



Fiscal Year 2022
Actuarial Valuation Report
for the
New York City
Teachers' Retirement System

JUNE 30, 2020 (LAG) ACTUARIAL VALUATION

prepared by the
New York City
Office of the Actuary

2022



OFFICE OF THE ACTUARY

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MICHAEL J. SAMET
INTERIM CHIEF ACTUARY

September 2, 2022

Board of Trustees
New York City Teachers' Retirement System
55 Water Street, 16th Floor
New York, NY 10041

Re: Fiscal Year 2022 Actuarial Valuation Report (Report)

Dear Trustees:

This Report presents the results of the June 30, 2020 (Lag) actuarial valuation of the benefits under both the New York City Teachers' Retirement System (TRS) Qualified Pension Plan and Group Life Insurance Plan (collectively, the Plan). This valuation, known as the June 30, 2020 (Lag) valuation, forms the basis for determining the statutorily required contribution (Statutory Contribution) of \$3,303,797,557 for Fiscal Year 2022 (i.e., for the period beginning July 1, 2021 and ending June 30, 2022). It is not intended, nor necessarily suitable, for other purposes. Calculations made for other purposes may differ significantly from those shown herein.

Results of the June 30, 2019 (Lag) actuarial valuation are shown in this Report for comparative purposes. Other historical information that the Actuary believes useful is also included.

The June 30, 2020 (Lag) and June 30, 2019 (Lag) actuarial valuations are based upon census data as of those dates submitted by the Plan's administrative staff and the employers' payroll facilities. Financial information was provided by TRS and the Office of the Comptroller as of June 30, 2020 and June 30, 2019.

Consistent with Actuarial Standards of Practice, the Office of the Actuary has reviewed census data and financial information for consistency and reasonability but has not audited it. The accuracy of the results and calculations presented in this Report are dependent on the accuracy of this census data and financial information. To the extent any such data or information provided is materially inaccurate or incomplete, the results contained herein will require revision.

A summary of the benefits available under the terms of the Plan is shown in SECTION VIII – SUMMARY OF PLAN PROVISIONS. The benefits under the Plan are unchanged from the prior valuation; however, continued compliance has been presumed under the Older Workers Benefit Protection Act.

A summary of the actuarial assumptions and methods used in the valuation of the Plan is shown in SECTION XI – ACTUARIAL ASSUMPTIONS AND METHODS. The actuarial assumptions and methods are unchanged from the prior valuation, except for a method change to include an adjustment based on the value of guaranteed interest credits payable to the Tax Deferred Annuity plan (TDA).

This Report does not present Governmental Accounting Standards Board (GASB) results. The Office of the Actuary will publish the Fiscal Year 2022 GASB67 and GASB68 results in September 2022, which will be available on the website of the Office of the Actuary (www.nyc.gov/actuary).

Also, note that this valuation does not reflect any potential cost due to *Gulino vs. Department of Education*, 96 Civ. 8414(KMW).

The undersigned actuaries are Fellows of the Society of Actuaries and Members of the American Academy of Actuaries. In addition, Craig T. Chu is an Enrolled Actuary under the Employee Retirement Income Security Act of 1974 and a Fellow of the Conference of Consulting Actuaries. We meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein. To the best of our knowledge, the results contained herein have been prepared in accordance with generally accepted actuarial principles and procedures and with the Actuarial Standards of Practice issued by the Actuarial Standards Board.

Best Regards,



Michael J. Samet, FSA, MAAA
Interim Chief Actuary



Craig T. Chu, FSA, EA, MAAA, FCA
Deputy Chief Actuary

MJS/eh

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SECTION I - EXECUTIVE SUMMARY

This Report presents the results of the June 30, 2020 (Lag) actuarial valuation of the New York City Teachers' Retirement System (TRS) and Group Life Insurance Plan (collectively, the Plan).

The purposes of the valuation are:

- To determine the actuarially required contribution (Actuarial Contribution) for Fiscal Year 2022 (i.e., July 1, 2021 to June 30, 2022),
- To measure the funding progress of the Plan,
- To disclose the census data and financial information used in the valuation, and
- To disclose the actuarial assumptions and actuarial methods used to determine the Actuarial Contribution.

The statutorily required contribution (Statutory Contribution) is also shown and compared to the Actuarial Contribution in historical years.

This Report does not provide financial and accounting information required by current GASB standards. That information is provided in a separate report.

Future measurements of this information may differ from current measurements for many reasons including, but not limited to, experience differing from economic or demographic assumptions, changes in actuarial assumptions and methods, and changes in applicable statute and plan provisions. These and additional risks may be present for the Plan. A further discussion is presented in SECTION VII - RISK AND UNCERTAINTY for consideration.

Table I-1 Executive Summary

Presented in **Table I-1** are the principal results of the June 30, 2020 (Lag) actuarial valuation and, for comparative purposes, the June 30, 2019 (Lag) actuarial valuation.

NEW YORK CITY TEACHERS' RETIREMENT SYSTEM		
SUMMARY OF VALUATION RESULTS		
Valuation Date	June 30, 2020 (Lag)	June 30, 2019 (Lag)
Fiscal Year	2022	2021
Funded Status		
1. Accrued Liability	\$ 75,452,987,066	\$ 73,938,546,544
2. Actuarial Value of Assets (AVA) ¹	<u>62,456,795,810</u>	<u>61,172,692,689</u>
3. Unfunded Accrued Liability (AVA Basis) (1. - 2.)	\$ 12,996,191,256	\$ 12,765,853,855
4. Market Value of Assets (MVA)	59,318,950,000	57,990,211,000
5. Unfunded Accrued Liability (MVA Basis) (1. - 4.)	\$ 16,134,037,066	\$ 15,948,335,544
6. Funded Ratio (MVA Basis) (4. / 1.)	78.6%	78.4%
Contribution		
1. Normal Cost	\$ 1,411,270,725	\$ 1,402,110,016
2. Unfunded Accrued Liability	1,860,069,384	1,697,740,859
3. Administrative Expenses	58,457,448	57,455,660
4. ASAF Credit	<u>(26,000,000)</u>	<u>(25,700,000)</u>
5. Actuarial Contribution (1. + 2. + 3. + 4.)	\$ 3,303,797,557	\$ 3,131,606,535
6. Statutory Contribution	\$ 3,303,797,557	\$ 3,131,606,535
Participant Data		
1. Active Members		
a. Number	124,276	123,336
b. Annual Salary ²	\$ 11,203,878,026	\$ 10,903,755,059
c. Average Salary	\$ 90,153	\$ 88,407
2. Terminated Nonvested Members / Actives Off Payroll ³	5,604	8,174
3. Deferred Vested Members	15,502	13,410
4. Retirees and Beneficiaries		
a. Number	89,536	88,507
b. Total Annual Benefits	\$ 4,437,206,309	\$ 4,370,615,951
c. Average Benefit	\$ 49,558	\$ 49,382

¹ Includes adjustments for receivable contributions.

² Includes the impact of recent labor contract settlements and certain non-union salary increases with retroactive effective dates, if any, that are not yet reflected in the census data.

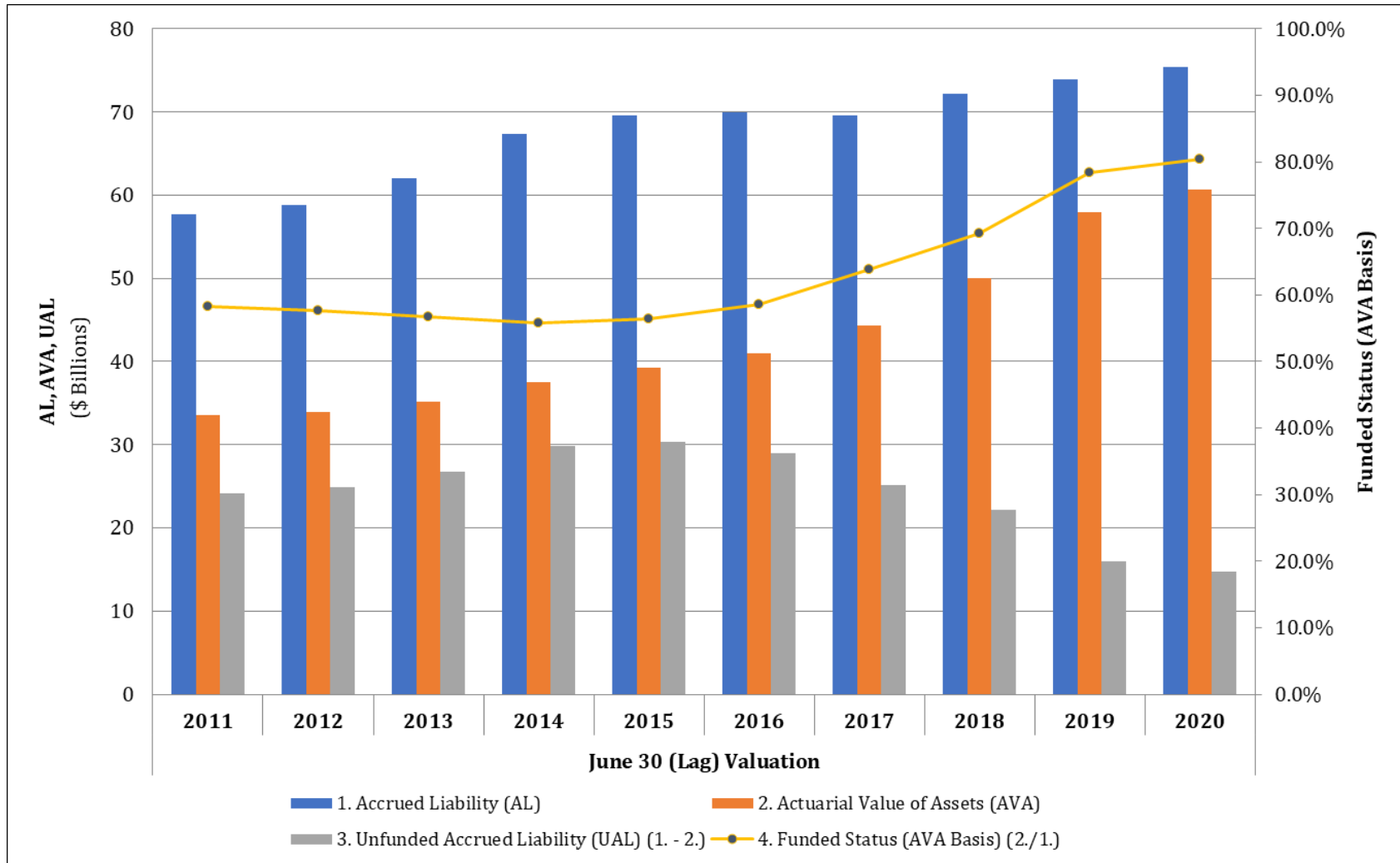
³ Actives Off Payroll as of June 30, 2019 (Lag) represents members no longer on payroll, but not otherwise classified.

Table I-2
Actuarial Liabilities

NEW YORK CITY TEACHERS' RETIREMENT SYSTEM		
ACTUARIAL LIABILITIES BY STATUS		
Valuation Date	June 30, 2020 (Lag)	June 30, 2019 (Lag)
Fiscal Year	2022	2021
Accrued Liability		
1. Active Members	\$ 29,779,050,120	\$ 28,711,678,928
2. Terminated Nonvested Members / Actives Off Payroll ¹	53,475,028	320,115,473
3. Deferred Vested Members	1,482,176,823	1,159,485,346
4. Retirees and Beneficiaries	<u>44,132,285,095</u>	<u>43,741,266,797</u>
5. Accrued Liability Pre-Adjustments (1. to 4.)	\$ 75,446,987,066	\$ 73,932,546,544
6. Actuarial Adjustments	<u>6,000,000</u>	<u>6,000,000</u>
7. Total Accrued Liability (AL) (5. + 6.)	\$ 75,452,987,066	\$ 73,938,546,544
Present Value of Benefits		
1. Active Members	\$ 48,421,107,086	\$ 46,939,656,475
2. Terminated Nonvested Members / Actives Off Payroll ¹	53,475,028	320,115,473
3. Deferred Vested Members	1,482,176,823	1,159,485,346
4. Retirees and Beneficiaries	<u>44,132,285,095</u>	<u>43,741,266,797</u>
5. Present Value of Benefits (1. to 4.)	\$ 94,089,044,032	\$ 92,160,524,091
6. Actuarial Adjustments	<u>6,000,000</u>	<u>6,000,000</u>
7. Total Present Value of Benefits (5. + 6.)	\$ 94,095,044,032	\$ 92,166,524,091

¹ Actives Off Payroll as of June 30, 2019 (Lag) represents members no longer on payroll, but not otherwise classified.

Graph I-3
Historical Funded Status



SECTION II – MARKET AND ACTUARIAL VALUES OF ASSETS

Information on the Market Value of Assets (MVA) of the Plan is provided by the Office of the Comptroller. An Actuarial Asset Valuation Method (AAVM) is used to determine the Actuarial Value of Assets (AVA) of the Plan.

The Actuary reset the AVA to the market value as of June 30, 2011 and as of June 30, 2019. Beginning with the June 30, 2020 (Lag) actuarial valuation, the AAVM recognizes investment returns greater or less than expected over a period of five years. In accordance with this AAVM, the Unexpected Investment Returns (UIR) are phased into the AVA at rates 20% per year.

UIR is defined as the excess of net investment return over the Expected Investment Return (EIR) based on the expected rate of return on the MVA, where EIR is based on beginning-of-fiscal-year MVA and assumes all net cash flow occurs midyear.

The AVA is further constrained to be within a corridor of 80% to 120% of the market value.

Table II-1
Statement of Plan Net Assets

(\$ Thousands)		
	June 30, 2020	June 30, 2019
ASSETS		
Cash	\$ 48,488	\$ 76,796
Receivables		
Investment Securities Sold	\$ 1,889,299	\$ 2,305,855
Member Loans	323,805	320,976
Accrued Interest and Dividends	289,845	290,228
Total Receivables	\$ 2,502,949	\$ 2,917,059
INVESTMENTS AT FAIR VALUE		
Pooled NYC Pension Fund Assets (Fixed-Return Fund)		
Short-Term Investments		
Commercial Paper	\$ 381,195	\$ 567,394
Short-term Investment Fund	747,639	779,479
U.S. Treasury Bills & Agencies	2,149,709	100,011
Discount Notes	0	203,555
Debt Securities		
U.S. Government	9,911,190	11,074,088
Corporate & Other	14,707,801	11,914,295
Equity Securities	25,363,162	24,374,505
Alternative Investments	10,765,147	10,069,086
Collective Trust Funds		
Fixed Income	0	0
International Equity	14,990,424	15,224,013
Mortgage Debt Security	0	0
Treasury Inflation Protected Securities	3,126,355	3,387,131
Collateral from securities lending (Fixed Return Fund)	1,355,516	1,182,863
Diversified Equity Fund		
Short-Term Investments	119,761	123,852
Equity Securities	5,366,777	5,826,298
Debt Securities	129,398	120,152
Bond Fund		
Short-Term Investments	1,086	775
Equity Securities	57,937	62,502
Debt Securities	0	0
International Equity Fund		
Short-Term Investments	104	65
International Equity	9,422	11,131
Inflation Protection Fund		
Short-Term Investments	0	13
Equity Securities	0	3,930
Socially Responsive Equity Fund		
Short-Term Investments	315	410
Equity Securities	12,691	10,975
International equity	0	985
U.S. Equity Index Fund		
Equity securities	2,568	0
International Equity Index Fund		
Equity securities	59	0
Collateral from securities lending (Variable Return Fund)	35,724	39,451
TOTAL INVESTMENTS	\$ 89,233,980	\$ 85,076,959
OTHER ASSETS	63,899	42,615
TOTAL ASSETS	\$ 91,849,316	\$ 88,113,429
LIABILITIES		
Accounts Payable	\$ 299,648	\$ 646,918
Payable for Investment Securities Purchased	3,096,888	2,574,584
Accrued Benefits Payable	88,957	77,154
Due to TDA Program's Fixed Return Fund	27,653,633	25,602,248
Security Lending	1,391,240	1,222,314
TOTAL LIABILITIES	\$ 32,530,366	\$ 30,123,218
PLAN ASSETS HELD IN TRUST FOR PENSION BENEFITS	\$ 59,318,950	\$ 57,990,211

Table II-2
Statement of Changes in Plan Net Assets

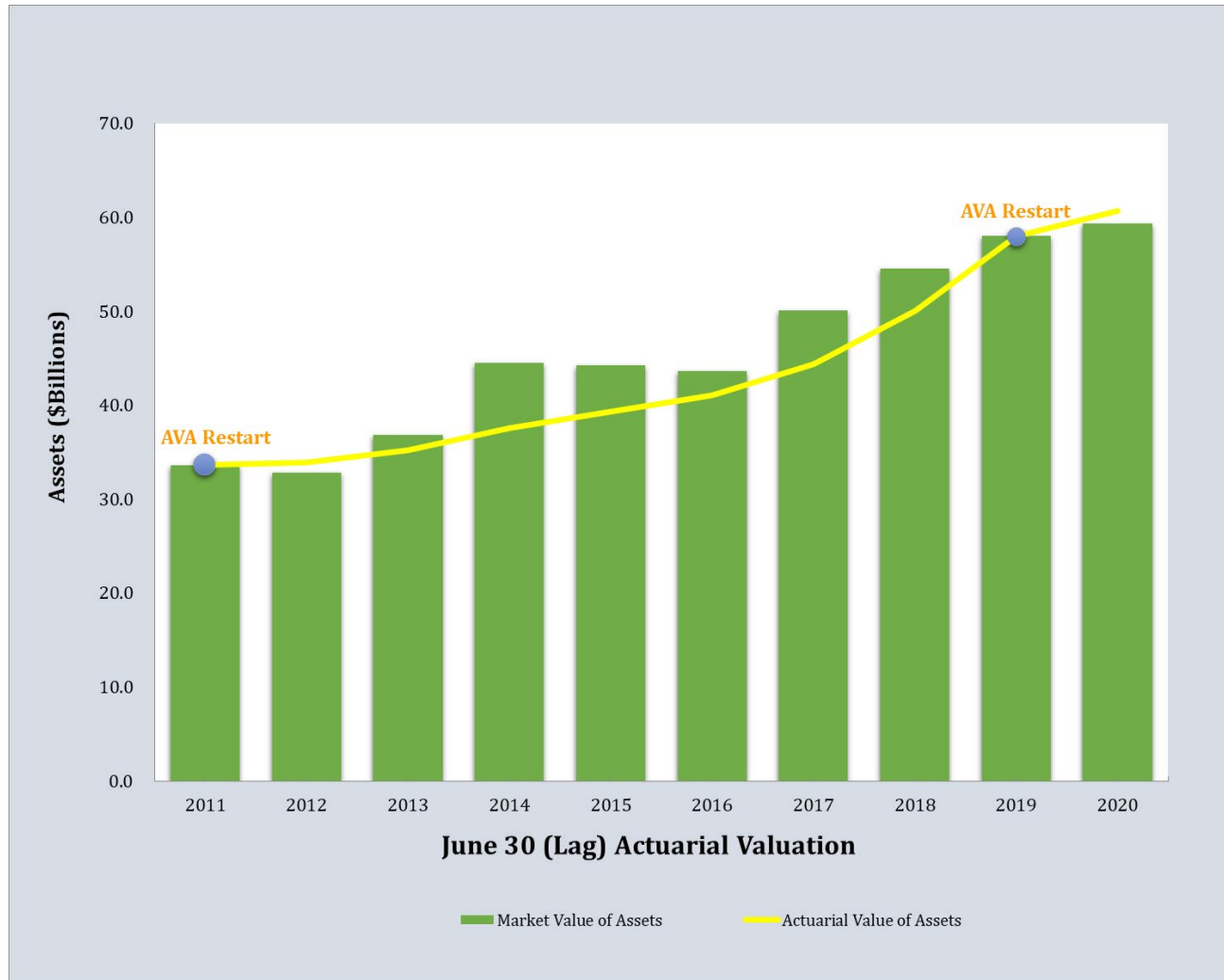
(\$ Thousands)		
	June 30, 2020	June 30, 2019
ADDITIONS		
Contributions		
Member Contributions	\$ 226,920	\$ 217,205
Employer Contributions	3,590,822	3,696,685
Other Employer Contributions ¹	<u>61,748</u>	<u>62,513</u>
Total Contributions	\$ 3,879,490	\$ 3,976,403
Investment Income		
Interest Income	\$ 1,094,140	\$ 1,148,789
Dividend Income	1,125,180	1,112,731
Net Appreciation in Fair Value of Investments	<u>1,972,228</u>	<u>3,749,095</u>
Total Investment Income	\$ 4,191,548	\$ 6,010,615
Less:		
Investment Expenses	\$ 296,818	\$ 307,370
Net (Decrease) in Fair Variable Expense Provision	<u>(5,947)</u>	<u>(5,933)</u>
Net Investment Income	\$ 3,900,677	\$ 5,709,178
Securities Lending Transactions		
Securities Lending Income	\$ 11,885	\$ 13,416
Securities Lending Fees	<u>(1,375)</u>	<u>(1,283)</u>
Net Securities Lending Income (Loss)	\$ 10,510	\$ 12,133
Other		
Net Receipts from (to) Other Retirement Systems	<u>(2,798)</u>	<u>1,222</u>
TOTAL ADDITIONS	\$ 7,787,879	\$ 9,698,936
DEDUCTIONS		
Benefit Payments and Withdrawals	\$ 4,591,086	\$ 4,487,680
Administrative Expenses	64,532	64,291
Other		
Interest from (to) TDA Program's Fixed Return Fund	\$ 1,846,173	\$ 1,716,679
TDA Rebalance	<u>(42,651)</u>	<u>(27,449)</u>
TOTAL DEDUCTIONS	\$ 6,459,140	\$ 6,241,201
NET INCREASE (DECREASE) IN PLAN NET ASSETS	\$ 1,328,739	\$ 3,457,735
PLAN NET ASSETS HELD IN TRUST FOR PENSION BENEFITS		
Beginning of Year	\$ 57,990,211	\$ 54,532,476
End of Year	\$ 59,318,950	\$ 57,990,211

¹ Includes amounts for employer's portion of Additional Member Contributions and supplemental contributions for the ASAF and ASF Funds.

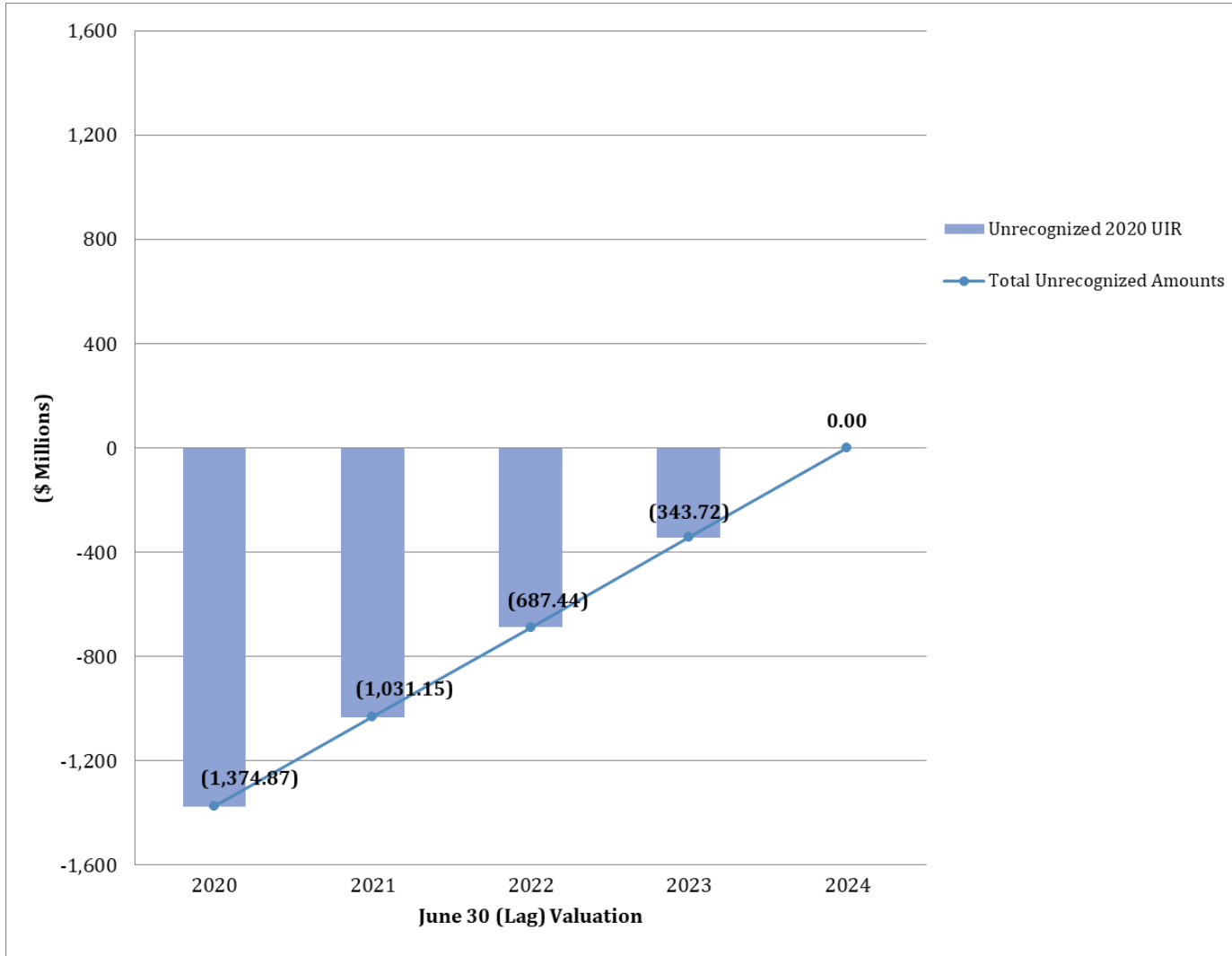
Table II-3
Development of Actuarial Value of Assets

(\$ Thousands)		
Valuation Date	June 30, 2020	June 30, 2019
1. Market Value of Assets (MVA)		
a. Beginning of Year (BOY)	\$ 51,949,650	\$ 48,172,801
b. End of Year (EOY)	\$ 53,732,776	\$ 51,949,650
2. Contributions		
a. Employee	\$ 226,673	\$ 216,875
b. Employer	3,590,822	3,696,686
c. Other	<u>61,734</u>	<u>62,495</u>
d. Total Contributions	\$ 3,879,229	\$ 3,976,056
3. Net Investment Income		
a. Investment Income	\$ 2,201,484	\$ 3,882,645
b. Investment Expenses	<u>(288,080)</u>	<u>(299,763)</u>
c. Total Net Investment Income	\$ 1,913,404	\$ 3,582,882
4. Benefit Payments and Other Cash Flow	\$ (4,009,507)	\$ (3,782,089)
5. Net Cash Flow (2.d. + 4.)	\$ (130,278)	\$ 193,967
6. Expected Investment Return (EIR)	\$ 3,631,993	\$ 3,582,882
7. Unexpected Investment Return (UIR) (3.c. - 6.)	\$ (1,718,589)	\$ 0
8. Preliminary Fixed AVA		
a. Preliminary Fixed AVA @ BOY	\$ 51,949,650	N/A
b. Net Cash Flow (5.)	\$ (130,278)	N/A
c. Expected Investment Return (6.)	\$ 3,631,993	N/A
d. Phase in of UIR		
20% of UIR for prior year	\$ (343,718)	N/A
20% of UIR for second prior year	N/A	N/A
20% of UIR for third prior year	N/A	N/A
20% of UIR for fourth prior year	N/A	N/A
20% of UIR for fifth prior year	N/A	N/A
Total	\$ (343,718)	N/A
e. Lower Corridor Bound (80% of 1.b.)	\$ 42,986,221	N/A
f. Upper Corridor Bound (120% of 1.b.)	\$ 64,479,331	N/A
g. Preliminary Fixed AVA (a. through d., bounded by e. and f.)	\$ 55,107,647	\$ 51,949,650
9. Variable Assets	\$ 5,586,174	\$ 6,040,561
10. Preliminary AVA (8.g. + 9.)	\$ 60,693,821	\$ 57,990,211
11. Receivable Amounts		
a. PV 1-year Adjusted Employer Contribution	\$ 3,052,283	\$ 3,496,030
b. PV Future Administrative Expense Reimbursement	52,816	51,911
c. Amounts due (To)/From TDA	<u>(1,342,124)</u>	<u>(365,459)</u>
d. Total	\$ 1,762,975	\$ 3,182,482
12. Final AVA (10. + 11.)	\$ 62,456,796	\$ 61,172,693

Graph II-4
Historical Market and Actuarial Value of Assets



Graph II-5
Future Recognition of UIR as of June 30, 2020



SECTION III – CONTRIBUTION DEVELOPMENT AND HISTORY

Table III-1 Statutory Contributions

Table III-1 shows the components of the Fiscal Year 2022 and the Fiscal Year 2021 Statutory Contributions.

COMPONENTS OF CURRENT AND PRIOR FISCAL YEAR STATUTORY CONTRIBUTIONS		
Valuation Date	June 30, 2020 (Lag)	June 30, 2019 (Lag)
Fiscal Year	2022	2021
Normal Cost ¹	\$ 1,411,270,725	\$ 1,402,110,016
Amortization of Unfunded Accrued Liability		
-Initial UAL	2,072,335,634	2,011,976,344
-2011 (Gain)/Loss	157,298,501	157,298,501
-2012 (Gain)/Loss	92,094,332	92,094,332
-2013 (Gain)/Loss	244,357,693	244,357,693
-2014 (Gain)/Loss	117,417,036	117,417,036
-2014 Assumption Changes ²	224,142,498	224,142,498
-2015 (Gain)/Loss	86,869,581	86,869,581
-2016 (Gain)/Loss	(100,351,916)	(100,351,916)
-2017 (Gain)/Loss	(264,357,362)	(264,357,362)
-2017 ASAF Method Change	11,633,517	11,633,517
-2017 Assumption Changes ³	(107,961,163)	(107,961,163)
-2017 Method Changes ³	908,566	908,566
-2018 (Gain)/Loss	(73,585,040)	(73,585,040)
-2018 Method Change ⁴	(140,476,031)	(140,476,031)
-2019 (Gain)/Loss	(207,653,807)	(207,653,807)
-2019 Assumption Changes ⁵	(38,429,261)	(38,429,261)
-2019 Method Change ⁵	(316,142,629)	(316,142,629)
-2020 (Gain)/Loss	(6,282,507)	N/A
-2020 TDA Method Changes ⁶	97,687,066	N/A
-2020 OWBPA	10,564,676	N/A
Total	\$ 1,860,069,384	\$ 1,697,740,859
Administrative Expenses	58,457,448	57,455,660
ASAF Credit ⁷	(26,000,000)	(25,700,000)
Total Contribution to the New York City Teachers' Retirement System	\$ 3,303,797,557	\$ 3,131,606,535

¹ Includes amounts necessary, if any, to provide for financing of the Excess Benefit Plan established by Chapter 623/04.

² Change in post retirement mortality assumptions including the change to the mortality improvement scale MP-2015.

³ 2019 A&M.

⁴ Change in method of characterizing interest credited on TDA Fixed Fund account balances.

⁵ Revised 2021 A&M.

⁶ TDA guaranteed interest credits included as an adjustment to the Actuarial Value of Assets.

⁷ Estimated contribution made by the Department of Education to the Annuity Savings Accumulation Fund (ASAF) of certain eligible members.

Table III-2
Schedule of Unfunded Accrued Liability Bases

The Initial Unfunded Accrued Liability (UAL) is being amortized over a closed 22-year period using Increasing Dollar Payments (IDP). Under IDP, amortization payments increase by 3.0% per year, consistent with the assumed rate of General Wage Increases. Increments to the UAL established after June 30, 2010 are amortized using Level Dollar Payments (LDP) as follows:

- Benefit Changes – Over the remaining working lifetimes of those impacted, unless the amortization period is determined by statute.
- Assumption and Method Changes – Over a closed 20-year period.
- Actuarial Gains and Losses – Over a closed 15-year period.

Under the One-Year Lag Methodology (OYLM), the number of payments is one fewer than the number of years in the amortization period (e.g., 14 payments over a closed 15-year amortization period).

Table III-2
Schedule of Unfunded Accrued Liability Bases (cont'd)

Table III-2 shows the Schedule of UAL Bases as of June 30, 2020.

NEW YORK CITY TEACHERS' RETIREMENT SYSTEM SCHEDULE OF UNFUNDED ACCRUED LIABILITY BASES						
Amortization Base	Date Established	Original Amount	Amortization Years	Amortization Payment	Payments Remaining	OYLM UAL June 30, 2020
Initial UAL	6/30/10	\$ 20,524,022,955	22	\$ 2,072,335,634	11	\$ 17,147,144,813
(Gain)/Loss	6/30/11	\$ 1,329,890,090	15	\$ 157,298,501	5	\$ 623,501,447
(Gain)/Loss	6/30/12	\$ 778,617,335	15	\$ 92,094,332	6	\$ 424,369,560
(Gain)/Loss	6/30/13	\$ 2,065,937,513	15	\$ 244,357,693	7	\$ 1,273,109,130
(Gain)/Loss	6/30/14	\$ 992,709,734	15	\$ 117,417,036	8	\$ 677,810,056
Assumption Change ¹	6/30/14	\$ 2,239,586,352	20	\$ 224,142,498	13	\$ 1,810,992,023
(Gain)/Loss	6/30/15	\$ 734,444,345	15	\$ 86,869,581	9	\$ 547,149,163
(Gain)/Loss	6/30/16	\$ (848,431,601)	15	\$ (100,351,916)	10	\$ (681,384,753)
(Gain)/Loss	6/30/17	\$ (2,235,025,973)	15	\$ (264,357,362)	11	\$ (1,916,390,517)
ASAF Method Change	6/30/17	\$ 116,239,745	20	\$ 11,633,517	16	\$ 106,242,167
Assumption Change ²	6/30/17	\$ (1,078,725,991)	20	\$ (107,961,163)	16	\$ (985,946,636)
Method Changes ²	6/30/17	\$ 9,078,212	20	\$ 908,566	16	\$ 8,297,410
(Gain)/Loss	6/30/18	\$ (622,129,323)	15	\$ (73,585,040)	12	\$ (565,021,570)
Method Change ³	6/30/18	\$ (1,403,608,000)	20	\$ (140,476,031)	17	\$ (1,325,877,957)
Gain/Loss	6/30/19	\$ (1,755,622,201)	15	\$ (207,653,807)	13	\$ (1,677,769,242)
Assumption Change ⁴	6/30/19	\$ (383,977,377)	20	\$ (38,429,261)	18	\$ (373,704,824)
Method Change ⁴	6/30/19	\$ (3,158,833,000)	20	\$ (316,142,629)	18	\$ (3,074,324,693)
Gain/Loss	6/30/20	\$ (53,115,849)	15	\$ (6,282,507)	14	\$ (53,115,849)
Method Change ⁵	6/30/20	\$ 976,069,325	20	\$ 97,687,066	19	\$ 976,069,325
Plan Change ⁶	6/30/20	\$ 55,042,203	8	\$ 10,564,676	7	\$ 55,042,203

¹ Change in post-retirement mortality assumptions including the change to the mortality improvement scale MP-2015.

² 2019 A&M.

³ Change in method of characterizing interest credited on TDA Fixed Fund account balances.

⁴ Revised 2021 A&M.

⁵ TDA guaranteed interest credits included as an adjustment to the Actuarial Value of Assets.

⁶ Older Workers Benefit Protection Act (OWBPA).

Graph III-3
 Remaining UAL Amortizations as of June 30, 2020

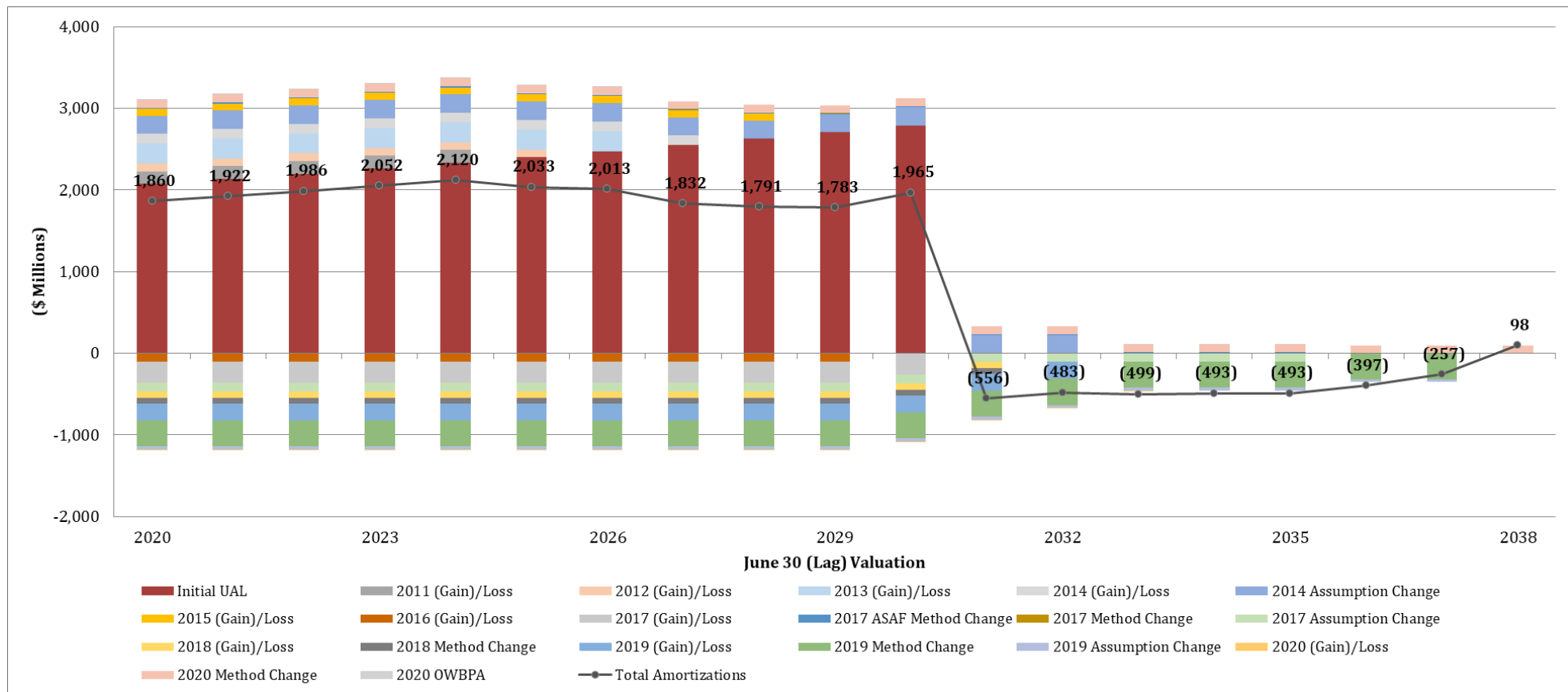


Table III-4
Reconciliation of Outstanding UAL Bases

Amounts Remaining to be Amortized, as of		
June 30 (Lag) Valuation Date	2020	2019
Unfunded Accrued Liability, June 30, 2010	\$ 17,147,144,813	\$ 17,843,173,609
2011 (Gain)/Loss	623,501,447	724,829,576
2012 (Gain)/Loss	424,369,560	479,813,562
2013 (Gain)/Loss	1,273,109,130	1,410,596,847
2014 (Gain)/Loss	677,810,056	739,552,702
2014 Assumption Change	1,810,992,023	1,895,026,873
2015 (Gain)/Loss	547,149,163	589,840,333
2016 (Gain)/Loss	(681,384,753)	(727,475,337)
2017 (Gain)/Loss	(1,916,390,517)	(2,029,863,946)
2017 ASAF Method Change	106,242,167	109,802,536
2017 Assumption Change	(985,946,636)	(1,018,987,504)
2017 Method Change	8,297,410	8,575,474
2018 (Gain)/Loss	(565,021,570)	(594,541,036)
2018 Method Change	(1,325,877,957)	(1,366,057,256)
2019 (Gain)/Loss	(1,677,769,242)	(1,755,622,201)
2019 Assumption Change	(373,704,824)	(383,977,377)
2019 Method Change	(3,074,324,693)	(3,158,833,000)
2020 (Gain)/Loss	(53,115,849)	
2020 Method Change	976,069,325	
2020 OWBPA	55,042,203	
Sum of Outstanding Amortization Amounts	\$ 12,996,191,256	\$ 12,765,853,855

June 30 (Lag) Valuation Date	2020	2019
1. Accrued Liability (AL)	\$ 75,452,987,066	\$ 73,938,546,544
2. Actuarial Value of Assets (AVA) ¹	62,456,795,810	61,172,692,689
3. Unfunded Accrued Liability (UAL) (1.-2.)	\$ 12,996,191,256	\$ 12,765,853,855

¹ Includes adjustments for receivable contributions.

Table III-5
Actuarial and Statutory Contribution History

Table III-5 compares the Statutory Contributions to the Actuarial Contributions for Fiscal Years 2013 through 2022.

(\$ Thousands)			
Fiscal Year Ended June 30	Actuarial Contribution Certified	Statutory Contribution Contributed	Percentage of Actuarial Contribution Contributed
2013	2,855,640	2,855,640	100.0%
2014	2,998,694	2,998,694	100.0%
2015	3,270,007	3,270,007	100.0%
2016	3,702,569	3,702,569	100.0%
2017	3,888,399	3,888,399	100.0%
2018	3,889,710	3,889,710	100.0%
2019	3,696,686	3,696,686	100.0%
2020	3,590,801	3,590,801	100.0%
2021	3,131,607	3,131,607	100.0%
2022	3,303,798	3,303,798	100.0%

Table III-6
City Rates: Contributions as a Percentage of Salary

Table III-6 shows the City Rates defined to be the contributions as a percentage of salary for the Fiscal Years 2013 through 2022.

CITY RATES (\$ Thousands)			
Fiscal Year Ended June 30	Actuarial Contribution ¹	Salary ² at Beginning of Fiscal Year	City Rate
2013	2,855,640	7,833,398	36.5%
2014	2,998,694	7,964,149	37.7%
2015	3,270,007	8,074,522	40.5%
2016	3,702,569	8,256,100	44.8%
2017	3,888,399	8,818,537	44.1%
2018	3,889,710	9,200,180	42.3%
2019	3,722,186	9,874,119	37.7%
2020 ³	3,616,322	10,439,259	34.6%
2021	3,157,307	10,950,176	28.8%
2022	3,329,798	11,266,796	29.6%

¹ Starting in Fiscal Year 2019, reflects the estimate of the contribution made by the Department of Education to the Annuity Savings Fund (ASAF).

² Includes the impact of recent labor contract settlements and certain non-union salary increases with retroactive effective dates, if any.

³ Actuarial Contribution is amount before offsetting for ASAF and Pre-Payment Credits.

SECTION IV - RESULTS BY CONTRIBUTING ENTITY

Table IV-1
Employer Contributions by Obligor

NEW YORK CITY TEACHERS' RETIREMENT SYSTEM							
EMPLOYER CONTRIBUTION BY OBLIGOR							
Valuation Date	June 30, 2020 (Lag)						
Fiscal Year	2022						
Obligor	Future Leaders	Harriet Tubman	Imagine Me Leadership	KIPP Academy	KIPP NYC	Opportunity	Renaissance
Contribution							
1. Normal Cost	\$ 319,931	\$ 461,021	\$ 113,243	\$ 591,466	\$ 692,994	\$ 712,151	\$ 756,382
2. Amortization of Unfunded Accrued Liability	33,028	28,326	13,396	(357,042)	149,784	109,389	623,791
3. Administrative Expenses	<u>11,945</u>	<u>23,888</u>	<u>4,728</u>	<u>33,345</u>	<u>18,663</u>	<u>22,893</u>	<u>17,916</u>
4. Actuarial Contribution (1. + 2. + 3.)	\$ 364,904	\$ 513,235	\$ 131,367	\$ 267,769	\$ 861,441	\$ 844,433	\$ 1,398,089
5. Statutory Contribution	\$ 364,904	\$ 513,235	\$ 131,367	\$ 267,769	\$ 861,441	\$ 844,433	\$ 1,398,089
Obligor	South Bronx Early College Academy	University Prep Charter HS	Voice	Wildcat			Charter School Subtotal
Contribution							
1. Normal Cost	\$ 218,145	\$ 675,937	\$ 594,673	\$ 374,518			\$ 5,510,461
2. Amortization of Unfunded Accrued Liability	(78,722)	195,711	57,526	119,718			894,905
3. Administrative Expenses	<u>11,945</u>	<u>19,409</u>	<u>21,400</u>	<u>8,959</u>			<u>195,091</u>
4. Actuarial Contribution (1. + 2. + 3.)	\$ 151,368	\$ 891,057	\$ 673,599	\$ 503,195			\$ 6,600,457
5. Statutory Contribution	\$ 151,368	\$ 891,057	\$ 673,599	\$ 503,195			\$ 6,600,457

Table IV-1
Employer Contributions by Obligor (cont'd)

NEW YORK CITY TEACHERS' RETIREMENT SYSTEM						
EMPLOYER CONTRIBUTION BY OBLIGOR						
Valuation Date	June 30, 2020 (Lag)					
Fiscal Year	2022					
Obligor	Charter School Subtotal	CUNY: Senior Colleges	CUNY: Community Colleges / Others	CUNY Subtotal	Department of Education	Total
Contribution						
1. Normal Cost	\$ 5,510,461	\$ 39,846,591	\$ 24,970,155	\$ 64,816,746	\$ 1,340,943,518	\$ 1,411,270,725
2. Amortization of Unfunded Accrued Liability	894,905	54,653,875	20,353,917	75,007,792	1,784,166,687	1,860,069,384
3. Administrative Expenses	195,091	1,838,694	1,020,002	2,858,696	55,403,661	58,457,448
4. ASAF Credit	0	0	0	0	(26,000,000)	(26,000,000)
5. Actuarial Contribution (1. + 2. + 3. + 4.)	\$ 6,600,457	\$ 96,339,160	\$ 46,344,074	\$ 142,683,234	\$ 3,154,513,866	\$ 3,303,797,557
6. Statutory Contribution	\$ 6,600,457	\$ 96,339,160	\$ 46,344,074	\$ 142,683,234	\$ 3,154,513,866	\$ 3,303,797,557

Table IV-2
Accrued Liabilities by Obligor

NEW YORK CITY TEACHERS' RETIREMENT SYSTEM							
SUMMARY OF LIABILITY BY STATUS AND OBLIGOR							
Valuation Date	June 30, 2020 (Lag)						
Fiscal Year	2022						
Obligor	Future Leaders	Harriet Tubman	Imagine Me Leadership	KIPP Academy	KIPP NYC	Opportunity	Renaissance
Accrued Liability							
1. Active Members	\$ 3,393,979	\$ 5,583,455	\$ 595,313	\$ 6,393,172	\$ 12,227,494	\$ 8,338,894	\$ 16,625,025
2. Terminated Nonvested Members	17,338	105,534	7,639	161,386	29,172	27,157	73,549
3. Deferred Vested Members	590,139	1,996,829	50,107	2,816,570	1,683,099	2,082,175	1,142,529
4. Retirees and Beneficiaries	<u>1,575,503</u>	<u>260,846</u>	<u>0</u>	<u>541,185</u>	<u>0</u>	<u>1,816,817</u>	<u>6,017,149</u>
5. Accrued Liability Pre-Adjustments (1. to 4.)	\$ 5,576,959	\$ 7,946,664	\$ 653,059	\$ 9,912,313	\$ 13,939,765	\$ 12,265,043	\$ 23,858,252
6. Actuarial Adjustments	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
7. Total Accrued Liability (AL) (5. + 6.)	\$ 5,576,959	\$ 7,946,664	\$ 653,059	\$ 9,912,313	\$ 13,939,765	\$ 12,265,043	\$ 23,858,252
Present Value of Benefits							
1. Active Members	\$ 10,702,127	\$ 13,334,394	\$ 2,750,680	\$ 22,579,346	\$ 20,167,352	\$ 19,883,752	\$ 24,931,837
2. Terminated Nonvested Members	17,338	105,534	7,639	161,386	29,172	27,157	73,549
3. Deferred Vested Members	590,139	1,996,829	50,107	2,816,570	1,683,099	2,082,175	1,142,529
4. Retirees and Beneficiaries	<u>1,575,503</u>	<u>260,846</u>	<u>0</u>	<u>541,185</u>	<u>0</u>	<u>1,816,817</u>	<u>6,017,149</u>
5. Present Value of Benefits (1. to 4.)	\$ 12,885,107	\$ 15,697,603	\$ 2,808,426	\$ 26,098,487	\$ 21,879,623	\$ 23,809,901	\$ 32,165,064
6. Actuarial Adjustments	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
7. Total Present Value of Benefits (5. + 6.)	\$ 12,885,107	\$ 15,697,603	\$ 2,808,426	\$ 26,098,487	\$ 21,879,623	\$ 23,809,901	\$ 32,165,064
Obligor	South Bronx Early College Academy	University Prep Charter HS	Voice	Wildcat			Charter School Subtotal
Accrued Liability							
1. Active Members	\$ 742,696	\$ 9,348,787	\$ 4,811,261	\$ 6,918,883			\$ 74,978,959
2. Terminated Nonvested Members	22,219	40,454	74,503	0			558,951
3. Deferred Vested Members	577,024	503,779	478,470	511,166			12,431,887
4. Retirees and Beneficiaries	<u>0</u>	<u>593,147</u>	<u>0</u>	<u>2,757,377</u>			<u>13,562,024</u>
5. Accrued Liability Pre-Adjustments (1. to 4.)	\$ 1,341,939	\$ 10,486,167	\$ 5,364,234	\$ 10,187,426			\$ 101,531,821
6. Actuarial Adjustments	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>			<u>0</u>
7. Total Accrued Liability (AL) (5. + 6.)	\$ 1,341,939	\$ 10,486,167	\$ 5,364,234	\$ 10,187,426			\$ 101,531,821
Present Value of Benefits							
1. Active Members	\$ 6,541,647	\$ 21,998,097	\$ 18,096,216	\$ 11,163,105			\$ 172,148,553
2. Terminated Nonvested Members	22,219	40,454	74,503	0			558,951
3. Deferred Vested Members	577,024	503,779	478,470	511,166			12,431,887
4. Retirees and Beneficiaries	<u>0</u>	<u>593,147</u>	<u>0</u>	<u>2,757,377</u>			<u>13,562,024</u>
5. Present Value of Benefits (1. to 4.)	\$ 7,140,890	\$ 23,135,477	\$ 18,649,189	\$ 14,431,648			\$ 198,701,415
6. Actuarial Adjustments	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>			<u>0</u>
7. Total Present Value of Benefits (5. + 6.)	\$ 7,140,890	\$ 23,135,477	\$ 18,649,189	\$ 14,431,648			\$ 198,701,415

Table IV-2
Accrued Liabilities by Obligor (cont'd)

NEW YORK CITY TEACHERS' RETIREMENT SYSTEM						
SUMMARY OF LIABILITY BY STATUS AND OBLIGOR						
Valuation Date	June 30, 2020 (Lag)					
Fiscal Year	2022					
Obligor	Charter School Subtotal	CUNY: Senior Colleges	CUNY: Community Colleges / Others	CUNY Subtotal	Department of Education	Total
Accrued Liability						
1. Active Members	\$ 74,978,959	\$ 542,947,276	\$ 296,847,542	\$ 839,794,818	\$ 28,864,276,343	\$ 29,779,050,120
2. Terminated Nonvested Members	558,951	4,328,424	3,798,829	8,127,253	44,788,824	53,475,028
3. Deferred Vested Members	12,431,887	52,176,438	24,269,812	76,446,250	1,393,298,686	1,482,176,823
4. Retirees and Beneficiaries	13,562,024	990,539,572	332,252,482	1,322,792,054	42,795,931,017	44,132,285,095
5. Accrued Liability Pre-Adjustments (1. to 4.)	\$ 101,531,821	\$ 1,589,991,710	\$ 657,168,665	\$ 2,247,160,375	\$ 73,098,294,870	\$ 75,446,987,066
6. Actuarial Adjustments	0	81,180	42,769	123,949	5,876,051	6,000,000
7. Total Accrued Liability (AL) (5. + 6.)	\$ 101,531,821	\$ 1,590,072,890	\$ 657,211,434	\$ 2,247,284,324	\$ 73,104,170,921	\$ 75,452,987,066
Present Value of Benefits						
1. Active Members	\$ 172,148,553	\$ 990,725,824	\$ 587,139,123	\$ 1,577,864,947	\$ 46,671,093,586	\$ 48,421,107,086
2. Terminated Nonvested Members	558,951	4,328,424	3,798,829	8,127,253	44,788,824	53,475,028
3. Deferred Vested Members	12,431,887	52,176,438	24,269,812	76,446,250	1,393,298,686	1,482,176,823
4. Retirees and Beneficiaries	13,562,024	990,539,572	332,252,482	1,322,792,054	42,795,931,017	44,132,285,095
5. Present Value of Benefits (1. to 4.)	\$ 198,701,415	\$ 2,037,770,258	\$ 947,460,246	\$ 2,985,230,504	\$ 90,905,112,113	\$ 94,089,044,032
6. Actuarial Adjustments	0	81,180	42,769	123,949	5,876,051	6,000,000
7. Total Present Value of Benefits (5. + 6.)	\$ 198,701,415	\$ 2,037,851,438	\$ 947,503,015	\$ 2,985,354,453	\$ 90,910,988,164	\$ 94,095,044,032

Table IV-3
Participant Data by Obligor

NEW YORK CITY TEACHERS' RETIREMENT SYSTEM							
PARTICIPANT DATA BY OBLIGOR							
Valuation Date	June 30, 2020 (Lag)						
Fiscal Year	2022						
Obligor	Future Leaders	Harriet Tubman	Imagine Me Leadership	KIPP Academy	KIPP NYC	Opportunity	Renaissance
Participant Data							
1. Active Members							
a. Number	37	60	16	79	34	67	54
b. Annual Salary ¹	\$ 3,134,228	\$ 4,143,248	\$ 1,101,497	\$ 7,258,624	\$ 4,291,915	\$ 6,209,450	\$ 5,397,577
c. Average Salary	\$ 84,709	\$ 69,054	\$ 68,844	\$ 91,881	\$ 126,233	\$ 92,678	\$ 99,955
2. Terminated Nonvested Members	2	23	2	17	3	4	3
3. Deferred Vested Members	7	12	1	37	38	18	4
4. Retirees and Beneficiaries							
a. Number	2	1	0	1	0	3	11
b. Total Annual Benefits	\$ 147,106	\$ 24,983	\$ 0	\$ 57,006	\$ 0	\$ 156,649	\$ 537,019
c. Average Annual Benefit	\$ 73,553	\$ 24,983	\$ 0	\$ 57,006	\$ 0	\$ 52,216	\$ 48,820
Obligor	South Bronx Early College Academy	University Prep Charter HS	Voice	Wildcat			Charter School Subtotal
Participant Data							
1. Active Members							
a. Number	37	69	69	26			548
b. Annual Salary ¹	\$ 2,693,470	\$ 6,329,867	\$ 5,779,844	\$ 2,728,202			\$ 49,067,922
c. Average Salary	\$ 72,796	\$ 91,737	\$ 83,766	\$ 104,931			\$ 89,540
2. Terminated Nonvested Members	5	1	8	0			68
3. Deferred Vested Members	6	7	9	4			143
4. Retirees and Beneficiaries							
a. Number	0	1	0	6			25
b. Total Annual Benefits	\$ 0	\$ 48,400	\$ 0	\$ 242,063			\$ 1,213,226
c. Average Annual Benefit	\$ 0	\$ 48,400	\$ 0	\$ 40,344			\$ 48,529

¹ Salaries shown reflect the impact of recent labor contract settlements and certain non-union salary increases with retroactive effective dates, if any.

Table IV-3
Participant Data by Obligor (cont'd)

NEW YORK CITY TEACHERS' RETIREMENT SYSTEM						
PARTICIPANT DATA BY OBLIGOR						
Valuation Date	June 30, 2020 (Lag)					
Fiscal Year	2022					
Obligor	Charter School Subtotal	CUNY: Senior Colleges	CUNY: Community Colleges / Others	CUNY Subtotal	Department of Education	Total
Participant Data						
1. Active Members						
a. Number	548	4,154	2,345	6,499	117,229	124,276
b. Annual Salary ¹	\$ 49,067,922	\$ 290,979,693	\$ 177,042,367	\$ 468,022,060	\$ 10,686,788,044	\$ 11,203,878,026
c. Average Salary	\$ 89,540	\$ 70,048	\$ 75,498	\$ 72,014	\$ 91,162	\$ 90,153
2. Terminated Nonvested Members	68	899	700	1,599	3,937	5,604
3. Deferred Vested Members	143	302	289	591	14,768	15,502
4. Retirees and Beneficiaries						
a. Number	25	2,034	765	2,799	86,712	89,536
b. Total Annual Benefits	\$ 1,213,226	\$ 122,095,512	\$ 36,672,929	\$ 158,768,441	\$ 4,277,224,642	\$ 4,437,206,309
c. Average Annual Benefit	\$ 48,529	\$ 60,027	\$ 47,938	\$ 56,723	\$ 49,327	\$ 49,558

¹ Salaries shown reflect the impact of recent labor contract settlements and certain non-union salary increases with retroactive effective dates, if any.

SECTION V - (GAIN)/LOSS ANALYSIS

Table V-1
Development of Experience (Gain)/Loss

NEW YORK CITY TEACHERS' RETIREMENT SYSTEM							
DEVELOPMENT OF EXPERIENCE (GAIN)/LOSS							
June 30, 2020							
	AL		AVA		UAL = AL - AVA		
	FIXED	VARIABLE	FIXED	VARIABLE	FIXED	VARIABLE	Total
AL, AVA, and UAL at June 30, 2019	\$ 68,055,657,072	\$ 5,882,889,472	\$ 55,132,131,689	\$ 6,040,561,000	\$ 12,923,525,383	\$ (157,671,528)	\$ 12,765,853,855
Normal Cost, Administrative Expenses, and Actuarial Adjustments ¹	1,570,570,222	0	(3,547,940,886)	0	5,118,511,108	0	5,118,511,108
Contributions Made (Employer and Employee) in Fiscal Year 2020	3,879,229,000	261,000	3,879,229,000	261,000	(3,879,229,000)	(261,000)	(3,879,490,000)
Benefit Payments in Fiscal Year 2020	(4,005,502,000)	(585,584,000)	(4,005,502,000)	(585,584,000)	0	0	0
Interest and Expected Return on Assets	4,736,014,424	391,653,463	3,606,548,549	402,699,451	1,129,465,875	(11,045,987)	1,118,419,888
Actuarial Adjustments ² at June 30, 2020	55,042,203	(271,763,451)	2,129,029,948	(271,763,451)	(2,073,987,745)	0	(2,073,987,745)
Expected AL, AVA, and UAL at June 30, 2020	\$ 70,411,781,921	\$ 5,417,195,485	\$ 57,193,496,300	\$ 5,586,174,000	\$ 13,218,285,621	\$ (168,978,515)	\$ 13,049,307,105
Actual AL, AVA, and UAL at June 30, 2020	\$ 69,978,396,301	\$ 5,474,590,765	\$ 56,870,621,810	\$ 5,586,174,000	\$ 13,107,774,491	\$ (111,583,235)	\$ 12,996,191,256
AL and UAL (Gain)/Loss; AVA Gain/(Loss)	\$ (433,385,620)	\$ 57,395,280	\$ (322,874,490)	\$ 0	\$ (110,511,130)	\$ 57,395,280	\$ (53,115,849)

¹ Actuarial Adjustments include those for receivable contributions and accumulated member contributions in excess of accumulated member normal costs.

² Actuarial Adjustments include those for liability changes other than experience and include receivable contributions, administrative expenses, and an asset adjustment for the variable fund.

Table V-2
Development of Actuarial Asset (Gain)/Loss

DEVELOPMENT OF ACTUARIAL ASSET (GAIN)/LOSS	
June 30, 2020	
(\$ Thousands)	
1. Phase-in of Unexpected Investment Return (UIR)	
20% of UIR for prior year	\$ 343,718
20% of UIR for second prior year	N/A
20% of UIR for third prior year	N/A
20% of UIR for fourth prior year	N/A
20% of UIR for fifth prior year	N/A
Total	\$ 343,718
2. Non-Benefit Payment Cash Flow	
a. Administrative Expenses paid in Fiscal Year 2020	\$ 51,059
b. Amount paid to Other System in Fiscal Year 2020	2,798
c. Transfers and Rebalancing in Fiscal Year 2020	(49,852)
d. Interest on a. through c. to June 30, 2020	138
e. Total Change at June 30, 2020	\$ 4,143
3. Changes Due to TDA Receivable	
a. Amount Due To/(From) TDA at June 30, 2019	\$ 365,459
b. Interest on a. to June 30, 2020	25,582
c. Amount Due To/(From) TDA at June 30, 2020	366,055
d. Total Change at June 30, 2020 (c. - a. - b.)	\$ (24,986)
4. Actuarial Asset (Gain)/Loss (1. + 2. + 3.)	\$ 322,875

SECTION VI – SCHEDULE OF FUNDING PROGRESS

A schedule of funding progress is provided below. This schedule of funding progress was previously required by GASB25, which has been superseded by GASB67, and is provided for historical context. These liability and asset measures are used to develop the Actuarial Contribution and are not suitable for other purposes including, but not limited to, settlement of plan obligations. For more information, see SECTION II – MARKET AND ACTUARIAL VALUES OF ASSETS.

Table VI-1
Schedule of Funding Progress

NEW YORK CITY TEACHERS' RETIREMENT SYSTEM (\$ Thousands)						
June 30 (Lag) Valuation Date	(1) Actuarial Value of Assets (AVA) ¹	(2) Accrued Liability (AL)	(3) Unfunded AL (UAL) ¹ (2) - (1)	(4) Funded Ratio (1) / (2)	(5) Covered Payroll ²	(6) UAL as a % of Covered Payroll (3) / (5)
2011	33,601,537	57,702,731	24,101,194	58.2%	7,888,204	305.5%
2012	33,871,180	58,783,399	24,912,219	57.6%	8,013,395	310.9%
2013	35,186,072	61,988,933	26,802,861	56.8%	8,128,378	329.7%
2014	37,521,424	67,309,977	29,788,553	55.7%	8,274,686	360.0%
2015	39,290,072	69,625,608	30,335,536	56.4%	8,844,651	343.0%
2016	41,015,087	69,964,412	28,949,325	58.6%	9,224,268	313.8%
2017	44,381,706	69,552,380	25,170,674	63.8%	9,848,899	255.6%
2018	50,012,149	72,205,318	22,193,169	69.3%	10,404,404	213.3%
2019	57,990,211	73,938,547	15,948,336	78.4%	10,903,755	146.3%
2020	60,693,821	75,452,987	14,759,166	80.4%	11,203,878	131.7%

¹ Unfunded Accrued Liability excludes receivables in the Actuarial Values of Assets.

² Salaries reflect the impact of recent labor contract settlements and certain non-union salary increases with retroactive effective dates, if any.

SECTION VII - RISK AND UNCERTAINTY

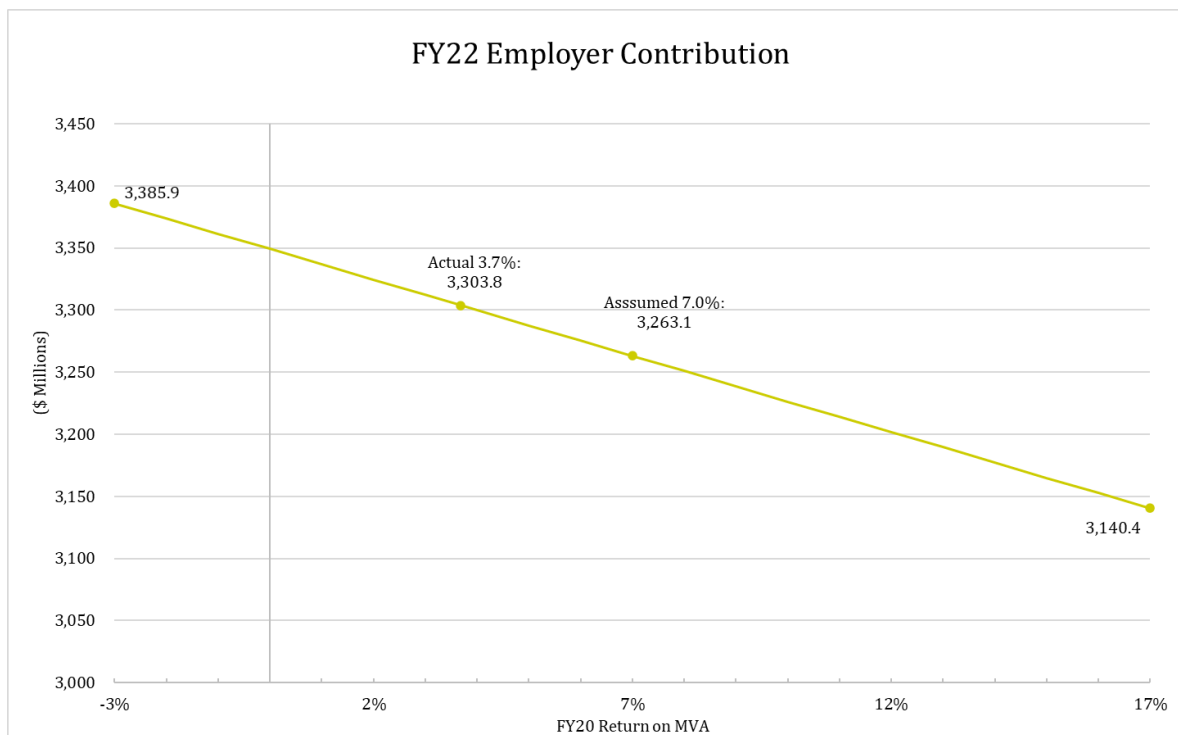
The funded status of TRS depends highly on the realization of the actuarial assumptions used, as well as certain demographic characteristics of the Plan and other exogenous factors. Risks faced by the Plan are described in this Section. These risks have been separated, based on the Actuary's professional judgement, into high, medium, and other risks.

High Risk Types

Investment Risk: The Risk of Not Realizing Expected Returns

The most substantial risk for most pension systems, TRS included, is the risk of investment returns being less than assumed. Generally speaking, as risk-free investment return rates have fallen in recent decades, more aggressive asset allocations have been taken to achieve long-term rates of return commensurate with the actuarial assumption of 7.0%.

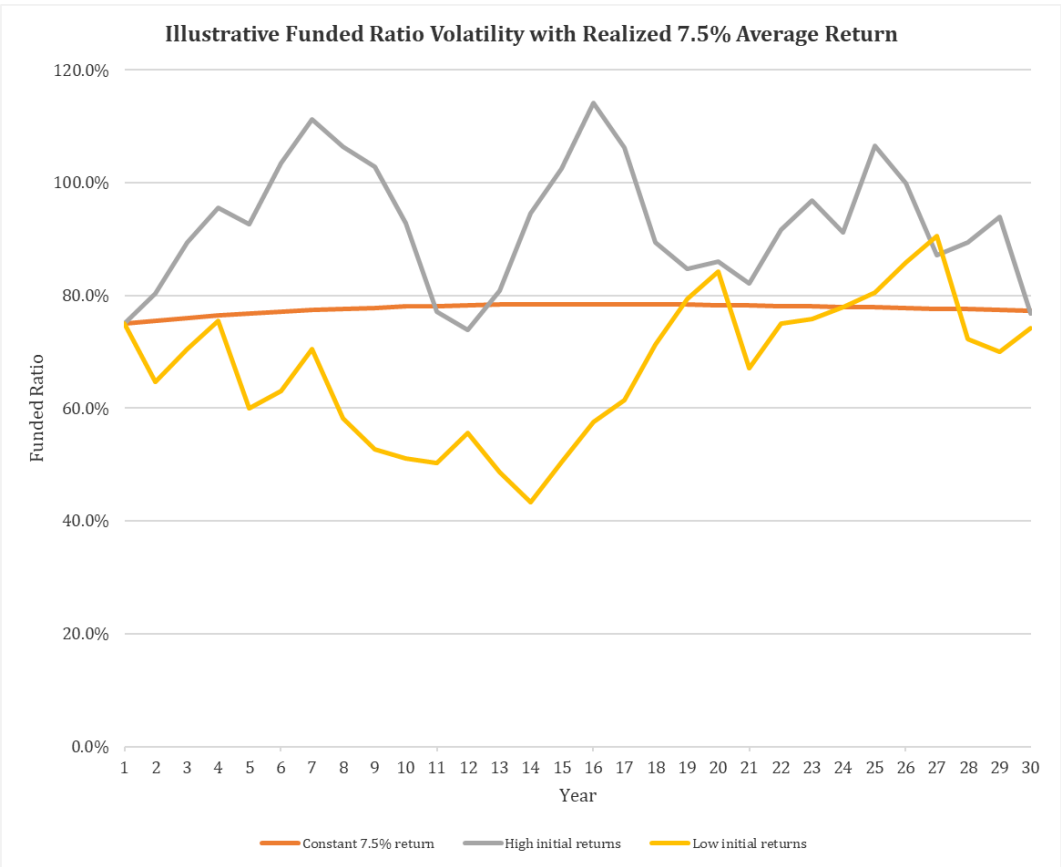
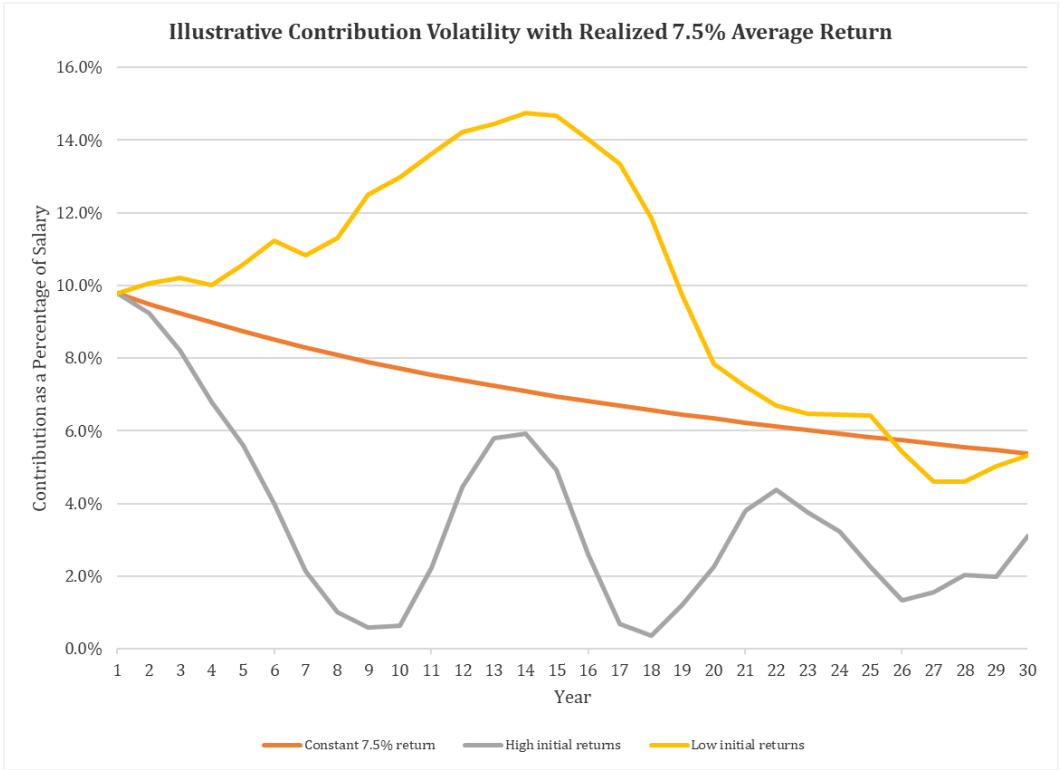
The graph below illustrates the potential FY22 employer contributions for a range of investment return outcomes if returns had differed from the assumed rate of return by up to 10%. (i.e., from -3% to 17%). In addition, the actual investment return and employer contribution are shown.



Investment Risk: The Risk of Volatile Realized Returns

Even when long-term investment returns meet actuarial assumptions, investment return volatility can contribute substantially to contribution and funded status volatility. While not yet available specifically for the Plan at this time, recent research demonstrates this volatility based on a sample public plan with typical characteristics, a typical contribution policy, and a long-term return assumption of 7.5%, which can be realized in different patterns.¹

¹ Yin, Yimeng; Boyd, Don. Pension Simulation Project. *The Nelson A. Rockefeller Institute of Government*.

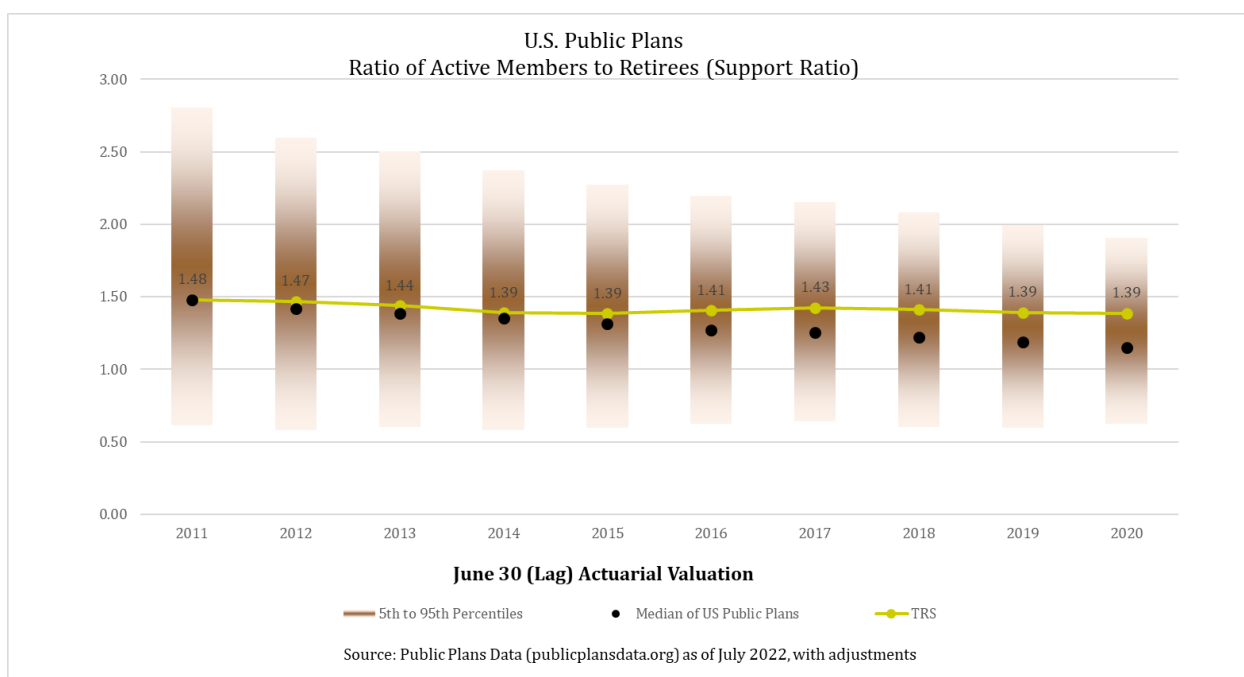


Maturity Risk: The Risk of Demographic Imbalance

In this subsection, the maturity of the Plan is examined with several metrics.

Ratio of Active Members to Retirees (Support Ratio)

A plan's Support Ratio (i.e., the ratio of active members to retirees) is an indicator of the Plan's maturity level. In a plan's early years, the ratio is very high as the plan contains mostly active members. As it matures, more active members transition to retirement, leading to a decrease in the Support Ratio over time that can result in a ratio near or below one. For TRS, this ratio has remained relatively stable in recent years, meaning that about the same number of active workers exist to support pensioner payments.

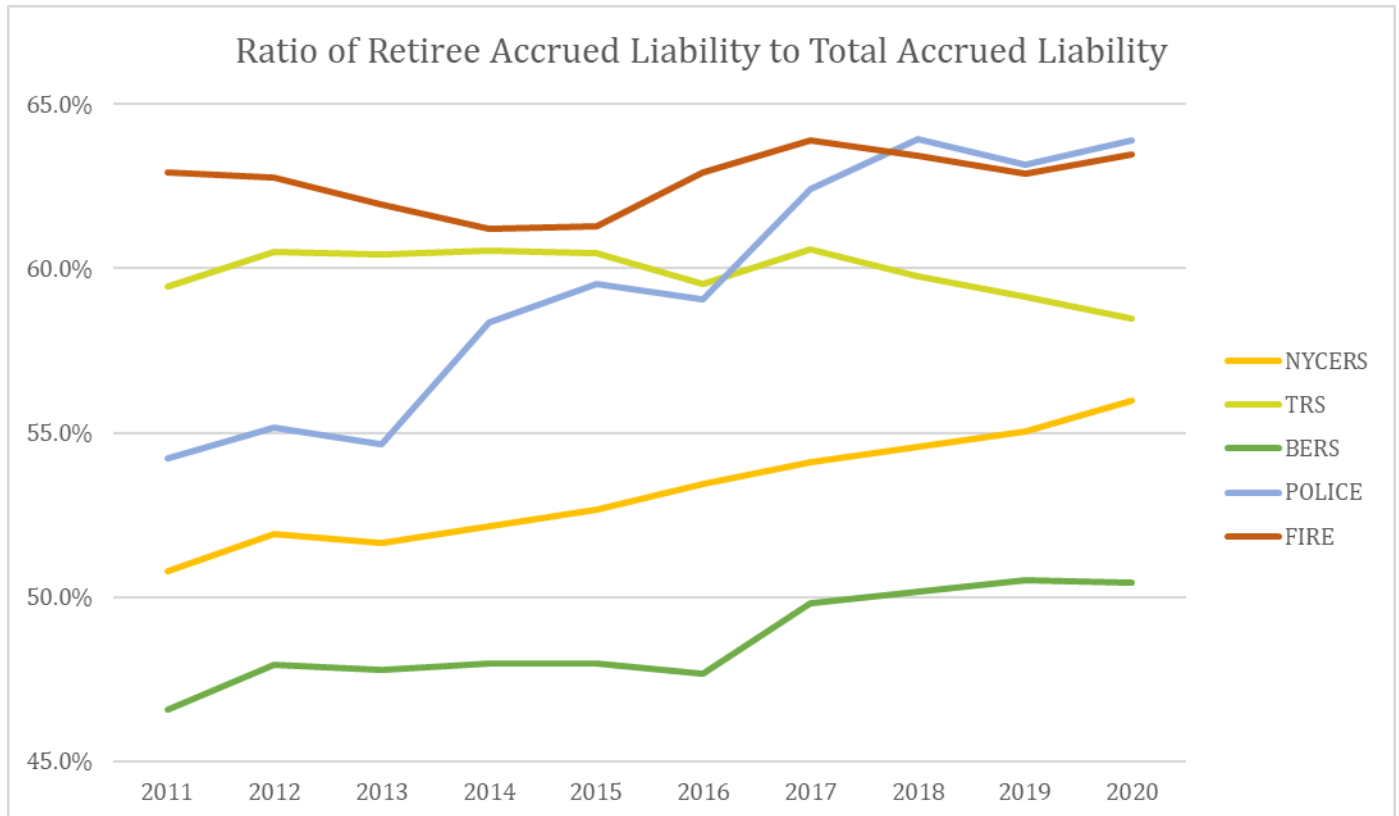


The chart above shows U.S. public pension plan Support Ratios in comparison to the Plan's. The median Support Ratio amongst U.S. public pensions has declined from 1.48 in the 2011 valuation year to 1.15 in the 2020 valuation year. Over that same period, the Plan's Support Ratio declined from 1.48 to 1.39, meaning fewer active workers exist to support guaranteed pensioner payments.

Because the Plan's Support Ratio is above the median in recent years, TRS's contributions for active members form a larger proportion of the total actuarial contribution than other pension funds in the U.S. with average maturity.

Ratio of Retiree Accrued Liability to Total Accrued Liability

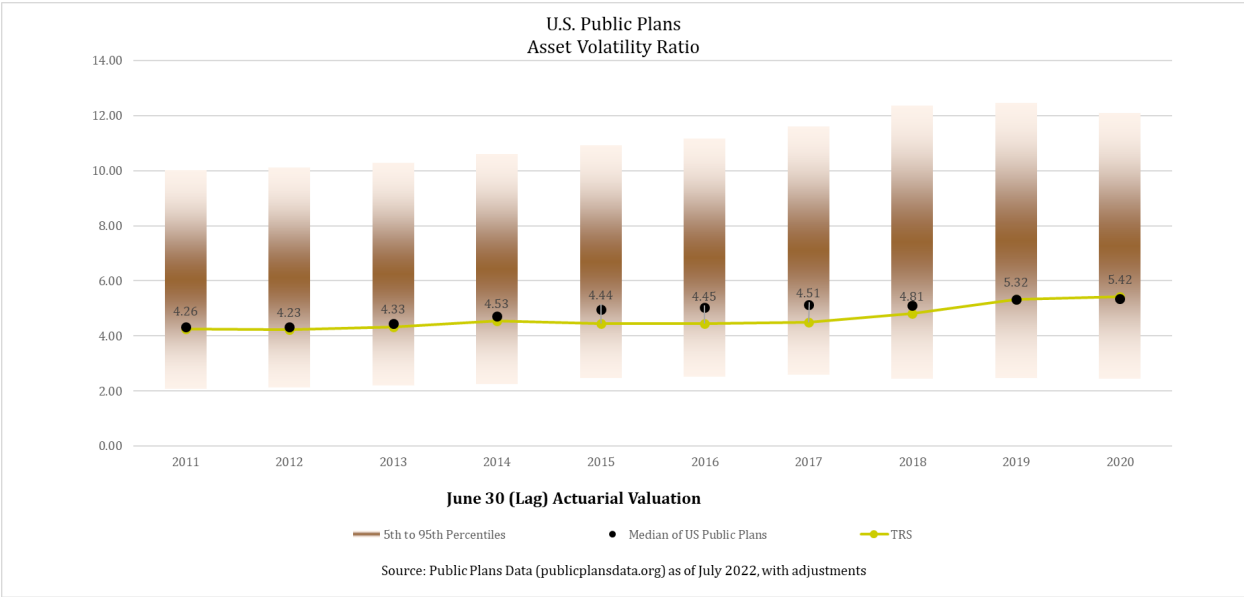
We can also consider the ratio of the Plan’s retiree liability to its total liability. A new pension plan begins with this ratio at zero; as the plan matures, the ratio increases. Mature plans often have ratios above 60%. This measure is shown in the graph below for TRS; the other New York City Retirement Systems¹ (NYCERS) are included for comparison. The ratio for TRS has been between 59-61% for the past few years, indicating that TRS is becoming a mature retirement system.



Asset Volatility Ratio

Another way to look at plan maturity is the Asset Volatility Ratio (AVR), or ratio of assets to payroll. This ratio tends to rise as plans mature because assets generally need to accumulate to provide for benefit payments. The chart below compares the AVR (on an AVA basis) for TRS to the population of public pension systems.

¹ New York City Employees’ Retirement System (NYCERS); Board of Education Retirement System (BERS); Police Pension Fund (POLICE); Fire Pension Fund (FIRE)



As a plan approaches maturity, AVRs tend to increase, and the plan’s actuarially-determined contribution becomes more sensitive to investment losses. For example, the same percentage of investment losses in more mature plans with a larger asset base can increase contributions as a percentage of payroll more than in less mature plans, leading to additional volatility. Therefore, mature plans may wish to consider more conservative investment strategies. Typical AVRs for a mature retirement system are between five and six. As shown in the tables above, for TRS, these ratios are close to the average.

Medium Risk Types

Interest Rate Risk: The Risk of Reduction in the Long-Term Rate of Return

The Accrued Liability for the Plan depends heavily on the actuarial assumption used for future investment returns. While the returns themselves can produce substantial volatility, as detailed in the Investment Risk subsection above, the long-term rate of return assumption of 7.0% is highly dependent on the allocation of Plan assets.

If market conditions and/or the allocation of Plan assets no longer support a long-term rate of return assumption of 7.0%, the Actuarial Interest Rate (AIR) may have to be reduced, which can significantly increase the Accrued Liability, Unfunded Accrued Liability, Normal Cost, and resulting contribution of the Plan. The sensitivity of the Accrued Liability, the Unfunded Accrued Liability, and Normal Cost of the Plan are shown below:

NEW YORK CITY TEACHERS' RETIREMENT SYSTEM	
SENSITIVITY ANALYSIS AS OF JUNE 30, 2020	
Valuation Date	June 30, 2020 (Lag)
Results at 7.0%	
1. Accrued Liability	\$ 75,452,987,066
2. Actuarial Value of Assets (AVA)	62,456,795,810
3. Unfunded Accrued Liability (1.-2.)	12,996,191,256
4. Normal Cost	1,411,270,725
Results at 6.0%	
1. Accrued Liability	\$ 83,814,623,909
2. Actuarial Value of Assets (AVA) ¹	62,456,795,810
3. Unfunded Accrued Liability (1.-2.)	21,357,828,099
4. Normal Cost	2,258,669,738
Sensitivity Analysis for 1.0% Reduction in Interest Rate	
1. Increase in Accrued Liability	11.1%
2. Increase in Unfunded Accrued Liability	64.3%
3. Increase in Normal Cost	60.0%

¹ Disregarding certain actuarial methodologies (e.g., receivable contributions) that would be revalued under a discount rate of 6.0%.

Longevity Risk: The Risk of Higher than Assumed Mortality Improvement

TRS faces risk in its assumption of future mortality rates. Actuarial experience studies were used to develop the base mortality rates assumed in the valuation; Society of Actuaries mortality improvement scale MP-2020 was subsequently applied to these base rates.¹

This scale MP-2020 is an assumption regarding the *improvement* of future mortality rates as compared to mortality when the experience studies were completed. The scale was developed using large amounts of historical data from the Social Security Administration. Risk therefore exists such that the mortality improvement inherent in the Plan population is higher than the improvement seen in the population provided by the Social Security Administration. When mortality improvement is higher than assumed, plan participants will live longer than expected, and the plan will pay more pension benefits than had been previously funded.

Furthermore, while the scale uses recent experience to develop short-term mortality improvement rates, an actuarial assumption is applied to long-term mortality improvement rates based on expert opinion. A rate of 1.0% is assumed, which the Society of Actuaries characterizes as “neither overly optimistic nor too pessimistic with respect to future longevity improvements.”² Risk to the Plan exists, however, if Plan mortality experience shows higher levels of long-term mortality improvement; expert opinion can in some cases be flawed, particularly when past experience is not indicative or predictive of future experience.

In a letter dated June 28, 2019, Buck analyzed historical Plan experience and noted “it appears that historical mortality improvement in NYC pensioners has kept pace with, and in some cases may have exceeded slightly, the mortality improvement trends in historical Social Security Administration graduated rates that are based on a broad U.S. population” and that “continued use of MP-20xx mortality improvement scales seems reasonable.” It may be prudent in future years, after longer trends can be observed, to quantify the effect of changing the ultimate mortality improvement rate to be higher than 1.0%.

Litigation Risk: The Risk of Legal Claims and Lawsuits

It is not uncommon for New York City to be a defendant in legal claims and lawsuits.³ In its most recent claims report, the Comptroller reports that in FY2021, NYC settled 10,618 claims and lawsuits for \$933.7 million. On occasion, these settlements involve NYCERS. The 1996 case *Gulino v. Board of Education* awards damages to plaintiffs that in some cases include counterfactual service and salary in NYCERS. It remains a continuing risk that litigation may expand the scope of pension benefits beyond what is intended or codified in statute.

Credit/Solvency Risk: The Risk of Potential Insolvency of Contributing Entities

All public pension systems face credit risk in the event their sponsoring entities become unable to pay their debts and obligations. Credit rating agencies currently consider New York City

¹ Retirement Plans Experience Committee. “Mortality Improvement Scale MP-2020 Report,” “Mortality Improvement Scale MP-2018 Report,” and “Mortality Improvement Scale MP-2014 Report.” *Society of Actuaries*.

² Retirement Plans Experience Committee. “Mortality Improvement Scale BB Report” 5.5 Selection of 1.0% Long-Term Rate of Mortality Improvement. *Society of Actuaries*.

³ <https://comptroller.nyc.gov/reports/annual-claims-report>

bonds to be of high quality, and the Actuary believes the City faces low credit risk as a main contributing entity to TRS.

In addition, TRS is a multiple-employer plan with several contributing entities. TRS faces risk if contributing entities become insolvent while still carrying Unfunded Accrued Liability. Existing law and precedent transfer these amounts to other employers, creating imbalanced funding responsibility in the event of default. For example, in the final June 30, 2016 (Lag) actuarial valuation for FY18, the Department of Education assumed responsibility for unfunded liabilities associated with the Beginning with Children Charter School, which closed in 2016.

Other Risk Types

Inflation Risk: The Risk of Higher than Assumed Inflation

TRS faces risk if inflation is higher than expected. Inflation is a key driver of the salary increase assumptions (affecting active members) and COLA assumptions (affecting both active members and pensioners/beneficiaries). A quantitative analysis is not available at this time. Notably, however, the pensioner COLA is limited to half of CPI on the first \$18,000 of annual benefits, which limits the risk exposure to inflation.

Contribution Risk: The Risk that Future Contributions Are Less Than the Actuarially-Determined Contributions

Public pension systems can suffer from contribution risk when sponsoring governmental entities fail to make contributions as determined by the actuary under their funding policies. A 2018 study¹ which used data from 50 states and 230 retirement systems, found that since 2007 the shortfall between actual contributions to state pension plans and minimum actuarial funding standards was \$200 billion.²

The New York City Retirement Systems and Pension Funds face low contribution risk. Participating employers have historically contributed to the actuarial contribution as certified by the Actuary. The Actuary believes the City will continue to do so in future years. See Table III-5 ACTUARIAL AND STATUTORY CONTRIBUTION HISTORY.

Contribution risk may also increase in future years if the actuarial contribution determined for the Plan grows to be a larger part of the City budget. The five New York City Retirement Systems and Pension Funds currently require contributions of approximately 10% of the City's annual budget, and contribution risk may increase if this contribution rate becomes untenable.

Agency/Political Risk: The Risk of Stakeholder Influences

With assumed long-term asset returns and gradual amortization of unfunded liabilities, the funded status of the Plan is expected to improve over time. Many public pension systems suffer from agency risk, wherein different stakeholders or agents want to influence the cost calculations in directions favorable to their interests. Agents may also downplay other risks (e.g., investment risk) to advance specific agendas. These situations create cases where promises for future funding can be disregarded for political expediency or other priorities. In other cases, certain plan provisions or administrative practices intended to provide occasional clarity or relief become commonplace or intentionally sought for the benefit of members at the expense of taxpayers.

¹ The Pew Charitable Trusts. *"The State Pension Funding Gap: 2018."*

² Accounting standards changed in 2014. From 2007 to 2013, the shortfall is calculated between the actuarial recommended contribution and actual employer contributions. From 2014 to 2018, the shortfall represents the gap between the net amortization benchmark and employer contributions.

Intergenerational Equity Risk: The Risk of Inequity in the Actuarially-Determined Contributions

Intergenerational inequity could exist for certain stakeholders (e.g., public taxpayers). If, for example, liabilities are valued using overly conservative assumptions, aggressive funding patterns may occur, thus causing current taxpayers to shoulder a disproportionately high share of the funding burden, as compared to past and future taxpayers. The reverse can also be true if aggressive or unrealistic assumptions are used. As the Plan is ongoing, taxpayers across all generations should be expected to offer similar funding contributions over the lifetime of the Plan.

Additionally, in future years of higher or lower funded status, changes in the statute may take place that can improve or diminish plan provisions. If so, intergenerational equity risk could increase as taxpayers and plan members at that time may receive preferential or less preferential treatment over the taxpayers and plan members prior to and subsequent to them.

SECTION VIII - SUMMARY OF PLAN PROVISIONS

A. Covered Employment

Membership in TRS is open to eligible teachers and administrative personnel employed by the Department of Education and certain employees of New York City Charter Schools and the City University of New York. Membership in TRS may be voluntary or mandated.

B. Tier Membership

Tier membership is based on the date that the member joined TRS. The tier status of earlier membership in TRS or another New York City or New York State public employee retirement system is reflected, but only if the service associated with that membership is purchased and included in Credited Service.

Tier 1: Prior to July 1, 1973

Tier 2: July 1, 1973 through July 26, 1976

Tier 4: July 27, 1976 through March 31, 2012

Tier 6: April 1, 2012

Tier 4 members who joined TRS before September 1, 1983 may elect a Tier 3 benefit. Unless otherwise noted, Tier 1 and Tier 2 provisions are hereafter omitted for brevity.¹ For more information about plan provisions, see the applicable Summary Plan Descriptions at www.trsnyc.org. In the event of a conflict between this summary and applicable law, the applicable laws will govern.

C. Basic Member Contributions (BMC)

Basic Member Contributions earn 5% interest per year, compounded annually.

Tier 4: The contribution rate is 3% of Salary. Tier 4 members contribute BMC for the first 10 years of Credited Service except members of the Chapter 504 55/27 plan contribute BMC for the first 27 years of Credited Service.

¹ Approximately 0.3% of active members as of June 30, 2020 are members of Tier 1 and Tier 2.

Tier 6: BMC are made for all years of Credited Service according to the following schedule:

Lookback Wages	BMC Contribution Rate
Less than \$45,000	3.00%
\$45,001 up to \$55,000	3.50%
\$55,001 up to \$75,000	4.50%
\$75,001 up to \$100,000	5.75%
Greater than \$100,000	6.00%

The lookback wages used for determining the Tier 6 BMC contribution rate for a plan year are the actual wages earned two plan years prior to the plan year. A projected salary is used during the first three years of Credited Service. The BMC contribution rate was limited to 3% from April 1, 2012 through March 31, 2013.

D. Additional Member Contributions (AMC)

Additional Member Contributions earn 5% interest per year, compounded annually.

Tier 4: Members of the Basic 62/5 plan do not make AMC. For other Tier 4 members, the AMC contribution rate is 1.85% of Salary and are made in accordance with the following schedule:

Plan Description	AMC Contribution Rate	Years Required
Chapter 19 55/25	1.85%	25
Chapter 19 55/27	1.85%	27
Chapter 504 55/27 plan	1.85%	All years

Tier 6: Members of the 63/10 plan do not make AMC.

E. Credited Service

Credited Service is comprised of Membership Service, Part-time Service, Prior Service, Amman Service, Transferred Service, and Military Service:

- **Membership Service:** Service earned while a member of TRS.
- **Part-time Service:** Service that is prorated based on the number of hours or days worked in the year.
- **Prior Service:** Any creditable service earned as an employee of New York City or New York State before joining TRS that was not transferred to TRS.
- **Amman Service:** Creditable service earned as a regular substitute teacher and/or for per diem employment during a leave of absence or after separating from service.

- **Transferred Service:** Service earned as a member of another public retirement system in the City or State of New York.
- **Military Service:** Service for qualified time served in one of the armed forces of the United States.

Prior Service, Amman Service, Transferred Service, and Military Service must be purchased to count as Credited Service. Payments made for purchasing Military Service are considered Employer contributions.

F. Salary

Salary is based on the annual wages earned in covered employment including overtime pay. Some limitations apply for the Salary used to determine Final Average Salary (FAS).

Tier 4: Wages greater than 110% of the average of the previous two years are excluded for purposes of determining FAS.

Tier 6: Wages greater than 110% of the average of the previous four years are excluded for purposes of determining FAS. In addition, the following payments are also excluded from wages for purposes of determining FAS:

1. Wages greater than the annual salary paid to the Governor of the State of New York;
2. Lump sum payments for deferred compensation, sick leave, accumulated vacation, or other credits for time not worked;
3. Overtime greater than the overtime ceiling of \$15,000, effective April 1, 2012 and indexed annually by the Consumer Price Index (CPI-U);
4. Any form of termination pay;
5. Any additional compensation paid in anticipation of retirement; and
6. In the case of employees who receive wages from three or more employers in a twelve-month period, the wages paid by the third and each successive employer.

G. Final Average Salary (FAS)

Service retirement, early retirement, disability retirement, and vested retirement benefits are based on Final Average Salary (FAS).

Tier 4: FAS is the highest average Salary earned in any three consecutive years of Credited Service or in the final 36 months of Credited Service if greater.

Tier 6: FAS is the highest average Salary earned in any five consecutive years of Credited Service or in the final 60 months of Credited Service if greater.

H. Service Retirement

1. Eligibility: The eligibility requirements for an unreduced service retirement benefit are summarized in the table below:

Tier	Plan Description	Minimum Age	Minimum Service
4	Basic 62/5 Plan	Earlier of Age 55 with 30 years of Service And Age 62 with 5 years of Service	
4	Chapter 19 55/25	55	25
4	Chapter 19 55/27	55	27
4	Chapter 504 55/27 plan	55	27
6	Basic 63/10 Plan	63	10

2. Benefits:

- a. Tier 4 Plans:

- i. Less than 20 years of Credited Service: 1/60 times FAS times Credited Service;
- ii. 20 or more years of Credited Service: Sum of 2.0% times FAS times Credited Service up to 30 years plus 1.5% times FAS times Credited Service in excess of 30 years.

- b. Basic Tier 6 63/10 Plan:

- i. Less than 20 years of Credited Service: 1/60 times FAS times Credited Service;
- ii. 20 or more years of Credited Service: Sum of 35% times FAS plus 2.0% times FAS times Credited Service in excess of 20 years.

- c. Annuity Savings Accumulation Fund (ASAF):

- i. Annuitized value of the ASAF balance, if any, is added to the benefit.

I. Early Retirement

1. Eligibility: The eligibility requirements for early retirement plans are summarized in the table below:

Tier	Plan Description	Minimum Age	Minimum Service
4	All Tier 4 plans except the Chapter 504 55/27 plan	55	5
4	Chapter 504 55/27	55	10
6	Basic 63/10 plan	55	10

2. Benefits:

The service retirement benefit is reduced for early retirement based on the age at commencement.

a. Tier 4 Basic 62/5 Plan:

The service retirement benefit is reduced by 0.50% for each of the first 24 months that the age at commencement precedes age 62, and reduced 0.25% for each of the next 60 months that the age of commencement precedes age 60:

Age	Early Retirement Factor
61	0.94
60	0.88
59	0.85
58	0.82
57	0.79
56	0.76
55	0.73

Tier 4 members with Tier 3 rights may elect early retirement based on the provisions of the Tier 3 Basic 62/5 Plan.

b. Tier 6 Basic 63/10 Plan:

The service retirement benefit is reduced by 13/2400 for each month (i.e., 6.5% per year) that the age of commencement precedes age 63.

c. Annuity Savings Accumulation Fund (ASAF):

The annuitized value of the ASAF balance, if any, is added to the benefit.

J. Disability Retirement

1. Accidental Disability (ADR)

- a. Eligibility: No age or service requirement. Requires Medical Board determination that the active member is physically or mentally incapacitated due to an accident in the performance of duties and that the accident is not due to willful negligence of the member.
- b. Benefits: Greater of $1/60$ times FAS times Credited Service or $2/3$ times FAS. The member may elect a service retirement benefit, if eligible.

2. Ordinary Disability (ODR)

- a. Eligibility: 10 years of Credited Service. Requires Medical Board determination that the member is physically or mentally incapacitated while an active member.
- b. Benefits: Greater of $1/60$ times FAS times Credited Service or $1/3$ times FAS. The member may elect a service retirement benefit, if eligible.

3. Annuity Savings Accumulation Fund (ASAF)

The annuitized value of the ASAF balance, if any, is added to the benefit.

K. Death Benefits

1. Accidental Death Benefits

- a. Eligibility: No age or service requirement. Death due to the performance of duties while an active member.
- b. Benefits: A monthly pension is payable to the beneficiary equal to 50% of $1/12$ of annual wages earned during the year prior to death. The benefit is equal to 50% of $1/12$ of the annual wage rate if the member had less than one year of Credited Service.

2. Ordinary Death Benefits

- a. Eligibility:
 - i. Active members: No age or service requirement. Death during active employment while not in the performance of duties.
 - ii. Deferred vested members: Death after termination of employment and prior to benefit commencement.

iii. Retired Members: Death after benefit commencement.

b. Death benefit:

- i. Active members: Refund of BMC and the employee portion of AMC with interest plus a salary-based death benefit. The salary-based death benefit is equal to one year's wages times completed years of Credited Service up to 3 years. The salary-based portion of the death benefit is reduced 5% for each year the member remains in service beyond age 60 (to a maximum reduction of 50% at age 70).
- ii. Deferred vested members with 10 or more years of Credited Service: Refund of BMC and the employee portion of AMC, if any, with interest plus one half of the salary-based death benefit that would have been payable had the member died on the last day of active service as described above.
- iii. Deferred vested members with less than 10 years of Credited Service: Refund of BMC and the employee portion of AMC, if any, with interest.
- iv. Retirees: The active salary-based death benefit that would have been payable had the member died on the last day of active service times the Adjustment Factor described in the table below:

Year of Death	Adjustment Factor
1 st year after retirement	50%
2 nd year after retirement	25%
3 rd year or later after retirement	10% times the benefit in effect at age 60 or at retirement if earlier

c. Form of Payment: Lump sum.

L. Vested Benefit After Termination

1. Eligibility:

- a. Tier 4 Chapter 504 55/27 plan: 10 years of Credited Service.
- b. All other Tier 4 plans: 5 years of Credited Service.
- c. Tier 6 plan: 10 years of Credited Service.

2. Benefits: The vested benefit is equal to the amount of the Service Retirement benefit (unless noted otherwise below), payable at the times specified below.
 - a. Tier 4 Plans: A vested member may elect a service retirement benefit payable at age 62 or an early retirement benefit payable as early as age 55. The eligibility and benefit provisions for a benefit that commences prior to age 62 are the same as those for early retirement except that benefits are unreduced at age 55 if the member has earned the minimum service required for a Service Retirement benefit shown in subsection H above.
 - b. Tier 6 Plan: Age 63. In no case can the vested benefit be less than the annuity equivalent of the BMC.
3. Annuity Savings Accumulation Fund (ASAF)

The annuitized value of the ASAF balance, if any, is added to the benefit.

M. Forms of Payment

1. Normal Form of Payment: Single Life Annuity.
2. Optional Forms of Payment: Joint and Survivor Annuities, Certain and Life Annuities, and Pop-up Annuities.

N. Cost of Living Adjustments (COLA)

Annuity payments are increased annually on September 1st, but only after a pensioner has attained the applicable eligibility threshold. Some beneficiaries are not eligible for COLA increases. The COLA increase is equal to a base benefit times a COLA percentage. The COLA increase for a spouse receiving a joint & survivor annuity is one half of the COLA increase that would have been applicable to the member had he or she survived.

1. Eligibility Thresholds:
 - a. Service Retirement and Vested Retirement: The earlier of (i) and (ii):
 - i. Attainment of age 62 and 5 years since commencement
 - ii. Attainment of age 55 and 10 years since commencement
 - b. Disability Retirement: 5 years since commencement
 - c. Beneficiaries of an Accidental Death benefit: 5 years since commencement
2. Eligible beneficiaries: Spouses receiving a joint & survivor annuity. All others are non-eligible.

3. Base Benefit: The lesser of \$18,000 and the maximum retirement allowance plus the sum of prior years' COLA increases.
4. COLA percentage: 50% of the Consumer Price Index (CPI-U) based upon the 12 months ending March 31 prior to each September 1 effective date, rounded to the next highest 0.1%. Such percentage shall not be less than 1.0% nor greater than 3.0%.

O. Refund of BMC and AMC

Refunded with interest under some circumstances. Only the employee portion of AMC is refunded.

1. Employee Portion of AMC: 50% for all plans that require AMC.
2. Non-vested termination: BMC and employee portion of AMC are refunded with interest.
3. Vested termination: A member may elect a refund of BMC and the employee portion of AMC with interest in lieu of a pension benefit, but only if he or she has less than 10 years of Credited Service.
4. Ordinary death: BMC and the employee portion of AMC are refunded with interest.
5. Accidental death: The employee portion of AMC are refunded with interest.
6. Disability retirement: The employee portion of AMC are refunded with interest.
7. Service retirement: The employee portion of AMC are refunded with interest if the member retires on or after age 62.

P. Service and Early Retirement for Tier 4 Members with Tier 3 Rights

1. Eligibility: Age 55 and 5 years of Credited Service.
2. Benefits: These members may elect a Tier 3 benefit instead of a Tier 4 benefit. The benefit formula for Tier 3 is the same as the benefit formula for the Tier 4 Basic 62/5 plan except:

- a. Credited Service under the Tier 3 benefit formula is capped at 30 years,
 - b. The Tier 3 benefit formula includes an offset starting at age 62 equal to 50% of the Primary Social Security benefit, and
 - c. The early retirement factors used to reduce benefits for early commencement are smaller and thus reduce benefits more for Tier 3 than the corresponding factors used under the Basic Tier 4 62/5 plan.
3. Cost of Living Adjustments: Tier 3 retirement benefits may be adjusted annually by Escalation. A Tier 3 retirement benefit cannot be less than the initial benefit payable at the commencement date.
- a. Full Escalation: Applicable for benefits commencing on or after age 65. Equal to the lesser of 3% and the Consumer Price Index (CPI-U) for positive increases in the CPI-U, and the greater of -3% and the Consumer Price Index (CPI-U) for negative increases in the CPI-U.
 - b. Partial Escalation: Applicable for benefits commencing after age 62 and prior to age 65. Equal to full escalation reduced by 1/36 times the number of months that the age at commencement precedes age 65.

Q. Loans

A member generally may borrow up to 75% of the accumulated BMC with interest. A member's unpaid loan balance will reduce his or her retirement benefit.

R. Tax-deferred Annuity Program (TDA)

Members may elect to make voluntary employee contributions to the TRS TDA. A member's contributions to a TDA account are capped by the dollar limitations under §402(g)(1) of the Internal Revenue Code (IRC) on the exclusion for elective deferrals described in §402(g)(3), and the dollar limitation under §414(v)(2)(B)(i) of the IRC for catch-up contributions for members who have attained aged 50.

A member may withdraw his or her TDA account balance as a lump sum or convert the total accumulated balance into an annuity upon retirement.

S. Changes Since the Prior Valuation

Continued compliance has been presumed under the OWBPA.

SECTION IX - CHAPTER AMENDMENTS

The June 30, 2020 (Lag) actuarial valuation results reflect the following Chapter amendments from the prior five years.

- **Chapter 89 of the Laws of 2020** (Chapter 89/20) provides death benefits to statutory beneficiaries of members whose death was a result of or was attributed to COVID-19.
- **Chapter 266 of the Laws of 2018** (Chapter 266/18) extends the deadline to file a Notice of Participation in the World Trade Center Rescue, Recovery, and Cleanup Operations to September 11, 2022.
- **Chapter 438 of the Laws of 2016** (Chapter 438/16), enacted on November 14, 2016, amended Retirement and Social Security Law Section 43 to eliminate restrictions upon transferring between public retirement systems.
- **Chapter 41 of the Laws of 2016** (Chapter 41/16) provides up to three years of service credit to members of public retirement systems of the State of New York for military service. Chapter 41/16 removes the requirement that such military service occur during specified periods of hostility.

SECTION X - SUBSEQUENT EVENTS

The following legislation was adopted after the June 30, 2020 valuation date and could have an impact on future years' valuations:

Chapter 56 of the Laws of 2022 (Chapter 56/22) reduces the Tier 6 vesting requirement from 10 years to 5 years and allows for retirement with 5 years of service, and excludes certain forms of overtime and extracurricular compensation from the salary used to determine Tier 6 BMC Contribution Rates during the specified period from 2022 through 2024.

Chapter 525 of the Laws of 2021 (Chapter 525/21), enacted on October 29, 2021, mandates certain Paraprofessionals into TRS and renders certain other titles ineligible to join TRS.

Chapter 424 of the Laws of 2021 (Chapter 424/21) expands eligibility of certain public service employees for participation in the World Trade Center Rescue, Recovery, or Clean-up Operations.

Chapter 78 of the Laws of 2021 (Chapter 78/21) amends Chapter 89/20 by extending the eligibility window of these death benefits through December 31, 2022.

SECTION XI - ACTUARIAL ASSUMPTIONS AND METHODS

The results in this valuation report are based upon standard actuarial models (including but not limited to Entry Age Normal and related parameters) that are widely used in actuarial practice. The models are intended to calculate the liabilities associated with these plan provisions using data and assumptions as of the measurement date and, using actuarial assumptions and methods further described below. Most of this liability and cashflow modeling is currently implemented using ProVal, a ubiquitous actuarial valuation and projection software program developed by Winklevoss Technologies (WinTech). These results are reviewed for accuracy, reasonability, and consistency with prior results, consistent with the requirements of Actuarial Standard of Practice 56. The model is also reviewed extensively when significant changes are made to the software by experts who are familiar with the applicable actuarial methods used therein.

There were no changes in actuarial assumptions and methods compared to the June 30, 2019 (Lag) valuation, except for a method change to include an adjustment equal to the unfunded value of guaranteed interest credits payable to the TDA.

Table XI-1
Active Retirement Rates

NEW YORK CITY TEACHERS' RETIREMENT SYSTEM					
PROBABILITIES OF SERVICE RETIREMENT					
Age	Reduced Service Retirement	Unreduced Service Retirement Probabilities For Members Who Did Not Elect an Improved Retirement Program		Unreduced Service Retirement Probabilities For Members Who Elected an Improved Retirement Program	
		Year 1	Ultimate	Year 1	Ultimate
55	2.50%	18.00%	0.00%	37.50%	0.00%
56	2.50%	18.00%	20.00%	37.50%	22.00%
57	2.50%	18.00%	20.00%	37.50%	22.00%
58	2.50%	18.00%	20.00%	37.50%	22.00%
59	3.75%	18.00%	20.00%	37.50%	22.00%
60	5.00%	18.00%	20.00%	37.50%	22.00%
61	6.25%	18.00%	20.00%	37.50%	22.00%
62	7.50% ¹	27.00%/18.00% ²	20.00%	50.00%	33.00%
63	0.00%	18.00%/27.00% ³	20.00%	37.50%	22.00%
64	0.00%	18.00%	20.00%	37.50%	22.00%
65	0.00%	27.00%	20.00%	50.00%	33.00%
66	0.00%	18.00%	20.00%	37.50%	22.00%
67	0.00%	18.00%	20.00%	37.50%	22.00%
68	0.00%	18.00%	20.00%	37.50%	22.00%
69	0.00%	18.00%	20.00%	37.50%	22.00%
70	0.00%	20.00%	20.00%	37.50%	22.00%
71	0.00%	20.00%	20.00%	37.50%	22.00%
72	0.00%	20.00%	20.00%	37.50%	22.00%
73	0.00%	20.00%	20.00%	37.50%	22.00%
74	0.00%	20.00%	20.00%	37.50%	22.00%
75	0.00%	20.00%	20.00%	37.50%	22.00%
76	0.00%	20.00%	20.00%	37.50%	22.00%
77	0.00%	20.00%	20.00%	37.50%	22.00%
78	0.00%	20.00%	20.00%	37.50%	22.00%
79	0.00%	20.00%	20.00%	37.50%	22.00%
80+	N/A	100.00%	100.00%	100.00%	100.00%

¹ 7.50% only applies to Tier 6 members; 0.00% otherwise.

² 27.00% for Tier 1, 2, & 4 members and 18.00% for Tier 6 members.

³ 18.00% for Tier 1, 2, & 4 members and 27.00% for Tier 6 members.

Table XI-2
Active Termination Rates

NEW YORK CITY TEACHERS' RETIREMENT SYSTEM	
PROBABILITIES OF TERMINATION	
Years of Service	Probability of Termination
0	9.00%
1	8.00%
2	7.00%
3	6.00%
4	5.00%
5	4.00%
6	3.50%
7	3.05%
8	2.65%
9	2.30%
10	2.00%
11	1.75%
12	1.55%
13	1.40%
14	1.30%
15	1.25%
16	1.20%
17	1.15%
18	1.10%
19	1.05%
20	1.00%
21	0.90%
22	0.80%
23	0.70%
24	0.60%
25+	0.50%

Table XI-3
Active Disability Rates

NEW YORK CITY TEACHERS' RETIREMENT SYSTEM				
PROBABILITIES OF DISABILITY RETIREMENT				
Age	Ordinary Disability		Accidental Disability	
	Males	Females	Males	Females
15	0.01%	0.01%	0.00%	0.00%
16	0.01%	0.01%	0.00%	0.00%
17	0.01%	0.01%	0.00%	0.00%
18	0.01%	0.01%	0.00%	0.00%
19	0.01%	0.01%	0.00%	0.00%
20	0.01%	0.01%	0.00%	0.00%
21	0.01%	0.01%	0.00%	0.00%
22	0.01%	0.01%	0.00%	0.00%
23	0.01%	0.01%	0.00%	0.00%
24	0.01%	0.01%	0.00%	0.00%
25	0.01%	0.01%	0.00%	0.00%
26	0.01%	0.01%	0.00%	0.00%
27	0.01%	0.01%	0.00%	0.00%
28	0.01%	0.01%	0.00%	0.00%
29	0.01%	0.01%	0.00%	0.00%
30	0.01%	0.01%	0.00%	0.00%
31	0.02%	0.01%	0.00%	0.00%
32	0.03%	0.02%	0.00%	0.00%
33	0.04%	0.03%	0.01%	0.00%
34	0.05%	0.04%	0.01%	0.00%
35	0.06%	0.05%	0.01%	0.01%
36	0.07%	0.06%	0.01%	0.01%
37	0.08%	0.07%	0.01%	0.01%
38	0.08%	0.08%	0.02%	0.01%
39	0.09%	0.09%	0.02%	0.01%
40	0.10%	0.10%	0.02%	0.01%
41	0.11%	0.11%	0.02%	0.01%
42	0.12%	0.12%	0.02%	0.01%
43	0.13%	0.13%	0.02%	0.02%
44	0.14%	0.14%	0.02%	0.02%
45	0.15%	0.15%	0.03%	0.02%
46	0.15%	0.16%	0.03%	0.02%
47	0.15%	0.17%	0.03%	0.02%
48	0.15%	0.18%	0.03%	0.03%
49	0.15%	0.19%	0.03%	0.03%
50	0.15%	0.20%	0.03%	0.03%
51	0.15%	0.20%	0.03%	0.03%
52	0.15%	0.20%	0.03%	0.03%
53	0.15%	0.20%	0.03%	0.03%
54	0.15%	0.20%	0.03%	0.03%
55	0.15%	0.20%	0.04%	0.04%
56	0.15%	0.20%	0.04%	0.04%
57	0.15%	0.20%	0.04%	0.04%
58	0.15%	0.20%	0.04%	0.04%
59	0.15%	0.20%	0.04%	0.04%
60	0.15%	0.20%	0.04%	0.04%
61	0.15%	0.20%	0.04%	0.04%
62	0.15%	0.20%	0.04%	0.04%
63	0.15%	0.20%	0.04%	0.04%
64	0.15%	0.20%	0.04%	0.04%
65	0.15%	0.20%	0.04%	0.04%
66	0.15%	0.20%	0.04%	0.04%
67	0.15%	0.20%	0.04%	0.04%
68	0.15%	0.20%	0.04%	0.04%
69	0.15%	0.20%	0.04%	0.04%
70	0.15%	0.20%	0.04%	0.04%
71	0.15%	0.20%	0.04%	0.04%
72	0.15%	0.20%	0.04%	0.04%
73	0.15%	0.20%	0.04%	0.04%
74	0.15%	0.20%	0.04%	0.04%
75	0.15%	0.20%	0.04%	0.04%
76	0.15%	0.20%	0.04%	0.04%
77	0.15%	0.20%	0.04%	0.04%
78	0.15%	0.20%	0.04%	0.04%
79	0.15%	0.20%	0.04%	0.04%
80+	N/A	N/A	N/A	N/A

Table XI-4
Active Mortality Rates

NEW YORK CITY TEACHERS' RETIREMENT SYSTEM			
PROBABILITIES OF MORTALITY FOR ACTIVE MEMBERS BASE RATES			
	Ordinary Death		
Age	Males	Females	Accidental Death
15	0.040%	0.025%	0.000%
16	0.040%	0.025%	0.000%
17	0.040%	0.025%	0.000%
18	0.040%	0.025%	0.000%
19	0.040%	0.025%	0.000%
20	0.040%	0.025%	0.000%
21	0.040%	0.025%	0.000%
22	0.040%	0.025%	0.000%
23	0.040%	0.025%	0.000%
24	0.040%	0.025%	0.000%
25	0.040%	0.025%	0.000%
26	0.040%	0.025%	0.000%
27	0.040%	0.025%	0.000%
28	0.040%	0.025%	0.000%
29	0.040%	0.025%	0.000%
30	0.040%	0.025%	0.000%
31	0.042%	0.026%	0.000%
32	0.044%	0.028%	0.000%
33	0.046%	0.029%	0.000%
34	0.048%	0.030%	0.000%
35	0.050%	0.031%	0.000%
36	0.052%	0.033%	0.000%
37	0.054%	0.034%	0.000%
38	0.056%	0.035%	0.000%
39	0.058%	0.036%	0.000%
40	0.060%	0.038%	0.000%
41	0.070%	0.044%	0.000%
42	0.080%	0.050%	0.000%
43	0.090%	0.056%	0.000%
44	0.100%	0.063%	0.000%
45	0.110%	0.069%	0.000%
46	0.120%	0.075%	0.000%
47	0.130%	0.081%	0.000%
48	0.140%	0.088%	0.000%
49	0.150%	0.094%	0.000%
50	0.160%	0.100%	0.000%
51	0.170%	0.106%	0.000%
52	0.180%	0.113%	0.000%
53	0.190%	0.119%	0.000%
54	0.200%	0.125%	0.000%
55	0.210%	0.131%	0.000%
56	0.220%	0.138%	0.000%
57	0.230%	0.144%	0.000%
58	0.240%	0.150%	0.000%
59	0.250%	0.156%	0.000%
60	0.260%	0.163%	0.000%
61	0.270%	0.169%	0.000%
62	0.280%	0.175%	0.000%
63	0.290%	0.181%	0.000%
64	0.300%	0.188%	0.000%
65	0.320%	0.200%	0.000%
66	0.350%	0.219%	0.000%
67	0.390%	0.244%	0.000%
68	0.440%	0.275%	0.000%
69	0.500%	0.313%	0.000%
70	0.540%	0.350%	0.000%
71	0.600%	0.388%	0.000%
72	0.650%	0.425%	0.000%
73	0.700%	0.463%	0.000%
74	0.750%	0.525%	0.000%
75	0.800%	0.588%	0.000%
76	0.890%	0.650%	0.000%
77	0.980%	0.713%	0.000%
78	1.070%	0.775%	0.000%
79	1.160%	0.925%	0.000%
80+	N/A	N/A	N/A

Table XI-5
Service Retiree Mortality

NEW YORK CITY TEACHERS' RETIREMENT SYSTEM					
PROBABILITIES OF MORTALITY FOR SERVICE RETIREES					
BASE RATES					
Age	Males	Females	Age	Males	Females
15	0.0108%	0.0105%	68	1.3827%	0.8399%
16	0.0146%	0.0128%	69	1.5070%	0.8992%
17	0.0197%	0.0140%	70	1.6306%	0.9855%
18	0.0222%	0.0145%	71	1.7953%	1.1072%
19	0.0235%	0.0151%	72	1.9579%	1.2311%
20	0.0246%	0.0153%	73	2.1191%	1.3549%
21	0.0263%	0.0162%	74	2.2784%	1.4775%
22	0.0278%	0.0171%	75	2.4370%	1.5961%
23	0.0295%	0.0181%	76	2.7233%	1.8356%
24	0.0309%	0.0193%	77	3.0074%	2.0765%
25	0.0320%	0.0206%	78	3.2885%	2.3162%
26	0.0335%	0.0220%	79	3.5677%	2.5533%
27	0.0347%	0.0234%	80	3.8824%	2.7842%
28	0.0364%	0.0249%	81	4.4474%	3.3221%
29	0.0386%	0.0267%	82	5.0193%	3.8708%
30	0.0418%	0.0286%	83	5.5977%	4.4089%
31	0.0476%	0.0348%	84	6.1798%	5.0027%
32	0.0532%	0.0401%	85	6.7676%	5.5878%
33	0.0583%	0.0449%	86	7.7139%	6.2981%
34	0.0629%	0.0489%	87	8.6843%	6.9333%
35	0.0673%	0.0527%	88	9.6857%	7.5758%
36	0.0698%	0.0557%	89	10.7135%	8.5620%
37	0.0720%	0.0591%	90	11.7744%	9.6778%
38	0.0745%	0.0626%	91	13.6049%	10.8390%
39	0.0782%	0.0672%	92	15.5105%	11.9717%
40	0.0837%	0.0726%	93	17.4679%	13.1425%
41	0.0941%	0.0775%	94	19.5105%	15.1670%
42	0.1051%	0.0838%	95	21.6689%	17.3761%
43	0.1167%	0.0918%	96	23.7343%	19.5275%
44	0.1294%	0.1013%	97	25.7571%	21.6213%
45	0.1432%	0.1132%	98	27.8633%	23.3643%
46	0.1582%	0.1271%	99	29.8272%	23.8705%
47	0.1744%	0.1429%	100	31.5152%	23.9898%
48	0.1918%	0.1597%	101	33.0771%	24.9134%
49	0.2102%	0.1774%	102	34.4234%	26.0067%
50	0.2317%	0.1950%	103	35.6398%	27.2992%
51	0.2657%	0.2130%	104	36.6357%	28.7614%
52	0.3011%	0.2304%	105	37.3430%	30.3385%
53	0.3373%	0.2472%	106	37.7004%	31.9944%
54	0.3744%	0.2638%	107	37.8599%	33.6898%
55	0.4112%	0.2806%	108	38.0314%	35.3785%
56	0.4578%	0.3034%	109	38.1998%	37.0129%
57	0.5025%	0.3264%	110	50.0000%	50.0000%
58	0.5448%	0.3498%	111	50.0000%	50.0000%
59	0.5843%	0.3732%	112	50.0000%	50.0000%
60	0.6211%	0.3973%	113	50.0000%	50.0000%
61	0.7018%	0.4321%	114	50.0000%	50.0000%
62	0.7804%	0.4686%	115	50.0000%	50.0000%
63	0.8588%	0.5072%	116	50.0000%	50.0000%
64	0.9371%	0.5479%	117	50.0000%	50.0000%
65	0.9994%	0.5912%	118	50.0000%	50.0000%
66	1.1295%	0.6619%	119	50.0000%	50.0000%
67	1.2569%	0.7367%	120	100.0000%	100.0000%

Table XI-6
Disabled Retiree Mortality

NEW YORK CITY TEACHERS' RETIREMENT SYSTEM					
PROBABILITIES OF MORTALITY FOR DISABLED RETIREES					
BASE RATES					
Age	Males	Females	Age	Males	Females
15	0.3819%	0.3483%	68	2.8007%	2.0012%
16	0.5167%	0.4712%	69	2.8946%	2.0043%
17	0.6964%	0.5141%	70	3.0268%	2.0073%
18	0.7863%	0.5351%	71	3.1148%	2.0103%
19	0.8312%	0.5569%	72	3.2684%	2.1811%
20	0.8353%	0.5649%	73	3.3926%	2.3760%
21	0.8659%	0.5961%	74	3.5875%	2.5968%
22	0.8978%	0.6295%	75	3.7271%	2.8417%
23	0.9464%	0.6597%	76	3.9657%	3.0808%
24	0.9977%	0.6908%	77	4.2691%	3.3373%
25	1.0424%	0.7150%	78	4.5349%	3.6085%
26	1.0960%	0.7387%	79	4.8252%	3.8944%
27	1.1348%	0.7520%	80	5.1378%	4.1909%
28	1.1774%	0.7625%	81	5.6917%	4.6921%
29	1.2163%	0.7686%	82	6.2841%	5.1536%
30	1.2878%	0.7763%	83	6.8835%	5.5061%
31	1.3554%	0.9885%	84	7.7954%	6.1180%
32	1.3755%	1.1922%	85	8.8286%	6.7342%
33	1.3953%	1.3874%	86	9.9032%	7.3088%
34	1.4153%	1.3942%	87	10.8837%	8.2536%
35	1.4357%	1.4012%	88	11.9567%	9.3264%
36	1.4563%	1.4082%	89	13.8059%	10.3734%
37	1.4772%	1.4152%	90	15.7270%	11.4459%
38	1.4985%	1.4223%	91	17.7012%	12.6271%
39	1.5200%	1.4294%	92	19.6428%	14.1350%
40	1.5418%	1.4366%	93	21.9234%	15.4424%
41	1.5640%	1.4436%	94	24.0761%	16.9560%
42	1.5865%	1.4509%	95	26.0577%	18.4261%
43	1.6093%	1.4581%	96	28.3614%	20.1727%
44	1.6324%	1.4654%	97	30.3483%	21.6213%
45	1.6559%	1.5299%	98	31.8739%	23.3643%
46	1.6797%	1.6016%	99	33.6652%	23.8705%
47	1.7038%	1.6623%	100	35.0392%	23.9898%
48	1.7283%	1.7238%	101	36.0496%	24.9134%
49	1.7531%	1.7485%	102	37.0460%	26.0067%
50	1.7783%	1.7736%	103	37.7767%	27.2992%
51	1.8039%	1.7991%	104	38.1460%	28.7614%
52	1.9408%	1.8530%	105	38.3076%	30.3385%
53	2.0713%	1.8909%	106	38.4698%	31.9944%
54	2.2040%	1.9173%	107	38.6325%	33.6898%
55	2.3207%	1.9622%	108	38.8076%	35.3785%
56	2.4304%	1.9652%	109	38.9794%	37.0129%
57	2.4937%	1.9681%	110	50.0000%	50.0000%
58	2.5070%	1.9711%	111	50.0000%	50.0000%
59	2.5245%	1.9741%	112	50.0000%	50.0000%
60	2.5362%	1.9770%	113	50.0000%	50.0000%
61	2.5394%	1.9801%	114	50.0000%	50.0000%
62	2.5426%	1.9831%	115	50.0000%	50.0000%
63	2.5480%	1.9861%	116	50.0000%	50.0000%
64	2.5797%	1.9891%	117	50.0000%	50.0000%
65	2.6258%	1.9921%	118	50.0000%	50.0000%
66	2.6510%	1.9951%	119	50.0000%	50.0000%
67	2.7083%	1.9982%	120	100.0000%	100.0000%

Table XI-7
Beneficiary Mortality

NEW YORK CITY TEACHERS' RETIREMENT SYSTEM					
PROBABILITIES OF MORTALITY FOR BENEFICIARIES					
BASE RATES					
Age	Males	Females	Age	Males	Females
15	0.0105%	0.0092%	68	1.8256%	1.3605%
16	0.0142%	0.0112%	69	1.9386%	1.4332%
17	0.0191%	0.0122%	70	2.0542%	1.5007%
18	0.0222%	0.0133%	71	2.2359%	1.6745%
19	0.0240%	0.0143%	72	2.4230%	1.8463%
20	0.0251%	0.0145%	73	2.6165%	2.0157%
21	0.0268%	0.0153%	74	2.8157%	2.1838%
22	0.0284%	0.0161%	75	3.0220%	2.3492%
23	0.0301%	0.0171%	76	3.4928%	2.6652%
24	0.0315%	0.0183%	77	3.9787%	2.9831%
25	0.0327%	0.0195%	78	4.4792%	3.3011%
26	0.0342%	0.0208%	79	4.9963%	3.6207%
27	0.0354%	0.0221%	80	5.5282%	3.9391%
28	0.0371%	0.0236%	81	6.1051%	4.4386%
29	0.0394%	0.0252%	82	6.6894%	4.9473%
30	0.0427%	0.0270%	83	7.2805%	5.4665%
31	0.0495%	0.0330%	84	7.8749%	5.9942%
32	0.0562%	0.0384%	85	8.4753%	6.5354%
33	0.0625%	0.0431%	86	9.6136%	7.4659%
34	0.0682%	0.0471%	87	10.8005%	8.3995%
35	0.0743%	0.0511%	88	12.0443%	9.3428%
36	0.0780%	0.0542%	89	13.3397%	10.2918%
37	0.0818%	0.0579%	90	14.6958%	11.2477%
38	0.0861%	0.0618%	91	16.4185%	12.8868%
39	0.0917%	0.0666%	92	18.1416%	14.4887%
40	0.0997%	0.0719%	93	19.8574%	16.0801%
41	0.1394%	0.0775%	94	21.6187%	17.5854%
42	0.1774%	0.0859%	95	23.5884%	19.0626%
43	0.2143%	0.0968%	96	25.4266%	20.2474%
44	0.2507%	0.1111%	97	27.2119%	21.2937%
45	0.2875%	0.1287%	98	29.0202%	22.0663%
46	0.3207%	0.1501%	99	30.6654%	22.5443%
47	0.3534%	0.1748%	100	32.1584%	22.6473%
48	0.3849%	0.2022%	101	33.7521%	23.5294%
49	0.4150%	0.2319%	102	35.1259%	24.5619%
50	0.4431%	0.2633%	103	36.3671%	25.7825%
51	0.5156%	0.2999%	104	37.3834%	27.1635%
52	0.5928%	0.3376%	105	38.1051%	28.6530%
53	0.6740%	0.3762%	106	38.4698%	30.2169%
54	0.7583%	0.4151%	107	38.6325%	31.8182%
55	0.8440%	0.4540%	108	38.8076%	33.4131%
56	0.9048%	0.5132%	109	38.9794%	34.9566%
57	0.9604%	0.5735%	110	50.0000%	50.0000%
58	1.0101%	0.6353%	111	50.0000%	50.0000%
59	1.0536%	0.6981%	112	50.0000%	50.0000%
60	1.0919%	0.7631%	113	50.0000%	50.0000%
61	1.1835%	0.8329%	114	50.0000%	50.0000%
62	1.2676%	0.8908%	115	50.0000%	50.0000%
63	1.3473%	0.9493%	116	50.0000%	50.0000%
64	1.4238%	1.0146%	117	50.0000%	50.0000%
65	1.4985%	1.0876%	118	50.0000%	50.0000%
66	1.6059%	1.1681%	119	50.0000%	50.0000%
67	1.7146%	1.2609%	120	100.0000%	100.0000%

**Table XI-8
Salary Scale**

NEW YORK CITY TEACHERS' RETIREMENT SYSTEM		
ANNUAL RATES OF MERIT AND SALARY INCREASE		
Years of Service	Merit Increase	Salary Increase ¹
0	10.00%	13.00%
1	8.00%	11.00%
2	6.00%	9.00%
3	5.00%	8.00%
4	6.00%	9.00%
5	5.00%	8.00%
6	5.00%	8.00%
7	4.00%	7.00%
8	2.00%	5.00%
9	5.00%	8.00%
10	1.00%	4.00%
11	1.00%	4.00%
12	3.00%	6.00%
13	1.00%	4.00%
14	5.00%	8.00%
15	1.00%	4.00%
16	1.00%	4.00%
17	2.00%	5.00%
18	1.00%	4.00%
19	9.00%	12.00%
20	1.00%	4.00%
21	5.00%	8.00%
22+	1.00%	4.00%

¹Salary Increase is the General Wage Increase of 3.00% plus the Merit Increase.

Additional Assumptions and Methods

1. **Actuarial Interest Rate (AIR):** 7.0% per annum, net of investment expenses.
2. **Mortality Assumption:** The mortality base tables are projected from 2012 using mortality improvement table MP-2020. The post-commencement base tables are also multiplied by adjustment factors to convert them from lives-weighted to amounts-weighted tables to account for socioeconomic effects on mortality. The adjustment factors are used as follows:

	Adjustment Factor	
	Male	Female
Service Retiree	0.908	0.944
Disabled Retiree	0.940	0.962
Beneficiary	0.890	0.951

3. **Marital Assumption:** All active members are assumed to be married, male employees are assumed to be four years older than their female spouses, and female employees are assumed to be two years younger than their males spouses.
4. **Credited Service:** Calculated in whole year increments for valuation purposes. For CUNY participants, since updated service is not provided on the census data, estimated service is used to calculate liabilities.
5. **Loans:** Except for Death Benefits, it is assumed that eligible members take a loan at retirement equal to 25% of their member contribution balances.
6. **Inflation:** The long-term Consumer Price Index inflation rate is assumed to be 2.50% per year. AutoCOLA is assumed to be 1.50% per year, and Escalation is assumed at 2.50% per year. The assumed 30-year Treasury rate for annuitization of outstanding loans at retirement is 3.50%.
7. **Form of Payment:** Retiring members are assumed to elect the Maximum Retirement Allowance (i.e., single life annuity) form of payment.
8. **Actuarial Asset Valuation Method (AAVM):**

The Actuary reset the Actuarial Value of Assets to Market Value as of June 30, 2019.

Beginning with the June 30, 2020 (Lag) actuarial valuation, the AAVM recognizes investment returns greater or less than expected over a period of five years.

In accordance with this AAVM, the UIR are phased into the AVA over five-year period at 20% per year, with the calculation of EIR based on the MVA.

The AVA is further constrained to be within a corridor of 80% to 120% of the MVA.

Beginning with the June 30, 2020 (Lag) actuarial valuation, the AAVM includes an adjustment based on the unfunded value of guaranteed interest credits payable to the TDA. See item 15 below for more information.

For more information, see SECTION II – MARKET AND ACTUARIAL VALUES OF ASSETS.

9. **Actuarial Cost Method:** The Entry Age Normal (EAN) cost method of funding is used by the Actuary to calculate the Employer Contribution.

Under this method, the Present Value (PV) of Future Benefits (PVFB) of each individual included in the actuarial valuation is allocated on a level basis over the expected earnings (or service) of the individual between entry age and the assumed exit age(s). The employer portion of this PVFB allocated to a valuation year is the Normal Cost. The portion of this PVFB not provided for at a valuation date by the PV of Future Normal Costs or future member contributions is the Accrued Liability (AL).

The excess, if any, of the AL over the Actuarial Value of Assets (AVA) is the Unfunded Accrued Liability (UAL).

Under this method, actuarial gains and losses, as they occur, reduce and increase the UAL, respectively, and are explicitly identified and amortized. Increases or decreases in obligations due to benefit changes, actuarial assumption changes, and actuarial method changes are also explicitly identified and amortized.

The explicit UALs that are developed under EAN each year are financed over fixed periods. For more information see Page 12.

Under EAN, the Normal Cost as a percentage of pay remains stable by individual and changes gradually over time for the entire plan as the characteristics of the group changes (e.g., more Tier 6 active members decrease the average Normal Cost as a percentage of pay).

10. **Allowances for Administrative Expenses:** The Employer Contribution for a fiscal year is increased by the interest-adjusted amount of administrative expenses paid from TRS during the second prior fiscal year.
11. **WTC Disability and Death Benefits:** Obligations attributable to the WTC Disability Benefits Law and to the WTC Death Benefits Law are determined through estimation techniques for post-retirement reclassifications.

12. **One-Year Lag Methodology (OYLM):** One-Year Lag Methodology uses a June 30, XX-2 valuation date to determine Fiscal Year XX employer contributions.

This methodology requires adjustments to certain components used to determine the Fiscal Year XX employer contributions as follows:

a. Normal Cost

The normal cost as of June 30, XX-2 is rolled forward with the assumed AIR of 7.0% to derive the normal cost as of December 31, XX-1.

b. UAL Payments

For determining the UAL payments for Fiscal Year XX, and to be consistent with the OYLM, the UAL as of June 30, XX-2 is adjusted by the discounted value of employer normal cost and UAL payments paid during Fiscal Year XX-1 and the discounted value of Administrative Expenses reimbursed during Fiscal Years XX-1 and XX.

13. **Excess Benefit Plan:** The valuation includes liabilities and costs, if any, associated with benefits in excess of the Internal Revenue Code Section 415 limitation.

14. **TDA Fixed Fund Normal Cost:** A cost is added to each year's Normal Cost for providing a guaranteed 8.25% return on the TDA Fixed Fund for non-UFT members.

15. **Additional Assumptions used for the TDA fixed fund:**

- a. Active TDA members would contribute 8.0% of compensation to the TDA fixed fund and 3.5% of compensation to the TDA variable fund.
- b. TDA members would transfer 25% of their TDA variable fund to the TDA fixed fund.
- c. Active members in the QPP who have not joined the TDA would join and contribute 2.0% of pay to the TDA fixed fund and approximately 0.9% to the variable fund.
- d. The probability that a member elects 4% per year withdrawals from the TDA fixed fund starting from the later of age 60 and the age at termination is 25%.
- e. The probability that a member elects required minimum distributions from the TDA fixed fund starting from the later of age 72 and the age at termination is 75%.

- f. Estimate techniques have been used to account for the difference in liabilities due to future annuitization of TDA funds.

SECTION XII - SUMMARY OF DEMOGRAPHIC DATA

The June 30, 2020 (Lag) and June 30, 2019 (Lag) actuarial valuations are based upon census data as of those dates submitted by the Plan's administrative staff and the employers' payroll facilities. Financial information was provided by the Office of the Comptroller as of June 30, 2020 and June 30, 2019.

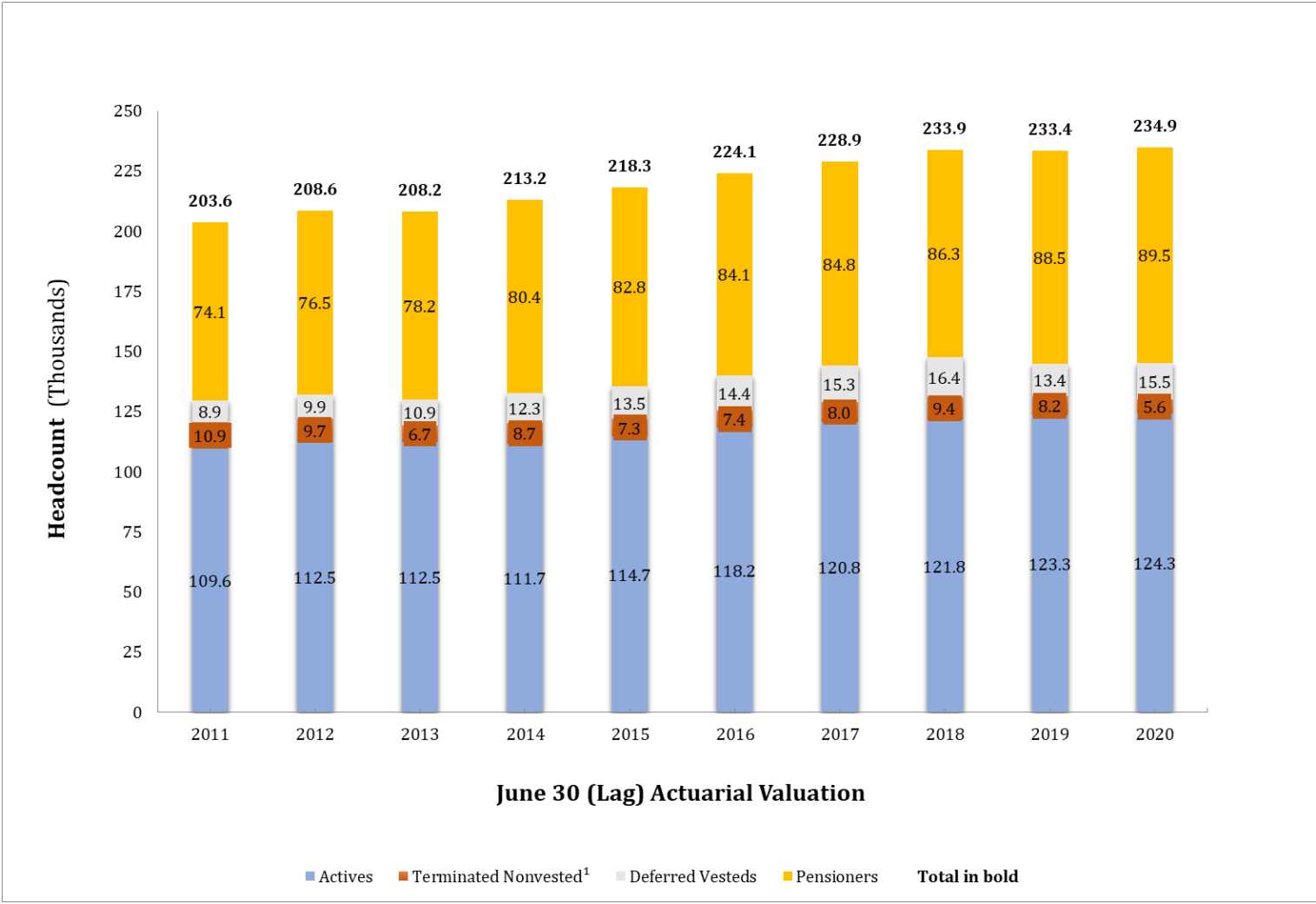
Beginning at June 30, 2020, TRS members who are no longer on payroll but not otherwise classified have been classified as Active, Terminated Nonvested, or Deferred Vested members, using actuarial judgment and consideration of available data, including leave of absence data when available.

Consistent with Actuarial Standards of Practice, the Office of the Actuary has reviewed census data and financial information for consistency and reasonability but has not audited it. The accuracy of the results and calculations contained in this Report are dependent on the accuracy of this census data and financial information. To the extent any such data or information provided is materially inaccurate or incomplete, the results contained herein will require revision.

Table XII-1
Status Reconciliation

CHANGES IN MEMBERSHIP DURING THE FISCAL YEAR CLASSIFIED BY STATUS										
Status	(1) Active Members	(2) Active Off Payroll / Terminated Nonvested	(3) Deferred Vested	(4) Service Pension	(5) Ordinary Disability	(6) Accidental Disability	(7) Accidental Death	(8) Other Beneficiary	(9) Pensioners Subtotal (4) to (8)	(10) Grand Total (1) + (2) + (3) + (9)
Number at June 30, 2019	123,336	8,174	13,410	80,048	2,728	776	0	4,955	88,507	233,427
New Entrants	7,074	160	0	0	0	0	0	0	0	7,234
Rehires	1,600	(1,224)	(173)	0	0	0	0	0	0	203
Leaving Active Payroll	(3,035)	3,035	0	0	0	0	0	0	0	0
Vested Termination	(1,224)	(1,714)	2,938	0	0	0	0	0	0	0
Non-Vested Termination / Cashout	(418)	(2,609)	(335)	0	0	0	0	0	0	(3,362)
Accidental Death	(29)	0	0	0	0	0	29	0	29	0
Ordinary Death	(95)	(10)	(31)	0	0	0	0	0	0	(136)
Service Retirement	(2,862)	(157)	(305)	3,324	0	0	0	0	3,324	0
Ordinary Disability Retirement	(66)	(46)	(1)	0	113	0	0	0	113	0
Accidental Disability Retirement	(5)	(5)	(1)	0	0	11	0	0	11	0
Reclassifications	0	0	0	0	0	0	0	0	0	0
Pensioner Death with Beneficiary	0	0	0	(606)	(86)	(19)	0	0	(711)	(711)
Pensioner Death without Beneficiary	0	0	0	(1,866)	(31)	(1)	0	(496)	(2,394)	(2,394)
On/(Off) Pension Payroll	0	0	0	15	7	(17)	1	651	657	657
Net Change	940	(2,570)	2,092	867	3	(26)	30	155	1,029	1,491
Number at June 30, 2020	124,276	5,604	15,502	80,915	2,731	750	30	5,110	89,536	234,918

**Graph XII-2
Headcount Summary by Status**



¹ Active Off Payroll prior to June 30, 2020

Table XII-3
Summary of Active Membership

NEW YORK CITY TEACHERS' RETIREMENT SYSTEM		
ACTIVE MEMBERS INCLUDED IN THE JUNE 30, 2020 (LAG) AND THE JUNE 30, 2019 (LAG) ACTUARIAL VALUATIONS		
	June 30, 2020 (Lag)	June 30, 2019 (Lag)
Number		
Males	27,538	27,566
Females	96,738	95,770
Total	124,276	123,336
Annual Salary ¹		
Males	\$ 2,619,461,763	\$ 2,586,864,706
Females	8,584,416,263	8,316,890,353
Total	\$ 11,203,878,026	\$ 10,903,755,059
Average Salary ¹		
Males	\$ 95,122	\$ 93,843
Females	88,739	86,842
Total Average	\$ 90,153	\$ 88,407
Average Age		
Males	44.2	44.2
Females	44.1	44.0
Total Average	44.2	44.1
Average Past Service		
Males	12.1	11.9
Females	12.0	11.8
Total Average	12.0	11.8

¹Salaries reflect the impact of recent labor contract settlements and certain non-union salary increases with retroactive effective dates, if any.

Graph XII-4
Active Membership by Tier

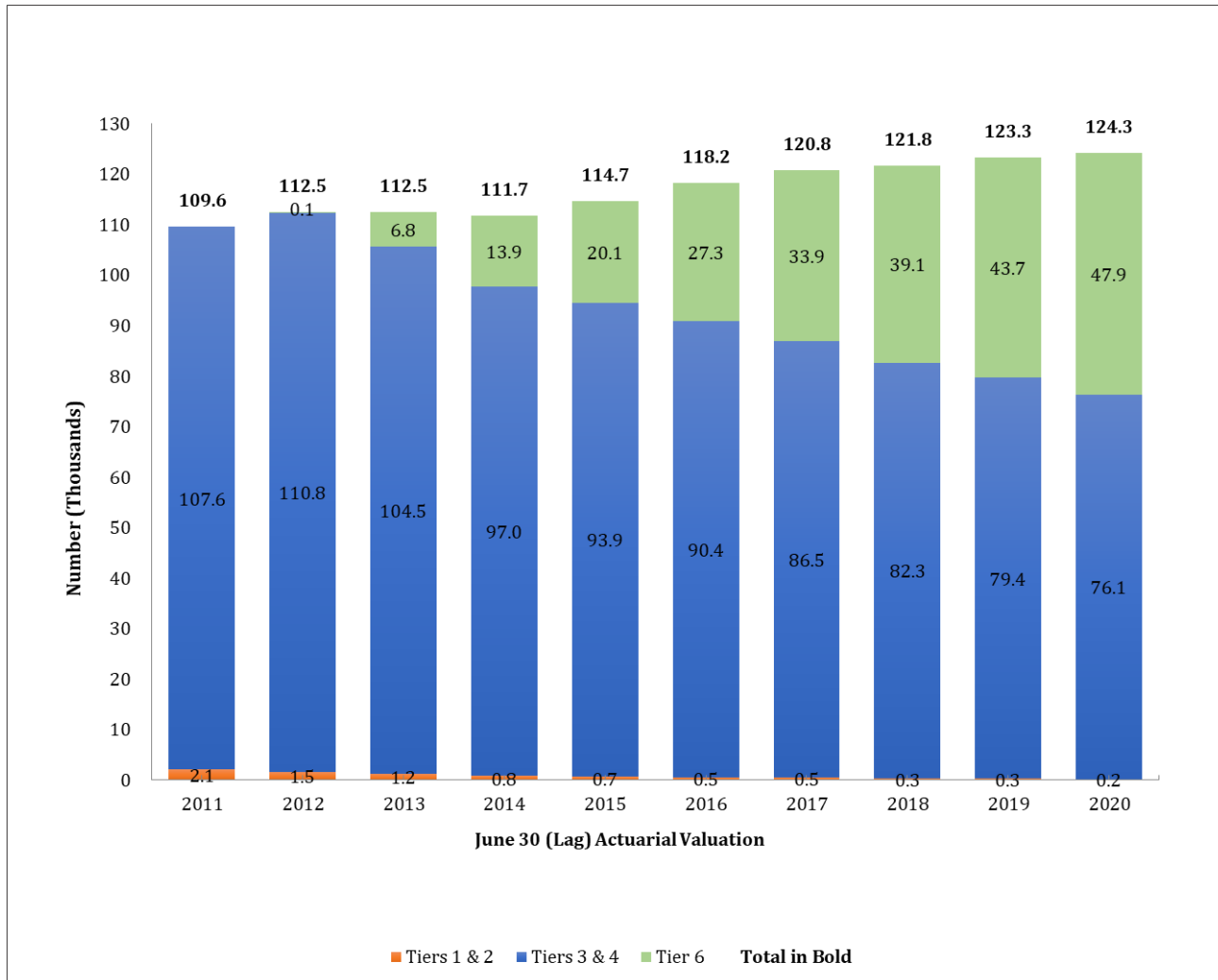


Table XII-5
Schedule of Active Member Salary Data

June 30 (Lag) Actuarial Valuation	Number	Annual Salary	Average Annual Salary	Percentage Increase/ (Decrease) In Avg. Salary
2011	109,636	7,888,203,642	71,949	0.7%
2012	112,460	8,013,395,184	71,256	(1.0%)
2013	112,481	8,128,378,071	72,264	1.4%
2014	111,726	8,274,685,657	74,062	2.5%
2015	114,652	8,844,650,633	77,143	4.2%
2016	118,201	9,224,267,647	78,039	1.2%
2017	120,826	9,848,899,232	81,513	4.5%
2018	121,764	10,404,403,684	85,447	4.8%
2019	123,336	10,903,755,059	88,407	3.5%
2020	124,276	11,203,878,026	90,153	2.0%

Salaries reflect the impact of recent labor contract settlements and certain non-union salary increases with retroactive effective dates, if any.

Table XII-6
Detailed Active Membership and Salaries as of June 30, 2020

AGE \ SVC	Male Total									
	UNDER 5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & UP	ALL YEARS
<i>NUMBER:</i>										
UNDER 20	1	0	0	0	0	0	0	0	0	1
20 TO 24	212	0	0	0	0	0	0	0	0	212
25 TO 29	1,897	381	0	0	0	0	0	0	0	2,278
30 TO 34	1,805	1,897	243	3	0	0	0	0	0	3,948
35 TO 39	1,054	1,414	1,464	375	3	0	0	0	0	4,310
40 TO 44	607	746	1,052	1,471	244	5	0	0	0	4,125
45 TO 49	385	537	594	1,149	917	118	2	0	0	3,702
50 TO 54	287	359	426	778	812	631	105	11	0	3,409
55 TO 59	206	262	327	530	492	400	282	41	0	2,540
60 TO 64	115	197	239	364	326	221	167	70	15	1,714
65 TO 69	43	106	134	196	157	85	67	40	24	852
70 & UP	19	59	73	89	73	42	18	26	48	447
TOTAL	6,631	5,958	4,552	4,955	3,024	1,502	641	188	87	27,538

<i>SALARIES (IN THOUSANDS):</i>										
UNDER 20	36	0	0	0	0	0	0	0	0	36
20 TO 24	11,014	0	0	0	0	0	0	0	0	11,014
25 TO 29	121,390	27,685	0	0	0	0	0	0	0	149,075
30 TO 34	121,818	161,293	25,167	331	0	0	0	0	0	308,610
35 TO 39	74,088	121,222	153,232	42,337	388	0	0	0	0	391,268
40 TO 44	43,391	64,234	107,852	169,928	30,472	696	0	0	0	416,574
45 TO 49	27,387	43,740	58,842	132,980	118,275	16,121	212	0	0	397,558
50 TO 54	21,088	26,631	40,203	85,435	101,909	84,367	13,637	1,523	0	374,793
55 TO 59	14,473	18,009	28,780	55,438	58,827	52,521	38,402	5,526	0	271,976
60 TO 64	7,729	12,764	19,593	36,905	38,069	28,216	22,149	9,444	2,090	176,960
65 TO 69	2,040	6,222	10,679	19,243	17,471	9,749	8,691	5,310	2,998	82,402
70 & UP	831	2,388	4,923	7,455	7,334	4,446	2,403	3,160	6,257	39,196
TOTAL¹	445,286	484,190	449,272	550,052	372,745	196,117	85,493	24,962	11,344	2,619,462

<i>AVERAGE SALARIES:²</i>										
UNDER 20	36,416	0	0	0	0	0	0	0	0	36,416
20 TO 24	51,953	0	0	0	0	0	0	0	0	51,953
25 TO 29	63,990	72,665	0	0	0	0	0	0	0	65,441
30 TO 34	67,489	85,026	103,569	110,242	0	0	0	0	0	78,169
35 TO 39	70,293	85,730	104,667	112,900	129,431	0	0	0	0	90,781
40 TO 44	71,485	86,105	102,521	115,519	124,883	139,280	0	0	0	100,988
45 TO 49	71,135	81,452	99,061	115,735	128,981	136,617	106,102	0	0	107,390
50 TO 54	73,476	74,182	94,374	109,814	125,504	133,704	129,873	138,414	0	109,942
55 TO 59	70,258	68,738	88,012	104,601	119,567	131,302	136,176	134,772	0	107,077
60 TO 64	67,209	64,793	81,977	101,388	116,777	127,676	132,631	134,917	139,308	103,244
65 TO 69	47,439	58,694	79,692	98,177	111,279	114,699	129,717	132,751	124,924	96,716
70 & UP	43,750	40,479	67,444	83,763	100,461	105,848	133,476	121,527	130,347	87,687
TOTAL	67,152	81,267	98,698	111,009	123,262	130,570	133,375	132,777	130,396	95,122

Note: Age is nearest birthday. Service is nearest year.

¹ Total may not add up due to rounding.

² Average based on unrounded salary.

Table XII-6
Detailed Active Membership and Salaries as of June 30, 2020 (cont'd)

AGE \ SVC	Female Total									
	UNDER 5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & UP	ALL YEARS
<i>NUMBER:</i>										
UNDER 20	0	0	0	0	0	0	0	0	0	0
20 TO 24	821	5	0	0	0	0	0	0	0	826
25 TO 29	7,309	1,520	1	0	0	0	0	0	0	8,830
30 TO 34	5,960	7,207	868	2	0	0	0	0	0	14,037
35 TO 39	3,139	4,403	5,095	1,461	2	0	0	0	0	14,100
40 TO 44	2,093	2,617	3,357	4,976	974	2	0	0	0	14,019
45 TO 49	1,662	1,821	2,147	3,513	3,242	426	4	0	0	12,815
50 TO 54	1,217	1,560	1,675	2,470	2,679	1,898	458	12	0	11,969
55 TO 59	749	1,116	1,326	1,865	2,029	1,230	992	144	0	9,451
60 TO 64	338	590	910	1,507	1,759	815	514	219	24	6,676
65 TO 69	90	243	350	606	799	411	274	116	65	2,954
70 & UP	22	85	125	173	215	142	117	65	117	1,061
TOTAL	23,400	21,167	15,854	16,573	11,699	4,924	2,359	556	206	96,738

<i>SALARIES (IN THOUSANDS):</i>										
UNDER 20	0	0	0	0	0	0	0	0	0	0
20 TO 24	46,546	234	0	0	0	0	0	0	0	46,781
25 TO 29	484,421	113,980	107	0	0	0	0	0	0	598,508
30 TO 34	407,525	620,822	86,340	146	0	0	0	0	0	1,114,832
35 TO 39	212,498	375,799	517,455	159,669	183	0	0	0	0	1,265,603
40 TO 44	136,586	208,555	327,133	548,580	113,168	123	0	0	0	1,334,145
45 TO 49	105,907	132,928	193,074	376,973	394,297	54,596	506	0	0	1,258,281
50 TO 54	72,793	104,170	134,011	244,173	306,423	237,941	56,890	1,167	0	1,157,566
55 TO 59	43,639	70,016	94,555	170,286	207,376	142,506	122,777	18,272	0	869,426
60 TO 64	19,738	34,456	65,238	132,459	168,559	85,116	55,964	28,244	2,873	592,645
65 TO 69	4,944	13,602	24,783	52,357	72,482	39,691	28,307	14,030	8,471	258,668
70 & UP	1,076	4,174	8,165	13,424	16,974	12,581	10,820	7,078	13,668	87,962
TOTAL ¹	1,535,673	1,678,736	1,450,861	1,698,066	1,279,461	572,552	275,263	68,791	25,013	8,584,416

<i>AVERAGE SALARIES: ²</i>										
UNDER 20	0	0	0	0	0	0	0	0	0	0
20 TO 24	56,695	46,858	0	0	0	0	0	0	0	56,635
25 TO 29	66,277	74,987	107,313	0	0	0	0	0	0	67,781
30 TO 34	68,377	86,142	99,470	72,882	0	0	0	0	0	79,421
35 TO 39	67,696	85,351	101,561	109,287	91,490	0	0	0	0	89,759
40 TO 44	65,259	79,693	97,448	110,245	116,188	61,313	0	0	0	95,167
45 TO 49	63,723	72,997	89,927	107,308	121,622	128,158	126,530	0	0	98,188
50 TO 54	59,814	66,776	80,007	98,855	114,379	125,364	124,213	97,233	0	96,714
55 TO 59	58,264	62,738	71,308	91,306	102,206	115,858	123,767	126,887	0	91,993
60 TO 64	58,395	58,400	71,690	87,896	95,826	104,436	108,879	128,967	119,713	88,772
65 TO 69	54,934	55,974	70,808	86,398	90,716	96,572	103,310	120,951	130,326	87,565
70 & UP	48,918	49,108	65,323	77,595	78,949	88,602	92,478	108,897	116,824	82,905
TOTAL	65,627	79,309	91,514	102,460	109,365	116,278	116,686	123,725	121,421	88,739

Note: Age is nearest birthday. Service is nearest year.

¹ Total may not add up due to rounding.

² Average based on unrounded salary.

Table XII-6
Detailed Active Membership and Salaries as of June 30, 2020 (cont'd)

AGE \ SVC	Total									
	UNDER 5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & UP	ALL YEARS
<i>NUMBER:</i>										
UNDER 20	1	0	0	0	0	0	0	0	0	1
20 TO 24	1,033	5	0	0	0	0	0	0	0	1,038
25 TO 29	9,206	1,901	1	0	0	0	0	0	0	11,108
30 TO 34	7,765	9,104	1,111	5	0	0	0	0	0	17,985
35 TO 39	4,193	5,817	6,559	1,836	5	0	0	0	0	18,410
40 TO 44	2,700	3,363	4,409	6,447	1,218	7	0	0	0	18,144
45 TO 49	2,047	2,358	2,741	4,662	4,159	544	6	0	0	16,517
50 TO 54	1,504	1,919	2,101	3,248	3,491	2,529	563	23	0	15,378
55 TO 59	955	1,378	1,653	2,395	2,521	1,630	1,274	185	0	11,991
60 TO 64	453	787	1,149	1,871	2,085	1,036	681	289	39	8,390
65 TO 69	133	349	484	802	956	496	341	156	89	3,806
70 & UP	41	144	198	262	288	184	135	91	165	1,508
TOTAL	30,031	27,125	20,406	21,528	14,723	6,426	3,000	744	293	124,276

<i>SALARIES (IN THOUSANDS):</i>										
UNDER 20	36	0	0	0	0	0	0	0	0	36
20 TO 24	57,560	234	0	0	0	0	0	0	0	57,795
25 TO 29	605,810	141,665	107	0	0	0	0	0	0	747,583
30 TO 34	529,343	782,115	111,507	476	0	0	0	0	0	1,423,442
35 TO 39	286,586	497,021	670,687	202,006	571	0	0	0	0	1,656,871
40 TO 44	179,977	272,790	434,986	718,508	143,639	819	0	0	0	1,750,719
45 TO 49	133,294	176,668	251,917	509,953	512,573	70,716	718	0	0	1,655,838
50 TO 54	93,881	130,801	174,214	329,608	408,332	322,308	70,526	2,689	0	1,532,359
55 TO 59	58,112	88,025	123,334	225,725	266,203	195,026	161,179	23,797	0	1,141,402
60 TO 64	27,467	47,220	84,830	169,364	206,628	113,332	78,113	37,688	4,963	769,604
65 TO 69	6,984	19,823	35,461	71,600	89,953	49,440	36,998	19,340	11,469	341,070
70 & UP	1,907	6,562	13,089	20,879	24,308	17,027	13,223	10,238	19,925	127,158
TOTAL ¹	1,980,959	2,162,926	1,900,133	2,248,118	1,652,206	768,669	360,757	93,753	36,357	11,203,878

<i>AVERAGE SALARIES: ²</i>										
UNDER 20	36,416	0	0	0	0	0	0	0	0	36,416
20 TO 24	55,722	46,858	0	0	0	0	0	0	0	55,679
25 TO 29	65,806	74,521	107,313	0	0	0	0	0	0	67,301
30 TO 34	68,170	85,909	100,367	95,298	0	0	0	0	0	79,146
35 TO 39	68,349	85,443	102,254	110,025	114,254	0	0	0	0	89,998
40 TO 44	66,658	81,115	98,659	111,448	117,930	117,003	0	0	0	96,490
45 TO 49	65,117	74,923	91,907	109,385	123,244	129,993	119,721	0	0	100,251
50 TO 54	62,421	68,161	82,920	101,480	116,967	127,445	125,268	116,928	0	99,646
55 TO 59	60,851	63,879	74,612	94,248	105,594	119,648	126,514	128,634	0	95,188
60 TO 64	60,633	60,000	73,830	90,520	99,102	109,394	114,703	130,408	127,250	91,729
65 TO 69	52,511	56,800	73,268	89,277	94,093	99,678	108,499	123,976	128,870	89,614
70 & UP	46,523	45,572	66,105	79,690	84,402	92,538	97,945	112,506	120,758	84,322
TOTAL	65,964	79,739	93,116	104,428	112,219	119,619	120,252	126,012	124,086	90,153

Note: Age is nearest birthday. Service is nearest year.

¹ Total may not add up due to rounding.

² Average based on unrounded salary.

Table XII-7 Detailed Reconciliation of Active Membership

TOTAL ACTIVE MEMBERS AS OF JUNE 30, 2020							TOTAL ACTIVE MEMBERS AS OF JUNE 30, 2019				
TIER	GENDER	NUMBER	SALARY	AVG SAL	AVG AGE	AVG SVC	NUMBER	SALARY	AVG SAL	AVG AGE	AVG SVC
1	M	51	6,697,089	131,315	77.0	45.5	64	8,512,985	133,015	76.3	45.4
1	F	91	11,504,920	126,428	74.5	45.1	124	15,183,101	122,444	73.4	43.5
		142	18,202,009	128,183	75.4	45.2	188	23,696,086	126,043	74.4	44.1
2	M	9	1,170,772	130,086	71.9	38.1	16	2,127,902	132,994	70.4	35.7
2	F	58	7,291,045	125,708	69.4	37.2	74	9,366,719	126,577	68.3	36.2
		67	8,461,817	126,296	69.7	37.3	90	11,494,621	127,718	68.7	36.1
4	M	17,033	1,848,864,785	108,546	48.9	17.1	17,877	1,895,643,547	106,038	48.5	16.3
4	F	59,106	5,902,641,512	99,865	49.1	17.1	61,527	5,962,172,232	96,903	48.6	16.4
		76,139	7,751,506,297	101,807	49.1	17.1	79,404	7,857,815,779	98,960	48.6	16.4
6	M	10,445	762,729,117	73,023	36.3	3.8	9,609	680,580,272	70,827	35.8	3.3
6	F	37,483	2,662,978,786	71,045	36.2	3.8	34,045	2,330,168,301	68,444	35.5	3.3
		47,928	3,425,707,903	71,476	36.2	3.8	43,654	3,010,748,573	68,968	35.6	3.3
ALL TIERS		124,276	11,203,878,026	90,153	44.2	12.0	123,336	10,903,755,059	88,407	44.1	11.8

JUNE 30, 2020 MEMBERS ALSO PRESENT AS OF JUNE 30, 2019							JUNE 30, 2019 MEMBERS ALSO PRESENT AS OF JUNE 30, 2020				
TIER	GENDER	NUMBER	SALARY	AVG SAL	AVG AGE	AVG SVC	NUMBER	SALARY	AVG SAL	AVG AGE	AVG SVC
1	M	50	6,537,535	130,751	77.1	45.9	50	6,659,341	133,187	76.1	44.9
1	F	91	11,504,920	126,428	74.5	45.1	91	11,191,349	122,982	73.5	44.1
		141	18,042,455	127,961	75.4	45.4	141	17,850,690	126,601	74.4	44.4
2	M	9	1,170,772	130,086	71.9	38.1	9	1,183,827	131,536	70.9	37.1
2	F	57	7,190,283	126,145	69.4	37.5	57	7,055,995	123,789	68.4	36.4
		66	8,361,055	126,683	69.8	37.6	66	8,239,822	124,846	68.8	36.5
4	M	16,791	1,828,033,886	108,870	49.0	17.2	16,791	1,783,697,968	106,229	48.0	16.1
4	F	57,906	5,797,344,716	100,116	49.2	17.3	57,906	5,610,906,362	96,897	48.2	16.2
		74,697	7,625,378,602	102,084	49.2	17.3	74,697	7,394,604,330	98,995	48.2	16.2
6	M	8,784	657,335,791	74,833	36.7	4.3	8,784	623,403,390	70,970	35.7	3.3
6	F	31,524	2,286,221,616	72,523	36.6	4.3	31,524	2,154,644,167	68,349	35.6	3.3
		40,308	2,943,557,407	73,027	36.6	4.3	40,308	2,778,047,557	68,921	35.6	3.3
ALL TIERS		115,212	10,595,339,519	91,964	44.8	12.8	115,212	10,198,742,399	88,522	43.8	11.7

ADDITIONS DURING THE YEAR ¹							SEPARATIONS FROM MEMBERSHIP DURING THE YEAR ¹				
TIER	GENDER	NUMBER	SALARY	AVG SAL	AVG AGE	AVG SVC	NUMBER	SALARY	AVG SAL	AVG AGE	AVG SVC
1	M	1	159,554	159,554	75.0	22.0	14	1,853,644	132,403	77.1	47.0
1	F	0	0	0	0.0	0.0	33	3,991,752	120,962	73.0	41.8
		1	159,554	159,554	75.0	22.0	47	5,845,396	124,370	74.2	43.3
2	M	0	0	0	0.0	0.0	7	944,075	134,868	69.9	33.9
2	F	1	100,762	100,762	67.0	22.0	17	2,310,724	135,925	67.8	35.5
		1	100,762	100,762	67.0	22.0	24	3,254,799	135,617	68.4	35.0
4	M	242	20,830,899	86,078	44.7	10.8	1,086	111,945,579	103,081	56.9	20.3
4	F	1,200	105,296,796	87,747	43.2	10.4	3,621	351,265,870	97,008	55.3	20.2
		1,442	126,127,695	87,467	43.4	10.5	4,707	463,211,449	98,409	55.7	20.2
6	M	1,661	105,393,326	63,452	34.5	0.9	825	57,176,882	69,305	36.6	3.1
6	F	5,959	376,757,170	63,225	34.0	1.1	2,521	175,524,134	69,625	34.6	3.2
		7,620	482,150,496	63,274	34.1	1.0	3,346	232,701,016	69,546	35.1	3.2
ALL TIERS		9,064	608,538,507	67,138	35.6	2.5	8,124	705,012,660	86,781	47.4	13.4

Note: Age is nearest birthday. Service is nearest year. The member is considered also present if active with the same tier and gender as of both valuation dates.
¹ Separations and additions do not include members who joined after June 30, 2019 and are no longer members on June 30, 2020. Members are included in separations and additions if the tier or gender has changed.

Table XII-8
Distribution of Pension Benefits by Cause and Age as of June 30, 2020

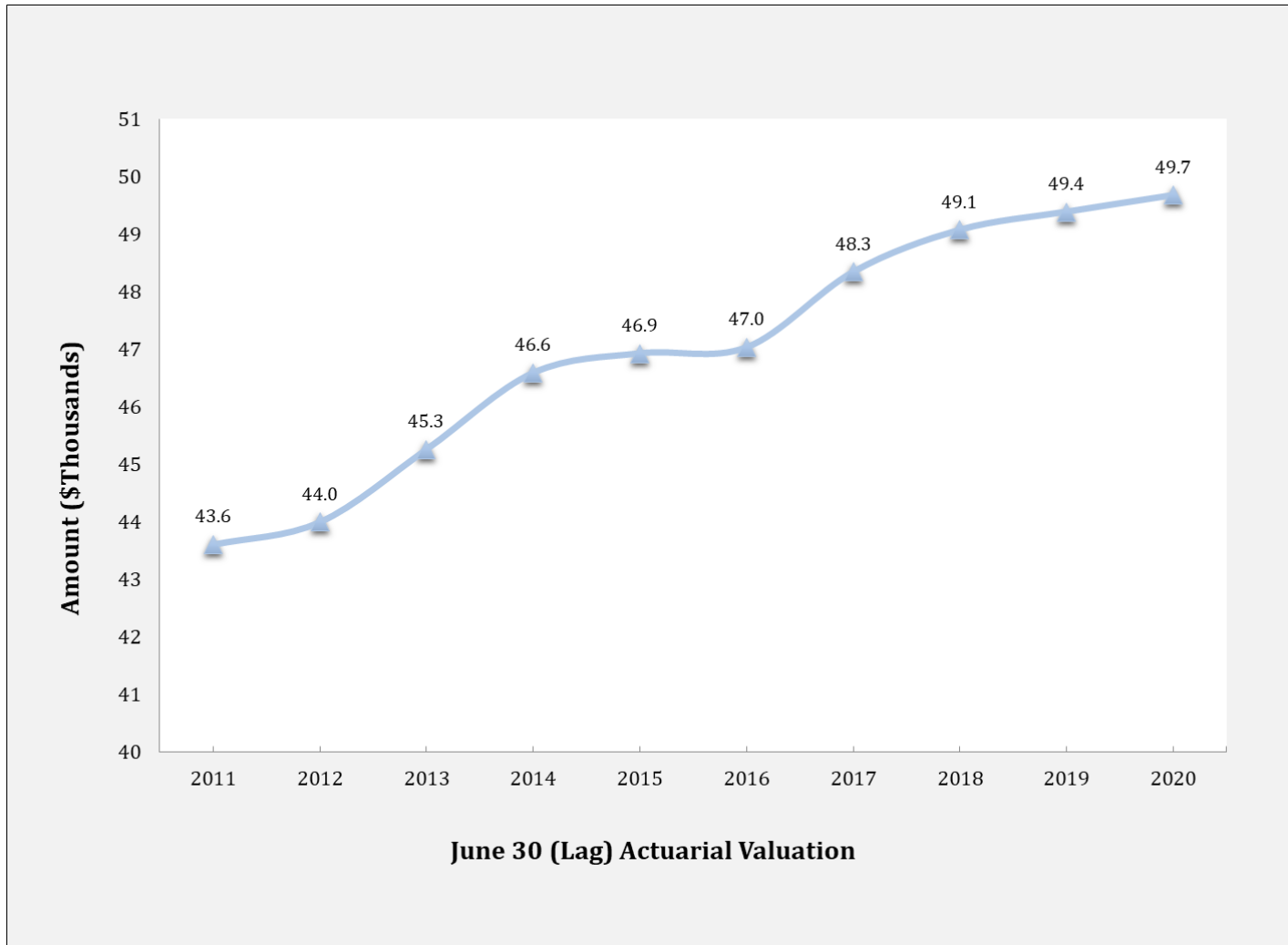
AGE	MALE			FEMALE			TOTAL		
	NUMBER	BENEFITS	AVERAGE	NUMBER	BENEFITS	AVERAGE	NUMBER	BENEFITS	AVERAGE
<i>SERVICE RETIREMENT:</i>									
UNDER 30	0	0	0	0	0	0	0	0	0
30 TO 34	0	0	0	0	0	0	0	0	0
35 TO 39	0	0	0	0	0	0	0	0	0
40 TO 44	0	0	0	0	0	0	0	0	0
45 TO 49	0	0	0	0	0	0	0	0	0
50 TO 54	0	0	0	0	0	0	0	0	0
55 TO 59	656	38,198,981	58,230	2,008	112,204,629	55,879	2,664	150,403,610	56,458
60 TO 64	1,702	90,698,545	53,289	5,407	270,168,940	49,967	7,109	360,867,485	50,762
65 TO 69	2,995	152,599,163	50,951	10,829	509,960,956	47,092	13,824	662,560,120	47,928
70 TO 74	6,274	398,457,201	63,509	15,203	811,395,540	53,371	21,477	1,209,852,740	56,332
75 TO 79	5,115	323,102,901	63,168	10,745	534,709,667	49,764	15,860	857,812,568	54,087
80 TO 84	2,723	160,564,045	58,966	6,606	287,578,066	43,533	9,329	448,142,111	48,038
85 TO 89	1,691	99,477,863	58,828	4,195	171,105,828	40,788	5,886	270,583,691	45,971
90 & UP	1,140	62,055,619	54,435	3,626	138,218,040	38,119	4,766	200,273,658	42,021
TOTAL	22,296	1,325,154,318	59,435	58,619	2,835,341,666	48,369	80,915	4,160,495,984	51,418
<i>ORDINARY DISABILITY:</i>									
UNDER 30	0	0	0	0	0	0	0	0	0
30 TO 34	0	0	0	0	0	0	0	0	0
35 TO 39	1	25,734	25,734	3	65,098	21,699	4	90,832	22,708
40 TO 44	8	194,447	24,306	30	794,688	26,490	38	989,135	26,030
45 TO 49	21	627,337	29,873	76	1,907,633	25,100	97	2,534,970	26,134
50 TO 54	36	1,081,667	30,046	164	4,453,649	27,156	200	5,535,316	27,677
55 TO 59	61	1,700,757	27,881	291	7,751,473	26,637	352	9,452,229	26,853
60 TO 64	78	2,022,126	25,925	383	9,031,956	23,582	461	11,054,082	23,978
65 TO 69	99	2,398,403	24,226	435	10,039,957	23,080	534	12,438,360	23,293
70 TO 74	133	3,713,685	27,922	367	8,527,144	23,235	500	12,240,829	24,482
75 TO 79	73	1,968,746	26,969	227	4,708,827	20,744	300	6,677,573	22,259
80 TO 84	28	638,790	22,814	108	1,899,985	17,592	136	2,538,775	18,667
85 TO 89	8	212,937	26,617	59	1,006,123	17,053	67	1,219,060	18,195
90 & UP	10	297,220	29,722	32	718,422	22,451	42	1,015,642	24,182
TOTAL	556	14,881,849	26,766	2,175	50,904,955	23,405	2,731	65,786,804	24,089
<i>ACCIDENTAL DISABILITY:</i>									
UNDER 30	0	0	0	0	0	0	0	0	0
30 TO 34	0	0	0	0	0	0	0	0	0
35 TO 39	1	38,179	38,179	3	109,666	36,555	4	147,846	36,961
40 TO 44	4	202,135	50,534	12	513,765	42,814	16	715,900	44,744
45 TO 49	6	301,022	50,170	11	479,457	43,587	17	780,479	45,911
50 TO 54	6	337,741	56,290	26	1,269,027	48,809	32	1,606,768	50,212
55 TO 59	8	347,319	43,415	49	2,112,313	43,108	57	2,459,632	43,151
60 TO 64	17	918,919	54,054	82	3,338,386	40,712	99	4,257,305	43,003
65 TO 69	28	1,418,098	50,646	105	4,480,130	42,668	133	5,898,228	44,348
70 TO 74	56	2,673,462	47,740	127	5,326,102	41,938	183	7,999,565	43,713
75 TO 79	41	2,070,039	50,489	76	3,283,468	43,204	117	5,353,507	45,756
80 TO 84	11	513,623	46,693	32	1,199,207	37,475	43	1,712,830	39,833
85 TO 89	9	381,723	42,414	23	768,018	33,392	32	1,149,741	35,929
90 & UP	6	265,649	44,275	11	529,299	48,118	17	794,948	46,762
TOTAL	193	9,467,909	49,057	557	23,408,839	42,027	750	32,876,748	43,836

Table XII-8

Distribution of Pension Benefits by Cause and Age as of June 30, 2020 (cont'd)

AGE	MALE			FEMALE			TOTAL		
	NUMBER	BENEFITS	AVERAGE	NUMBER	BENEFITS	AVERAGE	NUMBER	BENEFITS	AVERAGE
<i>ACCIDENTAL DEATH:</i>									
UNDER 30	0	0	0	3	133,845	44,615	3	133,845	44,615
30 TO 34	1	21,346	21,346	0	0	0	1	21,346	21,346
35 TO 39	0	0	0	0	0	0	0	0	0
40 TO 44	1	58,442	58,442	1	60,031	60,031	2	118,473	59,237
45 TO 49	1	51,010	51,010	2	93,708	46,854	3	144,718	48,239
50 TO 54	2	116,087	58,044	1	58,001	58,001	3	174,088	58,029
55 TO 59	4	198,956	49,739	7	384,426	54,918	11	583,382	53,035
60 TO 64	3	114,903	38,301	3	123,515	41,172	6	238,418	39,736
65 TO 69	1	54,416	54,416	0	0	0	1	54,416	54,416
70 TO 74	0	0	0	0	0	0	0	0	0
75 TO 79	0	0	0	0	0	0	0	0	0
80 TO 84	0	0	0	0	0	0	0	0	0
85 TO 89	0	0	0	0	0	0	0	0	0
90 & UP	0	0	0	0	0	0	0	0	0
TOTAL	13	615,160	47,320	17	853,526	50,207	30	1,468,686	48,956
<i>OTHER BENEFICIARIES:</i>									
UNDER 30	5	119,116	23,823	13	353,873	27,221	18	472,989	26,277
30 TO 34	6	140,546	23,424	8	289,190	36,149	14	429,736	30,695
35 TO 39	10	246,695	24,670	20	454,515	22,726	30	701,210	23,374
40 TO 44	21	471,844	22,469	23	506,534	22,023	44	978,378	22,236
45 TO 49	20	679,754	33,988	33	688,296	20,857	53	1,368,050	25,812
50 TO 54	34	633,737	18,639	50	991,867	19,837	84	1,625,603	19,352
55 TO 59	47	1,098,792	23,379	86	1,961,563	22,809	133	3,060,355	23,010
60 TO 64	75	1,733,508	23,113	151	4,354,326	28,837	226	6,087,834	26,937
65 TO 69	112	3,425,669	30,586	242	9,249,102	38,219	354	12,674,771	35,804
70 TO 74	241	8,409,032	34,892	493	21,794,287	44,207	734	30,203,319	41,149
75 TO 79	264	9,819,275	37,194	648	27,794,627	42,893	912	37,613,902	41,243
80 TO 84	219	6,535,952	29,845	593	25,617,437	43,200	812	32,153,389	39,598
85 TO 89	178	5,402,134	30,349	567	23,316,975	41,123	745	28,719,109	38,549
90 & UP	306	8,194,417	26,779	645	22,213,726	34,440	951	30,408,143	31,975
TOTAL	1,538	46,910,470	30,501	3,572	139,586,318	39,078	5,110	186,496,788	36,496
<i>ALL PENSIONERS AND BENEFICIARIES:</i>									
UNDER 30	5	119,116	23,823	16	487,718	30,482	21	606,834	28,897
30 TO 34	7	161,892	23,127	8	289,190	36,149	15	451,082	30,072
35 TO 39	12	310,608	25,884	26	629,279	24,203	38	939,887	24,734
40 TO 44	34	926,868	27,261	66	1,875,018	28,409	100	2,801,886	28,019
45 TO 49	48	1,659,123	34,565	122	3,169,094	25,976	170	4,828,217	28,401
50 TO 54	78	2,169,231	27,811	241	6,772,544	28,102	319	8,941,775	28,031
55 TO 59	776	41,544,805	53,537	2,441	124,414,404	50,969	3,217	165,959,209	51,588
60 TO 64	1,875	95,488,001	50,927	6,026	287,017,123	47,630	7,901	382,505,124	48,412
65 TO 69	3,235	159,895,749	49,427	11,611	533,730,146	45,968	14,846	693,625,895	46,721
70 TO 74	6,704	413,253,379	61,643	16,190	847,043,074	52,319	22,894	1,260,296,453	55,049
75 TO 79	5,493	336,960,960	61,344	11,696	570,496,590	48,777	17,189	907,457,550	52,793
80 TO 84	2,981	168,252,410	56,442	7,339	316,294,695	43,098	10,320	484,547,105	46,952
85 TO 89	1,886	105,474,657	55,925	4,844	196,196,944	40,503	6,730	301,671,601	44,825
90 & UP	1,462	70,812,905	48,436	4,314	161,679,487	37,478	5,776	232,492,391	40,251
TOTAL	24,596	1,397,029,705	56,799	64,940	3,050,095,304	46,968	89,536	4,447,125,010	49,669

Graph XII-9
Pensioner Average Benefits



Beginning June 30, 2020, disclosed pensioner benefits include anticipated increases due to non-finalized pensioners and other anticipated changes not otherwise reflected in the census data.

Table XII-10
Reconciliation of Pensioner and Beneficiary Data

SCHEDULE OF PENSIONERS AND BENEFICIARIES ADDED TO AND REMOVED FROM THE ROLLS								
June 30 (Lag) Actuarial Valuation	Added to Rolls		Removed from Rolls		End of Year Rolls		% Increase in Annual Allowances	Average Annual Allowances
	Number	Annual Allowances ¹	Number	Annual Allowances	Number	Annual Allowances ¹		
2011	3,849	278,652,149	2,141	67,488,320	74,064	3,228,919,440	7.0%	43,596
2012	4,684	200,786,572	2,209	62,805,438	76,539	3,366,900,574	4.3%	43,989
2013	4,078	248,087,233	2,440	77,107,240	78,177	3,537,880,567	5.1%	45,255
2014	4,356	275,947,759	2,114	67,585,789	80,419	3,746,242,537	5.9%	46,584
2015	4,728	219,769,491	2,370	81,986,287	82,777	3,884,025,741	3.7%	46,922
2016	3,808	157,518,432	2,492	86,890,450	84,093	3,954,653,723	1.8%	47,027
2017	3,519	254,567,439	2,842	111,573,800	84,770	4,097,647,362	3.6%	48,338
2018	4,107	240,586,776	2,582	103,957,220	86,295	4,234,276,918	3.3%	49,067
2019	4,921	249,898,766	2,709	113,559,733	88,507	4,370,615,951	3.2%	49,382
2020	4,144	211,711,365	3,115	135,202,307	89,536	4,447,125,010	1.8%	49,669

¹ Allowances shown through June 30, 2019 are those presented in the census data.

Beginning June 30, 2020, disclosed pensioner benefits include anticipated increases due to non-finalized pensioners and other changes not otherwise reflected in the census data.

APPENDIX: ACRONYMS AND ABBREVIATIONS

Revised 2021 A&M	Actuarial Assumptions and Methods proposed by the Actuary and adopted by the Board of Trustees during Fiscal Year 2021
2019 A&M	Actuarial Assumptions and Methods proposed by the Actuary and adopted by the Board of Trustees during Fiscal Year 2019
AAVM	Actuarial Asset Valuation Method
ACCNYS	Administrative Code of the City of New York
AIR	Actuarial Interest Rate
AL	Accrued Liability
AMC	Additional Member Contributions
ASAF	Annuity Savings Accumulation Fund
AVA	Actuarial Value of Assets
BERS	Board of Education Retirement System
BMC	Basic Member Contributions
COLA	Cost-of-Living Adjustment
EAN	Entry Age Normal cost method
EIR	Expected Investment Return
FAS	Final Average Salary
FIRE	Fire Pension Fund
FS	Final Salary
GASB	Governmental Accounting Standards Board
IRC	Internal Revenue Code
MVA	Market Value of Assets
NYCERS	New York City Employees' Retirement System
NYCRS	New York City Retirement Systems
OWBPA	Older Workers Benefit Protection Act
OYLM	One-Year Lag Methodology
POLICE	Police Pension Fund
PV	Present Value
PVFB	Present Value of Future Benefits
PVFC	Present Value of Future Normal Costs
PVFS	Present Value of Future Salary
TDA	Tax-Deferred Annuity Program
TRS	Teachers' Retirement System
UAL	Unfunded Accrued Liability
UIR	Unexpected Investment Return
WTC	World Trade Center