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CONNECTICUT STATE EMPLOYEES RETIREMENT SYSTEM

REPORT OF THE ACTUARY ON THE VALUATION PREPARED AS OF JUNE 30, 2020

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December 16, 2020

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, 2020.

The purpose of the report is to provide a summary of the funded status of SERS as of June 30, 2020 and to recommend an actuarially determined contribution rate for the fiscal year ending June 20, 2022. The report indicates that an annual actuarially determined employer contribution of approximately $1.991 billion (at the rate of 55.05% of compensation) for the fiscal year ending June 30, 2022 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	26 years
Transitional Base	2016	26 years
2018 Base	2018	23 years
2019 Base	2019	24 years
2020 Base	2020	25 years

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

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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 appropriate actuarial models that were developed for this purpose. These models use 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.

We note that as we are preparing this report, the world is in the midst of a pandemic. We have considered available information, but do not believe that there is yet sufficient data to warrant the modification of any of our assumptions prior to the upcoming experience study.

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

Table of Contents

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, 2020	June 30, 2019
Number of active members	47,662	49,429
Annual compensation	$ 3,617,105,311	$ 3,686,365,412
Retired members and beneficiaries:		
Number	52,498	51,745
Annual allowances	$ 2,158,277,040	$ 2,051,605,315
Deferred Vested Members:		
Number	2,437	2,185
Annual allowances	$ 29,028,666	$ 25,522,915
Assets:		
Market Value*	$ 13,311,109,931	$ 13,275,692,603
Actuarial Value*	$ 14,242,897,393	$ 13,795,389,341
Unfunded actuarial accrued liability	$ 22,726,058,302	$ 22,292,548,726
Funded Ratio based on Actuarial Assets	38.5%	38.2%
Funded Ratio based on Market Assets	36.0%	36.8%
For Fiscal Year Ending	**June 30, 2022**	**June 30, 2021**
Actuarially Determined Employer Contribution (ADEC):		
Normal	$ 211,006,354	$ 210,242,048
Accrued liability	1,780,480,800	1,596,465,638
Total	$ 1,991,487,154	$ 1,806,707,686
Actuarially Determined Employer Contribution Rate (ADEC):		
Normal	5.83%	5.70%
Accrued liability	49.22%	43.31%
Total	55.05%	49.01%

* The June 30, 2020 amounts include the transfer of $61,621,659 made subsequent to June 30, 2020.

2. The results of the valuation are given in Schedule A.

3. 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.

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 to reflect the General Fund surplus transfer of $61,621,659 completed subsequent to June 30, 2020.

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 38.5% 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 some pertinent figures.

Section I – Summary of Principal Results

Comparative Schedule

	Active Members				Retired Lives				Valuation Results ($ thousands)		
Valuation Date June 30	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
2012	47,868	$3,354,682	$70,082	4.3%	43,887	1.09	$1,424,477	42.5%	$23,018,752	$9,744,986	$13,273,766
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	3,617,105	75,891	1.8	52,498	0.91	2,158,277	59.7	36,968,956	14,242,897	22,726,058

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, 2020 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 – Hazardous	2	$ 263,698	$ 131,849	60.0	7.0
Tier I – Plan B	370	39,947,211	107,965	64.2	37.7
Tier I – Plan C	18	1,866,571	103,698	61.5	31.8
Tier II – Hazardous	417	47,741,784	114,489	53.7	25.8
Tier II – Hybrid Plan	422	54,143,654	128,302	60.5	27.0
Tier II – Others	8,365	788,942,019	94,315	57.1	27.9
Tier IIA – Hazardous	4,381	415,343,164	94,806	46.5	15.7
Tier IIA – Hybrid Plan	918	95,723,286	104,274	54.4	16.2
Tier IIA – Others	14,269	1,129,338,802	79,146	50.9	15.8
Tier III – Hazardous	2,177	160,196,323	73,586	38.2	6.9
Tier III – Hybrid Plan	573	41,751,918	72,865	44.6	6.4
Tier III – Others	7,333	473,003,037	64,503	43.3	6.7
Tier IV – Hazardous	1,538	71,725,718	46,636	32.9	1.4
Tier IV – Hybrid Plan	891	33,959,674	38,114	40.6	1.3
Tier IV – Others	5,988	263,158,452	43,948	37.7	1.5
Total	47,662	$3,617,105,311	$ 75,891	47.6	13.8

*Years

Of the 47,662 active members, 30,085 are vested and 17,577 are non-vested.

Section II – Membership

Retired Lives

Type of Benefit Payment	No.	Annual Benefits	Group Averages Benefit	Age*
Retired – Pre 1980	515	$ 10,996,968	$ 21,353	91.5
Retired – 1980 - 1997	9,309	355,680,301	38,208	83.4
Retired – 1997 - 2011	24,565	1,080,755,382	43,996	71.4
Retired – 2011+	18,109	710,844,389	39,254	63.2
Total	52,498	$ 2,158,277,040	$ 41,112	70.9

*Years

Valuation also includes 2,437 deferred vested members with estimated annual benefits of $29,028,666.

Section III – Assets

1. As of June 30, 2020, the total market value of assets amounted to $13,249,488,272 as reported by the Comptroller's Office. The estimated investment return for the plan year since the last valuation was 2.26%. Subsequent to June 30, 2020, the State deposited a General Fund surplus transfer to the System totaling $61,621,659 applicable to plan year. For valuation purposes, the June 30, 2020 market value of assets is $13,311,109,931 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 $14,242,897,393 (as adjusted for the subsequent transfer). The estimated investment return for the plan year on an actuarial value of assets basis was 5.20%, 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, 2020.

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, 2020. 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 $36,968,955,695, of which $27,468,821,741 is for the benefits payable on account of present retired members, beneficiaries of deceased members, and inactive members entitled to deferred vested benefits, and $9,500,133,954 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 $14,242,897,393 as of June 30, 2020. When this amount is deducted from the actuarial accrued liability of $36,968,955,695, there remains $22,726,058,302 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 5.83% 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	$ 3,965,854	26	$ 309,675
2016 Base	16,248,400	16,671,798	26	1,301,825
2018 Base	570,349	566,136	23	46,665
2019 Base	1,014,250	1,008,131	24	81,495
2020 Base	514,140	514,140	25	40,821
Total UAAL		$22,726,058		$ 1,780,481
Annual Valuation Payroll				$ 3,617,105
UAAL Amortization Rate				49.22%

5. We have determined that a contribution of 49.22% of payroll is required to amortize the unfunded actuarial accrued liability of $22,726,058,302 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 2021/2022 fiscal year.

Contribution for	Contribution Amount	Contribution Rate
A. Normal Cost:		
Service retirement benefits	$ 346,498,087	9.58%
Disability benefits	17,558,177	0.49%
Survivor benefits	2,148,982	0.00%
Total Normal Cost	$ 366,205,246	10.07%
B. Less Member Contributions	(155,198,892)	(4.29)%
C. Employer Normal Cost	$ 211,006,354	5.83%
D. Unfunded Actuarial Accrued Liabilities (25.8 year weighted average amortization period)	$1,780,480,800	49.22%
E. Total (C. + D.)	$1,991,487,154	55.05%

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 2021/2022 fiscal year.

Group	Employer Normal Cost	Employer Normal Cost Rate
Tier I – Hazardous	$ 24,630	9.34%
Tier I – Plan B	2,803,180	7.02
Tier I – Plan C	119,306	6.39
Tier II – Hazardous	7,832,793	16.41
Tier II – Hybrid Plan	2,645,040	4.89
Tier II – Others	44,100,370	5.59
Tier IIA – Hazardous	55,396,090	13.34
Tier IIA – Hybrid Plan	4,605,385	4.81
Tier IIA – Others	50,843,853	4.50
Tier III – Hazardous	14,563,788	9.09
Tier III – Hybrid Plan	821,451	1.97
Tier III – Others	15,703,371	3.32
Tier IV – Hazardous	4,351,206	6.07
Tier IV – Hybrid Plan	1,107,521	3.26
Tier IV – Others	6,088,370	2.31
Total	$ 211,006,354	5.83%

Section V – Contributions Payable By Employer

The official contribution requirement for the fiscal year ending June 30, 2023 will be determined in the June 30, 2021 valuation. However, we have estimated the contribution requirement for the fiscal year ending June 30, 2023 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, 2023	Roll Forward of June 30, 2020 Valuation	
	As % of Pay	$
Employer Normal Cost	5.83%	$ 218,417,000
Unfunded Actuarial Accrued Liabilities	51.73%	1,936,609,000
Total	57.56%	$ 2,155,026,000

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, 2020

GROUP	NUMBER
Retirees and beneficiaries currently receiving benefits	52,498
Terminated employees entitled to benefits but not yet receiving benefits	2,437
Active plan members	47,662
Total	102,597

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)
6/30/2012	$9,744,986	$23,018,752	$13,273,766	42.3%	$3,354,682	395.7%
6/30/2014	10,584,795	25,505,610	14,920,815	41.5	3,487,577	427.8
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	36,968,956	22,726,058	38.5	3,617,105	628.3

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
2015	2012	$ 1,379,189	$ 1,371,651	99.5%
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	N/A	N/A
2022	2020	1,991,487	N/A	N/A

4. The information presented in the required supplementary schedules was determined as part of the actuarial valuation at June 30, 2020. Additional information as of the latest actuarial valuation follows.

Valuation date	6/30/2020
Actuarial cost method	Entry Age Normal
Amortization method	Level percent of payroll, closed phasing in to Level dollar
Weighted amortization period	25.8 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*	3.50% - 19.50%
Cost-of-living adjustments	2.25% - 3.25%
Social Security Wage Base	3.50%
*Includes wage inflation at	3.50%

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, 2020 is shown below. Schedule H provides detailed gain/(loss) by source.

		$ Millions
(1)	UAAL* as of June 30, 2019	$ 22,292.5
(2)	Total Normal cost for 2020 fiscal year	363.6
(3)	Actual Employer and Employee contributions	1,809.0
(4)	Interest accrual: [[(5) + (6)] x .069] - [(7) x .0339]	1,501.9
(5)	Expected UAAL as of June 30, 2020: (1) + (2) - (3) + (4)	$ 22,349.0
(6)	Assumption/Method Changes	0.0
(7)	Expected UAAL as of June 30, 2020: (5) + (6)	$ 22,349.0
(8)	Actual UAAL as of June 30, 2020	$ 22,726.1
(9)	Gain/(loss): (7) – (8) (See Schedule H)	$ (377.1)
(10)	Gain/(loss) as percent of actuarial accrued liabilities at June 30, 2018 ($36,087.9)	(1.0)%

*Unfunded actuarial accrued liability.

Valuation Date June 30	Actuarial Gain/(Loss) as a % of Beginning Accrued Liabilities
2018	(1.5)%
2019	(3.9)%
2020	(1.0)%

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
2018	$12,527,542	$3,428,068	3.65
2019	13,275,693	3,686,365	3.60
2020	13,249,488	3,617,105	3.66

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 3.00, 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 0.46% 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 2.32%. A higher AVR would produce more volatility in the Required Contribution Rate.

AVR	Unsmoothed Amortization Increase due to 10% Market Loss	Smoothed Amortization Increase
2.00	1.55%	0.31%
3.00	2.32%	0.46%
4.00	3.09%	0.62%

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, 2019	-1% Discount Rate (5.90%)	Current Discount Rate (6.90%)	+1 Discount Rate (7.90%)
Accrued Liability	$41,441,871	$36,968,956	$33,321,898
Unfunded Liability	$27,198,974	$22,726,058	$18,989,001
Funded Ratio (AVA)	34.4%	38.5%	42.9%
ADEC Amount	$2,254,226	$1,991,487	$1,760,191

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 static projection of mortality improvement has been replaced in most recent experience investigations by a generational improvement approach. Still, the future is unknown, and actual mortality improvements may occur at a faster rate than expected, or at a slower rate than expected (or even decline) even under a generational improvement approach.

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, 2020	JUNE 30, 2019
1. ACTUARIAL ACCRUED LIABILITY		
Present value of prospective benefits payable in respect of:		
(a) Present active members		
- Tier I – Hazardous Duty	$ 399,368	$ 739,598
- Tier I – Plan B	291,392,712	389,401,127
- Tier I – Plan C	12,092,004	18,649,389
- Tier II – Hazardous Duty	375,792,951	450,708,629
- Tier II – Hybrid Plan	223,713,114	238,604,724
- Tier II – All Others	3,395,612,634	3,432,412,353
- Tier IIA – Hazardous Duty	1,858,600,843	1,774,951,908
- Tier IIA – Hybrid Plan	219,025,462	216,685,795
- Tier IIA – All Others	2,465,192,291	2,601,189,029
- Tier III – Hazardous Duty	200,482,860	163,422,455
- Tier III – Hybrid Plan	30,200,914	29,580,211
- Tier III – All Others	362,175,862	339,899,784
- Tier IV – Hazardous Duty	18,094,296	6,691,233
- Tier IV – Hybrid Plan	4,437,717	1,853,689
- Tier IV – All Others	42,920,927	21,807,226
- Total actives	$ 9,500,133,954	$ 9,686,597,350
(b) Present inactive members and members entitled to deferred vested benefits:	278,807,701	289,213,627
(c) Present annuitants and beneficiaries	27,190,014,040	26,112,127,090
(d) Total actuarial accrued liability [1(a) + 1(b) + 1(c)]	$ 36,968,955,695	$ 36,087,938,067
2. ACTUARIAL VALUE OF ASSETS	$ 14,242,897,393	$ 13,795,389,341
3. UNFUNDED ACTUARIAL ACCRUED LIABILITY [1(d) – 2]	$ 22,726,058,302	$ 22,292,548,726

Schedule B – Development of Actuarial Value of Assets

		June 30, 2020
(1)	Actuarial Value Beginning of Year*	$13,795,389,341
(2)	Market Value End of Year* (Before Adjustment)	13,249,488,272
(3)	Market Value Beginning of Year	13,275,692,603
(4)	Cash Flow	
	(a) Contributions*	$ 1,809,027,590
	(b) Disbursements	(2,130,969,211)
	(c) Net: (4)(a) + (4)(b)	$ (321,941,621)
(5)	Investment Income	
	(a) Market Total: (2) – (3) – (4)(c)	$ 295,737,290
	(b) Assumed Rate	6.90%
	(c) Amount for Immediate Recognition: [(1) x (5)(b)] + [(4)(c)] x (5)(b) x 0.5	940,774,879
(6)	Expected Actuarial Value End of Year (With Adjustment): (1) + (4)(c) + (5)(c) + Adjustment	$14,475,844,258
(7)	Phased-In Recognition of Investment Income	
	(a) Difference between Adjusted Market & Expected Actuarial Value: (2) + $61,621,659 – (6)	(1,164,734,327)
	(b) 20% of Difference: 0.2 x (7)(a)	(232,946,865)
(8)	Preliminary Actuarial Value End of Year: (6) + (7)(b)	14,242,897,393
(9)	Final Actuarial Value End of Year Using 20% Corridor: Greater of [(8) and .8 x (2)], but no more than 1.2 x (2)	14,242,897,393
(10)	Difference Between Adjusted Market & Actuarial Values: (2) + Adjustment – (9)	$ (931,787,462)

* Before corridor constraints, if applicable.
Adjustment = $61,621,659 subsequent transfer

Schedule C – Summary of Receipts and Disbursements

MARKET VALUE OF ASSETS	Year Ending June 30, 2020
Receipts for the Year	
Contributions:	
Members	$ 192,715,653
State	1,342,772,537
Federal (Net of Transfers)	273,539,400
Subtotal	$ 1,809,027,590
Investment Earnings (net of expenses)	295,737,290
Other	0
TOTAL	$ 2,104,764,880
Disbursements for the Year	
Benefit Payments	$ 2,119,003,590
Refunds to Members	9,376,667
Interest Awarded	1,806,912
Administrative Expense	782,042
Other	0
Total	$ 2,130,969,211
Excess of Receipts over Disbursements	$ (26,204,331)
Reconciliation of Asset Balances	
Asset Balance as of the Beginning of Year	$ 13,275,692,603
Excess of Receipts over Disbursements	(26,204,331)
Asset Balance as of the End of Year	$ 13,249,488,272
Rate of Return	2.26%
Adjusted Market Value of Assets *	$ 13,311,109,931

*Include $61,621,659 subsequent transfer.

Schedule D – Outline of Actuarial Assumptions and Methods

Adopted or reaffirmed by the Commission for the June 30, 2016 and later valuations.

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: The assumptions for salary increases are as follows:

Years of Service	Rate*
0	9.50%
1	19.50%
2	9.50%
3	5.75%
4	5.50%
5	5.25%
6	5.00%
7	5.00%
8	5.00%
9	5.00%
10	4.50%
11	4.50%
12	4.50%
13	4.50%
14	4.50%
15+	3.50%

*includes Wage Inflation of 3.50%

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: 3.50% per annum.

Schedule D – Outline of Actuarial Assumptions and Methods

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

WITHDRAWAL

Annual Rates of Withdrawal								
	Years of Service							
Age	0	1	2	3	4	5	6-9	10+
Hazardous Males								
20	6.00%	3.00%	6.00%	3.00%	2.75%	2.00%	1.25%	1.25%
25	6.00	3.00	6.00	3.00	2.75	2.00	1.25	1.25
30	6.00	3.00	4.00	3.00	2.75	2.00	1.25	1.25
35	6.00	3.00	4.00	3.00	2.00	2.00	1.25	1.25
40	8.75	3.00	4.00	3.50	2.00	2.50	1.25	1.25
45	8.75	4.00	4.00	3.50	2.00	2.50	1.25	1.25
50	8.75	5.50	4.00	3.50	2.00	2.50	1.25	1.25
55+	8.75	6.00	4.00	3.50	2.00	2.50	1.25	1.25
Hazardous Females								
20	10.00%	10.00%	5.00%	2.50%	3.00%	3.50%	2.50%	1.25%
25	10.00	10.00	5.00	2.50	3.00	3.50	2.50	1.25
30	12.00	6.00	5.00	2.50	3.00	3.50	2.50	1.25
35	12.00	5.00	6.00	2.50	4.00	3.50	2.50	1.25
40	12.00	5.00	6.00	2.00	4.00	3.50	2.50	1.25
45	12.00	5.00	5.00	2.00	4.00	3.50	2.50	1.25
50	12.00	8.00	5.00	2.00	4.00	3.50	2.50	1.25
55+	12.00	8.00	5.00	2.00	4.00	3.50	2.50	1.25
Nonhazardous Males								
20	45.0%	40.0%	40.0%	20.0%	20.0%	10.0%	6.0%	5.0%
25	30.0	28.0	19.0	10.0	7.0	10.0	6.0	5.0
30	22.0	20.0	14.0	9.0	6.0	7.0	4.5	5.0
35	20.0	15.0	14.0	8.0	6.0	4.0	4.0	3.0
40	20.0	15.0	10.0	8.0	6.0	4.0	4.0	2.5
45	22.0	12.0	10.0	8.0	6.0	4.0	4.0	2.0
50	22.0	12.0	10.0	8.0	5.0	4.0	4.0	2.0
55+	25.0	19.0	10.0	8.0	4.0	4.0	3.5	2.0
Nonhazardous Females								
20	45.0%	45.0%	45.0%	20.0%	8.0%	10.0%	6.0%	4.0%
25	25.0	23.0	15.0	12.0	8.0	10.0	6.0	4.0
30	20.0	19.0	12.0	9.0	7.0	6.0	5.0	4.0
35	18.0	13.0	11.0	8.0	6.0	5.0	4.0	3.0
40	18.0	13.0	10.0	8.0	5.5	4.0	3.5	2.5
45	18.0	13.0	10.0	6.0	5.5	4.0	3.0	2.5
50	18.0	13.0	10.0	6.0	5.5	4.0	3.0	2.0
55+	18.0	13.0	10.0	6.0	5.5	4.0	3.0	2.0

DISABILITY

Annual Rates of Disability		
Age	**Hazardous**	**Non-Hazardous**
30	0.05%	0.04%
35	0.12	0.05
40	0.18	0.10
45	0.35	0.12
50	0.40	0.20
55	0.50	0.40
60	0.65	0.50
65	0.80	0.60
70	1.35	0.60

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

Annual Rates of Retirement			
Hazardous			
	Tier I, II & IIA		
Age	First Year Eligible	All Years After	Tier III & IV
40	50%	50%	20%
41	30	40	20
42	30	35	20
43	30	30	20
44	30	25	20
45	40	25	20
46	40	25	20
47	40	25	20
48	40	15	20
49	40	15	20
50	40	20	20
51	40	20	20
52	40	20	20
53	40	25	20
54	40	25	20
55	40	25	20
56	40	25	20
57	40	15	20
58	40	25	20
59	40	20	20
60-64	50	30	20
65-69	50	50	20
70-79	100	30	20
80	100	100	100

Annual Rates of Retirement									
Nonhazardous									
Age	Tier I			Tier II & IIA			Tier III & IV		
	Early	First Year	Other Years	Early	First Year	Other Years	Early	First Year	Other Years
55	6.0%	28.0%		4.5%					
56	6.0	10.0	15.0%	4.0					
57	6.0	10.0	12.5	4.0					
58	6.0	10.0	10.0	4.0			5.0%		
59	6.0	10.0	10.0	4.0			7.0		
60		12.5	12.5	4.0	13.5%		9.0		
61		15.0	12.5	4.0	15.0	13.0%	10.0		
62		10.0	20.0		15.0	24.0	12.0		
63		35.0	15.0		15.0	15.0	12.0	32.0%	
64		45.0	10.0		15.0	15.0	12.0	30.0	30.0%
65		65.0	15.0		25.0	15.0		28.0	25.0
66		65.0	20.0		25.0	21.0		25.0	35.0
67		65.0	22.0		25.0	24.0		25.0	35.0
68		65.0	15.0		25.0	18.0		25.0	35.0
69		65.0	15.0		25.0	18.0		25.0	30.0
70		100.0	15.0		50.0	20.0		50.0	30.0
71		100.0	15.0		50.0	24.0		50.0	30.0
72		100.0	15.0		50.0	22.0		50.0	30.0
73		100.0	15.0		50.0	22.0		50.0	30.0
74		100.0	15.0		50.0	22.0		50.0	30.0
75		100.0	15.0		100.0	22.0		100.0	30.0
76		100.0	15.0		100.0	25.0		100.0	30.0
77		100.0	15.0		100.0	22.0		100.0	30.0
78		100.0	15.0		100.0	25.0		100.0	30.0
79		100.0	15.0		100.0	22.0		100.0	30.0
80		100.0	100.0		100.0	100.0		100.0	100.0

We have assumed that the assumed rate of retirement will increase by 20% of the current assumed rates in the year before July 1, 2022 to reflect the potential behavior of future eligible members to avoid the July 1, 2022 COLA change and moratorium.

Schedule D – Outline of Actuarial Assumptions and Methods

DEATHS AFTER RETIREMENT: The RP-2014 White Collar Mortality Table projected to 2020 by Scale BB at 100% for males and 95% for females is used for the period after retirement and for dependent beneficiaries. Representative values of the assumed annual rates of mortality are as follows:

Age	Males	Females	Age	Males	Females
40	0.043%	0.031%	65	0.705%	0.579%
45	0.067	0.052	70	1.133	0.933
50	0.272	0.194	75	1.943	1.553
55	0.384	0.250	80	3.407	2.688
60	0.501	0.348	85	6.247	4.826

In our opinion, the projection of the mortality rates with Scale BB provide a sufficient margin in the assumed rates of mortality to allow for additional improvement in mortality experience.

The RP-2014 Disabled Retiree Mortality Table at 65% for males and 85% for females is used for the period after disability.

ASSET METHOD: Actuarial Value, as developed in Schedule B. The actuarial value of assets recognizes 20% of any difference between actual and expected investment income (gain/loss) in the valuation year and 20% of any previous years' unrecognized investment gains/losses. 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.

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.

OTHER ASSUMPTIONS:

- 20% of Pre-Retirement deaths are assumed to be service related,
- 50% of Tier I Hazardous Employees are assumed to be State Police,
- 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 projected benefit basis, under which the present value of each member's expected benefits at retirement or death is determined, based on age, service and sex and using the interest rate assumed to be earned in the future (6.90% per annum). The calculations take into account the probability of a member's death or termination of employment prior to becoming eligible for a benefit, as well as the possibility of his terminating with a service, disability or survivor's benefit. Future salary increases are also anticipated. The present value of the expected benefits payable on account of the active members is added to the present value of the expected future payments to retired members, beneficiaries and members entitled to deferred vested benefits to obtain the present value of all expected benefits payable from the System on account of the present group of members and beneficiaries.

The employer contributions required to support the benefits of SERS are determined following a level funding approach, and consist of a normal cost contribution and an unfunded actuarial accrued liability contribution. The normal contribution is determined using the "entry age normal" method. Under this method, a calculation is made for pension benefits to determine the uniform and constant percentage rate of employer contribution which, if applied to the compensation of the average new member during the entire period of his anticipated covered service, would be required in addition to the contributions of the member to meet the cost of all benefits payable on his behalf.

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 if $360 per month.

* $10,700 increased by 6% each year after 1982, rounded to nearest $100 but not greater than Social Security Covered Compensation.

Schedule F – Summary of Main System Provisions

Tier IV All Others – 1.30% of FAE times years of service. Minimum benefit with 25 years if $360 per month.

Early Retirement Benefit

Eligibility	*Hazardous* – None.
	Tier I – Age 55 with 10 years of service.
	Tier II and IIA – Age 55 with 10 years of service.
	Tier III and IV – Age 58 with 10 years of service.
Benefit	*Tier I* – Benefit is Normal Retirement Benefit reduced for retirement prior to age 60 with less than 25 years of service.
	Tier II, IIA, III and IV – 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.

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, 2019	49,429
Retirements	(1,749)
Disability	(146)
Terminated	(1,700)
Deaths	(68)
Rehires	499
New Participants	3,734
Refunds	(2,337)
As of June 30, 2020	47,662

STATUS RECONCILIATION OF RETIRED MEMBERS

	Retirees	Disability	Survivor	Total
As of June 30, 2019	42,349	4,232	5,164	51,745
Retirements	47	(47)		0
Disability	(68)	68		0
Survivors	(484)	(32)	516	0
Deaths with no Survivors	(1,090)	(91)	(280)	(1,461)
Rehires	(4)			(4)
Refunds	(2)			(2)
Certain Period Ended			(12)	(12)
Data Corrections	245	20	47	312
From Active	1,749	146	25	1,920
As of June 30, 2020	42,742	4,296	5,460	52,498

Schedule G – Tables of Membership Data

TIER I – HAZARDOUS DUTY

The Number and Average Annual Compensation of Active Employees
By Age and Service as of June 30, 2020

	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	179,745
60 to 64		1						1	83,953
65 to 69									0
70 & Up									0
Total		2						2	$ 263,698

Average Age: 60.0
Average Service: 7.0

Average Salary: $131,849

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, 2020**

	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					1			1	101,453
50 to 54					2		1	3	335,811
55 to 59	1		1	1	4	7	50	64	6,156,037
60 to 64		4	2	6	6	6	134	158	15,430,908
65 to 69					3	4	83	90	10,572,341
70 & Up				1	3	1	49	54	7,350,661
Total	1	4	3	8	19	18	317	370	$ 39,947,211

Average Age: 64.2
Average Service: 37.7

Average Salary: $107,965

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, 2020

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	103,856
50 to 54			1	1				2	103,964
55 to 59		1					2	3	268,829
60 to 64				1	1		3	5	625,136
65 to 69					1		4	5	591,450
70 & Up							2	2	173,336
Total		1	1	2	3		11	18	$ 1,866,571

Average Age: 61.5
Average Service: 31.8

Average Salary: $103,698

TIER II – HAZARDOUS DUTY

The Number and Average Annual Compensation of Active Employees
By Age and Service as of June 30, 2020

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	81,273
35 to 39		1	2					3	239,109
40 to 44				2	3			5	593,496
45 to 49		1	1	4	57	19		82	9,853,917
50 to 54	1		2	5	47	87	21	163	19,043,289
55 to 59			1	5	18	50	30	104	11,782,326
60 to 64	1			3	9	15	16	44	4,544,835
65 to 69			1		1	7	1	10	1,142,608
70 & Up						4	1	5	460,931
Total	2	2	8	19	135	182	69	417	$ 47,741,784

Average Age: 53.7
Average Service: 25.8

Average Salary: $114,489

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, 2020

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		3	7		11	1,121,620
50 to 54			7	2	19	21	10	59	6,154,512
55 to 59			3	5	38	46	32	124	15,289,015
60 to 64	1	1	5	7	21	51	32	118	15,768,234
65 to 69	1		5	1	15	21	36	79	10,906,545
70 & Up			1		4	6	20	31	4,903,728
Total	2	1	22	15	100	152	130	422	$ 54,143,654

Average Age: 60.5
Average Service: 27.0

Average Salary: $128,302

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, 2020

	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				2	77,688
35 to 39	2	3	8	8				21	1,423,527
40 to 44	1	4	1	30	23	2		61	4,499,689
45 to 49	4	9	11	47	204	190	12	477	43,115,056
50 to 54	10	23	40	115	381	861	701	2,131	193,072,339
55 to 59	11	32	53	139	357	764	1,818	3,174	306,781,981
60 to 64	4	24	35	94	200	434	902	1,693	164,002,409
65 to 69	8	17	15	41	83	165	254	583	56,184,152
70 & Up	4	7	13	24	38	57	80	223	19,785,178
Total	44	119	177	499	1,286	2,473	3,767	8,365	$ 788,942,019

Average Age: 57.1
Average Service: 27.9

Average Salary: $94,315

TIER IIA – HAZARDOUS DUTY

The Number and Average Annual Compensation of Active Employees
By Age and Service as of June 30, 2020

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	41	83	7				132	10,603,246
35 to 39	4	83	563	156	1			807	71,115,270
40 to 44	3	40	456	471	96	2		1,068	102,450,275
45 to 49		34	301	386	196	11		928	91,552,851
50 to 54	1	28	206	282	152	8	1	678	65,990,360
55 to 59		15	146	168	90	4	1	424	40,726,207
60 to 64		4	76	92	51	5	1	229	22,036,164
65 to 69		2	20	40	26			88	8,362,300
70 & Up		2	4	8	12	1		27	2,506,491
Total	9	249	1,855	1,610	624	31	3	4,381	$ 415,343,164

Average Age: 46.5
Average Service: 15.7

Average Salary: $94,806

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, 2020

	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	3	1					5	365,865
35 to 39	1	6	15	3				25	1,889,445
40 to 44	3	7	32	24	8			74	6,892,844
45 to 49	3	11	62	59	25			160	16,557,938
50 to 54	5	14	42	83	48	1		193	21,498,772
55 to 59	8	10	47	76	60	1		202	20,806,484
60 to 64	4	8	40	67	37	3		159	16,612,609
65 to 69	2	7	12	36	21	1		79	8,861,413
70 & Up		3	7	8	3			21	2,237,916
Total	27	69	258	356	202	6		918	$ 95,723,286

Average Age: 54.4
Average Service: 16.2

Average Salary: $104,274

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, 2020

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	4	8					13	518,893
30 to 34	13	78	212	19				322	20,907,973
35 to 39	14	163	853	290	14			1,334	96,335,862
40 to 44	13	156	974	796	256	1		2,196	171,129,929
45 to 49	13	126	927	824	686	7		2,583	212,633,237
50 to 54	11	150	933	838	674	24	22	2,652	216,948,761
55 to 59	14	131	852	777	581	37	117	2,509	203,382,888
60 to 64	16	120	627	519	403	14	9	1,708	136,109,739
65 to 69	7	55	257	214	123	5	2	663	51,602,541
70 & Up	4	33	102	101	41	4	4	289	19,768,979
Total	106	1,016	5,745	4,378	2,778	92	154	14,269	$ 1,129,338,802

Average Age: 50.9
Average Service: 15.8

Average Salary: $79,146

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, 2020

	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	3							3	$ 95,374
25 to 29	57	119	3					179	12,268,839
30 to 34	67	590	58	7		1		723	51,462,144
35 to 39	62	439	25	30	1			557	40,695,903
40 to 44	31	226	17	8				282	21,699,325
45 to 49	23	129	6	5				163	12,806,189
50 to 54	28	107	2	4	1	1		143	10,609,088
55 to 59	11	69	3	2	1			86	7,280,304
60 to 64	3	25	2					30	2,488,117
65 to 69	2	8						10	724,158
70 & Up		1						1	66,882
Total	287	1,713	116	56	3	2		2,177	$ 160,196,323

Average Age: 38.2
Average Service: 6.9

Average Salary: $73,586

TIER III – HYBRID PLAN

The Number and Average Annual Compensation of Active Employees
By Age and Service as of June 30, 2020

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	2							2	$ 59,909
25 to 29	14	11	1					26	1,319,679
30 to 34	29	46	7	2				84	5,184,866
35 to 39	23	76	5	2				106	7,684,944
40 to 44	18	68	3	1				90	6,965,158
45 to 49	21	57	5	1				84	6,447,535
50 to 54	19	48	2					69	5,530,381
55 to 59	7	39	2	1				49	3,142,095
60 to 64	7	29			1			37	3,315,146
65 to 69	5	13						18	1,084,952
70 & Up	1	7						8	1,017,253
Total	146	394	25	7	1			573	$ 41,751,918

Average Age: 44.6
Average Service: 6.4

Average Salary: $72,865

TIER III – ALL OTHERS

The Number and Average Annual Compensation of Active Employees
By Age and Service as of June 30, 2020

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	88	10						98	$ 1,672,298
25 to 29	237	259	8					504	27,819,391
30 to 34	352	789	179	16				1,336	83,074,553
35 to 39	295	813	74	110	2			1,294	85,256,107
40 to 44	247	690	43	32	6			1,018	70,113,347
45 to 49	213	576	22	19	1			831	56,417,589
50 to 54	222	598	20	17	4			861	58,163,737
55 to 59	173	501	15	16	3	2	1	711	47,543,459
60 to 64	84	309	14	7	1	2		417	27,076,586
65 to 69	38	133	2	5	2			180	11,430,883
70 & Up	21	54	3	4	1			83	4,435,087
Total	1,970	4,732	380	226	20	4	1	7,333	$ 473,003,037

Average Age: 43.3
Average Service: 6.7

Average Salary: $64,503

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, 2020

	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	142							142	$ 4,282,249
25 to 29	503	6	1					510	22,435,800
30 to 34	398	5	1					404	19,123,105
35 to 39	206	2		1				209	11,024,910
40 to 44	102							102	5,327,433
45 to 49	77							77	4,344,867
50 to 54	56							56	3,000,450
55 to 59	23	1						24	1,269,909
60 to 64	13		1					14	916,995
65 to 69									0
70 & Up									0
Total	1,520	14	3	1				1,538	$ 71,725,718

Average Age: 32.9
Average Service: 1.4

Average Salary: $46,636

TIER IV – HYBRID PLAN

The Number and Average Annual Compensation of Active Employees
By Age and Service as of June 30, 2020

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	35							35	$ 594,629
25 to 29	149	2	1					152	4,853,770
30 to 34	151	1						152	5,542,019
35 to 39	129		1					130	5,782,829
40 to 44	122			1				123	4,791,415
45 to 49	86							86	3,876,236
50 to 54	72							72	3,304,383
55 to 59	66							66	2,769,450
60 to 64	40							40	1,908,781
65 to 69	24							24	339,816
70 & Up	11							11	196,346
Total	885	3	2	1				891	$ 33,959,674

Average Age: 40.6
Average Service: 1.3

Average Salary: $38,114

Schedule G – Tables of Membership Data

TIER IV – ALL OTHERS

The Number and Average Annual Compensation of Active Employees
By Age and Service as of June 30, 2020

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	618	2						620	$ 11,770,232
25 to 29	1,076	33	1					1,110	45,695,270
30 to 34	1,073	15	18	2				1,108	51,559,809
35 to 39	817	5	4	9				835	40,642,253
40 to 44	649	4	1	3				657	31,321,307
45 to 49	525		3	2				530	25,201,095
50 to 54	487	1	5	1		2		496	24,577,990
55 to 59	356	1					1	358	18,842,887
60 to 64	193		1	1				195	9,932,787
65 to 69	56	1						57	2,954,354
70 & Up	21	1						22	660,468
Total	5,871	63	33	18		2	1	5,988	$ 263,158,452

Average Age: 37.7
Average Service: 1.5

Average Salary: $43,948

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	930	$ 46,615,240	$ 50,124
50 – 54	1,926	104,263,497	54,135
55 – 59	3,523	162,497,195	46,125
60 – 64	6,873	296,569,478	43,150
65 – 69	9,462	409,891,050	43,320
70 – 74	9,343	396,550,415	42,444
75 – 79	6,569	272,927,922	41,548
80 – 84	4,064	166,904,760	41,069
85 – 89	2,512	97,200,408	38,694
90 – 94	1,353	45,561,405	33,674
95 & Over	483	13,478,370	27,906
Total	47,038	$ 2,012,459,740	$ 42,784

NUMBER OF BENEFICIARIES AND THEIR BENEFITS BY AGE

Age	Number	Total Annual Benefits	Average Annual Benefits
Under 50	246	$ 5,788,247	$ 23,529
50 – 54	118	3,294,630	27,921
55 – 59	188	5,072,031	26,979
60 – 64	370	10,322,354	27,898
65 – 69	502	14,884,903	29,651
70 – 74	723	20,523,734	28,387
75 – 79	841	22,473,859	26,723
80 – 84	874	22,730,749	26,008
85 – 89	797	20,383,875	25,576
90 – 94	560	14,129,383	25,231
95 & Over	241	6,213,535	25,782
Total	5,460	$ 145,817,300	$ 26,706

NUMBER OF DEFERRED VESTED MEMBERS AND THEIR BENEFITS BY AGE

Age	Number	Total Annual Benefits	Average Annual Benefits
Under 50	1,144	$ 12,289,257	$ 10,742
50 – 54	450	7,536,572	16,748
55 – 59	383	5,982,032	15,619
60 – 64	220	2,237,336	10,170
65 & Over	240	983,469	4,098
Total	2,437	$ 29,028,666	$ 11,912

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 6/30/2020
Age & Service Retirements. If members retire at older ages, there is a gain. If younger ages, a loss.	$ (168.0)
Disability Retirements. If disability claims are less than assumed, there is a gain. If more claims, a loss.	(32.0)
Death-in Service Benefits. If survivor claims are less than assumed, there is a gain. If more claims, there is a loss.	(8.2)
Withdrawal From Employment. If more liabilities are released by withdrawals than assumed, there is a gain. If smaller releases, a loss.	22.9
Pay Increases. If there are smaller pay increases than assumed, there is a gain. If greater increases, a loss.	98.0
New Members. Additional unfunded accrued liability will produce a loss.	(103.9)
Investment Income. If there is a greater investment income than assumed, there is a gain. If less income, a loss.	(232.9)
Death After Retirement. If retirants live longer than assumed, there is a loss. If not as long, a gain.	78.1
Other. Miscellaneous gains and losses resulting from changes in valuation software, data or asset adjustments, timing of financial transactions, etc.	(31.0)
Gain (or Loss) During Year From Financial Experience	$ (377.1)
Non-Recurring Items. Adjustments for plan amendments, assumption changes, or method changes.	0.0
Composite Gain (or Loss) During Year	$ (377.1)

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, 2019: (A)	$13,275,692,603
Market Value of Assets on June 30, 2020: (B)	$13,249,488,272
Investment Income for FY 2019-2020: (I)	$295,737,290
Actual Rate of Return for FY 2019-2020: 2I / (A + B – I)	2.26%
Actuarial Interest Rate Assumption:	6.90%

Actual return of 2.26% 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, 2020:	$13,311,109,931
Specified Liabilities on June 30, 2020:	
Liability for Retired Members	$27,190,014,040
Liability for Terminated Vested Members	$278,807,701
Liability for Member Contributions with Interest	$1,622,744,137
Total	$29,091,565,878
50% of Specified Liabilities	$14,545,782,939

Market Value does not exceed 50% of specified liabilities so the second criterion is not 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, 2020:	$22,726,058,302
Projected Unfunded Liability on June 30, 2025 (see next page):	$6,837,282,000

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).

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	8,804,428
1992	1,920,505	2007	2,698,021	2022	8,411,458
1993	1,794,192	2008	2,823,251	2023	7,956,355
1994	1,787,586	2009	2,861,884	2024	7,433,609
1995	1,780,419	2010	2,895,933	2025	6,837,282
1996	1,772,643	2011	2,924,709	2026	6,160,985
1997	1,764,205	2012	4,160,465	2027	5,397,841
1998	1,835,087	2013	4,172,971	2028	4,540,451
1999	1,907,249	2014	4,174,465	2029	3,580,857
2000	2,222,296	2015	4,163,616	2030	2,510,500
2001	2,291,494	2016	10,057,733	2031	1,320,178
				2032	0

Schedule J – Projections of Unfunded Accrued Liability

Valuation Year	Unfunded Accrued Liability ($ in thousands)	Amortization Payment ($ in thousands)
2020	22,726,058	1,780,481
2021	22,501,212	1,919,668
2022	22,134,128	1,919,668
2023	21,741,715	1,919,668
2024	21,322,226	1,919,668
2025	20,873,791	1,919,668
2026	20,394,415	1,919,668
2027	19,881,962	1,919,668
2028	19,334,149	1,919,668
2029	18,748,538	1,919,668
2030	18,122,519	1,919,668
2031	17,453,305	1,919,668
2032	16,737,915	1,919,668
2033	15,973,164	1,919,668
2034	15,155,644	1,919,668
2035	14,281,716	1,919,668
2036	13,347,486	1,919,668
2037	12,348,795	1,919,668
2038	11,281,194	1,919,668
2039	10,139,929	1,919,668
2040	8,919,916	1,919,668
2041	7,615,722	1,919,668
2042	6,221,539	1,919,668
2043	4,731,158	1,869,620
2044	3,187,987	1,782,047
2045	1,625,911	1,738,099
2046	0	0