stoneconsulting, inc

December 12, 2017

Concord Retirement Board
P.O. Box 535
22 Monument Square
Concord, MA 01742

Dear Concord Retirement Board:

Stone Consulting, Inc. has performed a January 1, 2017 actuarial valuation of the Concord Retirement System. This valuation and report was prepared using generally accepted actuarial principles and practices. To the best of our knowledge, this report is complete and accurate, and the assumptions used represent our best estimate of anticipated experience of the system except where noted in the text.

As part of performing the valuation, Stone Consulting, Inc. was furnished member data by the Concord Retirement System's administrative staff. Although examined for general reasonableness, the data was not audited by the actuary. In addition, the administrative staff furnished financial statements that were not audited by the actuary or by the plan's auditors.

The funding objective of the plan is to fully fund the system while attempting to maintain a stable contribution amount for the upcoming fiscal year that is consistent with prior funding schedules or if employer finances allow it, to increase the contribution amount. This funding objective is being met.

We anticipate over time the contribution level to increase as a percentage of payroll. The contribution rate is determined by adding the normal cost plus an amortization of the unfunded actuarial accrued liability. The normal cost is expected to remain at a level percentage of payroll. The length of the funding schedule contained in this actuarial valuation report is eleven years (fully funded in 2029). The amortization of the unfunded liability is set to remain level for the duration of the schedule.

The contribution amount for Fiscal Year 2019 is $5,667,902 which is $33,325 greater than the anticipated contribution amount from the prior funding schedule. PERAC and GASB guidelines indicate that actuarial valuations should be conducted at least every other year. The Concord Retirement Board conducted their previous actuarial valuation effective January 1, 2016.

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Future actuarial measurements may differ significantly from the current measurements 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 natural operation of the methodology used for these measurements such as additional contribution requirements based on the plan's funded status, and changes in plan provisions or applicable law. As part of the valuation, we have not performed an analysis of the potential range of future measurements.

Stone Consulting, Inc. is completely independent of the Town of Concord. This includes any of its officers and key personnel. Neither we or anyone else closely associated with us has any relationship with the Town of Concord that would impair our independence, other than this or related assignments.

We are pleased to present the results of this valuation. If the Retirement Board has any questions on the content of this report, we would be glad to respond. Please note that this report is meant to be used in its entirety. Use of excerpts of this report may result in inaccurate or misleading understanding of the results.

I, Lawrence Stone, am a consultant for Stone Consulting, Inc. I am a member of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Respectfully submitted,
STONE CONSULTING, INC.
Actuaries for the Plan

Lawrence B. Stone

Lawrence B. Stone
Member, American Academy of Actuaries

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Introduction

This report presents the results of the actuarial valuation of the Concord Retirement System. The valuation was performed at the request of the Retirement Board as of January 1, 2017 for the purpose of determining the contribution requirements for Fiscal Year 2019 and beyond. The contribution requirements are based on:

- The financial condition of the system as of December 31, 2016;
- The benefit provisions of M.G.L. Chapter 32 and related statutes;
- The demographics of members in the system (i.e., active and inactive participants, retirees and beneficiaries as of January 1, 2017);
- Economic assumptions regarding salary increases and investment earnings; and
- Other actuarial assumptions (e.g., withdrawals, retirement, death, etc.)

Valuation Summary

	January 1, 2017 Valuation	January 1, 2016 Valuation	Change
Contribution Fiscal 2019	$5,667,902	$5,634,578	$33,325 increase
Funding Schedule Length (as of Fiscal 2019)	11 years	12 years	1 year decrease
Amortization Increase	0.00%	2.00%	-2.00%
Funding Ratio	85%	83%	3%
Interest Rate Assumption	7.00%	7.00%	0.00%
Salary Increase Rate Assumption	4.00% ultimate rate, lowered to 3.50% while receiving the following steps: Police: 5.2% in year one, 5.6% in year two, 7.3% in year three, 5.0% in year four, 4.8% in year five Fire: 4.7% for three years Others: 4.3% for seven years	Same select and ultimate assumption	No change

- Stone Consulting, with agreement from the Retirement Board, values assets using a four-year asset smoothing method. In this approach, asset gains and losses are recognized over a four-year period. The purpose of this approach is to avoid wide swings in asset value from one year to the next.

- The System, over the one-year period from January 1 to December 31, 2016, experienced a 8.0% annual return on the market value of assets versus our assumption of 7.00%. There was a $1,359,962 net actuarial gain in calendar year 2016. The System's asset portfolio, effective December 31, 2016 is approximately 69% equities and 31% fixed income and short-term investments. The interest rate assumption was maintained at 7.00% to reflect anticipated future market performance.

- The investment return assumption is a long-term assumption and is based on capital market expectations by asset class, historical returns, and professional judgement.

- The salary increase assumption is based on a select and ultimate table, with a 4.00% ultimate rate, reduced to 3.50% for employees receiving steps. Police employees receive steps of 5.2% in year one, 5.6% in year two, 7.3% in year three, 5.0% in year four, and 4.8% in year five. Fire employees receive three years of 4.7% steps. All other employees receive 4.3% steps for their first seven years of service. This assumption has been maintained from the prior valuation. Total compensation changed by 5.6% over the prior valuation; however average annual compensation (compensation divided by number of active members) only changed by 2.5%.

- Payroll for active employees included in the 2016 valuation was $233 thousand lower than projected. This resulted in a $784 thousand decrease in the accrued liability. The salary increase assumption reflects prior experience including PERAC's 2002 local experience study, current expectations, and professional judgement.

- The funding level of the Concord Retirement System is 85% compared to 83% for the January 1, 2016 actuarial valuation. The funding level is estimated to be in the top quartile of Massachusetts' Contributory Retirement Systems.

The schedule length is eleven (11) years, a one year reduction compared to the 12 years remaining from the 13 year schedule from the January 1, 2016 valuation. The maximum period permitted under Section 22D of Chapter 32 of the Massachusetts General Laws is twelve years (Fiscal 2040). The amortization of the unfunded liability remains level.

- Non-economic assumptions were changed from the January 1, 2016 actuarial valuation. The mortality assumption is based upon the RP-2014 table projected generationally from 2006 using MP-2016. The previous assumption used the RP-2000 table projected generationally from 2000 with Scale BB. The net effect of this change decreased the present value of future benefits by $1.5 million.

January 1, 2017 Actuarial Valuation Results

	January 1, 2017	January 1, 2016	Percentage Change
Funding			
Contribution for Fiscal 2019	$5,667,902		0.6%
Contribution for Fiscal 2019 based on current schedule		$5,634,578	
Members			
Actives			
a. Number	535	519	3.1%
b. Annual Compensation	$31,625,584	$29,941,179	5.6%
c. Average Annual Compensation	$59,113	$57,690	2.5%
d. Average Attained Age	49.0	49.4	-0.7%
e. Average Past Service	11.5	12.0	-4.3%
Retired, Disabled and Beneficiaries			
a. Number	288	279	3.2%
b. Total Benefits*	$7,525,724	$6,856,829	9.8%
c. Average Benefits*	$26,131	$24,576	6.3%
d. Average Age	73.4	73.2	0.2%
Inactives			
a. Number	143	139	2.9%
Normal Cost			
a. Total Normal Cost as of January 1, 2017	$4,859,779	$4,625,336	5.1%
b. Less Expected Members' Contributions	2,921,540	2,726,688	7.1%
c. Normal Cost to be funded by the Municipality	$1,938,239	$1,898,648	2.1%
d. Adjustment to July 1, 2018	124,866	122,316	2.1%
e. Administrative Expense Assumption	264,766	285,141	-7.1%
f. Normal Cost Adjusted to July 1, 2018	$2,327,871	$2,306,105	0.9%
Actuarial Accrued Liability as of January 1, 2017			
a. Active Members	$93,473,733	$93,599,121	-0.1%
b. Inactive Members	2,467,030	1,694,591	45.6%
c. Retired Members and Beneficiaries	78,448,853	71,717,781	9.4%
d. Total	$174,389,616	$167,011,493	4.4%
Unfunded Actuarial Accrued Liability			
a. Actuarial Accrued Liability as of January 1, 2017	$174,389,616	$167,011,493	4.4%
b. Less Actuarial Value of Assets as of January 1, 2017	148,500,222	137,855,240	7.7%
c. Unfunded Actuarial Accrued Liability as of January 1, 2017	$25,889,394	$29,156,253	-11.2%
d. Adjustment to July 1, 2018	$401,692	$1,015,211	
e. Unfunded Actuarial Accrued Liability as of July 1, 2018	$26,291,086	$30,171,464	

*Excluding State reimbursed COLA

Data and History of Active Participants

- The data was supplied by the Concord Retirement Board. The data was checked under broad parameters for reasonableness. With the assistance of the staff of the Concord Retirement Board, we were able to develop a database sufficient for valuation purposes.

Valuation Year	Number	Average Age	Average Past Service	Average Ann'l Compensation
2017	535	49.0	11.5	$59,113
2016	519	49.4	12.0	$57,690
2015	513	49.6	12.2	$57,083
2014	502	49.5	12.3	$54,809
2012	493	49.3	12.0	$51,159
2010	488	48.7	11.7	$49,378
2008	461	48.2	11.3	$46,193
2006	451	47.8	11.1	$41,963
2004	438	47.1	10.5	$41,086
2002	444	46.2	10.0	$37,784
2000	434	45.6	9.7	$34,119

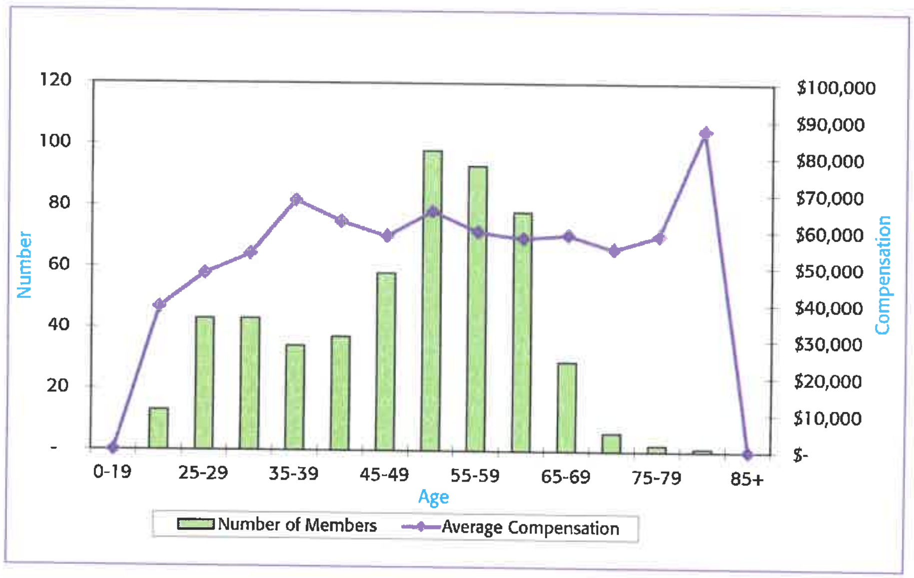
- Employee age has increased by 3.4 years and service has increased by 1.8 years over the course of the past seventeen years. This is consistent with the trend in the Commonwealth towards an aging of the employee population, and the recent slowdown or reversal in that trend. Average annual compensation has grown by 73.3% (3.3% annually) over the same time period.

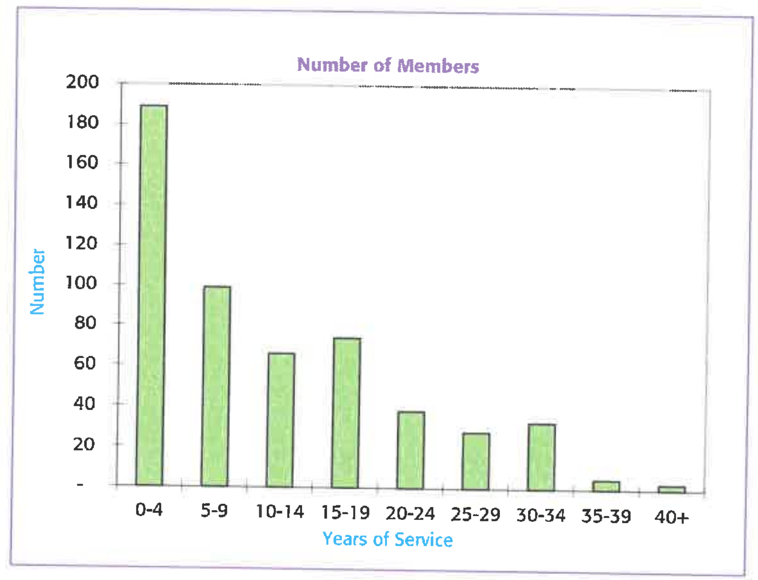
The charts on the following pages summarize demographic information regarding active and retiree members.

Distribution of Plan Members as of January 1, 2017

ACTIVE MEMBERS

AGE	0-4 Years	5-9 Years	10-14 Years	15-19 Years	20-24 Years	25-29 Years	30-34 Years	35-39 Years	40 + Years	Total	Total Compensation	Average Compensation
0-19	-	-	-	-	-	-	-	-	-	-	$ -	$ -
20-24	13	-	-	-	-	-	-	-	-	13	$ 506,826	$ 38,987
25-29	41	2	-	-	-	-	-	-	-	43	$ 2,077,820	$ 48,321
30-34	28	13	2	-	-	-	-	-	-	43	$ 2,307,743	$ 53,668
35-39	11	12	8	3	-	-	-	-	-	34	$ 2,315,757	$ 68,111
40-44	15	8	3	10	1	-	-	-	-	37	$ 2,311,232	$ 62,466
45-49	21	12	4	11	6	4	-	-	-	58	$ 3,394,710	$ 58,529
50-54	24	18	12	16	6	10	12	-	-	98	$ 6,387,632	$ 65,180
55-59	15	16	22	13	11	5	8	3	-	93	$ 5,552,622	$ 59,706
60-64	16	13	9	11	8	8	11	2	-	78	$ 4,527,126	$ 58,040
65-69	5	5	5	5	5	1	1	-	2	29	$ 1,708,125	$ 58,901
70-74	-	-	1	2	1	-	1	-	1	6	$ 331,078	$ 55,180
75-79	-	-	-	2	-	-	-	-	-	2	$ 117,607	$ 58,804
80-84	-	-	-	1	-	-	-	-	-	1	$ 87,305	$ 87,305
85+	-	-	-	-	-	-	-	-	-	-	$ -	$ -
TOTAL	189	99	66	74	38	28	33	5	3	535	$ 31,625,584	$ 59,113





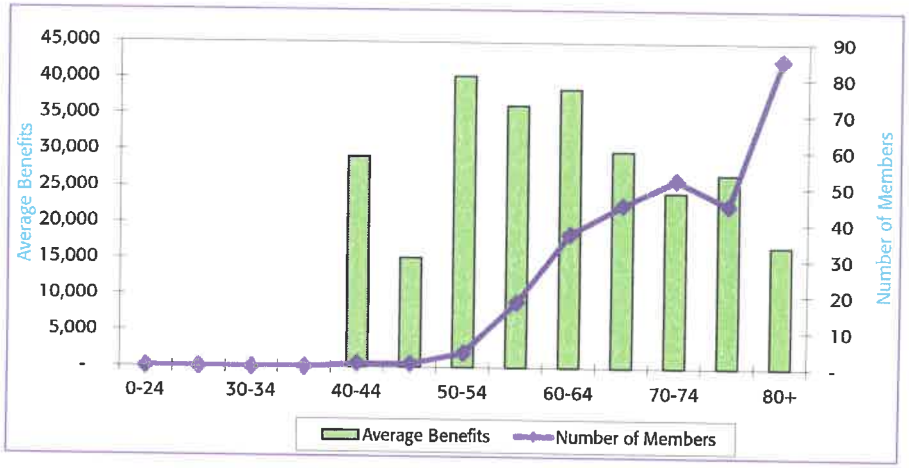
Distribution of Plan Members as of January 1, 2017

RETIRED MEMBERS

Retired Members and Beneficiaries			
Age	Number	Average Benefit	Total Benefit
0-24	-	-	-
25-29	-	-	-
30-34	-	-	-
35-39	-	-	-
40-44	-	-	-
45-49	1	15,152	15,152
50-54	3	39,390	118,170
55-59	14	41,485	580,796
60-64	31	39,939	1,238,097
65-69	43	29,200	1,255,609
70-74	50	24,338	1,216,902
75-79	41	26,760	1,097,170
80+	84	16,710	1,403,657
TOTAL	**267**	**$ 25,938**	**$ 6,925,553**

Disabled Members			
Age	Number	Average Benefit	Total Benefit
0-24	-	-	-
25-29	-	-	-
30-34	-	-	-
35-39	-	-	-
40-44	1	29,079	29,079
45-49	-	-	-
50-54	1	43,128	43,128
55-59	4	17,945	71,778
60-64	6	31,210	187,261
65-69	2	45,333	90,666
70-74	2	22,296	44,593
75-79	4	27,214	108,854
80+	1	24,812	24,812
TOTAL	**21**	**$ 28,580**	**$ 600,171**

Total			
Age	Number	Average Benefit	Total Benefit
0-24	-	-	-
25-29	-	-	-
30-34	-	-	-
35-39	-	-	-
40-44	1	29,079	29,079
45-49	1	15,152	15,152
50-54	4	40,325	161,298
55-59	18	36,254	652,574
60-64	37	38,523	1,425,358
65-69	45	29,917	1,346,275
70-74	52	24,260	1,261,495
75-79	45	26,801	1,206,024
80+	85	16,806	1,428,469
TOTAL	**288**	**$ 26,131**	**$ 7,525,724**



Benefits shown are net of State reimbursed COLA.

Valuation Methodology

Stone Consulting, Inc. used the Entry Age Normal actuarial funding method in this actuarial valuation. The use of the Entry Age Normal actuarial funding method is consistent with the requirements of Chapter 32 of the Massachusetts General Laws.

NORMAL COST

	January 1, 2017	% of Payroll*
Gross Normal Cost (GNC)	$4,859,779	15.4%
Employees Contribution	$2,921,540	9.2%
Net Normal Cost (NNC)	$1,938,239	6.1%
Adjusted to Beginning of Fiscal Year 2019	$124,866	
Administrative Expense	$264,766	0.8%
Adjusted Net Normal Cost With Admin. Expense	$2,327,871	

*Payroll paid in 2016 for employees as of January 1, 2017 is $31,625,584. Payroll for new hires in 2016 was annualized. Amounts may not total due to rounding.

- The gross normal cost (GNC) is the "price" of benefits accruing in the current year if the assumptions underlying the normal cost were realized.

- An individual normal cost represents that part of the cost of a member's future benefits that are assigned to the current year as if the costs are to remain level as a percentage of the member's pay. Benefits payable under all circumstances (i.e., retirement, death, disability, and withdrawals) are included in this calculation.

- Anticipated employee contributions to be made during the year are subtracted from the GNC to determine employer normal cost, or net normal cost (NNC).

- Administrative expenses added to the NNC. The administrative expense does not include investment manager and custodial fees. These fees are considered part of the interest rate assumption that is net of fees.

Actuarial Accrued Liability and Funded Status

				January 1, 2017	Percentage Change
Active Actuarial Accrued Liability			$	93,473,733	-0.1%
Superannuation	$	86,859,437			
Death	$	1,905,858			
Disability	$	3,745,306			
Withdrawal	$	963,132			
Retiree, Inactive, Survivor and Beneficiary Actuarial Accrued Liability			$	80,915,883	10.2%
Retirees and Beneficiaries	$	71,266,327			
Disabled	$	7,182,526			
Inactive	$	2,467,030			
Total Actuarial Accrued Liability (AAL)			$	174,389,616	4.4%
Actuarial Value of Assets (AVA)			$	148,500,222	7.7%
Unfunded Actuarial Accrued Liability			$	25,889,394	-11.2%
Funded Ratio (AVA / AAL)					
2017 (7.00% interest rate):		85%			
2016 (7.00% interest rate):		83%			

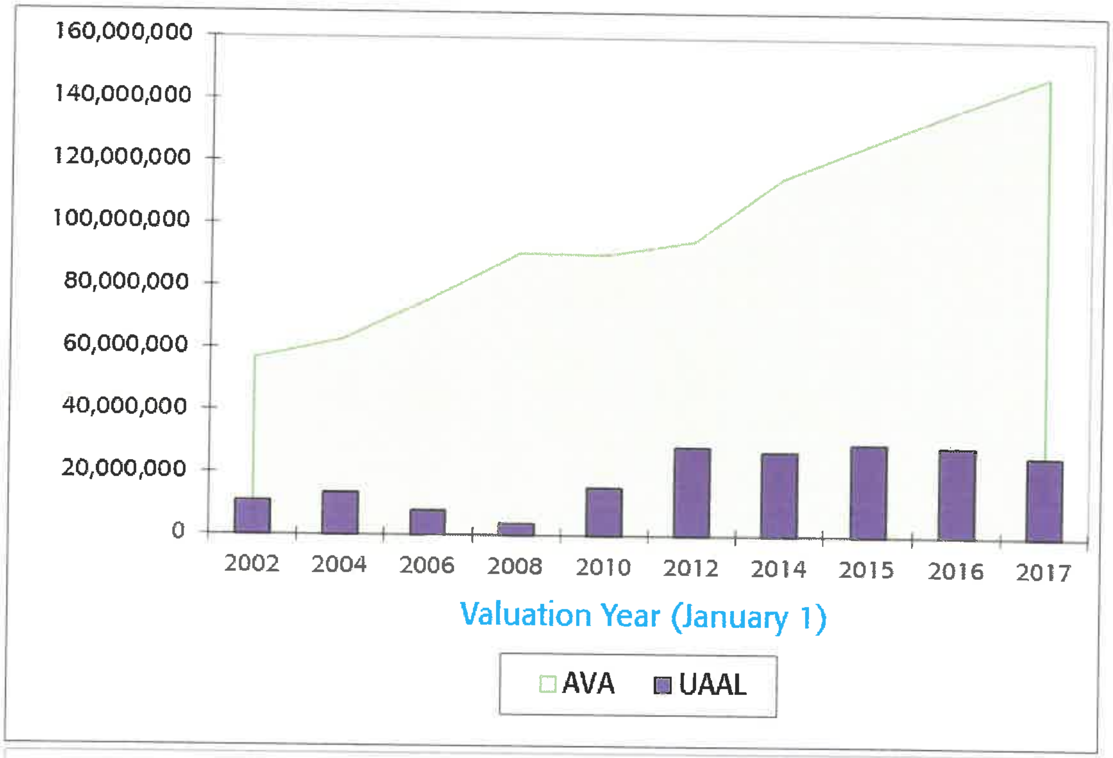
- Actuarial Accrued Liability (AAL) is the "price" of benefits attributable to benefits earned in past years, or in other words, represents today's value of all benefits earned by active and inactive members.

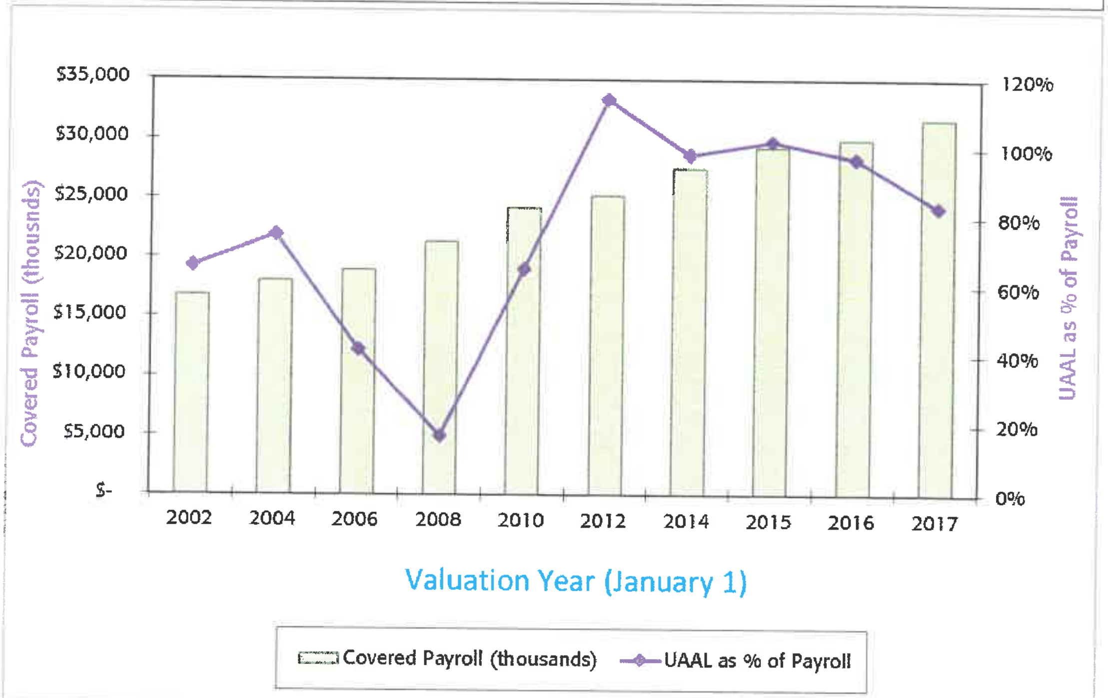
The total AAL is $174,389,616. This along with an actuarial value of assets of $148,500,222 produces a funded status of 85%. This compares to a funded status of 83% for the 2016 valuation.

The UAAL and funded ratio are measures of the plan's funded status. These measure reflect the plan's position as of January 1, 2017. We believe these measures, by themselves, are not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations or assessing the need for or the amount of future contributions. However, we believe these measures, in conjunction with the plan's funding schedule, are appropriate for assessing the amount of future contributions.

The chart on the following page contains a history of the covered payroll, unfunded actuarial accrued liability (UAAL), and the valuation assets (AVA) over the course of the past ten actuarial valuations.

Charts of Selected Actuarial and Demographic Statistics





Development of Funding Schedule

Net Employer Normal Cost for Fiscal 2019 (including admin. expenses)	2,327,871
Net 3(8)(c) Payments	63,305
Amortization	3,276,727
Total Appropriation required for Fiscal 2019	5,667,902

- The funding schedule is composed of the normal cost, the net 3(8)(c) payments and the amortization of the actuarial accrued unfunded liability and is adjusted by the administrative expense assumption. The contribution is assumed to be made at the beginning of the fiscal year. The 3(8)(c) payments are the amount that the Concord Retirement System pays to or receives from other retirement boards for service that a retiree had with a different retirement system. The net 3(8)(c) payments is the difference between what the Concord Retirement System paid out minus what was received by the System.

- The contribution amount for Fiscal 2019 is $5,667,902. The funding schedule is presented on page 11. The schedule's length is eleven (11) years (for the fresh start base) which is equal to the remainder of the 12 year schedule from the January 1, 2016 valuation. The maximum funding schedule length allowed by Section 22D of Chapter 32 of the Massachusetts General Laws is twelve years to Fiscal 2030.

- In developing the funding schedule, we used a fresh start approach in which the unfunded actuarial accrued liability (UAAL), other than the UAAL due to past early retirement incentives, is reamortized instead of maintaining the existing amortization amount and separately amortizing the actuarial gain or loss. The use of a fresh-start approach can result in a funding schedule in which the changes in contribution amounts from year to year are more consistent. The amortization of the unfunded liability remains level from year to year.

FUNDING SCHEDULE

Fiscal Year	Normal Cost	Unfunded Liability	Funding Amortization of UAAL	Net 3(8)(c) Payments	Schedule Contribution*
2019	2,327,871	26,291,086	3,276,727	63,305	5,667,902
2020	2,426,806	24,625,364	3,276,727	63,305	5,766,837
2021	2,529,945	22,843,041	3,276,727	63,305	5,869,976
2022	2,637,467	20,935,957	3,276,727	63,305	5,977,499
2023	2,749,560	18,895,376	3,276,727	63,305	6,089,591
2024	2,866,416	16,711,954	3,276,727	63,305	6,206,448
2025	2,988,239	14,375,693	3,276,727	63,305	6,328,270
2026	3,115,239	11,875,894	3,276,727	63,305	6,455,270
2027	3,247,637	9,201,109	3,276,727	63,305	6,587,668
2028	3,385,661	6,339,089	3,276,727	63,305	6,725,693
2029	3,529,552	3,276,727	3,276,727	63,305	6,869,583
2030	3,679,558	-	-	63,305	3,742,862

Amortization of Unfunded Liability as of July 1, 2017

Year	Type	Original Amort. Amount	Percentage Increasing	Original # of Years	Current Amort. Amount	Years Remaining
2019	Fresh Start	3,276,727	0.00%	11	3,276,727	11

Notes on Amortization of Unfunded Liability

Year is the year the amortization base was established. **Type** is the reason for the creation of the base. **Original Amortization Amount** is the annual amortization amount when the base was established. **Percentage Increasing** is the percentage that the Original Amortization Amount increases per year. **Original # of Years** is the number of years over which the base is being amortized. **Current Amortization Amount** is the amortization payment amount for this year. **Years Remaining** is the number of years left to amortize the base.

Assumptions and Methodology Summary

The principal actuarial assumptions used in this valuation are the same as the assumptions used in the previous valuation, except where noted, and are summarized in the following table:

Valuation Date	January 1, 2017 Valuation
Interest Rate	7.00% (same as prior valuation).
Salary Increase	4.00% ultimate rate, reduced to 3.50% while receiving steps: • Police: 5.2% in year one, 5.6% in year two, 7.3% in year three, 5.0% in year four, and 4.8% in year five. • Fire: three years of 4.7% steps • All other employees: seven years of 4.3% steps
COLA	3% of 12,000
COLA Frequency	Granted every year
Mortality	RP-2014 table projected generationally from 2006 using MP-2016. For members retired under an Accidental Disability (job-related), 40% of deaths are assumed to be from the same cause as the disability. Disabled mortality RP-2014 table projected generationally from 2006 using MP-2016, ages set forward 2 years. (Prior valuation used RP-2000 table projected generationally from 2000 with Scale BB.)
Overall Disability	Groups 1 and 2 45% ordinary disability 55% accidental disability Group 4 10% ordinary disability 90% accidental disability
Retirement Rates	Groups 1 and 2 Ages 55 – 70 Group 4 Ages 50 – 65
Administrative Expense	$264,766 budget estimated for FY 2019 provided by Concord Retirement Board.

Assets

	Cash	$	3,176,889.93
	Fixed Income Securities		30,536,694.97
	Pooled Domestic Equity Funds		46,201,416.22
	Pooled International Equity Funds		3,553,660.71
	Pooled Alternative Investments		1,628,673.78
	Pooled Real Estate Funds		7,360,410.67
	PRIT Cash		.68
	PRIT FUND		52,640,545.92
A	Sub-Total:	$	145,098,292.88
	Interest Due and Accrued		189,310.29
	Accounts Receivable		51,429.99
B	Sub-Total:	$	240,740.28
	Market Value of Assets [(A) + (B)]	$	145,339,033.16

- We were furnished with the System's annual report by the Board. The market value of assets as of December 31, 2016 (adjusted for payables and receivables) is $145,339,033.16.

- The asset allocation is approximately 31% fixed income, cash, receivables and payables and 69% equities, alternative investments, hedge funds and similar types of investments. Historically, 10% to 11% has been the expected long-term rate of return for equities, and 6% to 7% has been the expected long-term rate of return for fixed income securities. Many economists and investment professionals are projecting lower returns of 7% to 8% for equities and 4% to 6% for fixed income securities. In light of these projections, as well as historical investment returns, the 7.00% interest rate assumption is within the reasonable assumption range. We encourage close monitoring for changes in investment performance against expectations.

- Actuarial value of assets (AVA) of $148,500,222 is based on a four-year smoothing method. Investment gains or losses above or below the expected rate of investment return are recognized over 4 years, 25% per year. The AVA must be no more than 110% of the market value of assets and no less than 90% of the market value of assets.

Calculation of Valuation Assets as of January 1, 2017

FOUR-YEAR ASSET SMOOTHING

1. Market value of assets including receivable/payable as of 01/01/2017 — $145,339,033

2. Phase-in of asset gains and losses

	Plan Year (1)	Original Amount (2)	Percent Unrecognized (3)	Amount Unrecognized (2) x (3)
a.	2016	$1,359,962	75%	$1,019,971
b.	2015	($9,213,689)	50%	($4,606,845)
c.	2014	$1,702,738	25%	$425,684
d.	2013	$7,881,687	0%	$0
e.	Total	($1,730,697)		($3,161,189)

3. Valuation assets without corridor as of 01/01/2017 (1. - 2.e.) — $148,500,222

4. Corridor Check
   a. 90% of Market Value — $130,805,130
   b. 110% of Market Value — $159,872,936

5. Valuation assets with corridor as of 01/01/2017 (3. within Corridor) — $148,500,222

6. Calculation of return on valuation assets
   a. Valuation assets as of 01/01/2014 — $137,855,240
   b. ER contribs + EE contribs - Ben Pymts - Expenses — $819,936
   c. Actual return on valuation assets 5. - (6.a. + 6.b.) — $9,825,046
   d. Weighted value of valuation assets — $138,265,208
   e. Return on valuation assets (6.c. / 6.d.) — 7.1%
   f. Annualized return on assets — 7.1%

Disclosure Information

SCHEDULES OF FUNDING PROGRESS
(Dollars In Thousands)

Actuarial Valuation Date	Actuarial Value of Assets A	Actuarial Accrued Liability B	Unfunded AAL (UAAL) B-A	Funded Ratio A/B	Covered Payroll C	UAAL as a % of Covered Payroll (B-A)/C
1/1/2017	$148,500	$174,390	$25,890	85%	$31,626	82%
1/1/2016	$137,855	$167,011	$29,156	83%	$29,941	97%
1/1/2015	$126,817	$156,552	$29,735	81%	$29,283	102%
1/1/2014	$115,340	$142,405	$27,065	81%	$27,514	98%
1/1/2012	$94,996	$123,798	$28,802	77%	$25,221	114%

NOTES TO SCHEDULES

Additional information as of the latest actuarial valuation follows:

Valuation Date	1/1/2017
Actuarial cost method	Entry Age Normal
Amortization method	Level amortizations
Remaining amortization period	11 years for the fresh start base
Asset valuation method	Market value adjusted by accounts payable and receivables adjusted to phase in over 4 years investment gains or losses above or below the expected rate of investment return. The actuarial value of assets must be no less than 90% of the adjusted market value nor more than 110% of the adjusted market value. Market value of assets is $145,339,033.16
Actuarial assumptions:	
Investment Rate of Return	7.00% per year
Projected Salary Increases	4.00% ultimate rate, reduced to 3.50% while receiving steps: • Police: 5.2% in year one, 5.6% in year two, 7.3% in year three, 5.0% in year four, and 4.8% in year five. • Fire: three years of 4.7% steps • All other employees: seven years of 4.3% steps

PERAC Information Disclosure

The most recent actuarial valuation of the System was prepared by Stone Consulting, Inc. as of January 1, 2017

The normal cost for employees on that date was:	$2,921,540	9.2% of payroll
The normal cost for the employer was:	$1,938,239	6.1% of payroll

The actuarial liability for active members was:	$93,473,733
The actuarial liability for retired members was (includes inactives):	$80,915,883
Total actuarial accrued liability:	$174,389,616
System assets as of that date ($145,339,033.16 Market Value):	$148,500,222
Unfunded actuarial accrued liability:	$25,889,394

The ratio of system's assets to total actuarial liability was:	85%

As of that date the total covered employee payroll was:	$31,625,584

The principal actuarial assumptions used in the valuation are as follows:

Investment Return:	7.00% per annum
Rate of Salary Increase:	Select and ultimate rate (4.00% ultimate rate)

SCHEDULE OF FUNDING PROGRESS (Dollars in $000's)

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded AAL (UAAL) (b-a)	Funded Ratio (a/b)	Covered Payroll (c)	UAAL as a % of Covered Payroll ((b-a)/c)
1/1/2017	$148,500	$174,390	$25,890	85%	$31,626	82%
1/1/2016	$137,855	$167,011	$29,156	83%	$29,941	97%
1/1/2015	$126,817	$156,552	$29,735	81%	$29,283	102%
1/1/2014	$115,340	$142,405	$27,065	81%	$27,514	98%
1/1/2012	$94,996	$123,798	$28,802	77%	$25,221	114%

Actuarial Methods and Assumptions

ACTUARIAL METHODS

Actuarial Cost Method

The Entry Age Normal Actuarial Cost Method has been used in this valuation. Under this method, the normal cost is the amount calculated as the level percentage of compensation necessary to fully fund the prospective benefits from each member's entry age to retirement age.

The actuarial accrued liability represents the theoretical accumulation of all prior years' normal costs for the plan members as if the program had always been in effect. The unfunded actuarial accrued liability is the excess of the actuarial accrued liability over plan assets.

Asset Valuation Method

Market value of assets (adjusted by payables and receivables) adjusted to phase in investment gains or losses above or below the expected rate of investment return over a four-year rolling period. The phase-in is 25% for year one, 50% for year two, 75% for year three and finally 100% for year four. The actuarial value of assets may be no less than 90%, or more than 110% of the market value of assets plus payables and receivables.

Fiscal Year Adjustment

The actuarial results are adjusted by the valuation interest rate and salary scale to the beginning of Fiscal Year 2019. The unfunded actuarial accrued liability is rolled forward with normal cost and further adjusted by anticipated contributions and interest.

ACTUARIAL ASSUMPTIONS

Investment Return

7.00% per year net of investment expenses.

Regular Interest Rate Credited to Annuity Savings Account

2% per year.

Salary Increases

4.00% ultimate rate, reduced to 3.50% while receiving steps:

- Police: 5.2% in year one, 5.6% in year two, 7.3% in year three, 5.0% in year four, and 4.8% in year five
- Fire: three years of 4.7% steps
- All other employees: seven years of 4.3% steps

Actuarial Methods and Assumptions
(Continued)

Withdrawal Prior to Retirement

The rates shown at the following sample ages illustrate the withdrawal assumption. Withdrawal rates are set to zero if the retirement rate at that age is nonzero.

Rate of Withdrawal

Service	Group 1 and 2	Group 4
0	15%	1.5%
1	12%	1.5%
2	10%	1.5%
3	9%	1.5%
4	8%	1.5%
5	7.6%	1.5%
10	5.4%	1.5%
15	3.3%	0.0%
20	2.0%	0.0%
25	1.0%	0.0%
30+	0.0%	0.0%

Disability Prior to Retirement

The rates shown at the following sample ages illustrate the assumption regarding the incidence of disability:

Rate of Disability

Age	Group 1 and 2	Group 4
20	0.01%	0.10%
25	0.02%	0.20%
30	0.03%	0.30%
35	0.06%	0.30%
40	0.10%	0.30%
45	0.15%	1.00%
50	0.19%	1.25%
55	0.24%	1.20%
60	0.28%	0.85%

Disability is assumed to be 45% ordinary and 55% accidental for Group 1 and 2 and 10% ordinary and 90% accidental for Group 4.

Actuarial Methods and Assumptions
(Continued)

Rates of Retirement

The rates shown at the following ages illustrate the assumption regarding the incidence of retirement, once the member has achieved 10 years of service:

				Hired after 4/1/2012		
Age	Group 1& 2 Male	Group 1 & 2 Female	Group 4	Group 1& 2 Male	Group 1 & 2 Female	Group 4
50	1%	1.5%	2%	0%	0%	0%
51	1%	1.5%	2%	0%	0%	0%
52	1%	2.0%	2%	0%	0%	0%
53	1%	2.5%	2%	0%	0%	0%
54	2%	2.5%	7.5%	0%	0%	0%
55	2%	5.5%	15%	0%	0%	10%
56	2.5%	6.5%	10%	0%	0%	7%
57	2.5%	6.5%	10%	0%	0%	20%
58	5%	6.5%	10%	0%	0%	10%
59	6.5%	6.5%	15%	0%	0%	15%
60	12%	5%	20%	25%	30%	20%
61	20%	13%	20%	20%	13%	20%
62	30%	15%	25%	30%	15%	25%
63	25%	12.5%	25%	25%	12.5%	25%
64	22%	18%	30%	22%	18%	30%
65	40%	15%	100%	40%	15%	100%
66	25%	20%	N/A	25%	20%	N/A
67	25%	20%	N/A	25%	20%	N/A
68	30%	25%	N/A	30%	25%	N/A
69	30%	20%	N/A	30%	20%	N/A
70	100%	100%	N/A	100%	100%	N/A

Mortality

RP-2014 table projected generationally from 2006 using MP-2016 (sex-distinct). (Prior valuation used RP-2000 table projected generationally from 2000 with Scale BB). During employment the healthy employee mortality table is used. Post-employment the healthy annuitant table is used. In-service death is assumed to be 55% accidental for group 1 and 2 and 90% accidental for group 4.

Disabled Life Mortality

RP-2014 table projected generationally from 2006 using MP-2016 for healthy annuitants, set-forward by 2 years (sex-distinct). Death is assumed to be due to the same cause as the disability 40% of the time. (Prior valuation used RP-2000 table projected generationally from 2000 with Scale BB).

Actuarial Methods and Assumptions
(Continued)

Family Composition

Members assumed married with 2 dependent children – one male and one female both age 15; age difference between member and spouse assumed to be 3 years (the male being the older).

Cost-of-Living Increases

A 3% COLA on the first 12,000 of a member's retirement allowance is assumed to be granted every year.

Administrative Expenses

Estimated budgeted amount of $264,766 for the Fiscal Year 2019 excluding investment management fees and custodial fee is added to the Normal Cost.

Net 3(8)(c)

Net 3(8)(c) payments are assumed to be the same level as the past calendar year for all future years.

Step Increases

Step increases are assumed to be part of the salary increase assumption.

Credited Service

All service is assumed to be due to employment with the municipality.

Contribution Timing

Contributions are assumed to be made at the beginning of the fiscal year.

Total Payroll Increase

The total payroll is assumed to increase at 4.25% per year.

Valuation Date

January 1, 2017.

Summary of Principal Provisions

1. PARTICIPANT

Participation is mandatory for all full-time employees whose employment commences before age 65. There are three classes of members in the retirement system:

- Group 1: general employees
- Group 2: employees in specified hazardous occupations (e.g., electricians)
- Group 4: police and firefighters

2. MEMBER CONTRIBUTIONS

Member contributions vary depending upon date hired as follows:

Date of Hire	Member Contribution Rate
Prior to 1975	5% of Pay
1975 – 1983	7% of Pay
1984 – June 30, 1996	8% of Pay
After June 30, 1996	9% of Pay

Members hired after 1978 contribute an additional 2% of pay over $30,000.

3. PAY

a. Pay

Gross regular compensation excluding bonuses, overtime, severance pay, unused sick pay, and other similar compensation.

b. Average Pay

The average of pay during the three consecutive years that produce the highest average or, if greater, during the last three years (whether or not consecutive) preceding retirement. For members hired after April 1, 2012, five-year averages will be used.

4. CREDITED SERVICE

Period during which an employee contributes to the retirement system plus certain periods of military service and "purchased" service.

5. SERVICE RETIREMENT

a. Eligibility

Hired prior to April 2, 2012: Attainment of age 55 and completion of ten years of credited service or at any age with completion of 20 years of service. If hired prior to 1978 or a member of Group 4, the completion of ten years of service is not required.

Hired after April 1, 2012: Group 1 – Age 60 and Completion of 10 years of credited service; Group 2 – Age 55 and completion of 10 years of service; Group 4 – Age 55.

Summary of Principal Provisions (Continued)

b. Retirement Allowance

Determined as the product of the member's benefit percentage, average pay and credited service, where the benefit percentage is shown below (maximum allowance of 80% of average pay):

Benefit Percentage	Group 1	Group 2	Group 4
2.5%	65+	60+	55+
2.4	64	59	54
2.3	63	58	53
2.2	62	57	52
2.1	61	56	51
2.0	60	55	50
1.9	59	N/A	49
1.8	58	N/A	48
1.7	57	N/A	47
1.6	56	N/A	46
1.5	55	N/A	45
	Hired after April 1, 2012*		
2.5%	67+	62+	57+
2.35	66	61	56
2.20	65	60	55
2.05	64	59	54
1.90	63	58	53
1.75	62	57	52
1.60	61	56	51
1.45	60	55	50

*Reduction is .125% for each year early instead of .15% per year for employees with over 30 years of service.

In addition, veterans receive an additional $15 per year for each year of credited service up to 20 years

6. DEFERRED VESTED RETIREMENT

a. Eligibility

Completion of 10 years of credited service (for elected and appointed members, 6 years in the event of involuntary termination).

b. Retirement Allowance

Determined in the same manner as "Service Retirement" section above with the member eligible to start collecting a benefit at age 55, (or age 57 for post-April 1, 2012 hires) or defer until later at his or her discretion. If a member chooses, his or her contributions with interest may be withdrawn. The amount of interest he or she will receive depends on length of service and whether or not the termination of employment was voluntary.

Summary of Principal Provisions (Continued)

7. ORDINARY DISABILITY RETIREMENT

a. Eligibility

Non-job related disability after completion of 10 years of credited service.

b. Retirement Allowance

Determined in the same manner as "Service Retirement" section and calculated as if the member had attained age 55 (or age 57 for those hired after April 1, 2012), if younger. Veterans receive 50% of pay (during final year) plus an annuity based on accumulated member contributions with interest.

8. ACCIDENTAL DISABILITY RETIREMENT

a. Eligibility

Disabled as a result of an accident in the performance of duties. No age or service requirement.

b. Retirement Allowance

72% of pay plus an annuity based on accumulated member contributions with interest. Also, a dependent's allowance per year for each child. Total allowance not to exceed 100% of pay (75% for members hired after 1987).

9. NON-OCCUPATIONAL DEATH

a. Eligibility

Dies while in active service, but not due to occupational injury. 2 years of service.

b. Retirement Allowance

Benefit as if Option C had been elected (see below) and member had attained age 55 (or age 57 for those hired after April 1, 2012) if younger. Minimum monthly benefits provided as follows: spouse - $500, first child - $120, each additional child - $90

10. OCCUPATIONAL DEATH

a. Eligibility

Dies as a result of an occupational injury.

b. Benefit Amount

72% of pay plus refund of annuity savings fund balance. In the case of an accidental disability retiree who dies of the same cause, the beneficiary receives 72% of the last 12 months salary or the current pension amount, whichever is greater.

Summary of Principal Provisions
(Continued)

11. COST-OF-LIVING INCREASES

An increase of up to 3% applied to the first 12,000 of annual benefit. Funded by the Municipality from Fiscal Year 1999. Percentage increase is voted on each year by the Retirement Board. Cost-of-living increases granted during Fiscal Year 1982 through Fiscal 1998 are reimbursed by the Commonwealth.

12. OPTIONAL FORMS OF PAYMENT

- Option A

Allowance payable monthly for the life of the member.

- Option B

Allowance payable monthly for the life of the member with a guarantee of remaining member contributions with interest.

- Option C

Allowance payable monthly for the life of the member with 66-2/3% continuing to the member's beneficiary upon the member's death. If the beneficiary predeceases the member, the allowance amount "pops up" to the non-reduced amount.

Glossary of Terms

- Actuarial Accrued Liability

  The portion of the Present Value of Benefits that is attributable to past service.

- Actuarial Assets

  Market value of assets (adjusted by payables and receivables) adjusted to phase in investment gains or losses above or below the expected rate of investment return over a four-year rolling period. The phase-in is 25% for year one, 50% for year two, 75% for year three and finally 100% for year four. The actuarial value of assets may be no less than 90%, or more than 110% of the market value of assets plus payables and receivables.

- **Actuarial Assumptions**

Estimates are made as to the occurrence of certain events that determine the level of benefits to be paid and how long they will be provided. The more important actuarial assumptions include the investment return on assets, salary increases and the rates of turnover, disability, retirement and mortality.

- **Actuarial Cost Method**

The procedure that is used to allocate the present value of benefits between the liability that is attributable to past service (Actuarial Accrued Liability) and that attributable to future service.

- **GASB**

Government Accounting Standards Board (issues guidance for disclosure of retirement system liabilities).

- **Normal Cost**

The portion of the Present Value of Benefits that is attributable to benefits to be earned in the coming year.

- **PERAC**

Public Employee Retirement Administration Commission, a division of the State government which has regulatory authority over the administration of the retirement system.

- **Present Value of Benefits**

Represents the dollar value today of all benefits expected to be earned by current members if all actuarial assumptions are exactly realized.

- **PRIT**

Pension Reserves Investment Trust Fund is the state controlled and administered fund for the investment of assets for members of the retirement system.

- **Unfunded Actuarial Accrued Liability**

That portion of the Actuarial Accrued Liability not covered by System Assets.

Concord Retirement System

Rollup of Unfunded Actuarial Liability to July 1, 2018

Valuation Date	January 1, 2017

	Water	Sewer	Electric Light	Swim & Fitness	All Others	Total
Accrued Liability as of January 1, 2017	$4,066,760	$1,016,690	$16,474,402	$1,472,142	$151,359,622	$174,389,616
Gross Normal Cost as of January 1, 2017	93,578	23,394	464,562	82,953	4,195,292	4,859,779
Expected Employee Contributions during 2017	76,998	19,250	269,217	56,839	2,499,236	2,921,540
Expected Benefit Payouts excluding COLA during 2017[1]	63,618	15,904	742,344	8,554	6,695,304	7,525,724
Actuarial Value of Assets as of December 31, 2016	$3,463,020	$865,755	$14,028,658	$1,253,592	$128,889,196	$148,500,222
Unfunded Actuarial Accrued Liability as of July 1, 2018	$593,282	$148,321	$2,672,046	$168,289	$22,709,149	$26,291,087
Funding Ratio as of January 1, 2017	85%	85%	85%	85%	85%	85%

[1] State reimbursed COLA

Town of Concord Retirement System

DEPARTMENT BREAKDOWN OF FISCAL 2019 CONTRIBUTION

	Water	Sewer	Electric Light	Swim & Fitness	All Others	Total
1. Amortization	$ 73,942	$ 18,486	$ 333,024	$20,974	$ 2,830,301	$ 3,276,727
2. Net Normal Cost Fiscal 2018 including Administrative Expense[1]	22,746	5,686	233,239	32,316	2,033,884	$ 2,327,871
3. Net 3(8)(c) payments[2]	1,476	369	5,980	534	54,945	63,305
4. Fiscal 2019 Appropriation (1+2)	$ 98,164	$ 24,541	$ 572,244	$ 53,825	$ 4,919,129	$ 5,667,903

[1] Net Normal Cost for Fiscal 2019 plus administrative expense which is allocated by gross normal cost

[2] Net 3(8)(c) payments allocated by actuarial accrued liability