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CONNECTICUT STATE EMPLOYEES RETIREMENT SYSTEM

REPORT OF THE ACTUARY ON THE VALUATION PREPARED AS OF JUNE 30, 2022

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December 7, 2022

State of Connecticut
State Employees Retirement Commission
55 Elm Street
Hartford, CT 06106

Members of the Commission:

Connecticut General Statutes Section 5-155a governs the operation of the Connecticut State Employees Retirement System (SERS). The actuary makes periodic valuations of the contingent assets and liabilities of the Retirement System at the direction of the Commission. We are pleased to submit the report giving the results of the actuarial valuation of the Retirement System prepared as of June 30, 2022.

The purpose of the report is to provide a summary of the funded status of SERS as of June 30, 2022 and to recommend an actuarially determined contribution rate for the fiscal year ending June 30, 2024. The report indicates that an annual actuarially determined employer contribution of approximately $ 2.040 billion (at the rate of 53.88% of compensation) for the fiscal year ending June 30, 2024 is sufficient to support the benefits of the System.

In preparing the valuation, the actuary relied on data provided by the Comptroller's Office. While not verifying data at the source, the actuary performed tests for consistency and reasonableness.

The System is funded on an actuarial reserve basis. The actuarial assumptions recommended by the actuary and adopted by the Commission are reasonably related to the experience under the System and to reasonable expectations of anticipated experience under the System. The funding objective of the System is that contribution amounts will be sufficient to fully fund the liabilities of System over a reasonable funding period. The funding method determines the unfunded actuarial accrued liability (UAAL) as the excess of actuarial accrued liability over the actuarial value of assets. The UAAL is allocated as follows:

Portion of UAAL	Year Established	Remaining Amortization Period
Statutory Base*	1984	24 years
Transitional Base	2016	24 years
2018 Base	2018	21 years
2019 Base	2019	22 years
2020 Base	2020	23 years
2021 Base	2021	24 years
2022 Base	2022	25 years

*Legislation enacted changed the amortization period for the Statutory Base to the same as the Transitional Base effective 7/1/2018.

This is to certify that the valuation was prepared in accordance with principles of practice prescribed by the Actuarial Standards Board, and that the actuarial calculations were performed by qualified actuaries in accordance with accepted actuarial procedures, based on the current provisions of the retirement system and on actuarial assumptions that are internally consistent and reasonably based on the actual experience of the System.

In order to prepare the results in this report, we have utilized actuarial models that were developed to measure liabilities and develop actuarial costs. These models include tools that we have produced and tested, along with commercially available valuation software that we have reviewed to confirm the appropriateness and accuracy of the output. In utilizing these models, we develop and use input parameters and assumptions about future contingent events along with recognized actuarial approaches to develop the needed results.

Future actuarial results may differ significantly from the current results presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Since the potential impact of such factors is outside the scope of a normal annual actuarial valuation, an analysis of the range of results is not presented herein.

The actuarial computations presented in this report are for purposes of determining the recommended funding amounts for the System. Use of these computations for purposes other than meeting these requirements may not be appropriate.

The undersigned meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Sincerely yours,

John J. Garrett, ASA, FCA, MAAA
Principal and Consulting Actuary

Edward J. Koebel, FCA, MAAA, EA
Chief Executive Officer

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Section I – Summary of Principal Results

1. For convenience of reference, the principal results of the current and preceding valuations are summarized below:

Valuation Date	June 30, 2022	June 30, 2021
Number of active members	46,661	48,014
Annual compensation	$ 3,787,015,802	$ 3,847,145,828
Retired members and beneficiaries:		
Number	56,778	53,699
Annual allowances	$ 2,525,749,497	$ 2,280,127,039
Deferred Vested Members:		
Number	2,862	2,086
Annual allowances	$ 37,556,865	$ 24,073,132
Assets:		
Market Value*	$ 18,532,120,770	$ 17,062,998,717
Actuarial Value*	$ 19,726,002,486	$ 15,946,862,583
Unfunded actuarial accrued liability	$ 20,930,961,862	$ 22,397,581,788
Funded Ratio based on Actuarial Assets	48.5%	41.6%
Funded Ratio based on Market Assets	45.6%	44.5%
For Fiscal Year Ending	**June 30, 2024**	**June 30, 2023**
Actuarially Determined Employer Contribution (ADEC):		
Normal	$ 223,160,005	$ 232,467,082
Accrued liability	1,817,213,773	1,910,858,195
Total	$ 2,040,373,778	$ 2,143,325,277
Actuarially Determined Employer Contribution (ADEC) Rate:		
Normal	5.89%	6.04%
Accrued liability	47.99%	49.67%
Total	53.88%	55.71%

* The June 30, 2022 amounts include the transfer of $3,132,087,937 made subsequent to June 30, 2022. The June 30, 2021 amounts include the transfer of $697,023,153 made subsequent to June 30, 2021.

2. Comments on the valuation results are given in Section IV, comments on the experience and actuarial gains and losses during the valuation year are given in Section VII and the rates of contribution payable by employers are given in Section V.
3. The results of the valuation are given in Schedule A.
4. Schedule B of this report presents the development of the actuarial value of assets. We have included an adjustment to both the market and actuarial value of assets of $3,132,087,937 to reflect the discounted value of the amounts transferred subsequent to June 30, 2022. Without these transfers, the unfunded actuarial accrued liability would be correspondingly larger, the funded ratio would be 40.8% and the ADEC for FYE 2024 would be approximately $266M larger.
5. Schedule D details the actuarial assumptions and methods employed. There were no changes to the actuarial assumptions or methods since the last valuation.
6. Schedule F gives a summary of the benefit and contribution provisions of the plan. There were no changes to the plan provisions since the last valuation.
7. The Governmental Accounting Standards Board issued Statement No. 67 (GASB 67) in June 2012 and is effective for plan years beginning after June 15, 2013. GASB 67 replaced GASB 25 for plans and a separate GASB 67 report will be prepared for the Commission. We have provided some supplemental disclosure information and tables in Section VI.
8. As shown in the Summary of Principal Results, the funded ratio of 48.5% is the ratio of the actuarial value of assets to the accrued liability. The funded ratio is an indication of progress in funding the promised benefits using a long-term, stable funding approach. Since the ratio is less than 100%, there is a need for contributions in addition to the plan's normal cost. The funded ratio based on the market value of assets is also provided for informational purposes.
9. The table on the following page provides a history of pertinent census and valuation result figures.

Comparative Schedule

Valuation Date June 30	Active Members				Retired Lives				Valuation Results ($ thousands)		
	Number	Payroll ($ 000)	Average Salary	% increase from previous valuation	Number	Active/ Retired Ratio	Annual Benefits ($ 000)	Benefits as % of Payroll	Accrued Liability	Valuation Assets	UAAL
2014	49,976	$3,487,577	$69,785	(0.4)%	45,803	1.09	$1,576,606	45.2%	$25,505,610	$10,584,795	$14,920,815
2016	50,019	3,720,751	74,387	6.6	48,191	1.04	1,745,785	46.9	32,310,335	11,922,966	20,387,369
2018	49,153	3,428,068	69,743	(6.2)	50,441	0.97	1,931,098	56.3	34,214,163	12,990,400	21,223,763
2019	49,429	3,686,365	74,579	6.9	51,745	0.96	2,051,605	55.7	36,087,938	13,795,389	22,292,549
2020	47,662	3,672,443	77,052	3.3	52,498	0.91	2,158,277	58.8	36,971,136	14,242,897	22,728,239
2021	48,014	3,847,146	80,126	4.0	53,699	0.89	2,280,127	59.3	38,344,444	15,946,862	22,397,582
2022	46,661	3,787,016	81,160	4.0	56,778	0.82	2,525,749	66.7	40,656,964	19,726,002	20,930,962

Section II – Membership

Data regarding the membership of the System for use as a basis for the valuation were furnished by the Comptroller's office. The following tables summarize the membership of the Retirement System as of June 30, 2022 upon which the valuation was based. Detailed tabulations of the data are given in Schedule G.

Active Members

			Group Averages		
Group	**Number**	**Payroll**	**Salary**	**Age***	**Service***
Tier I – Plan B	117	$ 14,030,457	$ 119,918	67.6	40.0
Tier I – Plan C	5	469,933	93,987	69.8	41.6
Tier II – Hazardous	158	17,935,094	113,513	54.6	25.2
Tier II – Hybrid Plan	268	37,313,638	139,230	60.9	28.1
Tier II – Others	5,483	570,093,005	103,975	57.4	29.3
Tier IIA – Hazardous	3,559	376,041,744	105,659	47.0	16.4
Tier IIA – Hybrid Plan	783	90,395,849	115,448	55.0	18.0
Tier IIA – Others	12,243	1,087,180,389	88,800	51.4	17.2
Tier III – Hazardous	2,259	189,732,819	83,990	40.2	8.8
Tier III – Hybrid Plan	596	50,203,506	84,234	46.3	7.8
Tier III – Others	7,015	526,662,411	75,077	45.5	8.4
Tier IV – Hazardous	2,528	163,283,358	64,590	34.7	2.5
Tier IV – Hybrid Plan	1,382	76,526,773	55,374	41.2	2.0
Tier IV – Others	10,265	587,146,826	57,199	38.9	2.3
Total	46,661	$3,787,015,802	$ 81,160	46.5	12.3

*Years

Of the 46,661 active members, 24,436 are vested and 22,225 are non-vested.

Section II – Membership

Retired Lives

Type of Benefit Payment	No.	Annual Benefits	Group Averages Benefit	Group Averages Age*
Retired – Pre 1980	439	$ 16,960,659	$ 38,635	90.7
Retired – 1980 - 1997	10,044	420,381,000	41,854	83.1
Retired – 1997 - 2011	21,582	1,045,806,080	48,457	72.3
Retired – 2011+	24,713	1,042,601,758	42,188	64.1
Total	56,778	$ 2,525,749,497	$ 44,485	70.8

*Years

Valuation also includes 2,862 deferred vested members with estimated annual benefits of $37,556,865.

Section III – Assets

1. As of June 30, 2022, the total market value of assets amounted to $15,400,032,833 . The estimated investment return for the plan year since the last valuation was -8.16%. Subsequent to June 30, 2022, the State deposited two General fund surplus transfers totaling $3,203,691,833 and are treated as receivable amounts for the plan year ($1,942,390,940 on September 21, 2022 and $1,261,300,893 expected by December 15, 2022). For valuation purposes, we discounted these amounts using the 6.90% expected return on assets to the valuation date which results in an increase in the plan's assets of $3,132,087,937 as of June 30, 2022. The June 30, 2022 market value of assets is $18,532,120,770 including this transfer. Schedule C shows receipts and disbursements of the System for the year preceding the valuation date and a reconciliation of the fund balances at market value.

2. The actuarial value of assets used for the current valuation using a smoothed method was $19,726,002,486 (as adjusted for the subsequent transfer). The estimated investment return for the plan year on an actuarial value of assets basis was 4.57%, which can be compared to the investment return assumed over the period of 6.90%. Schedule B shows the development of the actuarial value of assets as of June 30, 2022.

Section IV – Comments on Valuation

1. Schedule A of this report outlines the results of the valuation of the Retirement System as of June 30, 2022. The valuation was prepared in accordance with the actuarial assumptions and methods set forth in Schedule D and the actuarial cost method which is described in Schedule E.

2. The valuation shows that the System has a total actuarial accrued liability of $40,656,964,348, of which $31,793,338,842 is for the benefits payable on account of present retired members, beneficiaries of deceased members, and inactive members entitled to deferred vested benefits, and $8,863,625,506 is for the benefits expected to be payable on account of present active members, based on service to the valuation date. Against these liabilities, the System has total present assets for valuation purposes of $19,726,002,486 as of June 30, 2022. When this amount is deducted from the actuarial accrued liability of $40,656,964,348, there remains $20,930,961,862 as the unfunded actuarial accrued liability (UAAL).

3. The employer's contributions to the System consist of normal cost contributions and accrued liability contributions. The normal cost represents the ultimate cost of the benefits, and the accrued liability contribution is an addition (reduction in case of a surplus) due to the amortization of the unfunded accrued liability. The valuation indicates that annual employer normal cost contributions at the rate of 5.89% of active members' compensation are required to provide the currently accruing benefits of the System.

4. The following table provides the components of the total UAAL, and the derivation of the amortization amounts required in accordance with the Memorandum of Understanding (MOU) between the State and SEBAC effective December 8, 2016.

Total UAAL Amortization Schedule
($ thousands)

	Initial UAAL	Remaining UAAL	Remaining Amortization Period (years)	Amortization Payment*
Statutory Base (1984 UAAL)	$ 4,138,969	$ 3,864,659	24	$ 334,003
2016 Base	16,248,400	16,246,393	24	1,404,096
2018 Base	570,349	546,677	21	50,048
2019 Base	1,014,250	976,751	22	87,573
2020 Base	516,320	501,767	23	44,134
2021 Base	(105,787)	(104,090)	24	(8,996)
2022 Base	(1,101,195)	(1,101,195)	25	(93,644)
Total UAAL		$20,930,962		$ 1,817,214
Annual Valuation Payroll				$ 3,787,016
UAAL Amortization Rate				47.99%

* Amortization payment method is level dollar methodology.

5. We have determined that a contribution of 47.99% of payroll is required to amortize the unfunded actuarial accrued liability of $20,930,961,862 over the scheduled amortization periods in accordance with the MOU.

6. Schedule J of this report shows the amortization schedule for the total UAAL.

Section V – Contributions Payable By Employer

The following table shows the amount and rate of contribution payable by the employer as determined from the present valuation for the 2023/2024 fiscal year.

Contribution for	Contribution Amount	Contribution Rate
A. Normal Cost:		
Service retirement benefits	$ 375,196,581	9.90%
Disability benefits	22,221,173	0.59%
Survivor benefits	3,262,892	0.09%
Total Normal Cost	$ 400,680,646	10.58%
B. Less Member Contributions	(177,520,641)	(4.69)%
C. Employer Normal Cost	$ 223,160,005	5.89%
D. Unfunded Actuarial Accrued Liabilities (23.7 year weighted average amortization period)	$1,817,213,773	47.99%
E. Total (C. + D.)	$2,040,373,778	53.88%

Section V – Contributions Payable By Employer

The following table shows a breakdown by group of the normal cost amount and rate payable by the employer as determined from the present valuation for the 2023/2024 fiscal year.

Group	Employer Normal Cost	Employer Normal Cost Rate
Tier I – Plan B	$ 777,094	5.54%
Tier I – Plan C	28,936	6.16
Tier II – Hazardous	2,874,675	16.03
Tier II – Hybrid Plan	1,234,841	3.31
Tier II – Others	28,789,501	5.05
Tier IIA – Hazardous	56,536,512	15.03
Tier IIA – Hybrid Plan	1,795,377	1.99
Tier IIA – Others	51,122,738	4.70
Tier III – Hazardous	25,809,546	13.60
Tier III – Hybrid Plan	900,933	1.79
Tier III – Others	21,201,103	4.03
Tier IV – Hazardous	16,284,373	9.97
Tier IV – Hybrid Plan	681,269	0.89
Tier IV – Others	15,123,107	2.58
Total	$ 223,160,005	5.89%

Section V – Contributions Payable By Employer

The official contribution requirement for the fiscal year ending June 30, 2025 will be determined in the June 30, 2023 valuation. However, we have estimated the contribution requirement for the fiscal year ending June 30, 2025 using standard roll forward techniques from this valuation. These results assume the market value of assets will earn 6.90% and the active member population will remain static.

Projected Contributions Required for Fiscal Year Ending June 30, 2025	Roll Forward of June 30, 2022 Valuation	
	As % of Pay	$
Employer Normal Cost	5.89%	$ 229,762,000
Unfunded Actuarial Accrued Liabilities	47.75%	1,862,434,000
Total	53.64%	2,092,196,000

Section VI – Accounting Information

1. The information required under Governmental Accounting Standards Board (GASB) will be issued in separate reports. The following is a distribution of the number of employees by type of membership:

NUMBER OF ACTIVE AND RETIRED MEMBERS
AS OF JUNE 30, 2022

GROUP	NUMBER
Retirees and beneficiaries currently receiving benefits	56,778
Terminated employees entitled to benefits but not yet receiving benefits	2,862
Active plan members	46,661
Total	106,301

2. Another such item is the schedule of funding progress as shown below.

SCHEDULE OF FUNDING PROGRESS
(Dollar amounts in thousands)

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) EAN (b)	Unfunded AAL (UAAL) (b – a)	Funded Ratio (a / b)	Covered Payroll (c)	UAAL as a Percentage of Covered Payroll ((b – a) / c)
6/30/2016#	$11,922,966	$32,310,335	$20,387,369	36.9%	$3,720,751	547.9%
6/30/2018	12,990,400	34,214,163	21,223,763	38.0	3,428,068	619.1
6/30/2019	13,795,389	36,087,938	22,292,549	38.2	3,686,365	604.7
6/30/2020	14,242,897	36,971,136	22,728,239	38.5	3,672,443	618.9
6/30/2021	15,946,862	38,344,444	22,397,582	41.6	3,847,146	582.2
6/30/2022	19,726,002	40,656,964	20,930,962	48.5	3,787,016	552.7

Reflects change in discount rate.

Section VI – Accounting Information

3. The following shows the schedule of employer contributions (all dollar amounts are in thousands).

Fiscal Year Ending June 30	Valuation Date Ending June 30	Actuarially Determined Contribution	Actual Contribution	Percentage Contributed
2016	2014	$1,514,467	$1,501,805	99.2%
2017	2014	1,569,142	1,542,298	98.3%
2018	2016	1,443,110	1,444,053	100.1%
2019	2016	1,574,537	1,578,323	100.2%
2020	2018	1,616,312	1,616,312	100.0%
2021*	2019	1,806,708	1,848,524	102.3%
2022*	2020	1,993,151	2,014,154	101.1%
2023	2021	2,143,325	N/A	N/A
2024	2022	2,040,374	N/A	N/A

* Does not reflect the General Fund surplus transfers.

4. The information presented in the required supplementary schedules was determined as part of the actuarial valuation at June 30, 2022. Additional information as of the latest actuarial valuation follows.

Valuation date	6/30/2022
Actuarial cost method	Entry Age Normal
Amortization method	Level dollar, closed
Weighted amortization period	23.7 years
Asset valuation method	Smoothed market with 20% recognition of investment gains and losses
Actuarial assumptions:	
Investment rate of return*	6.90%
Projected salary increases*	3.00% - 11.50%
Cost-of-living adjustments	2.25% - 3.25%
Social Security Wage Base	3.50%
*Includes wage inflation at	3.00%

Section VII – Experience

Actual experience will never (except by coincidence) coincide exactly with assumed experience. It is assumed that gains and losses will be in balance over a period of years, but sizable year to year fluctuations are common. Detail on the derivation of the experience gain/(loss) for the period ended June 30, 2022 is shown below. Schedule H provides detailed gain/(loss) by source.

		$ Millions
(1)	UAAL* as of June 30, 2021	$ 22,397.6
(2)	Total Normal cost for 2022 fiscal year	406.4
(3)	Actual Employer and Employee contributions	2,216.4
(4)	Interest accrual: [[(1) + (2)] x .069] - [(3) x .0345]	1,497.0
(5)	Expected UAAL as of June 30, 2022: (1) + (2) - (3) + (4)	$ 22,084.6
(6)	Assumption/Method Changes	0.0
(7)	Expected UAAL as of June 30, 2022: (5) + (6)	$ 22,084.6
(8)	Actual UAAL as of June 30, 2022	$ 20,931.0
(9)	Gain/(loss): (7) – (8) (See Schedule H)	$ 1,153.6
(10)	Gain/(loss) as percent of actuarial accrued liabilities at June 30, 2021 ($38,344.4)	3.0%

*Unfunded actuarial accrued liability.

Valuation Date June 30	Actuarial Gain/(Loss) as a % of Beginning Accrued Liabilities
2020	(1.1)%
2021	0.5%
2022	3.0%

Section VIII – Risk Assessment

Overview

Actuarial Standards of Practice (ASOP) No. 51, issued by the Actuarial Standards Board, provides guidance on assessing and disclosing risks related to pension plan funding. This guidance is binding on all credentialed actuaries practicing in the United States. This standard was issued as final in September 2017 with application to measurement dates on or after November 1, 2018.

The term “risk” frequently has a negative connotation, but from an actuarial perspective, it may be thought of as simply the fact that what actually happens in the real world will not always match what was expected, based on actuarial assumptions. Of course, when actual experience is better than expected, the favorable risk is easily absorbed. The risk of unfavorable experience will likely be unpleasant, and so there is an understandable focus on aspects of risk that are negative.

Risk usually can be reduced or eliminated at some cost. Consumers, for example, buy auto and home insurance to reduce the risk of accidents or catastrophes. Another way to express this concept, however, is that there is generally some reward for assuming risk. Thus, retirement plans invest not just in US Treasury bonds which have almost no risk, but also in equities which are considerably riskier – because they have an expected reward of a higher return that justifies the risk.

Under ASOP 51, the actuary is called on to identify the significant risks to the pension plan and provide information to help those sponsoring and administering the plan understand the implications of these risks. In this section, we identify some of the key risks for the System and provide information to help interested parties better understand these risks.

Section VIII – Risk Assessment

Investment Risk

The investment return on assets is the most obvious risk – and usually the largest risk – to funding a pension plan. To illustrate the magnitude of this risk, please review the following chart showing the Asset Volatility Ratio (AVR), defined as the market value of assets divided by covered payroll.

($ in thousands)

Valuation Date June 30	Market Value of Assets	Covered Payroll	Asset Volatility Ratio
2020	$13,249,488	$3,672,443	3.61
2021	16,365,976	3,847,146	4.25
2022	18,532,121	3,787,016	4.89

The asset volatility ratio is especially useful to compare across plans or through time. It is also frequently useful to consider how the AVR translates into changes in the Required Contribution Rate (actuarially determined employer contribution rate). For example, the following table demonstrates that with an AVR of 5.00, if the market value return is 10% below assumed, or -3.10% for the System, there will be an increase in the Required Contribution Rate of 0.82% payroll in the first year. Without asset smoothing or without returns above the expected return in the next four years, the impact on the Required Contribution Rate would be 4.11%. A higher AVR would produce more volatility in the Required Contribution Rate.

AVR	Unsmoothed Amortization Increase due to 10% Market Loss	Smoothed Amortization Increase
3.00	2.47%	0.49%
4.00	**3.29%**	**0.66%**
5.00	4.11%	0.82%

Section VIII – Risk Assessment

Sensitivity Measures

Valuations are generally performed with a single set of assumptions that reflects the best estimate of future conditions, in the opinion of the actuary and typically the governing board. Note that under actuarial standards of practice, the set of economic assumptions used for funding must be consistent. To enhance the understanding of the importance of an assumption, a sensitivity test can be performed where the valuation results are recalculated using a different assumption or set of assumptions.

The following tables contains the key measures for the System using the valuation assumption for investment return of 6.90%, along with the results if the assumption were 5.90% or 7.90%. In this analysis, only the investment return assumption is changed. Consequently, there may be inconsistencies between the investment return and other economic assumptions such as inflation or payroll increases. In addition, simply because the valuation results under alternative assumptions are shown here, it should not be implied that CMC believes that either assumption (5.90% or 7.90%) would comply with actuarial standards of practice.

($ in thousands)

As of June 30, 2021	-1% Discount Rate (5.90%)	Current Discount Rate (6.90%)	+1 Discount Rate (7.90%)
Accrued Liability	$45,514,769	$40,656,964	$36,608,375
Unfunded Liability	$25,788,766	$20,930,962	$16,882,373
Funded Ratio (AVA)	43.3%	48.5%	53.9%
ADEC Amount	$2,376,099	$2,040,374	$1,740,071

Section VIII – Risk Assessment

Mortality Risk

The mortality assumption is a significant assumption for valuation results, second only to the investment assumption in most situations. The System's mortality assumption utilizes a mortality table (with separate rates for males and females, as well as different rates by status) with static projection of future mortality improvement to establish a margin in actual vs. expected mortality experience to recognize improvement in mortality experience through the next experience study.

The valuation uses a generational improvement approach to anticipate future trends in mortality experience. Still, the future is unknown, and actual mortality improvements may occur at a faster rate than expected under a generational improvement approach. Periodic studies of the mortality experience will allow for adjustments to the mortality improvement scale to reflect emerging experience and reduce the plan's exposure to mortality risk.

Contribution Risk

The System is primarily funded by member and employer contributions to the trust fund, together with the earnings on those accumulated contributions. Each year in the valuation, the Actuarial Determined Employer Contribution is determined, based on the System's funding policy. This amount is the sum of the employer's share of the normal cost for the plan and the amortization of the UAAL. Since the System is obligated to make 100% of the ADEC by agreement, there is little contribution risk.

Schedule A – Results of Valuation

	JUNE 30, 2022	JUNE 30, 2021
1. ACTUARIAL ACCRUED LIABILITY		
Present value of prospective benefits payable in respect of:		
(a) Present active members		
- Tier I – Plan B	$ 103,590,689	$ 247,011,355
- Tier I – Plan C	3,418,157	8,178,877
- Tier II – Hazardous Duty	135,040,605	319,088,270
- Tier II – Hybrid Plan	149,539,064	218,238,066
- Tier II – All Others	2,593,620,740	3,378,977,721
- Tier IIA – Hazardous Duty	1,855,508,817	2,057,965,365
- Tier IIA – Hybrid Plan	217,557,306	238,670,974
- Tier IIA – All Others	2,600,751,904	2,598,366,215
- Tier III – Hazardous Duty	408,814,361	291,387,983
- Tier III – Hybrid Plan	45,988,835	36,027,675
- Tier III – All Others	508,196,515	400,191,446
- Tier IV – Hazardous Duty	85,806,101	43,721,490
- Tier IV – Hybrid Plan	18,310,153	8,380,147
- Tier IV – All Others	137,482,259	77,163,939
- Total actives	$ 8,863,625,506	$ 9,923,369,523
(b) Present inactive members and members entitled to deferred vested benefits:	363,185,803	234,688,473
(c) Present annuitants and beneficiaries	31,430,153,039	28,186,386,375
(d) Total actuarial accrued liability [1(a) + 1(b) + 1(c)]	$ 40,656,964,348	$ 38,344,444,371
2. ACTUARIAL VALUE OF ASSETS	$ 19,726,002,486	$ 15,946,862,583
3. UNFUNDED ACTUARIAL ACCRUED LIABILITY [1(d) – 2]	$ 20,930,961,862	$ 22,397,581,788

Schedule B – Development of Actuarial Value of Assets

	June 30, 2022
(1) Actuarial Value Beginning of Year*	$15,946,862,583
(2) Market Value End of Year* (Before Adjustment)	15,400,032,833
(3) Market Value Beginning of Year	17,062,998,717
(4) Cash Flow	
(a) Contributions**	$ 2,216,423,215
(b) Disbursements	(2,382,509,364)
(c) Net: (4)(a) + (4)(b)	$ (149,648,258)
(5) Investment Income	
(a) Market Total: (2) – (3) – (4)(c)	$ (1,513,317,626)
(b) Assumed Rate	6.90%
(c) Amount for Immediate Recognition: [(1) x (5)(b)] + [(4)(c)] x (5)(b) x 0.5	1,095,170,653
(6) Expected Actuarial Value End of Year (With Adjustment): (1) + (4)(c) + (5)(c) + Adjustment**	$20,024,472,915
(7) Phased-In Recognition of Investment Income	
(a) Difference between Adjusted Market & Expected Actuarial Value: (2) + $3,132,087,937 – (6)	(1,492,352,145)
(b) 20% of Difference: 0.2 x (7)(a)	(298,470,429)
(8) Preliminary Actuarial Value End of Year: (6) + (7)(b)	19,726,002,486
(9) Final Actuarial Value End of Year Using 20% Corridor: Greater of [(8) and .8 x (2) with adjustment], but no more than 1.2 x (2) with adjustment	19,726,002,486
(10) Difference Between Adjusted Market & Actuarial Values: (2) + Adjustment – (9)	$ (1,193,881,716)

* Before corridor constraints, if applicable.
** Adjustment = $3,132,087,937 discounted value of subsequent transfer amounts

Schedule C – Summary of Receipts and Disbursements

MARKET VALUE OF ASSETS	Year Ending June 30, 2022
Receipts for the Year	
Contributions:	
Members	$ 202,269,632
State	1,654,000,186
Federal (Net of Transfers)	360,153,397
Subtotal	$ 2,216,423,215
Investment Earnings (net of expenses)	(1,513,317,626)
Other	16,437,891
TOTAL	$ 719,543,480
Disbursements for the Year	
Benefit Payments	$ 2,362,003,569
Refunds to Members	12,656,029
Interest Awarded	7,849,766
Administrative Expense	0
Other	0
Total	$ 2,382,509,364
Excess of Receipts over Disbursements	$ (1,662,965,884)
Reconciliation of Asset Balances	
Asset Balance as of the Beginning of Year	$ 17,062,998,717
Excess of Receipts over Disbursements	(1,662,965,884)
Asset Balance as of the End of Year	$ 15,400,032,833
Rate of Return	(8.16)%
Adjusted Market Value of Assets *	$ 18,532,120,770

* Includes $3,132,087,937 discounted value of subsequent transfer amounts.

Schedule D – Outline of Actuarial Assumptions and Methods

Adopted or reaffirmed by the Commission on September 16, 2021 for the June 30, 2021 and later valuations based on the experience investigation report for the five-year period ending June 30, 2020 which can be found at on the Office of the State Comptroller - Retirement Services Division website.

VALUATION INTEREST RATE: 6.90% per annum, compounded annually, net of expenses, comprised of a 2.50% price inflation assumption and a 4.40% real return assumption.

SALARY INCREASES: **T**he assumptions for salary increases are as follows:

Years of Service	Hazardous Rate*	Non-Hazardous Rate*
0	11.50%	10.50%
1	11.50%	10.50%
2	7.50%	7.50%
3	5.50%	5.50%
4	5.25%	5.25%
5	5.00%	5.00%
6	4.75%	4.75%
7	4.75%	4.75%
8	4.75%	4.75%
9	4.75%	4.75%
10	4.50%	4.50%
11	4.50%	4.25%
12	4.25%	4.25%
13	4.25%	4.25%
14	4.00%	4.00%
15	3.50%	3.50%
16	3.50%	3.25%
17	3.50%	3.25%
18	3.25%	3.25%
19	3.25%	3.25%
20+	3.00%	3.00%

*includes Wage Inflation of 3.00%

COST OF LIVING ADJUSTMENTS (COLA):

Group	Rate
Pre July 1, 1980 Retirees	3.25%
July 1, 1980 – June 30, 1997 Retirees	3.00%
July 1, 1997 – October 1, 2011 Retirees	2.60%
Post October 1, 2011 Retirees	2.25%
Post July 1, 2022 Retirees	1.95%

We have also assumed a COLA moratorium for those retiring on or after July 1, 2022 for the first 30 months of retirement. We assume the first COLA received is increased by 0.15% to reflect the possible additional COLA in the event the annualized rate of increase in the CPI-W is greater than 5.5% during the first 18 months of retirement.

SOCIAL SECURITY WAGE BASE INCREASES: 3.50% per annum.

PAYROLL GROWTH ASSUMPTION: Level dollar amortization method.

SPOUSES: For members who have elected spouse coverage, husbands are assumed to be three years older than their wives.

PERCENT MARRIED: 80% of active members are assumed to be married with an average of two children who are on average age 12.

SEPARATIONS BEFORE SERVICE RETIREMENT: Representative values of the assumed annual rates of separation before service retirement are as follows:

WITHDRAWAL

Annual Rates of Withdrawal								
Age	Years of Service							
	0	1	2	3	4	5	6-9	10+
Hazardous Males								
20	8.00%	4.25%	4.25%	4.00%	3.00%	2.50%	1.25%	1.00%
25	8.00	4.25	4.25	4.00	3.00	2.50	1.25	1.00
30	8.00	4.25	4.25	3.50	2.75	2.50	1.25	1.00
35	8.00	4.00	4.00	3.25	2.75	2.50	1.25	1.00
40	8.00	4.00	4.00	3.00	2.50	2.50	1.25	0.80
45	8.00	4.00	4.00	3.00	2.50	2.50	1.25	0.80
50	8.00	4.00	4.00	3.00	2.50	2.50	1.25	0.80
55+	8.00	4.00	4.00	3.00	2.50	2.50	1.25	0.80
Hazardous Females								
20	11.00%	7.00%	7.00%	7.00%	4.00%	3.30%	2.50%	1.75%
25	11.00	7.00	7.00	7.00	4.00	3.30	2.50	1.75
30	11.00	6.00	6.00	6.00	4.00	3.30	2.50	1.75
35	11.00	5.50	5.50	5.50	4.00	3.30	2.50	1.75
40	11.00	5.50	5.50	5.50	4.00	3.30	2.00	1.00
45	11.00	5.50	5.50	5.50	4.00	3.30	2.00	1.00
50	11.00	5.50	5.50	5.50	4.00	3.30	2.00	1.00
55+	11.00	5.50	5.50	5.50	4.00	3.30	2.00	1.00
Nonhazardous Males								
20	45.00%	35.00%	17.00%	13.00%	11.00%	11.00%	4.50%	4.50%
25	25.00	22.00	17.00	13.00	11.00	11.00	4.50	4.50
30	20.00	15.00	14.00	10.00	7.50	7.50	4.50	4.50
35	17.00	10.00	12.00	9.00	6.50	5.00	4.50	3.00
40	17.00	10.00	10.00	8.00	6.50	5.00	4.00	2.75
45	17.00	10.00	9.00	8.00	6.50	5.00	4.00	2.50
50	17.00	10.00	9.00	8.00	6.50	5.00	3.00	2.50
55+	17.00	10.00	9.00	8.00	6.50	5.00	3.00	2.00
Nonhazardous Females								
20	40.00%	40.00%	40.00%	35.00%	20.00%	20.00%	10.00%	5.00%
25	25.00	22.00	17.00	12.00	10.00	10.00	7.00	5.00
30	18.00	15.00	12.00	10.00	8.00	7.00	5.00	4.50
35	16.00	10.00	11.00	9.00	6.00	5.00	4.00	3.25
40	16.00	10.00	10.00	8.00	6.00	5.00	3.50	2.00
45	16.00	10.00	10.00	7.00	6.00	5.00	3.25	2.00
50	16.00	10.00	10.00	7.00	6.00	4.00	3.25	2.00
55+	16.00	10.00	10.00	7.00	6.00	4.00	3.25	2.00

DISABILITY

Annual Rates of Disability		
Age	Hazardous	Non-Hazardous
30	0.05%	0.04%
35	0.09	0.05
40	0.15	0.07
45	0.25	0.12
50	0.33	0.22
55	0.42	0.40
60	0.50	0.50
65	0.60	0.50
70	0.80	0.50
75	1.00	0.50

RETIREMENT: The assumed annual rates of retirement are shown below.

Annual Rates of Retirement						
Hazardous						
Age	Tier I, II & IIA		Tier III & IV			
			Years of Service			
	First Year Eligible	All Years After	20	21 - 24	25	26+
40 - 49	45%	25%			45%	25%
50	45	25	45%	45%	45	25
51 - 56	45	25	45	25	25	25
57	60	25	60	25	25	25
58 – 61	60	30	60	30	30	30
62	65	30	65	30	30	30
63	65	30	65	30	30	30
64	65	40	65	40	40	40
65 – 66	75	50	75	50	50	50
67	75	45	75	45	45	45
68	75	40	75	40	40	40
69	75	35	75	35	35	35
70 - 73	75	30	75	30	30	30
74 - 79	100	30	100	30	30	30
80	100	100	100	100	100	100

Annual Rates of Retirement						
Nonhazardous						
Age	Tier I		Tier II & IIA		Tier III & IV	
	Early	Other Years	Early	Other Years	Early	Other Years
55	12.0%	30.0%	4.0%			
56	12.0	30.0	4.0			
57	12.0	30.0	4.0			
58	12.0	30.0	4.0		4.0%	
59	12.0	30.0	4.0		4.0	
60		30.0	4.0	20.0%	4.0	
61		30.0	4.0	20.0	4.0	
62		30.0		20.0	4.0	
63		30.0		20.0	4.0	25.0%
64		30.0		20.0	4.0	25.0
65		30.0		20.0		25.0
66 - 70		30.0		25.0		25.0
71 - 79		30.0		22.5		25.0
80		100.0		100.0		100.0

Schedule D – Outline of Actuarial Assumptions and Methods

MORTALITY: The Pub-2010 Mortality Tables projected generationally with scale MP-2020:

Non-Hazardous

- Service Retirees: General, Above-Median, Healthy Retiree Mortality Table.
- Disabled Retirees: General, Disabled Retiree Mortality Table.
- Beneficiaries: General, Above-Median Contingent Annuitant Mortality Table.
- Active Employees: General, Above-Median, Employee Mortality Table.

Hazardous

- Service Retirees: Public Safety, Above-Median, Healthy Retiree Mortality Table.
- Disabled Retirees: Public Safety, Disabled Retiree Mortality Table.
- Beneficiaries: Public Safety, Above-Median Contingent Annuitant Mortality Table.
- Active Employees: Public Safety, Above-Median, Employee Mortality Table.

In our opinion, the generational projection of the mortality rates with scale MP-2020 provide a sufficient margin in the assumed rates of mortality to allow for additional improvement in mortality experience.

ASSET METHOD: Actuarial Value, as developed in Schedule B. The actuarial value of assets recognizes 20% of the difference between actual market value and expected actuarial value as of the valuation date. In addition, the actuarial value of assets cannot be less than 80% or more than 120% of the market value of assets.

VALUATION METHOD: Entry Age Normal cost method. See Schedule E for a brief description of this method.

IMPACT OF LONGLEY DECISION: Benefits for members retiring from service on or after the *Longley* decision date are assumed to increase by 0.084% as a result of the revised treatment of longevity pay. Retroactive application of *Longley* has been reflected in this valuation to the extent impacted retiree benefits have been recalculated.

OTHER ASSUMPTIONS:

- Pre-Retirement deaths and disabilities assumed to be service related:
  - 30% for non-hazardous duty members
  - 60% for hazardous duty members

- To take into account State Police Supplemental Benefits and the offset of Workers Compensation, Social Security, and Non-Rehabilitation Earnings, the following minimum and maximum benefits as a percent of salary are assumed for disability benefits:

	Minimum	Maximum
Tier I State Police	60%	80%
All Other Members	40%	60%

Schedule E – Actuarial Cost Method

The valuation is prepared on the projected benefit basis, which is used to determine the present value of each member's expected benefit payable at retirement, disability, or death. The calculations are based on the member's age, years of service, sex, compensation, expected future salary increases, and an assumed future interest earnings rate (currently 6.90%). The calculations consider the probability of a member's death or termination of employment prior to becoming eligible for a benefit and the probability of the member terminating with a service, disability, or survivor's benefit. The present value of the expected benefits payable to active members is added to the present value of the expected future payments to current benefit recipients to obtain the present value of all expected benefits payable to the present group of members and survivors.

The employer contributions required to support the benefits of the System are determined following a level funding approach and consist of a normal contribution and an accrued liability contribution.

Under the entry age normal cost method, the actuarial present value of each member's projected benefits is allocated on a level basis over the member's compensation between the entry age of the member and the assumed exit ages. The portion of the actuarial present value allocated to the valuation year is called the normal cost. The actuarial present value of benefits allocated to prior years of service is called the actuarial accrued liability. The unfunded actuarial accrued liability represents the difference between the actuarial accrued liability and the actuarial value of assets as of the valuation date. The unfunded actuarial accrued liability is determined by subtracting the actuarial value of assets from the actuarial accrued liability. The UAAL is amortized according to the MOU between the State and SEBAC which established separate UAAL bases. Each base is rolled forward to the beginning of the fiscal year for which the amortization payment is applicable. The amortization amounts are adjusted with interest to the middle of the applicable fiscal year. The employer required contribution amount is the sum of the normal cost contribution and the UAAL amortization payment.

Schedule F – Summary of Main System Provisions

AS INTERPRETED FOR VALUATION PURPOSES

The Connecticut State Employees Retirement System (CT SERS) is a defined benefit pension plan established by the Connecticut General Assembly for the purpose of providing retirement allowances and other benefits for State employees in Connecticut, and their survivors and other beneficiaries.

Eligibility Requirements

Tier I	All State Employees, Elected Officials and their Appointees hired prior to July 1, 1984. Those employees hired between July 1, 1982 and January 1, 1984 could elect to move to Tier II.
Tier II	All State Employees, Elected Officials and their Appointees hired on or after July 1, 1984.
Tier IIA	All State Employees, Elected Officials and their Appointees hired on or after July 1, 1997.
Tier III	All State Employees, Elected Officials and their Appointees hired on or after July 1, 2011.
Tier IV	All State Employees, Elected Officials and their Appointees hired on or after July 1, 2017.

Final Average Earnings (FAE)

Tier I, II, and IIA	Average Salary of the three highest paid years of service. Effective January 1, 1986, no one year's earnings can be greater than 130% of the average of the two preceding years in calculating the Final Average Earnings.
Tier III and IV	Average Salary of the five highest paid years of service. No one year's earnings can be greater than 130% of the average of the two preceding years in calculating the Final Average Earnings.

Normal Retirement Benefit

Eligibility

Tier I Hazardous – 20 years of credited service.

Tier I Plans B and C – Earliest of age 55 with 25 years of service, age 60 with 10 years of service, or age 70 with 5 years of service.

Tier II Hazardous – 20 years of credited service.

	Tier II and IIA – For those who will be eligible for retirement on or before July 1, 2022, the earliest of age 62 with 10 years of vesting service (effective July 1, 1992), age 60 with 25 years of vesting service, age 70 with 5 years of vesting service, or age 62 with 5 years of actual state service for terminations on or after July 1, 1997.
	For those who will not be eligible for retirement on or before July 1, 2022, the earliest of age 65 with 10 years of vesting service, age 63 with 25 years of vesting service, age 70 with 5 years of vesting service.
	Tier III Hazardous – Earlier of Age 50 and 20 years of benefit service or 25 years of benefit service.
	Tier III and IV – Age 63 and 25 years of benefit service or Age 65 and 10 years of benefit service.
	Tier IV Hazardous – 25 years of benefit service.
Benefit	*Tier I Hazardous* – 50% of FAE plus 2% for each year of service in excess of 20.
	Tier I Plan B – 2% of FAE times years of service up to age 65. Thereafter, 1% of FAE up to $4,800, plus 2% of FAE in excess of $4,800 times years of service. At age 70, greater of 1.25% of FAE up to $4,800 plus 2.5% of FAE in excess of $4,800 times years of service (maximum 20 years) or 1.0% of FAE up to $4,800 plus 2% of FAE in excess of $4,800 times year of service. Minimum benefit with 25 years is $833.34 per month.
	Tier I Plan C – 2% of FAE times years of service. At age 70, greater of 2.5% of FAE times years of service (maximum 20 years) or 2.0% of FAE times years of service. Minimum benefit with 25 years is $833.34 per month.
	Tier II, IIA, III and IV Hazardous – 2.5% of FAE times years of service up to 20 years plus 2.0% of FAE times years of service in excess of 20 years, if any. Minimum benefit with 25 years is $360 per month.
	Tier II, IIA and III All Others – 1.40% of FAE plus 0.433% of FAE in excess of year's breakpoint*, times years of service from October 1, 1982 up to 35 years plus 1.625% of FAE times years of service in excess of 35 years, if any. Minimum benefit with 25 years is $360 per month.
	* $10,700 increased by 6% each year after 1982, rounded to nearest $100 but not greater than Social Security Covered Compensation.

<u>*Tier IV All Others*</u> – 1.30% of FAE times years of service. Minimum benefit with 25 years is $360 per month.

Early Retirement Benefit

Eligibility	<u>*Hazardous*</u> – None. <u>*Tier I*</u> – Age 55 with 10 years of service. <u>*Tier II and IIA*</u> – Age 55 with 10 years of service. <u>*Tier III and IV*</u> – Age 58 with 10 years of service.
Benefit	<u>*Tier I*</u> – Benefit is Normal Retirement Benefit reduced for retirement prior to age 60 with less than 25 years of service. <u>*Tier II, IIA, III and IV*</u> – Benefit is Normal Retirement Benefit reduced 0.25% (effective July 1, 1991) for each month prior to age 60 if at least 25 years of service or age 62 if at least 10 but less than 25 years of service. For those who retire on or after October 2, 2011 but prior to meeting the age and service requirements for a normal retirement, will be subject to a benefit reduced by 0.50% for each month prior to Normal Retirement.

Disability Retirement Benefit

Tier I	For non-service disabilities occurring prior to age 60 with at least 5 years of service, benefit is 3% of FAE times years of service; maximum benefit is 1.667% of FAE times year of service projected to age 65. For service disabilities occurring prior to age 60, benefit is 1.667% of Salary times years of service projected to age 65 (maximum 30 years). Exception: State Police benefit is equal to the normal retirement benefit if more than 20 years of service. State Police also receives an additional benefit of $360 per month plus $300 to spouse plus $300 to a surviving dependent child.
Tier II, IIA, III and IV	Prior to age 65 for service related disability or at any age with at least 10 years of service, benefit is 1.333% of FAE plus 0.50% of FAE in excess of the year's breakpoint, times service projected to age 65 (maximum 30 years).

Schedule F – Summary of Main System Provisions

Deferred Vested Retirement Benefit

Eligibility	*Tier I* - 10 years of service.
	Tier II and IIA – Effective July 1, 1997, 5 years of actual state service, 10 years of vesting service, or age 70 with 5 years of service.
	Tier III and IV – 10 years of benefit service.
Benefit	*Tier I* – Benefit is payable at Normal Retirement Age or an Early Retirement Benefit is payable at age 55.
	Tier II and IIA – Benefit is payable at Normal Retirement Age or an Early Retirement Benefit is payable at age 55.
	Tier III and IV – Benefit is payable at Normal Retirement Age or an Early Retirement Benefit is payable at age 58.

Pre-Retirement Spouse's Benefit

Tier I	State Police – Survivor benefits to spouse of $670 per month plus $300 to a surviving dependent child.
	If eligible for early or normal retirement, 50% of the average of the Life Benefit and the 50% Joint & Survivor Benefit the member would have received.
	If not eligible for retirement but with 25 years of service, the same benefit calculated as though age 55 using service and earnings at death.
	If not eligible for retirement, return of contributions (5% interest).
Tier II, IIA, III and IV	If eligible for early or normal retirement, 50% of the 50% Joint & Survivor Benefit the member would have received.
	If not eligible for retirement but with 25 years of service, the same benefit calculated as though age 55 using service and earnings at death.
	If not eligible for retirement, return of contributions (5% interest).
Tiers I, II, IIA, III and IV	If death is due to employment and there are dependent children under age 18, spouse will be paid $100,000 in 10 annual installments while living and not remarried. In addition, $50 per month will be paid to each child while under age 18.
	If death is due to employment and there are no dependent children under age 18, spouse will be paid $50,000 in not less than 10 annual installments.

Schedule F – Summary of Main System Provisions

Payment Options	50% or 100% Joint and Survivor (Normal Form if married). Straight life annuity (Normal Form if not married). 10 or 20 year certain and life annuity.
Cost of Living Adjustments (COLA)	Annual adjustments each July 1 of up to 5% for retirements prior to July 1, 1980; 3% for retirements after July 1, 1980. For members (and beneficiaries) not covered by Social Security and age 62 and over, the maximum increase is 6%.

For employees retiring after June 30, 1999, the annual adjustment will be 60% of the increase in CPI up to 6% and 75% of the increase in the CPI over 6%. This adjustment will be no less than 2.5% and no greater than 6%.

Employees retiring between July 1, 1997 and June 30, 1999 made an irrevocable choice between the above formula and a fixed 3% annual adjustment.

An employee from Tier IIA must have at least 10 years of actual state service or directly make the transition into retirement in order to be eligible for annual adjustments.

For employees retiring on or after October 2, 2011, the minimum COLA shall be 2.0% and the maximum COLA shall be 7.5%.

For employees retiring on or after July 1, 2022, the annual rate of increase will be the CPI-W from 0.00% to 2.00%, plus 60% of the annual rate of increase in CPI-W from 3.33% to 6.00%, plus 75% of the annual rate of increase in CPI-W above 6.00%, with a cap on the COLA rate of 7.50%. In addition, a COLA moratorium for those retiring on or after July 1, 2022 will be on the first 30 months of retirement. If rate of increase in CPI-W exceeds an annualized rate of 5.5% during the initial 18 month period of receiving retirement benefits, the COLA provided beginning with the 31st monthly benefit includes an additional adjustment based on the annual COLA rate as determined above using the annualized rate over the 18 month period. The COLA rate applied would but reduced by 2.5% and then multiplied by 1.5 to reflect the 18 month period.

Schedule F – Summary of Main System Provisions

Member Contributions*

Tier I – Hazardous	6% of earnings up to Social Security Taxable Wage Base plus 7% of earnings above that level.
Tier I – Plan B	4% of earnings up to Social Security Taxable Wage Base plus 7% of earnings above that level.
Tier I – Plan C	7% of earnings.
Tier II – Hazardous	6% of earnings.
Tier II – All Others	2% of earnings.
Tier IIA & III – Hazardous	7% of earnings.
Tier IIA & III – All Others	4% of earnings.
Tier IV – Hazardous	8% of earnings.
Tier IV – All Others	5% of earnings.

* In years where asset losses require further increases in contributions, Tier IV employees' contributions may increase by half the necessary increase in rates (up to 2.0%). Finally, all Tier IV employees must contribute 1% to the Defined Contributions (DC) portion of the Hybrid Plan and may elect additional contribution of up to 3% of salary to the DC portion.

Hybrid Defined Benefit/Defined Contribution Plan for Employees of Higher Learning

Individuals hired on or after July 1, 2011 otherwise eligible for the Alternate Retirement Plan ("ARP") shall be eligible to be members of the new Hybrid Plan in addition to their existing choices. Individuals who are currently members of the ARP shall be eligible to join the Hybrid Plan on a one time option at the full actuarial cost. The Hybrid Plan shall have defined benefits identical to Tier II/IIA and Tier III for individuals hired on or after July 1, 2011 but shall require employee contributions 3% higher than the contribution required from the Applicable Tier II/IIA/III Plan. An employee shall have the option, upon leaving state service, of accepting the defined benefit amount, or electing to receive a return of his/her contributions to the Hybrid Plan, plus a 5% employer match, plus 4% interest ("cash out option"). In the event the employee elects the cash out option, he/she shall permanently waive any entitlement they may have to health insurance as a retired state employee unless they convert the cash out option to a periodic payment as would be required under the current ARP Plan.

Schedule G – Tables of Membership Data

STATUS RECONCILIATION OF ACTIVE MEMBERS

	Total
As of June 30, 2021	48,014
Retirements	(3,898)
Disability	(157)
Terminated	(2,251)
Deaths	(65)
Rehires	614
New Participants	5,156
Refunds	(752)
As of June 30, 2022	46,661

STATUS RECONCILIATION OF RETIRED MEMBERS

	Retirees	Disability	Survivor	Total
As of June 30, 2021	44,066	4,267	5,366	53,699
Retirements	65	(65)		0
Disability	(2)	2		0
Survivors	(328)	(46)	374	0
Deaths with no Survivors	(1,043)	(93)	(314)	(1,450)
Rehires	(4)			(4)
Refunds				0
Certain Period Ended			(24)	(24)
Data Corrections	299	23	62	384
From Term Deferred	91	4	1	96
From Active	3,898	157	22	4,077
As of June 30, 2022	47,042	4,249	5,487	56,778

Schedule G – Tables of Membership Data

TIER I – PLAN B

The Number and Average Annual Compensation of Active Employees
By Age and Service as of June 30, 2022

	Years of Service							Total	
Age	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 30	30 & Up	No.	Payroll
Under 25									$ 0
25 to 29									0
30 to 34									0
35 to 39									0
40 to 44									0
45 to 49									0
50 to 54									0
55 to 59	1			1	1		6	9	848,776
60 to 64		1	1		4	1	29	36	3,879,163
65 to 69				2		3	32	37	4,311,510
70 & Up							35	35	4,991,008
Total	1	1	1	3	5	4	102	117	$ 14,030,457

Average Age: 67.6
Average Service: 40.0

Average Salary: $119,918

Schedule G – Tables of Membership Data

TIER I – PLAN C

The Number and Average Annual Compensation of Active Employees
By Age and Service as of June 30, 2022

Age	Years of Service							Total	
	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 30	30 & Up	No.	Payroll
Under 25									$ 0
25 to 29									0
30 to 34									0
35 to 39									0
40 to 44									0
45 to 49									0
50 to 54									0
55 to 59									0
60 to 64						1	1	2	207,639
65 to 69									0
70 & Up							3	3	262,294
Total						1	4	5	$ 469,933

Average Age: 69.8
Average Service: 41.6

Average Salary: $93,987

TIER II – HAZARDOUS DUTY

The Number and Average Annual Compensation of Active Employees
By Age and Service as of June 30, 2022

	Years of Service							Total	
Age	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 30	30 & Up	No.	Payroll
Under 25									$ 0
25 to 29									0
30 to 34			1					1	90,982
35 to 39			2					2	173,277
40 to 44		1		2	1			4	630,379
45 to 49	1			1	6	10		18	2,230,151
50 to 54	2		3	5	4	33	10	57	6,152,915
55 to 59	1	1	1	8	3	22	14	50	5,721,653
60 to 64			1	3	3	4	7	18	2,044,382
65 to 69				1	2	2	1	6	764,441
70 & Up						1	1	2	126,914
Total	4	2	8	20	19	72	33	158	$ 17,935,094

Average Age: 54.6
Average Service: 25.2

Average Salary: $113,513

Schedule G – Tables of Membership Data

TIER II – HYBRID PLAN

The Number and Average Annual Compensation of Active Employees
By Age and Service as of June 30, 2022

Age	Years of Service							Total	
	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 30	30 & Up	No.	Payroll
Under 25									$ 0
25 to 29									0
30 to 34									0
35 to 39									0
40 to 44									0
45 to 49				1	1	3		5	799,318
50 to 54			2	2	5	21	5	35	3,814,714
55 to 59			4	3	18	37	23	85	10,488,500
60 to 64	2		1	3		36	24	66	9,766,326
65 to 69			6	1	2	17	21	47	7,698,682
70 & Up			2	1	1	7	19	30	4,746,098
Total	2		15	11	27	121	92	268	$ 37,313,638

Average Age: 60.9
Average Service: 28.1

Average Salary: $139,230

Schedule G – Tables of Membership Data

TIER II – ALL OTHERS

The Number and Average Annual Compensation of Active Employees
By Age and Service as of June 30, 2022

	Years of Service							Total	
Age	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 30	30 & Up	No.	Payroll
Under 25									$ 0
25 to 29									0
30 to 34									0
35 to 39			1	3				4	238,946
40 to 44		1	1	5	12			19	1,613,510
45 to 49		2	1	14	30	105	1	153	15,238,452
50 to 54	8	8	17	62	119	786	359	1,359	136,475,769
55 to 59	9	25	29	76	168	706	1,451	2,464	258,175,594
60 to 64	6	15	31	47	81	259	590	1,029	109,699,632
65 to 69	2	7	12	15	20	89	147	292	32,110,403
70 & Up	6	8	7	7	12	46	77	163	16,540,699
Total	31	66	99	229	442	1,991	2,625	5,483	$ 570,093,005

Average Age: 57.4
Average Service: 29.3

Average Salary: $103,975

TIER IIA – HAZARDOUS DUTY

The Number and Average Annual Compensation of Active Employees
By Age and Service as of June 30, 2022

Age	Years of Service							Total	
	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 30	30 & Up	No.	Payroll
Under 25									$ 0
25 to 29									0
30 to 34	1	1	23	6				31	2,734,386
35 to 39	4	3	362	193	6			568	58,941,159
40 to 44	11		302	589	77	2		981	103,088,056
45 to 49	6	6	209	416	142	7		786	84,670,173
50 to 54	9	3	141	290	111	8	1	563	60,600,423
55 to 59		2	82	201	57	7		349	36,509,329
60 to 64			52	110	33	1	1	197	20,897,263
65 to 69			11	45	8		1	65	6,686,942
70 & Up			1	14	3	1		19	1,914,013
Total	31	15	1,183	1,864	437	26	3	3,559	$ 376,041,744

Average Age: 47.0
Average Service: 16.4

Average Salary: $105,659

Schedule G – Tables of Membership Data

TIER IIA – HYBRID PLAN

The Number and Average Annual Compensation of Active Employees
By Age and Service as of June 30, 2022

Age	Years of Service: 0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 30	30 & Up	Total: No.	Payroll
Under 25									$ 0
25 to 29									0
30 to 34	1		1					2	157,967
35 to 39	1	2	7	3				13	1,191,034
40 to 44	1	2	24	21	8			56	5,126,093
45 to 49	3	2	36	43	33	1		118	12,974,351
50 to 54	1	7	26	71	67	1		173	20,859,827
55 to 59	5	11	28	66	87	1	1	199	23,824,201
60 to 64	4	4	19	50	68	4		149	17,008,672
65 to 69		5	7	17	25			54	6,646,628
70 & Up		1	5	4	8	1		19	2,607,076
Total	16	34	153	275	296	8	1	783	$ 90,395,849

Average Age: 55.0
Average Service: 18.0

Average Salary: $115,448

Schedule G – Tables of Membership Data

TIER IIA – ALL OTHERS

The Number and Average Annual Compensation of Active Employees
By Age and Service as of June 30, 2022

Age	Years of Service							Total	
	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 30	30 & Up	No.	Payroll
Under 25									$ 0
25 to 29	1		2					3	82,038
30 to 34	10	8	66	6				90	6,064,718
35 to 39	27	47	466	310	16			866	70,293,227
40 to 44	37	62	614	853	236	1		1,803	154,524,680
45 to 49	52	57	560	858	846	9	1	2,383	214,054,439
50 to 54	60	51	556	917	963	32	7	2,586	240,221,734
55 to 59	24	55	518	823	830	28	70	2,348	214,154,615
60 to 64	31	59	371	536	454	16	12	1,479	130,504,822
65 to 69	15	31	116	168	123	4	4	461	40,472,626
70 & Up	17	28	43	87	42	3	4	224	16,807,490
Total	274	398	3,312	4,558	3,510	93	98	12,243	$ 1,087,180,389

Average Age: 51.4
Average Service: 17.2

Average Salary: $88,800

Schedule G – Tables of Membership Data

TIER III – HAZARDOUS DUTY

The Number and Average Annual Compensation of Active Employees
By Age and Service as of June 30, 2022

Age	Years of Service 0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 30	30 & Up	Total No.	Total Payroll
Under 25		1						1	$ 82,607
25 to 29	7	35	1					43	3,255,409
30 to 34	11	503	66	7				587	48,143,996
35 to 39	4	487	123	50	1			665	56,186,991
40 to 44	12	305	68	24	3			412	34,267,851
45 to 49	6	151	39	6				202	17,171,062
50 to 54	4	136	23	6	1			170	14,377,865
55 to 59	4	83	25	2	1			115	10,432,367
60 to 64		35	6		1			42	3,798,656
65 to 69		19	2					21	1,929,946
70 & Up		1						1	86,069
Total	48	1,756	353	95	7			2,259	$ 189,732,819

Average Age: 40.2
Average Service: 8.8

Average Salary: $83,990

Schedule G – Tables of Membership Data

TIER III – HYBRID PLAN

The Number and Average Annual Compensation of Active Employees
By Age and Service as of June 30, 2022

Age	Years of Service							Total	
	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 30	30 & Up	No.	Payroll
Under 25									$ 0
25 to 29	3	8	1					12	684,924
30 to 34	13	44	11	1				69	4,624,202
35 to 39	13	58	11	6				88	6,599,877
40 to 44	14	96	12	1				123	10,396,511
45 to 49	10	69	12	3				94	8,937,041
50 to 54	9	57	9	2				77	7,292,993
55 to 59	6	45	2	3				56	4,568,093
60 to 64	10	30	6		1			47	4,427,914
65 to 69	3	18	1					22	1,858,382
70 & Up	2	5	1					8	813,569
Total	83	430	66	16	1			596	$ 50,203,506

Average Age: 46.3
Average Service: 7.8

Average Salary: $84,234

Schedule G – Tables of Membership Data

TIER III – ALL OTHERS

The Number and Average Annual Compensation of Active Employees
By Age and Service as of June 30, 2022

Age	Years of Service							Total	
	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 30	30 & Up	No.	Payroll
Under 25	11	8						19	$ 372,632
25 to 29	58	158	7					223	12,976,932
30 to 34	98	680	201	17				996	70,514,627
35 to 39	87	852	206	135	7			1,287	97,088,761
40 to 44	68	808	161	63	19			1,119	88,798,217
45 to 49	66	628	116	33	7			850	67,330,948
50 to 54	58	660	135	25	6			884	66,359,393
55 to 59	49	579	100	16	8	1	2	755	57,625,603
60 to 64	27	405	75	15	6		1	529	41,051,269
65 to 69	18	170	46	5	1	2		242	17,711,453
70 & Up	16	72	17	4	2			111	6,832,576
Total	556	5,020	1,064	313	56	3	3	7,015	$ 526,662,411

Average Age: 45.5
Average Service: 8.4

Average Salary: $75,077

Schedule G – Tables of Membership Data

TIER IV – HAZARDOUS DUTY

The Number and Average Annual Compensation of Active Employees
By Age and Service as of June 30, 2022

Age	Years of Service							Total	
	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 30	30 & Up	No.	Payroll
Under 25	125							125	$ 5,392,938
25 to 29	693	3						696	43,059,459
30 to 34	697	3	7					707	44,742,759
35 to 39	407	4	1		1			413	27,197,534
40 to 44	221	2						223	15,177,197
45 to 49	140	1		1				142	10,387,835
50 to 54	121	1		1				123	9,177,153
55 to 59	61	1	2					64	5,289,392
60 to 64	26	1		1				28	2,195,841
65 to 69	6							6	443,480
70 & Up	2							2	219,770
Total	2,498	16	10	3	1			2,528	$ 163,283,358

Average Age: 34.7
Average Service: 2.5

Average Salary: $64,590

Schedule G – Tables of Membership Data

TIER IV – HYBRID PLAN

The Number and Average Annual Compensation of Active Employees
By Age and Service as of June 30, 2022

	Years of Service							Total	
Age	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 30	30 & Up	No.	Payroll
Under 25	46							46	$ 1,802,953
25 to 29	193	1						194	9,050,638
30 to 34	250		1					251	13,382,711
35 to 39	207		2					209	13,054,539
40 to 44	192	1		1				194	11,124,926
45 to 49	136		1					137	8,768,417
50 to 54	128							128	7,415,324
55 to 59	101		1					102	5,808,073
60 to 64	63							63	3,399,275
65 to 69	43							43	2,474,698
70 & Up	14	1						15	245,219
Total	1,373	3	5	1				1,382	$ 76,526,773

Average Age: 41.2
Average Service: 2.0

Average Salary: $55,374

TIER IV – ALL OTHERS

The Number and Average Annual Compensation of Active Employees
By Age and Service as of June 30, 2022

Age	Years of Service							Total	
	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 30	30 & Up	No.	Payroll
Under 25	876							876	$ 22,686,739
25 to 29	1,727	25	4					1,756	90,995,130
30 to 34	1,694	18	13	2				1,727	99,982,648
35 to 39	1,466	10	5	13				1,494	93,115,506
40 to 44	1,235	6	1	8	1			1,251	79,029,810
45 to 49	934	6	2	1		1		944	60,362,213
50 to 54	887	5	8	2		2		904	57,824,922
55 to 59	725	3	3	2		1		734	48,127,089
60 to 64	404		1	2	1		1	409	25,950,784
65 to 69	129	1						130	7,477,056
70 & Up	38	1	1					40	1,594,929
Total	10,115	75	38	30	2	4	1	10,265	$ 587,146,826

Average Age: 38.9
Average Service: 2.3

Average Salary: $57,199

Schedule G – Tables of Membership Data

**NUMBER OF RETIRED MEMBERS
AND THEIR BENEFITS BY AGE**

Age	Number	Total Annual Benefits	Average Annual Benefits
Under 50	913	$ 50,518,417	$ 55,332
50 – 54	1,901	114,572,412	60,270
55 – 59	3,970	196,009,744	49,373
60 – 64	7,770	350,571,657	45,119
65 – 69	10,200	465,143,919	45,602
70 – 74	9,830	454,281,401	46,214
75 – 79	7,621	352,492,553	46,253
80 – 84	4,671	205,482,124	43,991
85 – 89	2,627	114,415,981	43,554
90 – 94	1,319	49,750,174	37,718
95 & Over	469	14,722,059	31,390
Total	51,291	$ 2,367,960,441	$ 46,167

**NUMBER OF BENEFICIARIES
AND THEIR BENEFITS BY AGE**

Age	Number	Total Annual Benefits	Average Annual Benefits
Under 50	248	$ 6,410,630	$ 25,849
50 – 54	110	3,206,673	29,152
55 – 59	190	6,105,784	32,136
60 – 64	364	10,589,014	29,091
65 – 69	530	15,701,465	29,625
70 – 74	708	23,150,756	32,699
75 – 79	877	25,156,191	28,684
80 – 84	968	27,484,434	28,393
85 – 89	768	20,285,362	26,413
90 – 94	494	13,991,688	28,323
95 & Over	230	5,707,059	24,813
Total	5,487	$ 157,789,056	$ 28,757

Schedule G – Tables of Membership Data

NUMBER OF DEFERRED VESTED MEMBERS AND THEIR BENEFITS BY AGE

Age	Number	Total Annual Benefits	Average Annual Benefits
Under 50	1,358	$ 14,501,776	$ 10,679
50 – 54	533	8,521,110	15,987
55 – 59	428	7,911,822	18,486
60 – 64	244	3,405,603	13,957
65 & Over	299	3,216,554	10,758
Total	2,862	$ 37,556,865	$ 13,123

Schedule H – Analysis of Financial Experience

Gains & Losses in Accrued Liabilities Resulting from Difference Between Assumed Experience & Actual Experience ($ Millions)

Type of Activity	$ Gain (or Loss) For One-Year Period Ending 6/30/2022
Age & Service Retirements. If members retire at older ages, there is a gain. If younger ages, a loss.	$ (320.6)
Disability Retirements. If disability claims are less than assumed, there is a gain. If more claims, a loss.	(34.6)
Death-in Service Benefits. If survivor claims are less than assumed, there is a gain. If more claims, there is a loss.	(10.1)
Withdrawal From Employment. If more liabilities are released by withdrawals than assumed, there is a gain. If smaller releases, a loss.	(9.0)
Pay Increases. If there are smaller pay increases than assumed, there is a gain. If greater increases, a loss.	(240.2)
New Members. Additional unfunded accrued liability will produce a loss.	(25.8)
Investment Income. If there is a greater investment income than assumed, there is a gain. If less income, a loss.	(298.5)
Death After Retirement. If retirants live longer than assumed, there is a loss. If not as long, a gain.	67.2
Cost of Living Adjustments: If COLA increase more than expected there is a loss.	(840.0)
Other. Miscellaneous gains and losses resulting from changes in valuation software, data or asset adjustments, timing of financial transactions, etc.	(266.9)
Gain (or Loss) During Year From Financial Experience	$ (1,978.5)
Receivable Transfer Amounts: Discounted value of amounts transferred subsequent to the end of the fiscal year.	3,132.1
Composite Gain (or Loss) During Year	$ 1,153.6

Schedule I – Actuarial Surplus Test

Section 5-162(h) of the General Statutes of Connecticut provides that the Retirement Commission may grant additional Cost-of-Living Adjustments (COLAs) for retired members if an actuarial surplus exists. An actuarial surplus is deemed to exist if three criteria are met.

I. ***Investment Income:*** The actual rate of return for the Fiscal Year ending on the valuation date must exceed the actuarial interest rate assumption.

Market Value of Assets on June 30, 2021: (A)	$17,062,998,717
Market Value of Assets on June 30, 2022: (B)	$18,532,120,770
Investment Income for FY 2021-2022: (I)	$(1,513,317,626)
Actual Rate of Return for FY 2021-2022: 2I / (A + B – I)	(8.16)%
Actuarial Interest Rate Assumption:	6.90%

Actual return of (8.16)% is less than the assumed 6.90%, so the first criterion is not met.

II. ***Assets vs. Liabilities:*** Market value of assets must exceed 50% of specified liabilities.

Adjusted Market Value of Assets on June 30, 2022:	$18,532,120,770
Specified Liabilities on June 30, 2022:	
Liability for Retired Members	$31,430,153,039
Liability for Terminated Vested Members	$363,185,803
Liability for Member Contributions with Interest	$1,711,002,815
Total	$33,504,341,657
50% of Specified Liabilities	$16,752,170,828

Market Value exceeds 50% of specified liabilities so the second criterion is met.

III. ***Unfunded Liability***: Actual unfunded liability must be less than the projected unfunded liability five years from the determination date.

Actual Unfunded Liability on June 30, 2022:	$20,930,961,862
Projected Unfunded Liability on June 30, 2027 (see next page):	$ 4,776,755,000

Actual Unfunded Liability is not less than Projected Unfunded Liability, so the third criterion is not met and therefore, no actuarial surplus exists.

Schedule I – Actuarial Surplus Test

ACTUARIAL SURPLUS TEST
PROJECTION OF UNFUNDED LIABILITY

Section 5-162-h(b)(2) of the General Statutes of Connecticut specifies the means of calculating the Projected Unfunded Liability used in the third criterion of the Actuarial Surplus Test. The projection reflects the actual unfunded liability as of December 31, 1983 adjusted for changes in actuarial assumptions and cost methods through the determination date. No provision is made in the Statute for reflecting the impact of plan changes. The projection below reflects the following changes: data correction (June 30, 1987); change in actuarial assumptions (June 30, 1987); change in actuarial cost method (June 30, 1988); change in actuarial assumptions - interest rate only (June 30, 1989); change in actuarial cost method – amortization period only (June 30, 1992); change in actuarial assumptions (June 30, 1993); change in actuarial cost method – level percent amortization (June 30, 1997); change in actuarial methods and assumptions (June 30, 2000); change in actuarial assumptions (June 30, 2004); change in actuarial assumptions (June 30, 2008); change in actuarial assumptions (June 30, 2012); change in actuarial assumptions (June 30, 2016); change in actuarial assumptions (June 30, 2021).

Year	($000)	Year	($000) June 30 Unfunded Liability	Year	($000) June 30 Unfunded Liability
1987	$2,524,556	2002	$2,360,589	2017	$9,951,987
1988	1,954,257	2003	2,429,273	2018	9,659,917
1989	1,432,333	2004	2,502,591	2019	9,424,079
1990	1,939,758	2005	2,569,504	2020	9,140,386
1991	1,930,524	2006	2,634,814	2021	8,756,187
1992	1,920,505	2007	2,698,021	2022	8,198,476
1993	1,794,192	2008	2,823,251	2023	7,602,282
1994	1,787,586	2009	2,861,884	2024	6,964,951
1995	1,780,419	2010	2,895,933	2025	6,283,644
1996	1,772,643	2011	2,924,709	2026	5,555,326
1997	1,764,205	2012	4,160,465	2027	4,776,755
1998	1,835,087	2013	4,172,971	2028	3,944,463
1999	1,907,249	2014	4,174,465	2029	3,054,742
2000	2,222,296	2015	4,163,616	2030	2,103,631
2001	2,291,494	2016	10,057,733	2031	1,086,893
				2032	0

Schedule J – Projection of Unfunded Accrued Liability

An amortization payment schedule of the June 30, 2022 Unfunded Accrued Liability is provided in the table below. No future gains and losses are included in this table.

Valuation Year	Unfunded Accrued Liability ($ in thousands)	Amortization Payment ($ in thousands)
2022	20,930,962	1,817,214
2023	20,557,984	1,817,214
2024	20,159,272	1,817,214
2025	19,733,048	1,817,214
2026	19,277,414	1,817,214
2027	18,790,342	1,817,214
2028	18,269,662	1,817,214
2029	17,713,055	1,817,214
2030	17,118,042	1,817,214
2031	16,481,973	1,817,214
2032	15,802,015	1,817,214
2033	15,075,140	1,817,214
2034	14,298,111	1,817,214
2035	13,467,467	1,817,214
2036	12,579,509	1,817,214
2037	11,630,281	1,817,214
2038	10,615,556	1,817,214
2039	9,530,816	1,817,214
2040	8,371,229	1,817,214
2041	7,131,630	1,817,214
2042	5,806,498	1,817,214
2043	4,389,933	1,767,166
2044	2,925,672	1,679,593
2045	1,447,950	1,635,459
2046	(87,600)	(93,644)
2047	0	0