APPENDIX 18

### 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. Standard actuarial tables are also used as appropriate. An experience study is performed annually, and assumptions are revised when warranted. The current actuarial assumptions were adopted by the Retirement Board on October 28, 2021. Specific details regarding the development of the present actuarial assumptions can be found in the “*Report on the 2021 Recommended Actuarial Assumptions*”.

The NYSTRS Office of the Actuary utilizes ProVal, a widely used actuarial valuation software program leased from Winklevoss Technologies (WinTech), to calculate liabilities and projected benefit payments. We have audited the results produced by this model to a limited degree consistent with Actuarial Standards of Practice (ASOP) No. 56 and believe the software to be appropriate for the purposes for which it has been used.

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APPENDIX 18 (Cont'd)

I. Active Member Mortality Rates

<u>Age</u>	<u>Males</u>	<u>Age</u>	<u>Females</u>
	<u>Rate</u>		<u>Rate</u>
20	0.000326	20	0.000132
21	0.000292	21	0.000124
22	0.000249	22	0.000105
23	0.000215	23	0.000096
24	0.000189	24	0.000099
25	0.000173	25	0.000101
26	0.000189	26	0.000114
27	0.000206	27	0.000116
28	0.000223	28	0.000131
29	0.000252	29	0.000145
30	0.000269	30	0.000171
31	0.000298	31	0.000185
32	0.000314	32	0.000197
33	0.000340	33	0.000209
34	0.000353	34	0.000232
35	0.000376	35	0.000240
36	0.000396	36	0.000259
37	0.000412	37	0.000277
38	0.000438	38	0.000291
39	0.000448	39	0.000316
40	0.000467	40	0.000326
41	0.000494	41	0.000347
42	0.000518	42	0.000366
43	0.000550	43	0.000395
44	0.000582	44	0.000413
45	0.000633	45	0.000442
46	0.000683	46	0.000482
47	0.000743	47	0.000523
48	0.000816	48	0.000568
49	0.000891	49	0.000616
50	0.000988	50	0.000668
51	0.001090	51	0.000733
52	0.001197	52	0.000811
53	0.001327	53	0.000884
54	0.001463	54	0.000968

APPENDIX 18 (Cont'd)

I. Active Member Mortality Rates  
(cont'd.)

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
55	0.001605	55	0.001063
56	0.001769	56	0.001156
57	0.001948	57	0.001255
58	0.002146	58	0.001369
59	0.002363	59	0.001485
60	0.002605	60	0.001611
61	0.002875	61	0.001748
62	0.003162	62	0.001902
63	0.003461	63	0.002066
64	0.003789	64	0.002259
65	0.004146	65	0.002472
66	0.004515	66	0.002719
67	0.004918	67	0.003002
68	0.005349	68	0.003342
69	0.005822	69	0.003748
70	0.006313	70	0.004225
71	0.006838	71	0.004789
72	0.007406	72	0.005454
73	0.008017	73	0.006216
74	0.008674	74	0.007116
75	0.009408	75	0.008144
76	0.010787	76	0.009388
77	0.012380	77	0.010829
78	0.014221	78	0.012490
79	0.016338	79	0.014393

APPENDIX 18 (Cont'd)

II. Disability Retirement Rates

<u>Age</u>	<u>Males</u>	<u>Rate</u>	<u>Age</u>	<u>Females</u>	<u>Rate</u>
30		0.000007	30		0.000004
31		0.000031	31		0.000018
32		0.000060	32		0.000048
33		0.000100	33		0.000140
34		0.000131	34		0.000225
35		0.000156	35		0.000242
36		0.000183	36		0.000212
37		0.000220	37		0.000191
38		0.000261	38		0.000202
39		0.000297	39		0.000252
40		0.000324	40		0.000330
41		0.000353	41		0.000415
42		0.000378	42		0.000468
43		0.000439	43		0.000566
44		0.000519	44		0.000684
45		0.000610	45		0.000758
46		0.000680	46		0.000788
47		0.000724	47		0.000841
48		0.000772	48		0.000961
49		0.000878	49		0.001145
50		0.001035	50		0.001325
51		0.001225	51		0.001528
52		0.001395	52		0.001608
53		0.001480	53		0.001611
54		0.001435	54		0.001527
55		0.001287	55		0.001454
56		0.001060	56		0.001270
57		0.000845	57		0.001121
58		0.000721	58		0.001012
59		0.000655	59		0.000956
60		0.000642	60		0.000848
61		0.000617	61		0.000749
62		0.000581	62		0.000684
63		0.000536	63		0.000591
64		0.000485	64		0.000551

APPENDIX 18 (Cont'd)

II. Disability Retirement Rates  
(cont'd.)

<u>Age</u>	<u>Males</u>	<u>Rate</u>	<u>Age</u>	<u>Females</u>	<u>Rate</u>
65		0.000430	65		0.000476
66		0.000373	66		0.000258
67		0.000317	67		0.000178
68		0.000264	68		0.000169
69		0.000215	69		0.000152
70		0.000172	70		0.000131
71		0.000135	71		0.000107
72		0.000104	72		0.000083
73		0.000078	73		0.000060
74		0.000058	74		0.000042
75		0.000042	75		0.000028
76		0.000030	76		0.000018
77		0.000021	77		0.000011
78		0.000014	78		0.000006
79		0.000009	79		0.000004

## APPENDIX 18 (Cont'd)

## III. Withdrawal Rates

<u>Males</u>		<u>Females</u>	
<u>Duration</u>	<u>Rate</u>	<u>Duration</u>	<u>Rate</u>
0	0.281672	0	0.276603
1	0.139639	1	0.125667
2	0.103566	2	0.091900
3	0.082839	3	0.070395
4	0.061281	4	0.054609
5	0.046733	5	0.048608
6	0.040304	6	0.044007
7	0.033875	7	0.039406
8	0.027446	8	0.034805
9	0.021017	9	0.030204
10	0.017586	10	0.025604
11	0.015753	11	0.022445
12	0.012379	12	0.018454
13	0.009004	13	0.014464
14	0.008712	14	0.010474
15	0.008419	15	0.009808
16	0.007735	16	0.008100
17	0.007052	17	0.006392
18	0.006368	18	0.004683
19	0.005078	19	0.004300
20	0.005000	20	0.004251
21	0.004633	21	0.003896
22	0.004265	22	0.003883
23	0.003897	23	0.003869
24	0.003530	24	0.003856
25	0.003162	25	0.002475
26	0.003058	26	0.002156
27	0.002953	27	0.001836
28	0.002848	28	0.001516
29	0.002744	29	0.001230
30	0.002639	30	0.001223
31	0.002534	31	0.001217
32+	0.002430	32+	0.001210

APPENDIX 18 (Cont'd)

IV. Service Retirement Rates

a) With at Least 5 Years of Service and Less Than 20 Years of Service

<u>Age</u>	<u>Males</u>	<u>Rate</u>	<u>Age</u>	<u>Females</u>	<u>Rate</u>
55		0.016895	55		0.022034
56		0.018138	56		0.020920
57		0.018949	57		0.021583
58		0.020392	58		0.024243
59		0.023948	59		0.028714
60		0.032544	60		0.036747
61		0.053559	61		0.049865
62		0.076575	62		0.098737
63		0.086291	63		0.099499
64		0.101429	64		0.108244
65		0.135241	65		0.134619
66		0.165359	66		0.157206
67		0.171258	67		0.157651
68		0.162524	68		0.149321
69		0.168459	69		0.157048
70		0.178411	70		0.169309
71		0.168561	71		0.166236
72		0.175182	72		0.149874
73		0.204473	73		0.130584
74		0.205761	74		0.131818
75		0.201031	75		0.170940
76		0.223684	76		0.208633
77		0.250000	77		0.178744
78		0.259259	78		0.105960
79		0.243243	79		0.115385
80+		1.000000	80+		1.000000

APPENDIX 18 (Cont'd)

IV. Service Retirement Rates

b) With at Least 20 Years of Service and 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	0.036912	55	0.048946
56	0.038733	56	0.048932
57	0.042465	57	0.050278
58	0.045650	58	0.055984
59	0.053792	59	0.066847
60	0.074850	60	0.085816
61	0.137343	61	0.124821
62	0.317298	62	0.344649
63	0.291193	63	0.320354
64	0.264522	64	0.270180
65	0.284814	65	0.306632
66	0.326565	66	0.343562
67	0.323741	67	0.335230
68	0.287004	68	0.312155
69	0.316940	69	0.294658
70	0.345833	70	0.276159
71	0.274390	71	0.258438
72	0.244094	72	0.248951
73	0.316327	73	0.231388
74	0.314286	74	0.202817
75	0.222222	75	0.232824
76	0.200000	76	0.283422
77	0.206897	77	0.291667
78	0.214286	78	0.243590
79	0.148148	79	0.170732
80+	1.000000	80+	1.000000

APPENDIX 18 (Cont'd)

IV. Service Retirement Rates

c) With at Least 30 Years of Service

<u>Age</u>	<u>Males</u>	<u>Rate</u>	<u>Age</u>	<u>Females</u>	<u>Rate</u>
55		0.357369	55		0.360457
56		0.308100	56		0.328854
57		0.270702	57		0.285005
58		0.275266	58		0.281178
59		0.296323	59		0.303384
60		0.311082	60		0.329377
61		0.310642	61		0.358157
62		0.319459	62		0.383599
63		0.319013	63		0.361017
64		0.297225	64		0.336647
65		0.311052	65		0.345155
66		0.340284	66		0.361702
67		0.325405	67		0.339678
68		0.291372	68		0.289690
69		0.274286	69		0.270671
70		0.259067	70		0.268173
71		0.238434	71		0.269377
72		0.223404	72		0.255354
73		0.224806	73		0.220085
74		0.262136	74		0.204420
75		0.294872	75		0.182796
76		0.254902	76		0.157205
77		0.200000	77		0.175258
78		0.178571	78		0.222973
79		0.184615	79		0.253012
80+		1.000000	80+		1.000000

APPENDIX 18 (Cont'd)

V. Healthy Annuitant Mortality Rates

<u>Age</u>	<u>Males</u> <u>Rate</u>	<u>Age</u>	<u>Females</u> <u>Rate</u>
55	0.002062	55	0.001763
56	0.002298	56	0.001932
57	0.002558	57	0.002104
58	0.002850	58	0.002284
59	0.003160	59	0.002461
60	0.003492	60	0.002642
61	0.003850	61	0.002833
62	0.004238	62	0.003026
63	0.004643	63	0.003239
64	0.005097	64	0.003476
65	0.005594	65	0.003756
66	0.006160	66	0.004075
67	0.006809	67	0.004460
68	0.007562	68	0.004926
69	0.008430	69	0.005489
70	0.009446	70	0.006169
71	0.010632	71	0.006976
72	0.012012	72	0.007929
73	0.013614	73	0.009050
74	0.015459	74	0.010362
75	0.020078	75	0.013227
76	0.022872	76	0.015184
77	0.026050	77	0.017425
78	0.029647	78	0.019982
79	0.033736	79	0.022903
80	0.038367	80	0.026219
81	0.043643	81	0.029999
82	0.049675	82	0.034278
83	0.056541	83	0.039141
84	0.064371	84	0.044654

Society of Actuaries Mortality Improvement Scale MP-2020 is applied on a generational basis to base table rates.

APPENDIX 18 (Cont'd)

V. Healthy Annuitant Mortality Rates (Cont'd)

<u>Age</u>	<u>Males</u> <u>Rate</u>	<u>Age</u>	<u>Females</u> <u>Rate</u>
85	0.073241	85	0.050874
86	0.083220	86	0.057876
87	0.094351	87	0.065733
88	0.106789	88	0.074568
89	0.120557	89	0.084462
90	0.135736	90	0.109847
91	0.152258	91	0.124150
92	0.169997	92	0.139945
93	0.188712	93	0.157256
94	0.208207	94	0.175838
95	0.228238	95	0.195482
96	0.256135	96	0.216617
97	0.278405	97	0.238632
98	0.300930	98	0.261262
99	0.323597	99	0.284370
100	0.346058	100	0.307717
101	0.368382	101	0.331284
102	0.390636	102	0.355062
103	0.412527	103	0.378941
104	0.433960	104	0.402553
105	0.454672	105	0.425814
106	0.474623	106	0.448404
107	0.493810	107	0.470342
108	0.511957	108	0.491432
109	0.529320	109	0.511431
110	0.530405	110	0.530405
111	0.548187	111	0.548187
112	0.557992	112	0.557992
113	0.558942	113	0.558942
114	0.559950	114	0.559950

Society of Actuaries Mortality Improvement Scale MP-2020 is applied on a generational basis to base table rates.

APPENDIX 18 (Cont'd)

V. Healthy Annuitant Mortality Rates (Cont'd)

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
115	0.560902	115	0.560902
116	0.560959	116	0.560959
117	0.561015	117	0.561015
118	0.561015	118	0.561015
119	0.561015	119	0.561015
120	1.000000	120	1.000000

Society of Actuaries Mortality Improvement Scale MP-2020 is applied on a generational basis to base table rates.

APPENDIX 18 (Cont'd)

VI. Survivor and Beneficiary Mortality Rates

<u>Age</u>	<u>Males</u> <u>Rate</u>	<u>Age</u>	<u>Females</u> <u>Rate</u>
1	0.000403	1	0.000145
2	0.000403	2	0.000145
3	0.000403	3	0.000145
4	0.000403	4	0.000145
5	0.000403	5	0.000145
6	0.000403	6	0.000145
7	0.000403	7	0.000145
8	0.000403	8	0.000145
9	0.000403	9	0.000145
10	0.000403	10	0.000145
11	0.000403	11	0.000145
12	0.000403	12	0.000145
13	0.000403	13	0.000145
14	0.000403	14	0.000145
15	0.000403	15	0.000145
16	0.000403	16	0.000145
17	0.000403	17	0.000145
18	0.000403	18	0.000145
19	0.000403	19	0.000145
20	0.000403	20	0.000134
21	0.000387	21	0.000125
22	0.000360	22	0.000116
23	0.000333	23	0.000106
24	0.000306	24	0.000097
25	0.000302	25	0.000099
26	0.000338	26	0.000114
27	0.000360	27	0.000128
28	0.000383	28	0.000144
29	0.000420	29	0.000160
30	0.000442	30	0.000175

Society of Actuaries Mortality Improvement Scale MP-2020 is applied on a generational basis to base table rates.

APPENDIX 18 (Cont'd)

VI. Survivor and Beneficiary Mortality Rates (Cont'd)

<u>Age</u>	<u>Males</u> <u>Rate</u>	<u>Age</u>	<u>Females</u> <u>Rate</u>
31	0.000479	31	0.000204
32	0.000498	32	0.000218
33	0.000530	33	0.000244
34	0.000559	34	0.000255
35	0.000599	35	0.000279
36	0.000621	36	0.000300
37	0.000651	37	0.000317
38	0.000677	38	0.000346
39	0.000712	39	0.000360
40	0.000740	40	0.000383
41	0.000764	41	0.000405
42	0.000798	42	0.000425
43	0.000841	43	0.000456
44	0.000883	44	0.000487
45	0.000935	45	0.000518
46	0.001001	46	0.000552
47	0.001068	47	0.000597
48	0.001151	48	0.000647
49	0.001237	49	0.000699
50	0.001339	50	0.000767
51	0.001459	51	0.000839
52	0.001585	52	0.000916
53	0.001729	53	0.001017
54	0.001890	54	0.001111
55	0.004211	55	0.003011
56	0.004591	56	0.003214
57	0.004992	57	0.003415
58	0.005427	58	0.003623
59	0.005881	59	0.003842
60	0.006353	60	0.004095

Society of Actuaries Mortality Improvement Scale MP-2020 is applied on a generational basis to base table rates.

APPENDIX 18 (Cont'd)

VI. Survivor and Beneficiary Mortality Rates (Cont'd)

<u>Age</u>	<u>Males</u> <u>Rate</u>	<u>Age</u>	<u>Females</u> <u>Rate</u>
61	0.006847	61	0.004376
62	0.007355	62	0.004709
63	0.007893	63	0.005081
64	0.008469	64	0.005515
65	0.009119	65	0.006007
66	0.009879	66	0.006574
67	0.010764	67	0.007228
68	0.011791	68	0.007991
69	0.012977	69	0.008882
70	0.014348	70	0.009913
71	0.015914	71	0.011099
72	0.017714	72	0.012469
73	0.019770	73	0.014025
74	0.022137	74	0.015798
75	0.024837	75	0.017811
76	0.027914	76	0.020084
77	0.031432	77	0.022658
78	0.035426	78	0.025572
79	0.039971	79	0.028889
80	0.045158	80	0.032661
81	0.051057	81	0.036972
82	0.057759	82	0.041889
83	0.065291	83	0.047505
84	0.073728	84	0.053910
85	0.083113	85	0.061218
86	0.093445	86	0.069540
87	0.104717	87	0.078933
88	0.117043	88	0.089461
89	0.130367	89	0.101045
90	0.144705	90	0.113634

Society of Actuaries Mortality Improvement Scale MP-2020 is applied on a generational basis to base table rates.

## APPENDIX 18 (Cont'd)

## VI. Survivor and Beneficiary Mortality Rates (Cont'd)

<u>Age</u>	<u>Males</u> <u>Rate</u>	<u>Age</u>	<u>Females</u> <u>Rate</u>
91	0.160306	91	0.127095
92	0.177295	92	0.141336
93	0.195554	93	0.157256
94	0.214933	94	0.175838
95	0.235173	95	0.195482
96	0.256846	96	0.216617
97	0.279223	97	0.238632
98	0.301941	98	0.261262
99	0.324803	99	0.284370
100	0.347403	100	0.307717
101	0.369814	101	0.331284
102	0.392154	102	0.355062
103	0.414131	103	0.378941
104	0.435647	104	0.402553
105	0.456440	105	0.425814
106	0.476468	106	0.448404
107	0.495730	107	0.470342
108	0.513947	108	0.491432
109	0.531378	109	0.511431
110	0.545110	110	0.530405
111	0.548187	111	0.548187
112	0.557992	112	0.557992
113	0.558942	113	0.558942
114	0.559950	114	0.559950
115	0.560902	115	0.560902
116	0.560959	116	0.560959
117	0.561015	117	0.561015
118	0.561015	118	0.561015
119	0.561015	119	0.561015
120	1.000000	120	1.000000

Society of Actuaries Mortality Improvement Scale MP-2020 is applied on a generational basis to base table rates.

APPENDIX 18 (Cont'd)

VII. Disabled Annuitant Mortality Rates

<u>Age</u>	<u>Males</u>	<u>Rate</u>	<u>Age</u>	<u>Females</u>	<u>Rate</u>
30		0.004652	30		0.003422
31		0.004963	31		0.003769
32		0.005272	32		0.004129
33		0.005569	33		0.004505
34		0.005877	34		0.004881
35		0.006163	35		0.005259
36		0.006456	36		0.005634
37		0.006751	37		0.006015
38		0.007059	38		0.006401
39		0.007371	39		0.006802
40		0.007705	40		0.007219
41		0.008073	41		0.007660
42		0.008491	42		0.008131
43		0.008966	43		0.008652
44		0.009542	44		0.009236
45		0.010203	45		0.009899
46		0.010984	46		0.010640
47		0.011887	47		0.011491
48		0.012917	48		0.012463
49		0.014064	49		0.013571
50		0.015343	50		0.014803
51		0.016424	51		0.015537
52		0.017566	52		0.016336
53		0.018749	53		0.017181
54		0.019960	54		0.018046
55		0.021172	55		0.018866
56		0.022361	56		0.019608
57		0.023488	57		0.020231
58		0.024557	58		0.020721
59		0.025566	59		0.021082

Society of Actuaries Mortality Improvement Scale MP-2020 is applied on a generational basis to base table rates.

APPENDIX 18 (Cont'd)

VII. Disabled Annuitant Mortality Rates (Cont'd)

<u>Age</u>	<u>Males</u>	<u>Rate</u>	<u>Age</u>	<u>Females</u>	<u>Rate</u>
60		0.026516	60		0.021350
61		0.027415	61		0.021532
62		0.028313	62		0.021709
63		0.029236	63		0.021906
64		0.030182	64		0.022166
65		0.031154	65		0.022529
66		0.032187	66		0.023039
67		0.033281	67		0.023732
68		0.034485	68		0.024639
69		0.035810	69		0.025784
70		0.037301	70		0.027188
71		0.039017	71		0.028858
72		0.040985	72		0.030823
73		0.043225	73		0.033071
74		0.045778	74		0.035661
75		0.048700	75		0.038596
76		0.051973	76		0.041899
77		0.055667	77		0.045616
78		0.059793	78		0.049768
79		0.064417	79		0.054392
80		0.069552	80		0.059522
81		0.075256	81		0.065190
82		0.081539	82		0.071412
83		0.088386	83		0.078249
84		0.095845	84		0.085710
85		0.103866	85		0.093862
86		0.112482	86		0.102354
87		0.121693	87		0.111003
88		0.131659	88		0.119794
89		0.144125	89		0.128685

Society of Actuaries Mortality Improvement Scale MP-2020 is applied on a generational basis to base table rates.

## APPENDIX 18 (Cont'd)

## VII. Disabled Annuitant Mortality Rates (Cont'd)

<u>Age</u>	<u>Males</u>	<u>Rate</u>	<u>Age</u>	<u>Females</u>	<u>Rate</u>
90		0.157863	90		0.137873
91		0.171906	91		0.147449
92		0.186069	92		0.157607
93		0.200252	93		0.168645
94		0.214573	94		0.180687
95		0.229208	95		0.195482
96		0.256135	96		0.216617
97		0.278405	97		0.238632
98		0.300930	98		0.261262
99		0.323597	99		0.284370
100		0.346058	100		0.307717
101		0.368382	101		0.331284
102		0.390636	102		0.355062
103		0.412527	103		0.378941
104		0.433960	104		0.402553
105		0.454672	105		0.425814
106		0.474623	106		0.448404
107		0.493810	107		0.470342
108		0.511957	108		0.491432
109		0.529320	109		0.511431
110		0.530405	110		0.530405
111		0.548187	111		0.548187
112		0.557992	112		0.557992
113		0.558942	113		0.558942
114		0.559950	114		0.559950
115		0.560902	115		0.560902
116		0.560959	116		0.560959
117		0.561015	117		0.561015
118		0.561015	118		0.561015
119		0.561015	119		0.561015
120		1.000000	120		1.000000

Society of Actuaries Mortality Improvement Scale MP-2020 will be applied on a generational basis to base table rates.

APPENDIX 18 (Cont'd)

VIII. Salary Scale

<u>Duration</u>	<u>Rate</u>	<u>Duration</u>	<u>Rate</u>
0	1.1231	20	1.0293
1	1.1079	21	1.0283
2	1.0814	22	1.0274
3	1.0683	23	1.0265
4	1.0582	24	1.0257
5	1.0518	25	1.0250
6	1.0480	26	1.0243
7	1.0459	27	1.0237
8	1.0447	28	1.0230
9	1.0438	29	1.0225
10	1.0430	30	1.0219
11	1.0421	31	1.0214
12	1.0409	32	1.0210
13	1.0396	33	1.0204
14	1.0380	34	1.0200
15	1.0364	35	1.0195
16	1.0347	36	1.0191
17	1.0332	37	1.0186
18	1.0317	38	1.0183
19	1.0305	39	1.0183
		40	1.0184

## IX. Valuation Rate of Interest Assumption

The interest rate for valuation purposes is a level 6.95%. This valuation rate of interest is made up of a 2.4%<sup>1</sup> annual rate of inflation and a 4.55% 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 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 Callan, 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. Callan's expected annual rate of return for the total portfolio using a 20-year horizon is 7.48% on an arithmetic basis and 6.76% on a geometric basis. Using a 30-year horizon, the expected annual rate of return for the total portfolio is 8.01% on an arithmetic basis and 7.32% on a geometric basis.

Additionally, stochastic simulation projections were performed for the System by Cheiron, an actuarial consulting firm. In the stochastic simulation modeling, over five-thousand different future investment outcomes were generated based on the System's specific asset allocation. In one simulation set, the Callan capital market assumption projections were used, while in another simulation set the Horizon Actuarial Survey capital market assumption projections were used. Horizon annually surveys investment consultants and provides data with respect to the average of all their investment return expectations by asset class. For the 2021 Horizon survey, 16 different investment consultants provided long-term (20-year) investment return forecasts.

- The stochastic simulation run using Callan's 20-year projection capital market assumptions produced a return set with a distribution that had a 50<sup>th</sup> percentile return of 6.7% in 20 years. The returns' 25<sup>th</sup> to 75<sup>th</sup> percentile range was 4.7% to 8.7%.
- The stochastic simulation run using Callan's 30-year projection capital market assumptions produced a return set with a distribution that had a 50<sup>th</sup> percentile return of 7.2% in 30 years. The returns' 25<sup>th</sup> to 75<sup>th</sup> percentile range was 5.2% to 9.2%.
- The stochastic simulation run using the Horizon Survey's 20-year projection capital market assumptions produced a return set with a distribution that had a 50<sup>th</sup> percentile return of 6.7% in 20 years. The returns' 25<sup>th</sup> to 75<sup>th</sup> percentile range was 4.9% to 8.6%.

For a complete explanation of the rationale behind the System's valuation rate of interest assumption, please refer to the "*Report on the 2021 Recommended Actuarial Assumptions*".

## X. Other Assumptions

### Projected COLA Assumption

The annual percentage for estimating future COLA benefit payments is 1.3%.<sup>2</sup>

## APPENDIX 18 (Cont'd)

### IRC Section 415(b) and 401(a)(17)

For purposes of the normal rate, the limitations under IRC Section 415(b) were not reflected due to immateriality. The IRC Section 401(a)(17) limit for the fiscal year ending June 30, 2021 was reflected for members with a membership date on or after July 1, 1996.

### Retirement Rates

Retirement Rates for terminated vested members (no earnings in the fiscal year and entitled to a vested benefit, not yet retired): 100% at the age of 55 or current age if later.

### Marriage Assumptions

None

### Tier 6 Pensionable Salary Limit

Tier 6 Pensionable earnings are limited to the current Governor's salary of \$225,000 per year and \$250,000 in 2021, which is then assumed to increase annually by the assumed rate of inflation of 2.4%.

### Maximum Salary for Tier 2-6 Death Benefits

The Tier 2 to Tier 6 maximum Salary allowable under Section 130 of the Civil Service Law as of June 30, 2021 is \$191,018. It is assumed to increase annually by the assumed annual rate of inflation of 2.4%.

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<sup>1</sup> The average annual rate of increase in the Consumer Price Index (CPI) for the last 30 years ending with March 31, 2021 was 2.27%.

<sup>2</sup> 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%.

## APPENDIX 19

### SUMMARY OF BENEFIT PROVISIONS

#### 1. Membership

With certain limited exceptions, membership is mandatory for all full-time New York State public school teachers and administrators, outside New York City. Membership is optional for certain teachers/administrators eligible for the Optional Retirement Program and 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 non-vested person 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.

\*The end date for Tier 2 and the start date for Tier 3 differs from what is in the law due to a court case known as the Oliver decision, making the start date of the new tier the date that it was signed into law.

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. Final Average Salary (FAS)

For Tiers 1-5, FAS is generally the average of the three highest consecutive full years of regular salary, whenever they occurred in the salary history, for duties involving the supervision and instruction of students.

For Tier 6 members, the FAS calculation is based on 5 years. Pensionable earnings can be no more than the Governor's salary, which is \$250,000 as of 1/1/2022.

## APPENDIX 19 (Cont'd)

Certain other restrictions apply to pensionable earnings that can be used in the FAS calculation. There are also limits on the year-over-year percentage increase in salary used in calculating FAS.

### 3. 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:

1/100<sup>th</sup> of final average salary (FAS) per year for each of the first 25 years of service, plus 1/120<sup>th</sup> of FAS per year for each of the next 10 years of service, plus 1/140<sup>th</sup> 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:

1/50<sup>th</sup> of final average salary (FAS) per year for each of the first 25 years of NYS service, plus 1/60<sup>th</sup> of FAS per year for each of the next 10 years of NYS service, plus 1/70<sup>th</sup> of FAS per year for each year of NYS service in excess of 35.

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.

## APPENDIX 19 (Cont'd)

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

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

## APPENDIX 19 (Cont'd)

### 4. Disability Retirement

Generally, a member with at least 10 years of service may qualify for a disability retirement benefit of the smaller of 1)  $1\frac{1}{3}\%$  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  $1\frac{1}{3}\%$  of FAS per year of completed service.

### 5. 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.

Under legislation enacted in 2000, all Tier 2-6 members will be covered by the Paragraph 2 Death Benefit, unless they selected Paragraph 1 (see Tier 1 Calculation above) and it is greater than Paragraph 2. All members joining on or after Jan. 1, 2001, will be covered by the Paragraph 2 Death Benefit. The benefit is one year's salary<sup>1</sup> after a year of service, increasing to a maximum of three years' salary after three years or more of service. The benefit is reduced after age 60 by 4% per year, up to a maximum reduction of 40% at age 70. (Reductions begin at age 61; age is not rounded, and the reduction is not prorated.) Under Paragraph 2, if the in-service death benefit is in effect when a member retires, coverage may continue after retirement. The benefit would be:

- 1st Year: 50% of the death benefit in effect at retirement;
- 2nd Year: 25% of the benefit at retirement; and,
- 3rd & Ensuing Years: 10% of the benefit in effect at retirement (or at age 60, if the member retires after age 59). To be eligible for the continued coverage in retirement, the member must retire within one year of leaving the payroll and not be employed (other than NYSTRS service) between the member's cease-teaching date and retirement date.

#### *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.

### 6. 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.

<sup>1</sup> The law limits the amount of salary that can be used in the calculation of the Paragraph 2 Death Benefit.

## APPENDIX 19 (Cont'd)

### *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 contributions with interest.

### 7. Member Contributions

Certain Tier 1 and 2 members may elect to contribute 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 were 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 \$250,000 (the limit currently equal to the NYS governor's salary)	6.00%

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, the member will contribute a percentage based on a salary projection provided by the employer.

### 8. 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:

## APPENDIX 19 (Cont'd)

- Age 62 and retired for 5 years, or
- 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.