



Middlesex County Retirement System

**Actuarial Valuation and Review as of
January 1, 2018**

This report has been prepared at the request of the Retirement Board to assist in administering the Middlesex County Retirement System. This valuation report may not otherwise be copied or reproduced in any form without the consent of the Retirement Board and may only be provided to other parties in its entirety. The measurements shown in this actuarial valuation may not be applicable for other purposes.

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July 31, 2018

Middlesex County Retirement Board
Middlesex County Retirement System
25 Linnell Circle
Billerica, MA 01865

Dear Board Members:

We are pleased to submit this Actuarial Valuation and Review as of January 1, 2018. It summarizes the actuarial data used in the valuation, analyzes the preceding two years' experience, and establishes the funding requirements for fiscal 2019 and later years.

This report was prepared in accordance with generally accepted actuarial principles and practices at the request of the Board to assist in administering the Retirement System. The census information and financial information on which our calculations were based was prepared by the staff of the Middlesex County Retirement System. That assistance is gratefully acknowledged.

The actuarial calculations were directed under my supervision. I am a member of the American Academy of Actuaries and I meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the best of my knowledge, the information supplied in this actuarial valuation is complete and accurate. Further, in my opinion, the assumptions as approved by the Board are reasonably related to the experience of and the expectations for the Middlesex County Retirement System.

We look forward to reviewing this report at your next meeting and to answering any questions.

Sincerely,

Segal Consulting, a Member of The Segal Group, Inc.

By: 
Kathleen A. Riley, FSA, MAAA, EA
Senior Vice President and Actuary

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Section 1: Actuarial Valuation Summary

Purpose and Basis

This report was prepared by Segal Consulting to present a valuation of the Middlesex County Retirement System as of January 1, 2018. The valuation was performed to determine whether the assets and contributions are sufficient to provide the prescribed benefits. The measurements shown in this actuarial valuation may not be applicable for other purposes. In particular, the measures herein are not necessarily appropriate for assessing the sufficiency of System assets to cover the estimated cost of settling the System's benefit obligations. 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 the natural operation of the methodology used for these measurements; and changes in plan provisions or applicable law.

Certain disclosure information required by GASB Statements No. 67 and 68 as of January 1, 2018 for the Middlesex County Retirement System is provided in a separate report.

The contribution requirements presented in this report are based on:

- The benefit provisions of Massachusetts General Law Chapter 32;
- The characteristics of covered active participants, inactive participants, and retired participants and beneficiaries as of December 31, 2017, provided by the staff of the Retirement System;
- The assets of the System as of December 31, 2017, provided by the staff of the Retirement System;
- Economic assumptions regarding future salary increases and investment earnings; and
- Other actuarial assumptions regarding employee terminations, retirement, death, etc.

Significant Issues

1. Segal Consulting (“Segal”) strongly recommends an actuarial funding method that targets 100% funding of the actuarial accrued liability. Generally, this implies payments that are ultimately at least enough to cover normal cost, interest on the unfunded actuarial accrued liability and the principal balance. The funding policy adopted by the Middlesex County Retirement Board meets this standard and fully funds the unfunded actuarial accrued liability of the Plan by June 30, 2035.
2. The funded ratio (the ratio of the actuarial value of assets to actuarial accrued liability) is 47.87%, compared to the prior year funded ratio of 45.79%. This ratio is one measure of funding status, and its history is a measure of funding progress. Using the market value of assets, the funded ratio is 49.27%, compared to 44.32% as of the prior valuation date. These measurements are not necessarily appropriate for assessing the sufficiency of assets to cover the estimated cost of settling the Middlesex County Retirement System’s benefit obligation or the need for or the amount of future contributions.
3. During the plan years ending December 31, 2016 and December 31, 2017, the market value rate of return was 6.77% and 15.99%, respectively. Because the actuarial value of assets gradually recognizes market value fluctuations over a five-year period, the actuarial rate of return for the plan years ended 2016 and 2017 was 7.46% and 8.38%, respectively. The actuarial value of assets as of December 31, 2017 was \$1.34 billion, or 97.2% of the market value of assets of \$1.38 billion (as reported in the Annual Statement). As of December 31, 2015, the actuarial value of assets was 103.3% of the market value.
4. As indicated in Section 2 of this report, the total unrecognized investment gain as of December 31, 2017 was \$39.3 million. This investment gain will be recognized in the determination of the actuarial value of assets for funding purposes in the next few years, to the extent it is not offset by recognition of investment losses derived from future experience. This implies that earning the assumed rate of investment return (net of expenses) on a market value basis will result in investment gains on the actuarial value of assets in the next few years. The unrecognized investment gains are not reflected in the funding schedule shown in Section 2.
5. The following actuarial assumptions were changed with this valuation:
 - The investment return assumption was lowered from 7.75% to 7.50%.
 - The mortality assumption for non-disabled participants was updated from the RP-2000 Employee and Healthy Annuitant Mortality Tables projected generationally from 2009 with Scale BB2D to the RP-2014 Blue Collar Employee and Healthy Annuitant Mortality Tables projected generationally with Scale MP-2017.
 - The mortality assumption for disabled participants was updated from the RP-2000 Healthy Annuitant Mortality Table projected generationally from 2015 with Scale BB2D to the RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year and projected generationally with Scale MP-2017.

- The ultimate salary increase assumption, which varies by years of service and Group, was lowered by 0.25% to 4.00% for Group 1 employees with 11 or more years of service, to 4.25% for Group 2 employees with 9 or more years of service and to 4.50% for Group 4 employees with 8 or more years of service.
- The administrative expense assumption was changed from \$3,500,000 for calendar 2016, increasing 3.5% per year, to \$3,500,000 for calendar 2018, increasing 3.25% per year.

These changes in assumptions increased the unfunded liability by approximately \$97.2 million and increased the employer normal cost by approximately \$2,332,000.

6. The unfunded liability was expected to increase by \$25.4 million from \$1,351.0 million as of January 1, 2016 to \$1,376.4 million as of January 1, 2018. The actual unfunded liability of \$1,458.5 million as of January 1, 2018 is \$82.1 million greater than expected, primarily due to the assumption changes described above. The sources of the net experience gain are detailed in Section 2.
7. The funding schedule included in this report fully funds the System by fiscal 2035, the same as the prior funding schedule. The appropriation for fiscal 2019 was set to the previously budgeted amount of \$121,534,601. In fiscal 2020 through fiscal 2027, the appropriation is the prior year's budgeted amount increased 6.5%. Thereafter, the amortization payment on the unfunded liability will increase 4.0% per year. With the prior funding schedule the appropriation was the prior year's budgeted amount increased 6.5% through fiscal 2024 and, thereafter, the amortization payment on the unfunded liability increased 4.0%.
8. This actuarial report as of January 1, 2018 is based on financial and demographic data as of that date. Changes subsequent to that date are not reflected and will affect future actuarial costs of the plan.
9. Since the actuarial valuation results are dependent on a given set of assumptions, there is a risk that emerging results may differ significantly as actual experience proves to be different from the assumptions. We have included a discussion of various risks that may affect the plan in Section 2.

Summary of Key Valuation Results

		2018	2016
Contributions for fiscal year beginning July 1:	• Actuarially Determined Contributions for fiscal year 2019 and 2017	\$121,534,601	\$107,210,668
	• Actuarially Determined Contributions for fiscal year 2020 and 2018	129,434,350	114,117,450
	• Actuarially Determined Contributions for fiscal year 2021 and 2019	137,847,583	121,534,601
Actuarial accrued liability for plan year beginning January 1:	• Retired participants and beneficiaries	\$1,417,545,709	\$1,254,052,923
	• Inactive vested participants	34,368,739	29,865,625
	• Inactive participants due a refund of employee contributions	16,499,876	14,813,599
	• Active participants	1,329,121,646	1,193,429,619
	• Total	2,797,535,970	2,492,161,766
	• Normal cost including administrative expenses for plan year beginning January 1	68,115,910	61,949,136
Assets for plan year beginning January 1:	• Market value of assets (MVA)	\$1,378,351,219	\$1,104,482,897
	• Actuarial value of assets (AVA)	1,339,085,622	1,141,122,663
	• Actuarial value of assets as a percentage of market value of assets	97.15%	103.32%
Funded status for plan year beginning January 1:	• Unfunded actuarial accrued liability on market value of assets	\$1,419,184,751	\$1,387,678,869
	• Funded percentage on MVA basis	49.27%	44.32%
	• Unfunded actuarial accrued liability on actuarial value of assets	\$1,458,450,348	\$1,351,039,103
	• Funded percentage on AVA basis	47.87%	45.79%
Key assumptions:	• Net investment return	7.50%	7.75%
	• Long-term inflation rate	3.25%	3.50%
Demographic data for plan year beginning January 1:	• Number of retired participants and beneficiaries	5,531	5,327
	• Number of inactive vested participants	343	321
	• Number of inactive participants entitled to a refund of employee contributions	2,771	2,640
	• Number of active participants	9,168	9,072
	• Total payroll	\$451,777,105	\$421,085,856
	• Average payroll	49,278	46,416

Important Information About Actuarial Valuations

An actuarial valuation is a budgeting tool with respect to the financing of future projected obligations of a pension plan. It is an estimated forecast – the actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.

In order to prepare a valuation, Segal Consulting (“Segal”) relies on a number of input items. These include:

Plan of benefits	Plan provisions define the rules that will be used to determine benefit payments, and those rules, or the interpretation of them, may change over time. Even where they appear precise, outside factors may change how they operate. It is important to keep Segal informed with respect to plan provisions and administrative procedures, and to review the plan summary included in our report to confirm that Segal has correctly interpreted the plan of benefits.
Participant data	An actuarial valuation for a plan is based on data provided to the actuary by the Middlesex County Retirement System. Segal does not audit such data for completeness or accuracy, other than reviewing it for obvious inconsistencies compared to prior data and other information that appears unreasonable. It is important for Segal to receive the best possible data and to be informed about any known incomplete or inaccurate data.
Assets	The valuation is based on the market value of assets as of the valuation date, as provided by the Middlesex County Retirement System. The Middlesex County Retirement System uses an “actuarial value of assets” that differs from market value to gradually reflect year-to-year changes in the market value of assets in determining the contribution requirements.
Actuarial assumptions	In preparing an actuarial valuation, Segal projects the benefits to be paid to existing plan participants for the rest of their lives and the lives of their beneficiaries. This projection requires actuarial assumptions as to the probability of death, disability, withdrawal, and retirement of each participant for each year. In addition, the benefits projected to be paid for each of those events in each future year reflect actuarial assumptions as to salary increases and cost-of-living adjustments. The projected benefits are then discounted to a present value, based on the assumed rate of return that is expected to be achieved on the plan’s assets. There is a reasonable range for each assumption used in the projection and the results may vary materially based on which assumptions are selected. It is important for any user of an actuarial valuation to understand this concept. Actuarial assumptions are periodically reviewed to ensure that future valuations reflect emerging plan experience. While future changes in actuarial assumptions may have a significant impact on the reported results, that does not mean that the previous assumptions were unreasonable.

The user of Segal’s actuarial valuation (or other actuarial calculations) should keep the following in mind:

- The actuarial valuation is prepared at the request of the Middlesex County Retirement System. Segal is not responsible for the use or misuse of its report, particularly by any other party.
- An actuarial valuation is a measurement of the plan’s assets and liabilities at a specific date. Accordingly, except where otherwise noted, Segal did not perform an analysis of the potential range of future financial measures. The actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.
- Actuarial results in this report are not rounded, but that does not imply precision.
- If the Middlesex County Retirement System is aware of any event or trend that was not considered in this valuation that may materially change the results of the valuation, Segal should be advised, so that we can evaluate it.
- Segal does not provide investment, legal, accounting, or tax advice. Segal’s valuation is based on our understanding of applicable guidance in these areas and of the plan’s provisions, but they may be subject to alternative interpretations. The Middlesex County Retirement System should look to their other advisors for expertise in these areas.

As Segal Consulting has no discretionary authority with respect to the management or assets of the System, it is not a fiduciary in its capacity as actuaries and consultants with respect to the System.

Section 2: Actuarial Valuation Results

Participant Data

The Actuarial Valuation and Review considers the number and demographic characteristics of covered participants, including active participants, inactive participants, retired participants and beneficiaries.

This section presents a summary of significant statistical data on these participant groups.

More detailed information for this valuation year and the preceding valuation can be found in *Section 4, Exhibits A and B*.

PARTICIPANT POPULATION: 1999 – 2017

Year Ended December 31	Active Participants	Inactive Participants	Retired Participants and Beneficiaries	Total Non- Actives	Ratio of Non-Actives to Actives
1999	8,437	1,887	4,383	6,270	0.74
2001	9,246	2,331	4,481	6,812	0.74
2003	9,043	2,913	4,780	7,693	0.85
2005	9,106	3,158	4,763	7,921	0.87
2007	9,285	3,267	4,764	8,031	0.86
2009	9,093	3,430	4,833	8,263	0.91
2011	8,979	3,102	4,886	7,988	0.89
2013	9,082	3,016	5,077	8,093	0.89
2015	9,072	2,961	5,327	8,288	0.91
2017	9,168	3,114	5,531	8,644	0.94

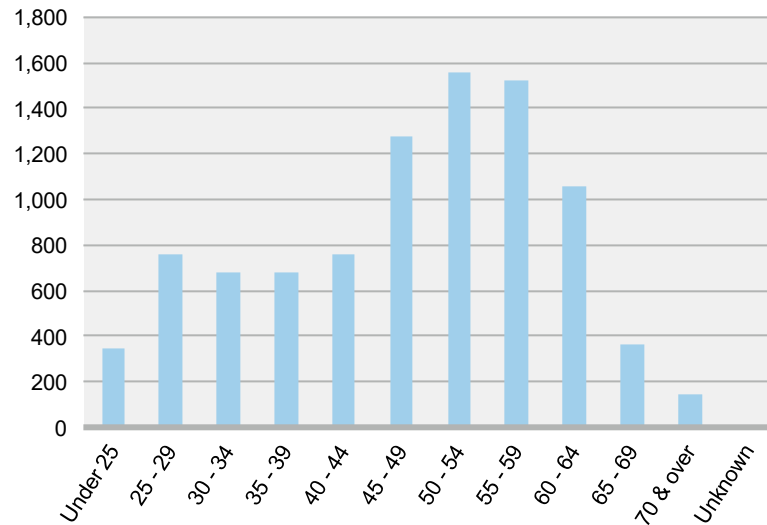
Active Participants

Plan costs are affected by the age, years of service and payroll of active participants. In this year's valuation, there were 9,168 active participants with an average age of 48.1, average service of 11.5 years and average payroll of \$49,278. The 9,072 active participants in the prior valuation had an average age of 48.2, average service of 11.6 years and average payroll of \$46,416.

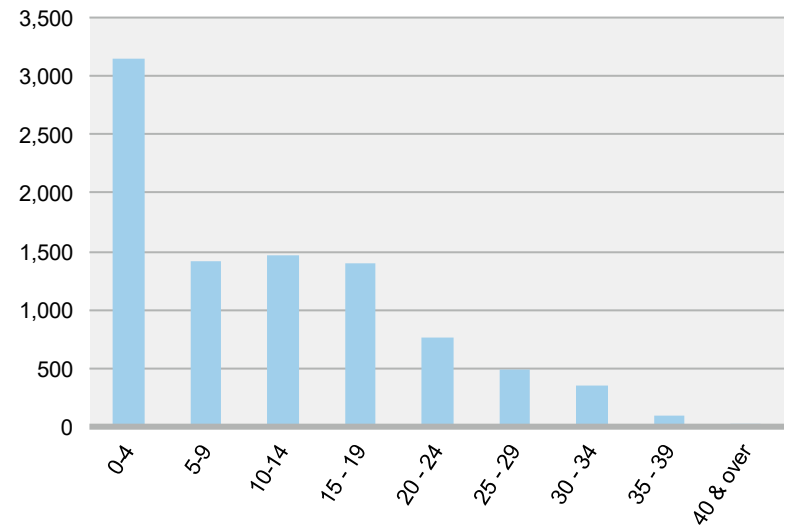
Among the active participants, there were 9 participants with unknown age. The actuarial calculations were adjusted for the missing information by assuming that it was the same as information provided for other active participants with similar known characteristics.

Distribution of Active Participants as of December 31, 2017

BY AGE



BY YEARS OF SERVICE



Inactive Participants

In this year's valuation, there were 343 participants with a vested right to a deferred or immediate benefit and 2,771 participants entitled to a return of their employee contributions.

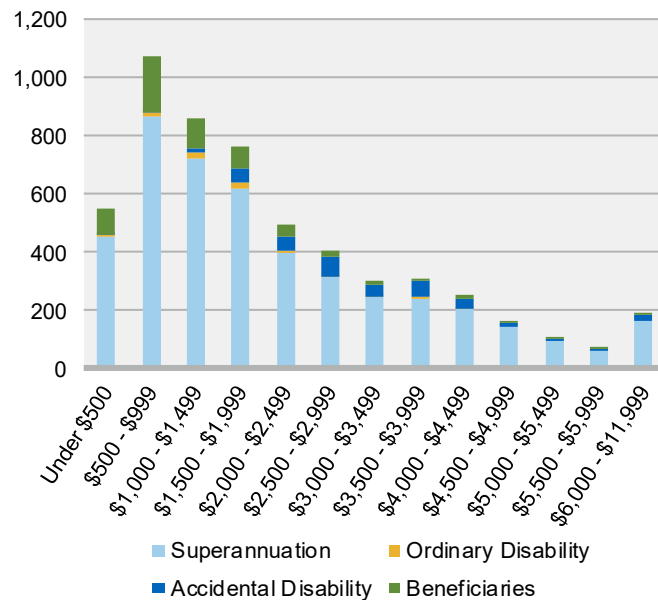
Retired Participants and Beneficiaries

As of December 31, 2017, 4,965 retired participants and 566 beneficiaries were receiving total monthly benefits of \$11,848,656, excluding COLAs reimbursed by the Commonwealth. For comparison, in the previous valuation, there were 4,725 retired participants and 602 beneficiaries receiving monthly benefits of \$10,832,618, excluding COLAs reimbursed by the Commonwealth.

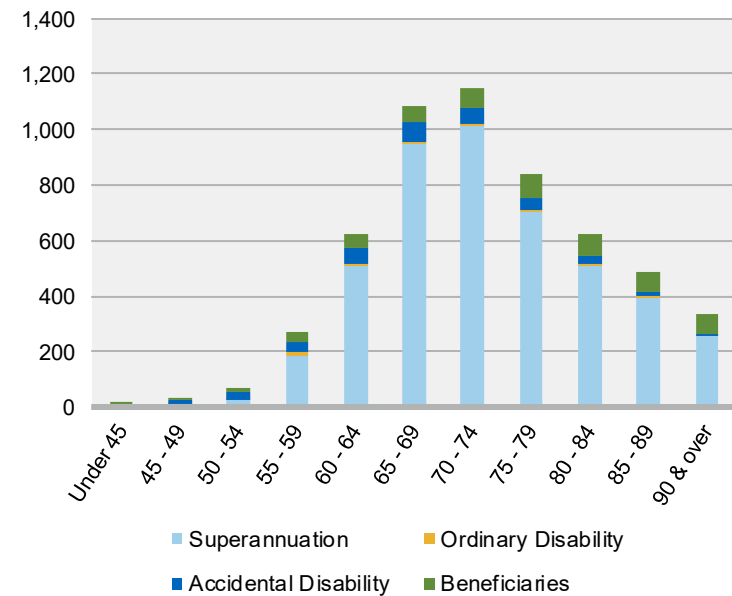
As of December 31, 2017, the average monthly benefit for retired participants and beneficiaries is \$2,142, compared to \$2,034 in the previous valuation. The average age for retired participants is 73.1 in the current valuation and in the prior valuation.

Distribution of Pensioners and Beneficiaries as of December 31, 2017

BY TYPE AND MONTHLY AMOUNT



BY TYPE AND AGE

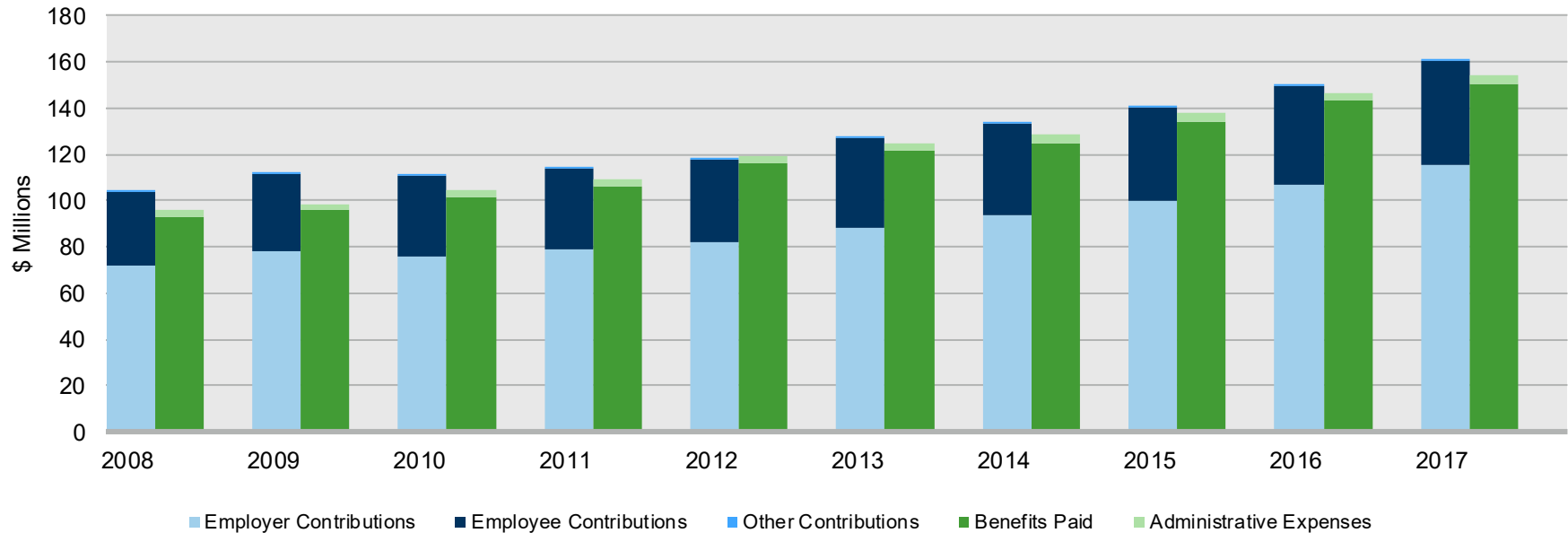


Financial Information

Retirement plan funding anticipates that, over the long term, both contributions (less administrative expenses) and investment earnings (less investment fees) will be needed to cover benefit payments. Retirement plan assets change as a result of the net impact of these income and expense components.

Additional financial information, including a summary of transactions for the valuation year, is presented in *Section 4, Exhibits C and D*.

COMPARISON OF CONTRIBUTIONS WITH BENEFITS AND EXPENSES FOR YEARS ENDED DECEMBER 31, 2008 – 2017



It is desirable to have level and predictable plan costs from one year to the next. For this reason, the Board has approved an asset valuation method that gradually adjusts to market value. Under this valuation method, the full value of market fluctuations is not recognized in a single year and, as a result, the asset value and the plan costs are more stable. The amount of the adjustment to recognize market value is treated as income, which may be positive or negative. Realized and unrealized gains and losses are treated equally and, therefore, the sale of assets has no immediate effect on the actuarial value.

DETERMINATION OF ACTUARIAL VALUE OF ASSETS

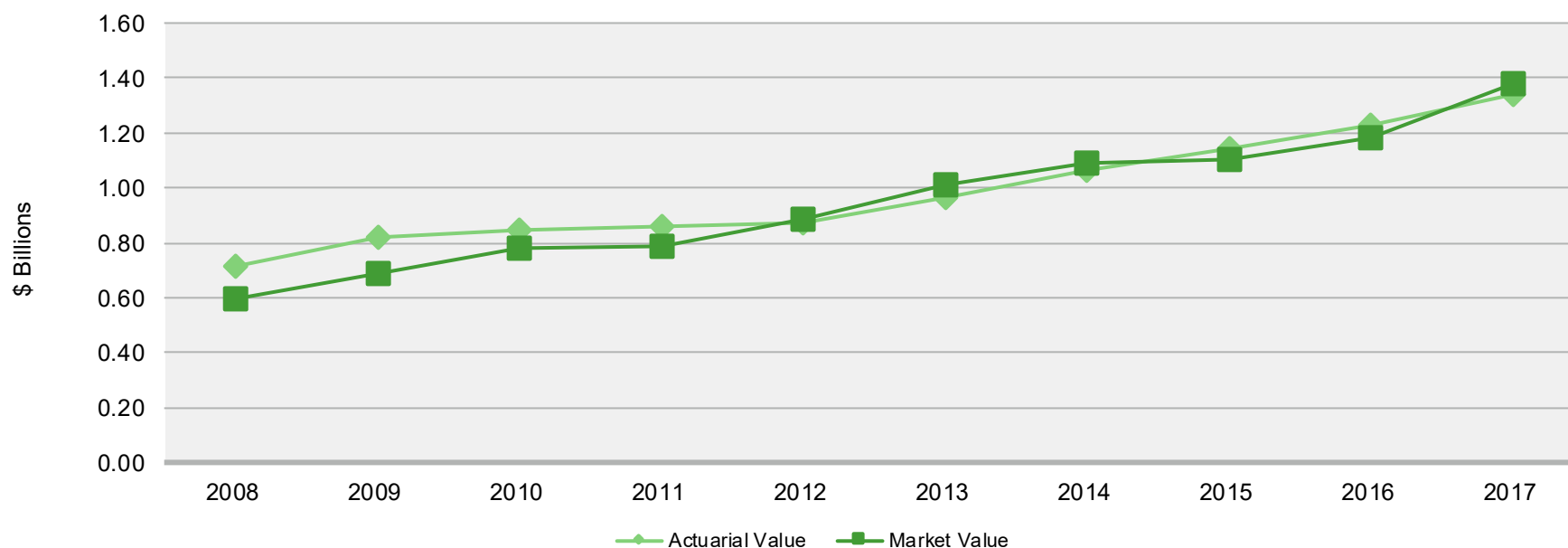
			Year Ended	
			December 31, 2017	December 31, 2016
1.	Market value of assets at the end of the year		\$1,378,351,219	\$1,182,420,196
2.	Calculation of unrecognized return	Original Amount¹	Percent Deferred	Unrecognized Return²
				Unrecognized Return²
	(a) Year ended December 31, 2017	\$97,658,911	80%	\$78,127,129
	(b) Year ended December 31, 2016	-10,796,891	60%	-6,478,134
	(c) Year ended December 31, 2015	-78,422,911	40%	-31,369,164
	(d) Year ended December 31, 2014	-5,071,171	20%	-1,014,234
	(e) Year ended December 31, 2013	53,733,022	0%	0
	(f) Total unrecognized return			10,746,604
3.	Preliminary actuarial value: (1) - (2f)		1,339,085,622	1,229,393,319
4.	Adjustment to be within 20% corridor		0	0
5.	Final actuarial value of assets as of December 31, 2017: (3) + (4)		1,339,085,622	1,229,393,319
6.	Actuarial value as a percentage of market value: (5) ÷ (1)		97.2%	104.0%
7.	Amount deferred for future recognition: (1) - (5)		\$39,265,597	-\$46,973,123

¹ Total return minus expected return on a market value basis.

² Recognition at 20% per year over five years.

Both the actuarial value and market value of assets are representations of the Middlesex County Retirement System's financial status. As investment gains and losses are gradually taken into account, the actuarial value of assets tracks the market value of assets. The actuarial asset value is significant because the Middlesex County Retirement System's liabilities are compared to these assets to determine what portion, if any, remains unfunded. Amortization of the unfunded actuarial accrued liability is an important element in determining the contribution requirement.

ACTUARIAL VALUE OF ASSETS VS. MARKET VALUE OF ASSETS AS OF DECEMBER 31, 2008 – 2017



Actuarial Experience

To calculate the actuarially determined contribution, assumptions are made about future events that affect the amount and timing of benefits to be paid and assets to be accumulated. Each year actual experience is measured against the assumptions. If overall experience is more favorable than anticipated (an actuarial gain), the contribution requirement will decrease from the previous year. On the other hand, the contribution requirement will increase if overall actuarial experience is less favorable than expected (an actuarial loss).

Taking account of experience gains or losses in one year without making a change in assumptions reflects the belief that the single year's experience was a short-term development and that, over the long term, experience will return to the original assumptions. For contribution requirements to remain stable, assumptions should approximate experience.

If assumptions are changed, the contribution requirement is adjusted to take into account a change in experience anticipated for all future years.

The net experience gain over the two-year period is \$15,109,753, which includes a gain \$4,476,657 from investments and a net gain of \$10,633,096 from all other sources. The net experience variation from individual sources other than investments was 0.4% of the actuarial accrued liability. A discussion of the major components of the actuarial experience is on the following pages.

ACTUARIAL EXPERIENCE FOR TWO-YEAR PERIOD ENDED DECEMBER 31, 2017

1	Net gain from investments	\$4,476,657
2	Net gain from administrative expenses	594,075
3	Net gain from other experience	<u>10,039,021</u>
4	Net experience gain: 1 + 2 + 3	\$15,109,753

Investment Experience

A major component of projected asset growth is the assumed rate of return. The assumed return should represent the expected long-term rate of return, based on the Middlesex County Retirement System's investment policy. The rate of return on the market value of assets for the 2017 and 2016 plan years was 15.99% and 6.77%, respectively.

For valuation purposes, the assumed rate of return on the actuarial value of assets was 7.75% for the 2017 and 2016 plan years. The actual rate of return on an actuarial basis for the 2017 and 2016 plan years was 8.38% and 7.46%, respectively. The Middlesex County Retirement System experienced an actuarial gain during the two-year period ending December 31, 2017 with regard to its investments.

INVESTMENT EXPERIENCE

	Year Ended December 31, 2017		Year Ended December 31, 2016	
	Market Value	Actuarial Value	Market Value	Actuarial Value
1 Net investment income	\$189,543,974	\$103,305,254	\$74,917,549	\$85,250,906
2 Average value of assets	1,185,613,721	1,232,586,844	1,105,992,772	1,142,632,538
3 Rate of return: 1 ÷ 2	15.99%	8.38%	6.77%	7.46%
4 Assumed rate of return	7.75%	7.75%	7.75%	7.75%
5 Expected investment income: 2 x 4	\$91,885,063	\$95,525,480	\$85,714,440	\$88,554,023
6 Actuarial gain/(loss): 1 – 5	\$97,658,911	\$7,779,774	-\$10,796,891	-\$3,303,117

Because actuarial planning is long term, it is useful to see how the assumed investment rate of return has followed actual experience over time. The chart below shows the rate of return on an actuarial basis compared to the actual market value investment return for the last 12 years, including averages over select time periods. Based on this experience and future expectations, we have lowered the assumed rate of return from 7.75% to 7.50%.

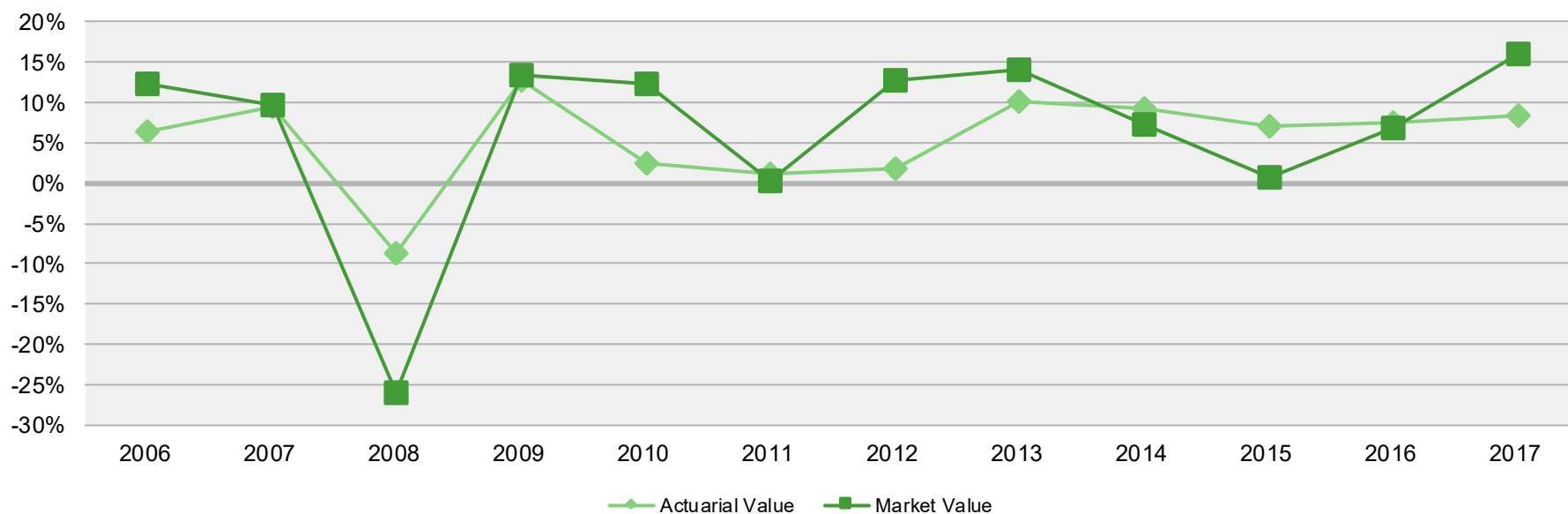
INVESTMENT RETURN – ACTUARIAL VALUE VS. MARKET VALUE: 2006 - 2017

Year Ended December 31	Actuarial Value Investment Return		Market Value Investment Return	
	Amount	Percent	Amount	Percent
2006	\$42,522,819	6.49%	\$78,230,492	12.26%
2007	67,081,999	9.53	69,754,061	9.66
2008	-68,010,444	-8.73	-208,326,323	-26.04
2009	92,107,036	12.77	80,318,175	13.34
2010	20,487,695	2.49	85,309,569	12.32
2011	10,333,913	1.22	1,488,563	0.19
2012	15,213,243	1.77	101,170,082	12.86
2013	88,945,014	10.14	124,783,005	14.05
2014	90,787,044	9.36	74,962,895	7.38
2015	75,500,265	7.10	7,817,250	0.71
2016	85,250,906	7.46	74,917,549	6.77
2017	<u>103,305,254</u>	8.38	<u>189,543,974</u>	15.99
Total	\$623,524,744		\$679,929,292	
Most recent five-year average return		8.40%	8.92%	
Most recent ten-year average return		5.51%	5.94%	
Most recent 12-year average return		5.84%	6.59%	

Note: Each year's yield is weighted by the average asset value in that year.

The actuarial asset valuation method gradually recognizes fluctuations in the market value rate of return. The goal of this is to stabilize the actuarial rate of return and to produce more level pension plan costs.

MARKET AND ACTUARIAL RATES OF RETURN FOR YEARS ENDED DECEMBER 31, 2006 - 2017



Administrative Expenses

Administrative expenses for the years ended December 31, 2016 and 2017 were \$3,460,782 and \$3,234,147, respectively, compared to the assumption of \$3,500,000 for calendar 2016 and \$3,622,500 for calendar 2017. This resulted in a gain of \$594,075 for the two-year period, including an adjustment for interest. Based on information on expenses provided by the Retirement System, we have reset the assumption to \$3,500,000 for calendar 2018.

Other Experience

There are other differences between the expected and the actual experience that appear when the new valuation is compared with the projections from the previous valuation. These include:

- the extent of turnover among participants,
- retirement experience (earlier or later than projected),
- mortality (more or fewer deaths than projected),
- the number of disability retirements (more or fewer than projected), and
- salary increases (greater or smaller than projected).

The net gain from this other experience for the two-year period ending December 31, 2017 amounted to \$10,039,021, which is 0.4% of the actuarial accrued liability.

LIABILITY CHANGES DUE TO DEMOGRAPHIC EXPERIENCE FOR TWO-YEAR PERIOD ENDED DECEMBER 31, 2017

Salary increases less than expected for continuing actives	\$21,017,838
Gain due to more deaths than expected amongst retirees and beneficiaries	70,041
Net loss from data changes, new active participants with high service amounts and other miscellaneous experience	<u>-11,048,858</u>
Total	\$10,039,021

Changes in the Actuarial Accrued Liability

The actuarial accrued liability as of January 1, 2018 is \$2,797,535,970, an increase of \$305,374,204, or 12.3%, from the actuarial accrued liability as of the prior valuation date. The liability is expected to grow each year with normal cost and interest, and to decline due to benefit payments made. Additional fluctuations can occur due to actual experience that differs from expected (as discussed in the previous subsection) and changes in assumptions (described below).

Actuarial Assumptions

The following assumption changes were changed with this valuation:

- The investment return assumption was lowered from 7.75% to 7.50%.
- The mortality assumption for non-disabled participants was updated from the RP-2000 Employee and Healthy Annuitant Mortality Tables projected generationally from 2009 with Scale BB2D to the RP-2014 Blue Collar Employee and Healthy Annuitant Mortality Tables projected generationally with Scale MP-2017.
- The mortality assumption for disabled participants was updated from the RP-2000 Healthy Annuitant Mortality Table projected generationally from 2015 with Scale BB2D to the RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year and projected generationally with Scale MP-2017.
- The salary increase assumption, which varies by years of service and by Group, was lowered by 0.25% to 4.00% for Group 1 employees with 11 or more years of service, to 4.25% for Group 2 employees with 9 or more years of service and to 4.50% for Group 4 employees with 8 or more years of service.
- The administrative expense assumption was changed from \$3,500,000 for calendar 2016, increasing 3.5% per year, to \$3,500,000 for calendar 2018, increasing 3.25% per year.

These changes in assumptions increased the unfunded liability by approximately \$97.2 million and increased the employer normal cost by approximately \$2,332,000.

Details on actuarial assumptions and methods are in *Section 5, Exhibit I*.

Plan Provisions

There were no changes in plan provisions since the prior valuation.

A summary of plan provisions is in *Section 5, Exhibit II*.

Development of Unfunded Actuarial Accrued Liability

	Year Ended	
	December 31, 2017	December 31, 2016
1 Unfunded actuarial accrued liability at beginning of year	\$1,367,332,519	\$1,351,039,103
2 Normal cost at beginning of year	64,117,356	61,949,136
3 Total contributions	-160,402,127	-149,909,168
4 Interest		
• For whole year on 1 + 2	\$110,937,365	\$109,506,588
• For half year on 3	-5,620,836	-5,253,140
Total interest	<u>105,316,529</u>	<u>104,253,448</u>
5 Expected unfunded actuarial accrued liability	\$1,376,364,277	\$1,367,332,519
6 Changes due to:		
• Net gain from investments	-\$4,476,657	--
• Net gain from other experience	-10,633,096	--
• Changes in assumptions	<u>97,195,824</u>	--
Total changes	<u>82,086,071</u>	--
7 Unfunded actuarial accrued liability at end of year	\$1,458,450,348	--

Actuarially Determined Contribution

The actuarially determined contribution is equal to the employer normal cost payment and a payment on the unfunded actuarial accrued liability. For fiscal 2019, the actuarially determined contribution has been set to the previously budgeted amount of \$121,534,601. The detail for this calculation for the current and prior valuation is shown below.

The funding schedule included in this report fully funds the System by fiscal 2035, the same as the prior funding schedule. In fiscal 2020 through fiscal 2027, the appropriation is the prior year's budgeted amount increased 6.5%. Thereafter, the amortization payment on the unfunded liability will increase 4.0% per year. With the prior funding schedule the appropriation was the prior year's budgeted amount increased 6.5% through fiscal 2024 and, thereafter, the amortization payment on the unfunded liability increased 4.0%.

ACTUARIALLY DETERMINED CONTRIBUTION FOR YEAR BEGINNING JANUARY 1

	2018		2016	
	Amount	% of Projected Payroll	Amount	% of Projected Payroll
1. Total normal cost	\$64,615,910	13.72%	\$58,449,136	13.29%
2. Administrative expenses	3,500,000	0.74%	3,500,000	0.80%
3. Expected employee contributions	<u>-45,566,198</u>	<u>-9.67%</u>	<u>-42,068,898</u>	<u>-9.57%</u>
4. Employer normal cost: (1) + (2) - (3)	\$22,549,712	4.79%	\$19,880,238	4.52%
5. Actuarial accrued liability	2,797,535,970		2,492,161,766	
6. Actuarial value of assets	<u>1,339,085,622</u>		<u>1,141,122,663</u>	
7. Unfunded actuarial accrued liability: (5) - (6)	\$1,458,450,348		\$1,351,039,103	
8. Employer normal cost projected to July 1, 2018 and 2016, adjusted for timing	23,331,257	4.87%	20,606,111	4.61%
9. Projected unfunded actuarial accrued liability	1,512,153,505		1,402,415,032	
10. Payment on projected unfunded actuarial accrued liability, adjusted for timing	98,203,344	20.51%	86,604,557	19.36%
11. Actuarially Determined Contribution: (8) + (10)	\$121,534,601	25.39%	\$107,210,668	23.97%
12. Projected payroll	\$478,709,596		\$447,271,930	

Notes: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31.
Actuarially Determined Contributions are set equal to the budgeted amounts determined with the prior valuation.

Funding Schedule

(1) Fiscal Year Ended June 30	(2) Employer Normal Cost	(3) Amortization of 2002 ERI Liability	(4) Amortization of 2003 ERI Liability	(5) Amortization of 2010 ERI Liability	(6) Amortization of Remaining Unfunded Liability	(7) Actuarially Determined Contribution: (2) + (3) + (4) + (5) + (6)	(8) Total Unfunded Actuarial Accrued Liability at Beginning of Fiscal Year	(9) Percent Increase Over Prior Year
2019	\$23,331,257	\$1,669,963	\$729,812	\$60,429	\$95,743,140	\$121,534,601	\$1,512,153,505	
2020	24,193,066	0	729,812	60,429	104,451,043	129,434,350	1,521,887,970	6.50%
2021	25,086,408	0	0	60,429	112,700,746	137,847,583	1,524,922,295	6.50%
2022	26,012,430	0	0	60,429	120,734,817	146,807,676	1,520,245,156	6.50%
2023	26,972,317	0	0	0	129,377,858	156,350,175	1,506,735,354	6.50%
2024	27,967,298	0	0	0	138,545,638	166,512,936	1,483,151,323	6.50%
2025	28,998,647	0	0	0	148,337,630	177,336,277	1,448,119,712	6.50%
2026	30,067,683	0	0	0	158,795,452	188,863,135	1,400,122,947	6.50%
2027	31,175,772	0	0	0	169,963,467	201,139,239	1,337,485,700	6.50%
2028	32,324,331	0	0	0	179,321,247	211,645,578	1,258,360,156	5.22%
2029	33,514,826	0	0	0	186,494,097	220,008,923	1,163,420,828	3.95%
2030	34,748,778	0	0	0	193,953,861	228,702,639	1,053,788,397	3.95%
2031	36,027,760	0	0	0	201,712,015	237,739,775	928,057,974	3.95%
2032	37,353,405	0	0	0	209,780,496	247,133,901	784,707,187	3.95%
2033	38,727,402	0	0	0	218,171,716	256,899,118	622,086,886	3.95%
2034	40,151,502	0	0	0	226,898,585	267,050,087	438,411,128	3.95%
2035	41,627,520	0	0	0	235,974,528	277,602,048	231,746,397	3.95%
2036	43,157,333	0	0	0	0	43,157,333	0	-84.45%

Notes: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31.

Actuarially Determined Contribution for fiscal 2019 is set equal to the budgeted amount determined with prior valuation.

Item (2) reflects 3.25% growth in payroll as well as a 0.15% adjustment to total normal cost to reflect the effects of mortality improvement due to generational mortality assumption.

Projected normal cost does not reflect the future impact of pension reform for new hires.

Items (3), (4) and (5) reflect level dollar amortization.

Item (6) increases 4% per year beginning in fiscal 2029.

Projected unfunded actuarial accrued liability does not reflect deferred investment gains.

Risk

The actuarial valuation results depend on a single set of assumptions; however, there is a risk that emerging results may differ significantly as actual experience proves to be different from the current assumptions.

We have not been engaged to perform a detailed analysis of the potential range of the impact of risk relative to the System's future financial condition, but have included a brief discussion of some of the risks that may affect the System. This discussion is focused on funding-related risks, but similar concerns may apply to risks regarding the level of expense and liabilities reported for System accounting purposes as well.

We recommend a more detailed assessment of the risks to provide the Board with a better understanding of the risks inherent in the System. This assessment may include scenario testing, sensitivity testing, and/or stochastic modeling.

A detailed risk assessment is important for your System because relatively small changes in investment performance can produce large increases in the contribution requirements since the funding schedule is relatively short

- Investment Risk (the risk that returns will be different than expected)

The market value rate of return over the last 12 years has ranged from a low of -26.04% to a high of 15.99%.

- Longevity Risk (the risk that mortality experience will be different than expected)

The actuarial valuation includes an expectation of future improvement in life expectancy. Emerging plan experience that does not match these expectations will result in either an increase or decrease in the actuarially determined contribution.

- Contribution Risk (the risk that actual contributions will be different from actuarially determined contribution)

Massachusetts General Law Chapter 32 requires payment of the actuarially determined contribution. If future experience matches the current assumptions, we project the unfunded actuarial accrued liability will be paid off in 17 years.

- Demographic Risk (the risk that participant experience will be different than assumed)

Examples of this risk include:

- Actual retirements occurring earlier or later than assumed.
- Disability experience greater or less than projected.

- More or less active participant turnover than assumed.
- Salary increases greater or less than projected.

➤ Actual Experience in Recent Years and Implications for the Future

Past experience can help demonstrate the sensitivity of key results to the Plan's actual experience. Over the past ten years:

- The investment gain(loss) has ranged from a loss of \$274,324,931 to a gain of \$97,658,911.
- The non-investment gain(loss) has ranged from a loss of \$7,422,238 to a gain of \$16,974,209.
- Since 2008, the funded percentage on the actuarial value of assets has ranged from a low of 43.7% as of January 1, 2012 to a high of 50.7% as of January 1, 2008.

➤ Maturity Measures

As pension plans mature, the cash need to fulfill benefit obligations will increase over time. Therefore, cash flow projections and analysis should be performed to assure that the Plan's asset allocation is aligned to meet emerging pension liabilities.



Section 3: Unit Results

Summary of Actuarial Results

		Total
The valuation was made with respect to the following data supplied to us:		
1.	Retired participants as of the valuation date (including 566 beneficiaries in pay status)	5,531
2.	Participants active during the year ended December 31, 2017	9,168
3.	Inactive participants entitled to a return of their employee contributions	2,771
4.	Inactive participants with a vested right to a deferred or immediate benefit	343
The actuarial factors as of January 1, 2018 are as follows:		
1.	Normal cost	\$64,615,910
2.	Administrative expenses	3,500,000
3.	Expected employee contributions	-45,566,198
4.	Employer normal cost: (1) + (2) + (3)	\$22,549,712
5.	Actuarial accrued liability	2,797,535,970
	Retired participants and beneficiaries	\$1,417,545,709
	Active participants	1,329,121,646
	Inactive participants	50,868,615
6.	Actuarial value of assets	1,339,085,622
7.	Unfunded actuarial accrued liability: (5) – (6)	1,458,450,348
8.	Reallocated unfunded actuarial accrued liability	0
9.	Total unfunded actuarial accrued liability: (7) + (8)	\$1,458,450,348
The actuarial factors projected to FY19 are as follows:		
	Amount	% of Payroll
1.	Projected employer normal cost	\$23,331,257 4.87%
2.	Projected unfunded actuarial accrued liability	1,512,153,505
3.	Payment on projected unfunded actuarial accrued liability	95,743,140
4.	Payment on 2002 ERI	1,669,963
5.	Payment on 2003 ERI	729,812
6.	Payment on 2010 ERI	60,429
7.	Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$121,534,601 25.39%
8.	Total FY19 Actuarially Determined Contribution, payable on July 1	119,287,682 24.92%
9.	Projected payroll	478,709,596
The actuarial factors projected to FY20 and FY21 are as follows:		
	FY20	FY21
1.	Projected employer normal cost	\$24,193,066 \$25,086,408
2.	Payment on projected unfunded actuarial accrued liability	104,451,043 112,700,746
3.	Payment on 2003 ERI	729,812 0
4.	Payment on 2010 ERI	60,429 60,429
5.	Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$129,434,350 \$137,847,583
6.	Total Actuarially Determined Contribution, payable on July 1	127,115,184 135,377,672

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Middlesex County Retirement Board		1
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 1 beneficiary in pay status)		12
2. Participants active during the year ended December 31, 2017		17
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		1
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$142,379
2. Administrative expenses		7,712
3. Expected employee contributions		-121,909
4. Employer normal cost: (1) + (2) + (3)		\$28,182
5. Actuarial accrued liability		8,847,135
Retired participants and beneficiaries	\$3,981,396	
Active participants	4,765,246	
Inactive participants	<u>100,493</u>	
6. Actuarial value of assets		4,571,010
7. Unfunded actuarial accrued liability: (5) – (6)		4,276,125
8. Reallocated unfunded actuarial accrued liability		<u>81,079</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$4,357,204
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$29,159	2.33%
2. Projected unfunded actuarial accrued liability	4,517,645	
3. Payment on projected unfunded actuarial accrued liability	317,736	
4. Payment on 2002 ERI	8,368	
5. Payment on 2003 ERI	20,256	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$375,519	30.00%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	368,576	29.44%
9. Projected payroll	1,251,909	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$30,335	\$31,556
2. Payment on projected unfunded actuarial accrued liability	307,028	331,278
3. Payment on 2003 ERI	20,256	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$357,619	\$362,834
6. Total Actuarially Determined Contribution, payable on July 1	351,211	356,333

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Middlesex County		100
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 42 beneficiaries in pay status)		118
2. Participants active during the year ended December 31, 2017		0
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$ 0
2. Administrative expenses		0
3. Expected employee contributions		<u>0</u>
4. Employer normal cost: (1) + (2) + (3)		\$ 0
5. Actuarial accrued liability		16,079,431
Retired participants and beneficiaries	\$16,079,431	
Active participants	0	
Inactive participants	<u>0</u>	
6. Actuarial value of assets		0
7. Unfunded actuarial accrued liability: (5) – (6)		16,079,431
8. Reallocated unfunded actuarial accrued liability		-16,079,431
9. Total unfunded actuarial accrued liability: (7) + (8)		\$ 0
The actuarial factors projected to FY19 are as follows:		
	Amount	% of Payroll
1. Projected employer normal cost	\$ 0	0.00%
2. Projected unfunded actuarial accrued liability	0	
3. Payment on projected unfunded actuarial accrued liability	0	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$ 0	0.00%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	0	0.00%
9. Projected payroll	0	
The actuarial factors projected to FY20 and FY21 are as follows:		
	FY20	FY21
1. Projected employer normal cost	\$ 0	\$ 0
2. Payment on projected unfunded actuarial accrued liability	0	0
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$ 0	\$ 0
6. Total Actuarially Determined Contribution, payable on July 1	0	0

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Middlesex Hospital		200
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 5 beneficiaries in pay status)		77
2. Participants active during the year ended December 31, 2017		0
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$ 0
2. Administrative expenses		0
3. Expected employee contributions		0
4. Employer normal cost: (1) + (2) + (3)		\$ 0
5. Actuarial accrued liability		9,325,534
Retired participants and beneficiaries	\$9,325,534	
Active participants	0	
Inactive participants	0	
6. Actuarial value of assets		0
7. Unfunded actuarial accrued liability: (5) – (6)		9,325,534
8. Reallocated unfunded actuarial accrued liability		-9,325,534
9. Total unfunded actuarial accrued liability: (7) + (8)		\$ 0
The actuarial factors projected to FY19 are as follows:		
	Amount	% of Payroll
1. Projected employer normal cost	\$ 0	0.00%
2. Projected unfunded actuarial accrued liability	0	
3. Payment on projected unfunded actuarial accrued liability	0	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	0	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$ 0	0.00%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	0	0.00%
9. Projected payroll	0	
The actuarial factors projected to FY20 and FY21 are as follows:		
	FY20	FY21
1. Projected employer normal cost	\$ 0	\$ 0
2. Payment on projected unfunded actuarial accrued liability	0	0
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	0	0
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$ 0	\$ 0
6. Total Actuarially Determined Contribution, payable on July 1	0	0

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Acton		300
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 20 beneficiaries in pay status)		180
2. Participants active during the year ended December 31, 2017		200
3. Inactive participants entitled to a return of their employee contributions		33
4. Inactive participants with a vested right to a deferred or immediate benefit		5
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$2,019,836
2. Administrative expenses		109,407
3. Expected employee contributions		<u>-1,439,101</u>
4. Employer normal cost: (1) + (2) + (3)		\$690,142
5. Actuarial accrued liability		96,567,091
Retired participants and beneficiaries	\$49,566,520	
Active participants	46,363,074	
Inactive participants	<u>637,497</u>	
6. Actuarial value of assets		47,980,706
7. Unfunded actuarial accrued liability: (5) – (6)		48,586,385
8. Reallocated unfunded actuarial accrued liability		<u>884,981</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$49,471,366
The actuarial factors projected to FY19 are as follows:		
	Amount	% of Payroll
1. Projected employer normal cost	\$714,061	4.78%
2. Projected unfunded actuarial accrued liability	51,293,004	
3. Payment on projected unfunded actuarial accrued liability	3,040,733	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$3,754,794	25.14%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	3,685,376	24.67%
9. Projected payroll	14,938,185	
The actuarial factors projected to FY20 and FY21 are as follows:		
	FY20	FY21
1. Projected employer normal cost	\$740,505	\$767,918
2. Payment on projected unfunded actuarial accrued liability	3,566,140	3,847,799
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$4,306,645	\$4,615,717
6. Total Actuarially Determined Contribution, payable on July 1	4,229,480	4,533,014

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Ashby		400
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		10
2. Participants active during the year ended December 31, 2017		25
3. Inactive participants entitled to a return of their employee contributions		4
4. Inactive participants with a vested right to a deferred or immediate benefit		1
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$196,546
2. Administrative expenses		10,646
3. Expected employee contributions		<u>-111,417</u>
4. Employer normal cost: (1) + (2) + (3)		\$95,775
5. Actuarial accrued liability		4,847,979
Retired participants and beneficiaries	\$2,096,540	
Active participants	2,584,589	
Inactive participants	<u>166,850</u>	
6. Actuarial value of assets		3,016,078
7. Unfunded actuarial accrued liability: (5) – (6)		1,831,901
8. Reallocated unfunded actuarial accrued liability		<u>44,429</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$1,876,330
The actuarial factors projected to FY19 are as follows:		
	Amount	% of Payroll
1. Projected employer normal cost	\$99,094	8.54%
2. Projected unfunded actuarial accrued liability	1,945,420	
3. Payment on projected unfunded actuarial accrued liability	59,760	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$158,854	13.69%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	155,917	13.44%
9. Projected payroll	1,160,398	
The actuarial factors projected to FY20 and FY21 are as follows:		
	FY20	FY21
1. Projected employer normal cost	\$102,630	\$106,291
2. Payment on projected unfunded actuarial accrued liability	139,284	150,285
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$241,914	\$256,576
6. Total Actuarially Determined Contribution, payable on July 1	237,579	251,979

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Ashland		500
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 14 beneficiaries in pay status)		133
2. Participants active during the year ended December 31, 2017		285
3. Inactive participants entitled to a return of their employee contributions		126
4. Inactive participants with a vested right to a deferred or immediate benefit		11
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$1,809,702
2. Administrative expenses		98,025
3. Expected employee contributions		<u>-1,280,621</u>
4. Employer normal cost: (1) + (2) + (3)		\$627,106
5. Actuarial accrued liability		70,333,204
Retired participants and beneficiaries	\$35,800,550	
Active participants	33,004,619	
Inactive participants	<u>1,528,035</u>	
6. Actuarial value of assets		37,594,649
7. Unfunded actuarial accrued liability: (5) – (6)		32,738,555
8. Reallocated unfunded actuarial accrued liability		<u>644,563</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$33,383,118
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$648,841	4.82%
2. Projected unfunded actuarial accrued liability	34,612,353	
3. Payment on projected unfunded actuarial accrued liability	2,093,303	
4. Payment on 2002 ERI	180,071	
5. Payment on 2003 ERI	54,896	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$2,977,111	22.12%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	2,922,071	21.71%
9. Projected payroll	13,456,910	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$672,828	\$697,694
2. Payment on projected unfunded actuarial accrued liability	2,382,679	2,570,866
3. Payment on 2003 ERI	54,896	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$3,110,403	\$3,268,560
6. Total Actuarially Determined Contribution, payable on July 1	3,054,672	3,209,995

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Ayer		600
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 13 beneficiaries in pay status)		72
2. Participants active during the year ended December 31, 2017		99
3. Inactive participants entitled to a return of their employee contributions		17
4. Inactive participants with a vested right to a deferred or immediate benefit		7
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$938,320
2. Administrative expenses		50,825
3. Expected employee contributions		<u>-651,918</u>
4. Employer normal cost: (1) + (2) + (3)		\$337,227
5. Actuarial accrued liability		38,853,975
Retired participants and beneficiaries	\$17,651,644	
Active participants	20,476,306	
Inactive participants	<u>726,025</u>	
6. Actuarial value of assets		20,624,890
7. Unfunded actuarial accrued liability: (5) – (6)		18,229,085
8. Reallocated unfunded actuarial accrued liability		<u>356,074</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$18,585,159
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$348,915	5.17%
2. Projected unfunded actuarial accrued liability	19,269,503	
3. Payment on projected unfunded actuarial accrued liability	1,096,484	
4. Payment on 2002 ERI	15,753	
5. Payment on 2003 ERI	17,117	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$1,478,269	21.92%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	1,450,939	21.51%
9. Projected payroll	6,744,666	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$361,758	\$375,070
2. Payment on projected unfunded actuarial accrued liability	1,339,496	1,445,292
3. Payment on 2003 ERI	17,117	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$1,718,371	\$1,820,362
6. Total Actuarially Determined Contribution, payable on July 1	1,687,582	1,787,745

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Bedford		700
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 15 beneficiaries in pay status)		176
2. Participants active during the year ended December 31, 2017		371
3. Inactive participants entitled to a return of their employee contributions		154
4. Inactive participants with a vested right to a deferred or immediate benefit		8
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$2,594,536
2. Administrative expenses		140,536
3. Expected employee contributions		<u>-1,907,066</u>
4. Employer normal cost: (1) + (2) + (3)		\$828,006
5. Actuarial accrued liability		101,820,085
Retired participants and beneficiaries	\$43,731,107	
Active participants	56,535,024	
Inactive participants	<u>1,553,954</u>	
6. Actuarial value of assets		51,676,754
7. Unfunded actuarial accrued liability: (5) – (6)		50,143,331
8. Reallocated unfunded actuarial accrued liability		<u>933,122</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$51,076,453
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$856,704	4.29%
2. Projected unfunded actuarial accrued liability	52,957,194	
3. Payment on projected unfunded actuarial accrued liability	3,402,655	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$4,259,359	21.35%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	4,180,613	20.95%
9. Projected payroll	19,953,498	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$888,704	\$921,886
2. Payment on projected unfunded actuarial accrued liability	3,662,756	3,952,046
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$4,551,460	\$4,873,932
6. Total Actuarially Determined Contribution, payable on July 1	4,469,908	4,786,602

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Billerica		800
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 58 beneficiaries in pay status)		455
2. Participants active during the year ended December 31, 2017		620
3. Inactive participants entitled to a return of their employee contributions		111
4. Inactive participants with a vested right to a deferred or immediate benefit		16
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$4,831,638
2. Administrative expenses		261,712
3. Expected employee contributions		<u>-3,284,542</u>
4. Employer normal cost: (1) + (2) + (3)		\$1,808,808
5. Actuarial accrued liability		242,058,272
Retired participants and beneficiaries	\$132,642,357	
Active participants	106,706,574	
Inactive participants	<u>2,709,341</u>	
6. Actuarial value of assets		101,694,051
7. Unfunded actuarial accrued liability: (5) – (6)		140,364,221
8. Reallocated unfunded actuarial accrued liability		<u>2,218,321</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$142,582,542
The actuarial factors projected to FY19 are as follows:		
	Amount	% of Payroll
1. Projected employer normal cost	\$1,871,500	5.41%
2. Projected unfunded actuarial accrued liability	147,832,722	
3. Payment on projected unfunded actuarial accrued liability	9,854,738	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$11,726,238	33.92%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	11,509,445	33.29%
9. Projected payroll	34,570,471	
The actuarial factors projected to FY20 and FY21 are as follows:		
	FY20	FY21
1. Projected employer normal cost	\$1,940,064	\$2,011,123
2. Payment on projected unfunded actuarial accrued liability	10,198,955	11,004,483
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$12,139,019	\$13,015,606
6. Total Actuarially Determined Contribution, payable on July 1	11,921,516	12,782,396

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Boxborough		900
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 3 beneficiaries in pay status)		36
2. Participants active during the year ended December 31, 2017		48
3. Inactive participants entitled to a return of their employee contributions		15
4. Inactive participants with a vested right to a deferred or immediate benefit		5
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$461,370
2. Administrative expenses		24,991
3. Expected employee contributions		<u>-292,667</u>
4. Employer normal cost: (1) + (2) + (3)		\$193,694
5. Actuarial accrued liability		19,405,732
Retired participants and beneficiaries	\$9,499,838	
Active participants	8,914,536	
Inactive participants	<u>991,358</u>	
6. Actuarial value of assets		9,125,175
7. Unfunded actuarial accrued liability: (5) – (6)		10,280,557
8. Reallocated unfunded actuarial accrued liability		<u>177,842</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$10,458,399
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$200,407	6.63%
2. Projected unfunded actuarial accrued liability	10,843,499	
3. Payment on projected unfunded actuarial accrued liability	659,288	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$859,695	28.45%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	843,801	27.93%
9. Projected payroll	3,021,564	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$207,660	\$215,173
2. Payment on projected unfunded actuarial accrued liability	752,699	812,148
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$960,359	\$1,027,321
6. Total Actuarially Determined Contribution, payable on July 1	943,152	1,008,914

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Burlington		1000
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 27 beneficiaries in pay status)		350
2. Participants active during the year ended December 31, 2017		577
3. Inactive participants entitled to a return of their employee contributions		180
4. Inactive participants with a vested right to a deferred or immediate benefit		17
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$4,489,028
2. Administrative expenses		243,154
3. Expected employee contributions		<u>-3,271,161</u>
4. Employer normal cost: (1) + (2) + (3)		\$1,461,021
5. Actuarial accrued liability		213,474,475
Retired participants and beneficiaries	\$105,814,532	
Active participants	105,723,884	
Inactive participants	<u>1,936,059</u>	
6. Actuarial value of assets		95,742,527
7. Unfunded actuarial accrued liability: (5) – (6)		117,731,948
8. Reallocated unfunded actuarial accrued liability		<u>1,956,369</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$119,688,317
The actuarial factors projected to FY19 are as follows:		
	Amount	% of Payroll
1. Projected employer normal cost	\$1,511,658	4.40%
2. Projected unfunded actuarial accrued liability	124,095,488	
3. Payment on projected unfunded actuarial accrued liability	7,786,125	
4. Payment on 2002 ERI	264,248	
5. Payment on 2003 ERI	70,680	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$9,632,711	28.06%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	9,454,623	27.54%
9. Projected payroll	34,328,034	
The actuarial factors projected to FY20 and FY21 are as follows:		
	FY20	FY21
1. Projected employer normal cost	\$1,567,980	\$1,626,378
2. Payment on projected unfunded actuarial accrued liability	8,567,533	9,244,209
3. Payment on 2003 ERI	70,680	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$10,206,193	\$10,870,587
6. Total Actuarially Determined Contribution, payable on July 1	10,023,321	10,675,811

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Carlisle		1100
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 1 beneficiary in pay status)		38
2. Participants active during the year ended December 31, 2017		101
3. Inactive participants entitled to a return of their employee contributions		30
4. Inactive participants with a vested right to a deferred or immediate benefit		6
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$739,616
2. Administrative expenses		40,062
3. Expected employee contributions		<u>-503,064</u>
4. Employer normal cost: (1) + (2) + (3)		\$276,614
5. Actuarial accrued liability		25,786,855
Retired participants and beneficiaries	\$8,528,663	
Active participants	16,551,895	
Inactive participants	<u>706,297</u>	
6. Actuarial value of assets		16,076,143
7. Unfunded actuarial accrued liability: (5) – (6)		9,710,712
8. Reallocated unfunded actuarial accrued liability		<u>236,321</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$9,947,033
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$286,201	5.26%
2. Projected unfunded actuarial accrued liability	10,313,303	
3. Payment on projected unfunded actuarial accrued liability	663,815	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$950,016	17.47%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	932,452	17.15%
9. Projected payroll	5,436,540	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$296,688	\$307,556
2. Payment on projected unfunded actuarial accrued liability	713,230	769,562
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$1,009,918	\$1,077,118
6. Total Actuarially Determined Contribution, payable on July 1	991,823	1,057,819

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Chelmsford		1200
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 45 beneficiaries in pay status)		425
2. Participants active during the year ended December 31, 2017		544
3. Inactive participants entitled to a return of their employee contributions		137
4. Inactive participants with a vested right to a deferred or immediate benefit		26
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$3,695,931
2. Administrative expenses		200,195
3. Expected employee contributions		<u>-2,518,798</u>
4. Employer normal cost: (1) + (2) + (3)		\$1,377,328
5. Actuarial accrued liability		172,345,467
Retired participants and beneficiaries	\$98,080,060	
Active participants	71,251,579	
Inactive participants	<u>3,013,828</u>	
6. Actuarial value of assets		68,507,974
7. Unfunded actuarial accrued liability: (5) – (6)		103,837,493
8. Reallocated unfunded actuarial accrued liability		<u>1,579,446</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$105,416,939
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$1,425,065	5.36%
2. Projected unfunded actuarial accrued liability	109,298,609	
3. Payment on projected unfunded actuarial accrued liability	6,763,707	
4. Payment on 2002 ERI	297,230	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$8,486,002	31.94%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	8,329,114	31.35%
9. Projected payroll	26,566,672	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$1,477,302	\$1,531,438
2. Payment on projected unfunded actuarial accrued liability	7,556,811	8,153,659
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$9,034,113	\$9,685,097
6. Total Actuarially Determined Contribution, payable on July 1	8,872,242	9,511,562

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Dracut		1300
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 18 beneficiaries in pay status)		226
2. Participants active during the year ended December 31, 2017		322
3. Inactive participants entitled to a return of their employee contributions		57
4. Inactive participants with a vested right to a deferred or immediate benefit		9
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$2,315,085
2. Administrative expenses		125,399
3. Expected employee contributions		<u>-1,476,193</u>
4. Employer normal cost: (1) + (2) + (3)		\$964,291
5. Actuarial accrued liability		110,494,956
Retired participants and beneficiaries	\$64,935,618	
Active participants	44,432,643	
Inactive participants	<u>1,126,695</u>	
6. Actuarial value of assets		50,169,141
7. Unfunded actuarial accrued liability: (5) – (6)		60,325,815
8. Reallocated unfunded actuarial accrued liability		<u>1,012,622</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$61,338,437
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$997,712	6.41%
2. Projected unfunded actuarial accrued liability	63,597,045	
3. Payment on projected unfunded actuarial accrued liability	3,897,137	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$4,894,849	31.43%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	4,804,354	30.85%
9. Projected payroll	15,573,934	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$1,033,848	\$1,071,284
2. Payment on projected unfunded actuarial accrued liability	4,412,369	4,760,865
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$5,446,217	\$5,832,149
6. Total Actuarially Determined Contribution, payable on July 1	5,348,633	5,727,650

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Dunstable		1400
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		9
2. Participants active during the year ended December 31, 2017		23
3. Inactive participants entitled to a return of their employee contributions		2
4. Inactive participants with a vested right to a deferred or immediate benefit		1
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$191,248
2. Administrative expenses		10,359
3. Expected employee contributions		-121,539
4. Employer normal cost: (1) + (2) + (3)		\$80,068
5. Actuarial accrued liability		5,877,388
Retired participants and beneficiaries	\$2,451,155	
Active participants	3,359,645	
Inactive participants	<u>66,588</u>	
6. Actuarial value of assets		3,270,996
7. Unfunded actuarial accrued liability: (5) – (6)		2,606,392
8. Reallocated unfunded actuarial accrued liability		<u>53,863</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$2,660,255
The actuarial factors projected to FY19 are as follows:		
	Amount	% of Payroll
1. Projected employer normal cost	\$82,843	6.49%
2. Projected unfunded actuarial accrued liability	2,758,211	
3. Payment on projected unfunded actuarial accrued liability	140,884	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$223,727	17.52%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	219,591	17.20%
9. Projected payroll	1,276,802	
The actuarial factors projected to FY20 and FY21 are as follows:		
	FY20	FY21
1. Projected employer normal cost	\$85,842	\$88,949
2. Payment on projected unfunded actuarial accrued liability	193,405	208,680
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$279,247	\$297,629
6. Total Actuarially Determined Contribution, payable on July 1	274,244	292,296

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Groton		1500
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 7 beneficiaries in pay status)		65
2. Participants active during the year ended December 31, 2017		108
3. Inactive participants entitled to a return of their employee contributions		18
4. Inactive participants with a vested right to a deferred or immediate benefit		4
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$1,102,550
2. Administrative expenses		59,721
3. Expected employee contributions		<u>-755,238</u>
4. Employer normal cost: (1) + (2) + (3)		\$407,033
5. Actuarial accrued liability		41,395,280
Retired participants and beneficiaries	\$20,902,525	
Active participants	19,766,862	
Inactive participants	<u>725,893</u>	
6. Actuarial value of assets		19,855,949
7. Unfunded actuarial accrued liability: (5) – (6)		21,539,331
8. Reallocated unfunded actuarial accrued liability		<u>379,364</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$21,918,695
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$421,140	5.49%
2. Projected unfunded actuarial accrued liability	22,725,787	
3. Payment on projected unfunded actuarial accrued liability	1,491,231	
4. Payment on 2002 ERI	189,227	
5. Payment on 2003 ERI	19,312	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$2,120,910	27.66%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	2,081,699	27.15%
9. Projected payroll	7,667,294	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$436,594	\$452,610
2. Payment on projected unfunded actuarial accrued liability	1,553,145	1,675,815
3. Payment on 2003 ERI	19,312	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$2,009,051	\$2,128,425
6. Total Actuarially Determined Contribution, payable on July 1	1,973,053	2,090,289

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Holliston		1600
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 10 beneficiaries in pay status)		115
2. Participants active during the year ended December 31, 2017		259
3. Inactive participants entitled to a return of their employee contributions		159
4. Inactive participants with a vested right to a deferred or immediate benefit		17
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$1,411,609
2. Administrative expenses		76,462
3. Expected employee contributions		<u>-1,023,424</u>
4. Employer normal cost: (1) + (2) + (3)		\$464,647
5. Actuarial accrued liability		58,567,358
Retired participants and beneficiaries	\$25,629,567	
Active participants	30,919,206	
Inactive participants	<u>2,018,585</u>	
6. Actuarial value of assets		34,283,082
7. Unfunded actuarial accrued liability: (5) – (6)		24,284,276
8. Reallocated unfunded actuarial accrued liability		<u>536,736</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$24,821,012
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$480,751	4.40%
2. Projected unfunded actuarial accrued liability	25,734,973	
3. Payment on projected unfunded actuarial accrued liability	1,666,839	
4. Payment on 2002 ERI	56,316	
5. Payment on 2003 ERI	20,845	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$2,224,751	20.35%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	2,183,620	19.98%
9. Projected payroll	10,930,078	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$498,638	\$517,182
2. Payment on projected unfunded actuarial accrued liability	1,771,982	1,911,936
3. Payment on 2003 ERI	20,845	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$2,291,465	\$2,429,118
6. Total Actuarially Determined Contribution, payable on July 1	2,250,407	2,385,594

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Hopkinton		1700
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 6 beneficiaries in pay status)		99
2. Participants active during the year ended December 31, 2017		287
3. Inactive participants entitled to a return of their employee contributions		107
4. Inactive participants with a vested right to a deferred or immediate benefit		15
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$2,037,365
2. Administrative expenses		110,356
3. Expected employee contributions		<u>-1,414,093</u>
4. Employer normal cost: (1) + (2) + (3)		\$733,628
5. Actuarial accrued liability		64,983,165
Retired participants and beneficiaries	\$27,147,113	
Active participants	35,898,860	
Inactive participants	<u>1,937,192</u>	
6. Actuarial value of assets		43,484,258
7. Unfunded actuarial accrued liability: (5) – (6)		21,498,907
8. Reallocated unfunded actuarial accrued liability		<u>595,533</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$22,094,440
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$759,055	5.15%
2. Projected unfunded actuarial accrued liability	22,908,003	
3. Payment on projected unfunded actuarial accrued liability	1,386,241	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$2,145,296	14.55%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	2,105,634	14.28%
9. Projected payroll	14,742,509	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$786,989	\$815,942
2. Payment on projected unfunded actuarial accrued liability	1,590,630	1,716,261
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$2,377,619	\$2,532,203
6. Total Actuarially Determined Contribution, payable on July 1	2,335,018	2,486,832

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Hudson		1800
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 22 beneficiaries in pay status)		207
2. Participants active during the year ended December 31, 2017		448
3. Inactive participants entitled to a return of their employee contributions		170
4. Inactive participants with a vested right to a deferred or immediate benefit		14
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$3,149,832
2. Administrative expenses		170,615
3. Expected employee contributions		<u>-2,151,322</u>
4. Employer normal cost: (1) + (2) + (3)		\$1,169,125
5. Actuarial accrued liability		124,317,407
Retired participants and beneficiaries	\$62,099,642	
Active participants	59,863,945	
Inactive participants	<u>2,353,820</u>	
6. Actuarial value of assets		60,691,744
7. Unfunded actuarial accrued liability: (5) – (6)		63,625,663
8. Reallocated unfunded actuarial accrued liability		<u>1,139,297</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$64,764,960
The actuarial factors projected to FY19 are as follows:		
	Amount	% of Payroll
1. Projected employer normal cost	\$1,209,645	5.34%
2. Projected unfunded actuarial accrued liability	67,149,740	
3. Payment on projected unfunded actuarial accrued liability	4,235,391	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$5,445,036	24.03%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	5,344,369	23.59%
9. Projected payroll	22,657,163	
The actuarial factors projected to FY20 and FY21 are as follows:		
	FY20	FY21
1. Projected employer normal cost	\$1,254,006	\$1,299,981
2. Payment on projected unfunded actuarial accrued liability	4,650,116	5,017,389
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$5,904,122	\$6,317,370
6. Total Actuarially Determined Contribution, payable on July 1	5,798,334	6,204,177

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Lincoln		1900
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 11 beneficiaries in pay status)		101
2. Participants active during the year ended December 31, 2017		198
3. Inactive participants entitled to a return of their employee contributions		99
4. Inactive participants with a vested right to a deferred or immediate benefit		11
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$1,357,066
2. Administrative expenses		73,507
3. Expected employee contributions		<u>-984,985</u>
4. Employer normal cost: (1) + (2) + (3)		\$445,588
5. Actuarial accrued liability		53,362,272
Retired participants and beneficiaries	\$25,285,505	
Active participants	26,591,105	
Inactive participants	<u>1,485,662</u>	
6. Actuarial value of assets		28,210,456
7. Unfunded actuarial accrued liability: (5) – (6)		25,151,816
8. Reallocated unfunded actuarial accrued liability		<u>489,034</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$25,640,850
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$461,032	4.48%
2. Projected unfunded actuarial accrued liability	26,584,999	
3. Payment on projected unfunded actuarial accrued liability	1,727,679	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$2,188,711	21.26%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	2,148,246	20.87%
9. Projected payroll	10,294,000	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$478,190	\$495,979
2. Payment on projected unfunded actuarial accrued liability	1,837,322	1,982,437
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$2,315,512	\$2,478,416
6. Total Actuarially Determined Contribution, payable on July 1	2,274,023	2,434,008

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Littleton		2000
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 11 beneficiaries in pay status)		102
2. Participants active during the year ended December 31, 2017		242
3. Inactive participants entitled to a return of their employee contributions		78
4. Inactive participants with a vested right to a deferred or immediate benefit		16
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$1,682,529
2. Administrative expenses		91,136
3. Expected employee contributions		<u>-1,185,208</u>
4. Employer normal cost: (1) + (2) + (3)		\$588,457
5. Actuarial accrued liability		59,899,994
Retired participants and beneficiaries	\$25,867,631	
Active participants	31,833,746	
Inactive participants	<u>2,198,617</u>	
6. Actuarial value of assets		37,804,889
7. Unfunded actuarial accrued liability: (5) – (6)		22,095,105
8. Reallocated unfunded actuarial accrued liability		<u>548,949</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$22,644,054
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$608,852	4.91%
2. Projected unfunded actuarial accrued liability	23,477,855	
3. Payment on projected unfunded actuarial accrued liability	1,618,267	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$2,227,119	17.98%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	2,185,944	17.65%
9. Projected payroll	12,388,274	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$631,336	\$654,642
2. Payment on projected unfunded actuarial accrued liability	1,615,876	1,743,501
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$2,247,212	\$2,398,143
6. Total Actuarially Determined Contribution, payable on July 1	2,206,947	2,355,174

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of North Reading		2100
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 22 beneficiaries in pay status)		173
2. Participants active during the year ended December 31, 2017		249
3. Inactive participants entitled to a return of their employee contributions		38
4. Inactive participants with a vested right to a deferred or immediate benefit		5
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$1,790,628
2. Administrative expenses		96,992
3. Expected employee contributions		<u>-1,263,890</u>
4. Employer normal cost: (1) + (2) + (3)		\$623,730
5. Actuarial accrued liability		88,749,091
Retired participants and beneficiaries	\$45,956,856	
Active participants	41,984,908	
Inactive participants	<u>807,327</u>	
6. Actuarial value of assets		40,525,369
7. Unfunded actuarial accrued liability: (5) – (6)		48,223,722
8. Reallocated unfunded actuarial accrued liability		<u>813,334</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$49,037,056
The actuarial factors projected to FY19 are as follows:		
	Amount	% of Payroll
1. Projected employer normal cost	\$645,348	4.84%
2. Projected unfunded actuarial accrued liability	50,842,702	
3. Payment on projected unfunded actuarial accrued liability	3,211,066	
4. Payment on 2002 ERI	21,560	
5. Payment on 2003 ERI	56,687	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$3,934,661	29.48%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	3,861,918	28.93%
9. Projected payroll	13,347,135	
The actuarial factors projected to FY20 and FY21 are as follows:		
	FY20	FY21
1. Projected employer normal cost	\$669,191	\$693,907
2. Payment on projected unfunded actuarial accrued liability	3,511,052	3,788,360
3. Payment on 2003 ERI	56,687	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$4,236,930	\$4,482,267
6. Total Actuarially Determined Contribution, payable on July 1	4,161,014	4,401,955

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Pepperell		2200
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 6 beneficiaries in pay status)		54
2. Participants active during the year ended December 31, 2017		73
3. Inactive participants entitled to a return of their employee contributions		13
4. Inactive participants with a vested right to a deferred or immediate benefit		6
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$660,434
2. Administrative expenses		35,773
3. Expected employee contributions		<u>-459,313</u>
4. Employer normal cost: (1) + (2) + (3)		\$236,894
5. Actuarial accrued liability		31,637,567
Retired participants and beneficiaries	\$15,159,866	
Active participants	15,387,688	
Inactive participants	<u>1,090,013</u>	
6. Actuarial value of assets		15,191,146
7. Unfunded actuarial accrued liability: (5) – (6)		16,446,421
8. Reallocated unfunded actuarial accrued liability		<u>289,940</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$16,736,361
The actuarial factors projected to FY19 are as follows:		
	Amount	% of Payroll
1. Projected employer normal cost	\$245,104	5.16%
2. Projected unfunded actuarial accrued liability	17,352,628	
3. Payment on projected unfunded actuarial accrued liability	1,118,017	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$1,363,121	28.71%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	1,337,920	28.18%
9. Projected payroll	4,747,623	
The actuarial factors projected to FY20 and FY21 are as follows:		
	FY20	FY21
1. Projected employer normal cost	\$254,129	\$263,482
2. Payment on projected unfunded actuarial accrued liability	1,199,963	1,294,738
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$1,454,092	\$1,558,220
6. Total Actuarially Determined Contribution, payable on July 1	1,428,038	1,530,300

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Sherborn		2300
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 2 beneficiaries in pay status)		44
2. Participants active during the year ended December 31, 2017		75
3. Inactive participants entitled to a return of their employee contributions		35
4. Inactive participants with a vested right to a deferred or immediate benefit		8
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$606,625
2. Administrative expenses		32,859
3. Expected employee contributions		<u>-395,301</u>
4. Employer normal cost: (1) + (2) + (3)		\$244,183
5. Actuarial accrued liability		22,188,139
Retired participants and beneficiaries	\$11,201,573	
Active participants	9,926,630	
Inactive participants	<u>1,059,936</u>	
6. Actuarial value of assets		11,567,265
7. Unfunded actuarial accrued liability: (5) – (6)		10,620,874
8. Reallocated unfunded actuarial accrued liability		<u>203,341</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$10,824,215
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$252,646	6.04%
2. Projected unfunded actuarial accrued liability	11,222,785	
3. Payment on projected unfunded actuarial accrued liability	740,904	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$993,550	23.76%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	975,181	23.32%
9. Projected payroll	4,181,596	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$261,829	\$271,344
2. Payment on projected unfunded actuarial accrued liability	774,782	835,975
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$1,036,611	\$1,107,319
6. Total Actuarially Determined Contribution, payable on July 1	1,018,037	1,087,478

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Shirley		2400
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 6 beneficiaries in pay status)		42
2. Participants active during the year ended December 31, 2017		40
3. Inactive participants entitled to a return of their employee contributions		22
4. Inactive participants with a vested right to a deferred or immediate benefit		3
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$313,527
2. Administrative expenses		16,983
3. Expected employee contributions		<u>-171,637</u>
4. Employer normal cost: (1) + (2) + (3)		\$158,873
5. Actuarial accrued liability		15,957,705
Retired participants and beneficiaries	\$11,066,088	
Active participants	4,394,835	
Inactive participants	<u>496,782</u>	
6. Actuarial value of assets		7,505,893
7. Unfunded actuarial accrued liability: (5) – (6)		8,451,812
8. Reallocated unfunded actuarial accrued liability		<u>146,243</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$8,598,055
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$164,379	9.12%
2. Projected unfunded actuarial accrued liability	8,914,653	
3. Payment on projected unfunded actuarial accrued liability	599,860	
4. Payment on 2002 ERI	32,785	
5. Payment on 2003 ERI	19,627	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$816,651	45.29%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	801,553	44.45%
9. Projected payroll	1,803,346	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$170,224	\$176,276
2. Payment on projected unfunded actuarial accrued liability	609,491	657,630
3. Payment on 2003 ERI	19,627	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$799,342	\$833,906
6. Total Actuarially Determined Contribution, payable on July 1	785,020	818,964

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Stow		2500
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 4 beneficiaries in pay status)		37
2. Participants active during the year ended December 31, 2017		60
3. Inactive participants entitled to a return of their employee contributions		6
4. Inactive participants with a vested right to a deferred or immediate benefit		2
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$525,760
2. Administrative expenses		28,478
3. Expected employee contributions		<u>-365,283</u>
4. Employer normal cost: (1) + (2) + (3)		\$188,955
5. Actuarial accrued liability		21,440,871
Retired participants and beneficiaries	\$9,513,399	
Active participants	11,651,841	
Inactive participants	<u>275,631</u>	
6. Actuarial value of assets		10,880,123
7. Unfunded actuarial accrued liability: (5) – (6)		10,560,748
8. Reallocated unfunded actuarial accrued liability		<u>196,493</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$10,757,241
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$195,504	5.15%
2. Projected unfunded actuarial accrued liability	11,153,345	
3. Payment on projected unfunded actuarial accrued liability	702,106	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$897,610	23.64%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	881,015	23.20%
9. Projected payroll	3,796,933	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$202,700	\$210,159
2. Payment on projected unfunded actuarial accrued liability	772,468	833,479
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$975,168	\$1,043,638
6. Total Actuarially Determined Contribution, payable on July 1	957,695	1,024,938

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Sudbury		2600
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 19 beneficiaries in pay status)		206
2. Participants active during the year ended December 31, 2017		281
3. Inactive participants entitled to a return of their employee contributions		97
4. Inactive participants with a vested right to a deferred or immediate benefit		15
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$2,239,689
2. Administrative expenses		121,316
3. Expected employee contributions		<u>-1,607,207</u>
4. Employer normal cost: (1) + (2) + (3)		\$753,798
5. Actuarial accrued liability		105,177,296
Retired participants and beneficiaries	\$55,903,743	
Active participants	47,027,164	
Inactive participants	<u>2,246,389</u>	
6. Actuarial value of assets		46,271,410
7. Unfunded actuarial accrued liability: (5) – (6)		58,905,886
8. Reallocated unfunded actuarial accrued liability		<u>963,889</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$59,869,775
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$779,924	4.63%
2. Projected unfunded actuarial accrued liability	62,074,304	
3. Payment on projected unfunded actuarial accrued liability	3,746,318	
4. Payment on 2002 ERI	26,188	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$4,552,430	27.05%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	4,468,265	26.55%
9. Projected payroll	16,827,322	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$808,860	\$838,859
2. Payment on projected unfunded actuarial accrued liability	4,308,992	4,649,323
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$5,117,852	\$5,488,182
6. Total Actuarially Determined Contribution, payable on July 1	5,026,152	5,389,846

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Tewksbury		2700
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 29 beneficiaries in pay status)		303
2. Participants active during the year ended December 31, 2017		424
3. Inactive participants entitled to a return of their employee contributions		86
4. Inactive participants with a vested right to a deferred or immediate benefit		9
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$3,229,387
2. Administrative expenses		174,924
3. Expected employee contributions		<u>-2,213,873</u>
4. Employer normal cost: (1) + (2) + (3)		\$1,190,438
5. Actuarial accrued liability		160,597,031
Retired participants and beneficiaries	\$94,628,768	
Active participants	64,662,415	
Inactive participants	<u>1,305,848</u>	
6. Actuarial value of assets		62,790,138
7. Unfunded actuarial accrued liability: (5) – (6)		97,806,893
8. Reallocated unfunded actuarial accrued liability		<u>1,471,778</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$99,278,671
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$1,231,697	5.33%
2. Projected unfunded actuarial accrued liability	102,934,317	
3. Payment on projected unfunded actuarial accrued liability	6,313,974	
4. Payment on 2002 ERI	227,822	
5. Payment on 2003 ERI	348,371	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$8,121,864	35.15%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	7,971,708	34.50%
9. Projected payroll	23,107,744	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$1,276,902	\$1,323,753
2. Payment on projected unfunded actuarial accrued liability	7,075,867	7,634,730
3. Payment on 2003 ERI	348,371	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$8,701,140	\$8,958,483
6. Total Actuarially Determined Contribution, payable on July 1	8,545,236	8,797,968

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Townsend		2800
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 2 beneficiaries in pay status)		32
2. Participants active during the year ended December 31, 2017		57
3. Inactive participants entitled to a return of their employee contributions		8
4. Inactive participants with a vested right to a deferred or immediate benefit		2
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$527,376
2. Administrative expenses		28,566
3. Expected employee contributions		<u>-306,846</u>
4. Employer normal cost: (1) + (2) + (3)		\$249,096
5. Actuarial accrued liability		19,394,125
Retired participants and beneficiaries	\$10,369,875	
Active participants	8,706,013	
Inactive participants	<u>318,237</u>	
6. Actuarial value of assets		11,145,643
7. Unfunded actuarial accrued liability: (5) – (6)		8,248,482
8. Reallocated unfunded actuarial accrued liability		<u>177,736</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$8,426,218
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$257,729	7.97%
2. Projected unfunded actuarial accrued liability	8,736,489	
3. Payment on projected unfunded actuarial accrued liability	550,091	
4. Payment on 2002 ERI	20,084	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$827,904	25.59%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	812,598	25.11%
9. Projected payroll	3,235,663	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$266,951	\$276,500
2. Payment on projected unfunded actuarial accrued liability	603,614	651,289
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$870,565	\$927,789
6. Total Actuarially Determined Contribution, payable on July 1	854,966	911,165

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Tyngsborough		2900
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 11 beneficiaries in pay status)		75
2. Participants active during the year ended December 31, 2017		176
3. Inactive participants entitled to a return of their employee contributions		43
4. Inactive participants with a vested right to a deferred or immediate benefit		7
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$1,226,824
2. Administrative expenses		66,452
3. Expected employee contributions		<u>-816,399</u>
4. Employer normal cost: (1) + (2) + (3)		\$476,877
5. Actuarial accrued liability		44,094,553
Retired participants and beneficiaries	\$20,086,428	
Active participants	23,263,306	
Inactive participants	<u>744,819</u>	
6. Actuarial value of assets		22,958,962
7. Unfunded actuarial accrued liability: (5) – (6)		21,135,591
8. Reallocated unfunded actuarial accrued liability		<u>404,101</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$21,539,692
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$493,405	5.73%
2. Projected unfunded actuarial accrued liability	22,332,828	
3. Payment on projected unfunded actuarial accrued liability	1,495,162	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$1,988,567	23.08%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	1,951,803	22.66%
9. Projected payroll	8,615,140	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$511,407	\$530,060
2. Payment on projected unfunded actuarial accrued liability	1,540,273	1,661,926
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$2,051,680	\$2,191,986
6. Total Actuarially Determined Contribution, payable on July 1	2,014,919	2,152,711

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Wayland		3000
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 20 beneficiaries in pay status)		236
2. Participants active during the year ended December 31, 2017		398
3. Inactive participants entitled to a return of their employee contributions		129
4. Inactive participants with a vested right to a deferred or immediate benefit		13
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$2,629,274
2. Administrative expenses		142,418
3. Expected employee contributions		<u>-1,854,432</u>
4. Employer normal cost: (1) + (2) + (3)		\$917,260
5. Actuarial accrued liability		107,928,553
Retired participants and beneficiaries	\$59,102,335	
Active participants	47,013,602	
Inactive participants	<u>1,812,616</u>	
6. Actuarial value of assets		53,772,172
7. Unfunded actuarial accrued liability: (5) – (6)		54,156,381
8. Reallocated unfunded actuarial accrued liability		<u>989,102</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$55,145,483
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$949,051	4.87%
2. Projected unfunded actuarial accrued liability	57,176,054	
3. Payment on projected unfunded actuarial accrued liability	3,764,809	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	22,693	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$4,736,553	24.32%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	4,648,984	23.87%
9. Projected payroll	19,474,960	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$984,108	\$1,020,449
2. Payment on projected unfunded actuarial accrued liability	3,944,772	4,256,336
3. Payment on 2003 ERI	22,693	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$4,951,573	\$5,276,785
6. Total Actuarially Determined Contribution, payable on July 1	4,862,852	5,182,237

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Westford		3100
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 12 beneficiaries in pay status)		217
2. Participants active during the year ended December 31, 2017		555
3. Inactive participants entitled to a return of their employee contributions		172
4. Inactive participants with a vested right to a deferred or immediate benefit		13
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$3,493,228
2. Administrative expenses		189,215
3. Expected employee contributions		<u>-2,451,454</u>
4. Employer normal cost: (1) + (2) + (3)		\$1,230,989
5. Actuarial accrued liability		124,586,159
Retired participants and beneficiaries	\$52,924,761	
Active participants	69,032,978	
Inactive participants	<u>2,628,420</u>	
6. Actuarial value of assets		71,856,606
7. Unfunded actuarial accrued liability: (5) – (6)		52,729,553
8. Reallocated unfunded actuarial accrued liability		<u>1,141,760</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$53,871,313
The actuarial factors projected to FY19 are as follows:		
	Amount	% of Payroll
1. Projected employer normal cost	\$1,273,654	4.95%
2. Projected unfunded actuarial accrued liability	55,854,966	
3. Payment on projected unfunded actuarial accrued liability	3,534,518	
4. Payment on 2002 ERI	101,211	
5. Payment on 2003 ERI	25,226	
6. Payment on 2010 ERI	<u>60,429</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$4,995,038	19.42%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	4,902,690	19.07%
9. Projected payroll	25,715,455	
The actuarial factors projected to FY20 and FY21 are as follows:		
	FY20	FY21
1. Projected employer normal cost	\$1,320,645	\$1,369,354
2. Payment on projected unfunded actuarial accrued liability	3,840,475	4,143,802
3. Payment on 2003 ERI	25,226	0
4. Payment on 2010 ERI	<u>60,429</u>	<u>60,429</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$5,246,775	\$5,573,585
6. Total Actuarially Determined Contribution, payable on July 1	5,152,765	5,473,719

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Weston		3200
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 21 beneficiaries in pay status)		236
2. Participants active during the year ended December 31, 2017		371
3. Inactive participants entitled to a return of their employee contributions		164
4. Inactive participants with a vested right to a deferred or immediate benefit		18
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$2,612,694
2. Administrative expenses		141,520
3. Expected employee contributions		<u>-1,914,670</u>
4. Employer normal cost: (1) + (2) + (3)		\$839,544
5. Actuarial accrued liability		114,229,142
Retired participants and beneficiaries	\$57,241,423	
Active participants	52,919,628	
Inactive participants	<u>4,068,091</u>	
6. Actuarial value of assets		52,589,125
7. Unfunded actuarial accrued liability: (5) – (6)		61,640,017
8. Reallocated unfunded actuarial accrued liability		<u>1,046,844</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$62,686,861
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$868,642	4.34%
2. Projected unfunded actuarial accrued liability	64,995,121	
3. Payment on projected unfunded actuarial accrued liability	4,342,328	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$5,210,970	26.03%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	5,114,630	25.55%
9. Projected payroll	20,021,779	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$901,059	\$934,673
2. Payment on projected unfunded actuarial accrued liability	4,483,303	4,837,401
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$5,384,362	\$5,772,074
6. Total Actuarially Determined Contribution, payable on July 1	5,287,887	5,668,652

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Town of Wilmington		3300
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 39 beneficiaries in pay status)		255
2. Participants active during the year ended December 31, 2017		412
3. Inactive participants entitled to a return of their employee contributions		95
4. Inactive participants with a vested right to a deferred or immediate benefit		15
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$3,144,547
2. Administrative expenses		170,328
3. Expected employee contributions		<u>-2,281,436</u>
4. Employer normal cost: (1) + (2) + (3)		\$1,033,439
5. Actuarial accrued liability		149,653,868
Retired participants and beneficiaries	\$73,200,041	
Active participants	73,977,537	
Inactive participants	<u>2,476,290</u>	
6. Actuarial value of assets		66,031,858
7. Unfunded actuarial accrued liability: (5) – (6)		83,622,010
8. Reallocated unfunded actuarial accrued liability		<u>1,371,490</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$84,993,500
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$1,069,257	4.47%
2. Projected unfunded actuarial accrued liability	88,123,136	
3. Payment on projected unfunded actuarial accrued liability	5,588,876	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$6,658,133	27.84%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	6,535,038	27.33%
9. Projected payroll	23,915,725	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$1,109,046	\$1,150,301
2. Payment on projected unfunded actuarial accrued liability	6,100,303	6,582,114
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$7,209,349	\$7,732,415
6. Total Actuarially Determined Contribution, payable on July 1	7,080,174	7,593,868

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Acton-Boxborough RSD		3400
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 5 beneficiaries in pay status)		122
2. Participants active during the year ended December 31, 2017		336
3. Inactive participants entitled to a return of their employee contributions		67
4. Inactive participants with a vested right to a deferred or immediate benefit		8
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$1,799,051
2. Administrative expenses		97,448
3. Expected employee contributions		<u>-1,273,308</u>
4. Employer normal cost: (1) + (2) + (3)		\$623,191
5. Actuarial accrued liability		54,795,842
Retired participants and beneficiaries	\$21,867,724	
Active participants	31,791,795	
Inactive participants	<u>1,136,323</u>	
6. Actuarial value of assets		27,470,144
7. Unfunded actuarial accrued liability: (5) – (6)		27,325,698
8. Reallocated unfunded actuarial accrued liability		<u>502,172</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$27,827,870
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$644,790	4.72%
2. Projected unfunded actuarial accrued liability	28,852,550	
3. Payment on projected unfunded actuarial accrued liability	1,869,140	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$2,513,930	18.42%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	2,467,453	18.08%
9. Projected payroll	13,647,944	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$668,629	\$693,340
2. Payment on projected unfunded actuarial accrued liability	1,994,463	2,151,989
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$2,663,092	\$2,845,329
6. Total Actuarially Determined Contribution, payable on July 1	2,615,376	2,794,347

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Acton Water Supply		3500
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		8
2. Participants active during the year ended December 31, 2017		16
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		2
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$106,334
2. Administrative expenses		5,760
3. Expected employee contributions		<u>-117,817</u>
4. Employer normal cost: (1) + (2) + (3)		<u>-\$5,723</u>
5. Actuarial accrued liability		6,772,023
Retired participants and beneficiaries	\$2,787,252	
Active participants	3,717,013	
Inactive participants	<u>267,758</u>	
6. Actuarial value of assets		3,372,707
7. Unfunded actuarial accrued liability: (5) – (6)		3,399,316
8. Reallocated unfunded actuarial accrued liability		<u>62,062</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$3,461,378
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	<u>-\$5,921</u>	<u>-0.49%</u>
2. Projected unfunded actuarial accrued liability	3,588,833	
3. Payment on projected unfunded actuarial accrued liability	222,577	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	5,514	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$222,170	18.39%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	218,063	18.05%
9. Projected payroll	1,207,934	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	<u>-\$5,943</u>	<u>-\$5,960</u>
2. Payment on projected unfunded actuarial accrued liability	248,029	267,619
3. Payment on 2003 ERI	5,514	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$247,600	\$261,659
6. Total Actuarially Determined Contribution, payable on July 1	243,164	256,971

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Bedford Housing Authority		3600
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 1 beneficiary in pay status)		2
2. Participants active during the year ended December 31, 2017		3
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$18,873
2. Administrative expenses		1,022
3. Expected employee contributions		-16,311
4. Employer normal cost: (1) + (2) + (3)		\$3,584
5. Actuarial accrued liability		634,057
Retired participants and beneficiaries	\$235,923	
Active participants	398,134	
Inactive participants	<u>0</u>	
6. Actuarial value of assets		317,809
7. Unfunded actuarial accrued liability: (5) – (6)		316,248
8. Reallocated unfunded actuarial accrued liability		5,811
9. Total unfunded actuarial accrued liability: (7) + (8)		\$322,059
The actuarial factors projected to FY19 are as follows:		
	Amount	% of Payroll
1. Projected employer normal cost	\$3,708	2.22%
2. Projected unfunded actuarial accrued liability	333,918	
3. Payment on projected unfunded actuarial accrued liability	20,481	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	6,905	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$31,094	18.59%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	30,519	18.24%
9. Projected payroll	167,299	
The actuarial factors projected to FY20 and FY21 are as follows:		
	FY20	FY21
1. Projected employer normal cost	\$3,859	\$4,016
2. Payment on projected unfunded actuarial accrued liability	22,200	23,953
3. Payment on 2003 ERI	6,905	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$32,964	\$27,969
6. Total Actuarially Determined Contribution, payable on July 1	32,373	27,468

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Billerica Housing Authority		3700
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 1 beneficiary in pay status)		4
2. Participants active during the year ended December 31, 2017		6
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$36,085
2. Administrative expenses		1,955
3. Expected employee contributions		<u>-29,553</u>
4. Employer normal cost: (1) + (2) + (3)		\$8,487
5. Actuarial accrued liability		2,269,532
Retired participants and beneficiaries	\$1,295,378	
Active participants	974,154	
Inactive participants	<u>0</u>	
6. Actuarial value of assets		911,569
7. Unfunded actuarial accrued liability: (5) – (6)		1,357,963
8. Reallocated unfunded actuarial accrued liability		<u>20,799</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$1,378,762
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$8,781	2.85%
2. Projected unfunded actuarial accrued liability	1,429,531	
3. Payment on projected unfunded actuarial accrued liability	91,176	
4. Payment on 2002 ERI	9,748	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$109,705	35.63%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	107,677	34.97%
9. Projected payroll	307,931	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$9,124	\$9,481
2. Payment on projected unfunded actuarial accrued liability	98,215	105,972
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$107,339	\$115,453
6. Total Actuarially Determined Contribution, payable on July 1	105,416	113,384

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Chelmsford Housing Authority		3800
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		3
2. Participants active during the year ended December 31, 2017		34
3. Inactive participants entitled to a return of their employee contributions		9
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$296,620
2. Administrative expenses		16,067
3. Expected employee contributions		<u>-251,160</u>
4. Employer normal cost: (1) + (2) + (3)		\$61,527
5. Actuarial accrued liability		5,525,733
Retired participants and beneficiaries	\$842,032	
Active participants	4,576,447	
Inactive participants	<u>107,254</u>	
6. Actuarial value of assets		3,437,582
7. Unfunded actuarial accrued liability: (5) – (6)		2,088,151
8. Reallocated unfunded actuarial accrued liability		<u>50,640</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$2,138,791
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$63,659	2.52%
2. Projected unfunded actuarial accrued liability	2,217,546	
3. Payment on projected unfunded actuarial accrued liability	55,558	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$119,217	4.72%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	117,013	4.63%
9. Projected payroll	2,527,926	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$66,204	\$68,847
2. Payment on projected unfunded actuarial accrued liability	159,677	172,289
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$225,881	\$241,136
6. Total Actuarially Determined Contribution, payable on July 1	221,834	236,815

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Chelmsford Water District		3900
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 1 beneficiary in pay status)		11
2. Participants active during the year ended December 31, 2017		21
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$146,704
2. Administrative expenses		7,946
3. Expected employee contributions		<u>-135,182</u>
4. Employer normal cost: (1) + (2) + (3)		\$19,468
5. Actuarial accrued liability		7,713,601
Retired participants and beneficiaries	\$3,430,174	
Active participants	4,283,427	
Inactive participants	<u>0</u>	
6. Actuarial value of assets		7,121,756
7. Unfunded actuarial accrued liability: (5) – (6)		591,845
8. Reallocated unfunded actuarial accrued liability		<u>70,691</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$662,536
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$20,143	1.43%
2. Projected unfunded actuarial accrued liability	686,932	
3. Payment on projected unfunded actuarial accrued liability	97,082	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$117,225	8.30%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	115,058	8.14%
9. Projected payroll	1,412,873	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$21,032	\$21,959
2. Payment on projected unfunded actuarial accrued liability	43,673	47,122
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$64,705	\$69,081
6. Total Actuarially Determined Contribution, payable on July 1	63,546	67,843

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Dracut Housing Authority		4000
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		6
2. Participants active during the year ended December 31, 2017		6
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$39,954
2. Administrative expenses		2,164
3. Expected employee contributions		<u>-38,268</u>
4. Employer normal cost: (1) + (2) + (3)		\$3,850
5. Actuarial accrued liability		3,057,808
Retired participants and beneficiaries	\$1,800,540	
Active participants	1,257,268	
Inactive participants	<u>0</u>	
6. Actuarial value of assets		1,015,460
7. Unfunded actuarial accrued liability: (5) – (6)		2,042,348
8. Reallocated unfunded actuarial accrued liability		<u>28,023</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$2,070,371
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$3,983	1.00%
2. Projected unfunded actuarial accrued liability	2,146,606	
3. Payment on projected unfunded actuarial accrued liability	129,707	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$133,690	33.73%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	131,218	33.11%
9. Projected payroll	396,346	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$4,177	\$4,379
2. Payment on projected unfunded actuarial accrued liability	149,065	160,838
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$153,242	\$165,217
6. Total Actuarially Determined Contribution, payable on July 1	150,496	162,257

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Dracut Water Supply		4100
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 2 beneficiaries in pay status)		6
2. Participants active during the year ended December 31, 2017		14
3. Inactive participants entitled to a return of their employee contributions		3
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$67,412
2. Administrative expenses		3,651
3. Expected employee contributions		<u>-61,297</u>
4. Employer normal cost: (1) + (2) + (3)		\$9,766
5. Actuarial accrued liability		5,055,123
Retired participants and beneficiaries	\$2,421,461	
Active participants	2,611,390	
Inactive participants	<u>22,272</u>	
6. Actuarial value of assets		2,026,829
7. Unfunded actuarial accrued liability: (5) – (6)		3,028,294
8. Reallocated unfunded actuarial accrued liability		<u>46,327</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$3,074,621
The actuarial factors projected to FY19 are as follows:		
	Amount	% of Payroll
1. Projected employer normal cost	\$10,104	1.56%
2. Projected unfunded actuarial accrued liability	3,187,835	
3. Payment on projected unfunded actuarial accrued liability	167,026	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$177,130	27.31%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	173,855	26.80%
9. Projected payroll	648,665	
The actuarial factors projected to FY20 and FY21 are as follows:		
	FY20	FY21
1. Projected employer normal cost	\$10,541	\$10,995
2. Payment on projected unfunded actuarial accrued liability	223,226	240,856
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$233,767	\$251,851
6. Total Actuarially Determined Contribution, payable on July 1	229,578	247,338

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – E. Chelmsford Water		4200
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 1 beneficiary in pay status)		2
2. Participants active during the year ended December 31, 2017		3
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$27,481
2. Administrative expenses		1,489
3. Expected employee contributions		-19,510
4. Employer normal cost: (1) + (2) + (3)		\$9,460
5. Actuarial accrued liability		920,855
Retired participants and beneficiaries	\$266,381	
Active participants	654,474	
Inactive participants	<u>0</u>	
6. Actuarial value of assets		592,921
7. Unfunded actuarial accrued liability: (5) – (6)		327,934
8. Reallocated unfunded actuarial accrued liability		8,439
9. Total unfunded actuarial accrued liability: (7) + (8)		\$336,373
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$9,788	4.78%
2. Projected unfunded actuarial accrued liability	348,759	
3. Payment on projected unfunded actuarial accrued liability	21,078	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$30,866	15.08%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	30,295	14.80%
9. Projected payroll	204,697	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$10,150	\$10,525
2. Payment on projected unfunded actuarial accrued liability	24,218	26,131
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$34,368	\$36,656
6. Total Actuarially Determined Contribution, payable on July 1	33,752	35,999

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – E. Middlesex Mosq Control		4300
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		3
2. Participants active during the year ended December 31, 2017		6
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$38,170
2. Administrative expenses		2,068
3. Expected employee contributions		<u>-32,105</u>
4. Employer normal cost: (1) + (2) + (3)		\$8,133
5. Actuarial accrued liability		2,052,499
Retired participants and beneficiaries	\$1,211,398	
Active participants	841,101	
Inactive participants	<u>0</u>	
6. Actuarial value of assets		1,509,509
7. Unfunded actuarial accrued liability: (5) – (6)		542,990
8. Reallocated unfunded actuarial accrued liability		<u>18,810</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$561,800
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$8,415	2.50%
2. Projected unfunded actuarial accrued liability	582,487	
3. Payment on projected unfunded actuarial accrued liability	38,976	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$47,391	14.11%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	46,515	13.85%
9. Projected payroll	335,962	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$8,750	\$9,097
2. Payment on projected unfunded actuarial accrued liability	40,175	43,348
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$48,925	\$52,445
6. Total Actuarially Determined Contribution, payable on July 1	48,048	51,505

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Greater Lowell RVTSD		4400
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 8 beneficiaries in pay status)		81
2. Participants active during the year ended December 31, 2017		87
3. Inactive participants entitled to a return of their employee contributions		18
4. Inactive participants with a vested right to a deferred or immediate benefit		2
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$495,053
2. Administrative expenses		26,815
3. Expected employee contributions		<u>-424,659</u>
4. Employer normal cost: (1) + (2) + (3)		\$97,209
5. Actuarial accrued liability		28,032,168
Retired participants and beneficiaries	\$15,282,938	
Active participants	12,397,284	
Inactive participants	<u>351,946</u>	
6. Actuarial value of assets		12,379,731
7. Unfunded actuarial accrued liability: (5) – (6)		15,652,437
8. Reallocated unfunded actuarial accrued liability		<u>256,898</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$15,909,335
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$100,578	2.22%
2. Projected unfunded actuarial accrued liability	16,495,150	
3. Payment on projected unfunded actuarial accrued liability	1,009,254	
4. Payment on 2002 ERI	164,515	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$1,274,347	28.11%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	1,250,787	27.59%
9. Projected payroll	4,533,847	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$104,640	\$108,861
2. Payment on projected unfunded actuarial accrued liability	1,132,620	1,222,076
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$1,237,260	\$1,330,937
6. Total Actuarially Determined Contribution, payable on July 1	1,215,091	1,307,090

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Groton-Dunstable RSD		4500
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 2 beneficiaries in pay status)		75
2. Participants active during the year ended December 31, 2017		133
3. Inactive participants entitled to a return of their employee contributions		75
4. Inactive participants with a vested right to a deferred or immediate benefit		5
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$597,350
2. Administrative expenses		32,356
3. Expected employee contributions		<u>-419,810</u>
4. Employer normal cost: (1) + (2) + (3)		\$209,896
5. Actuarial accrued liability		25,474,372
Retired participants and beneficiaries	\$12,656,600	
Active participants	11,794,687	
Inactive participants	<u>1,023,085</u>	
6. Actuarial value of assets		14,556,164
7. Unfunded actuarial accrued liability: (5) – (6)		10,918,208
8. Reallocated unfunded actuarial accrued liability		<u>233,458</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$11,151,666
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$217,171	4.73%
2. Projected unfunded actuarial accrued liability	11,562,293	
3. Payment on projected unfunded actuarial accrued liability	694,555	
4. Payment on 2002 ERI	4,037	
5. Payment on 2003 ERI	15,275	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$931,038	20.29%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	913,825	19.91%
9. Projected payroll	4,588,901	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$225,186	\$233,494
2. Payment on projected unfunded actuarial accrued liability	800,775	864,022
3. Payment on 2003 ERI	15,275	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$1,041,236	\$1,097,516
6. Total Actuarially Determined Contribution, payable on July 1	1,022,579	1,077,851

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Hudson Housing Authority		4600
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		5
2. Participants active during the year ended December 31, 2017		5
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$34,274
2. Administrative expenses		1,856
3. Expected employee contributions		<u>-26,662</u>
4. Employer normal cost: (1) + (2) + (3)		\$9,468
5. Actuarial accrued liability		2,034,606
Retired participants and beneficiaries	\$1,447,647	
Active participants	586,959	
Inactive participants	<u>0</u>	
6. Actuarial value of assets		877,396
7. Unfunded actuarial accrued liability: (5) – (6)		1,157,210
8. Reallocated unfunded actuarial accrued liability		<u>18,646</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$1,175,856
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$9,796	3.58%
2. Projected unfunded actuarial accrued liability	1,219,153	
3. Payment on projected unfunded actuarial accrued liability	99,710	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$109,506	39.97%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	107,481	39.23%
9. Projected payroll	274,002	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$10,169	\$10,557
2. Payment on projected unfunded actuarial accrued liability	82,772	89,310
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$92,941	\$99,867
6. Total Actuarially Determined Contribution, payable on July 1	91,276	98,078

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Lincoln Sudbury		4700
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 2 beneficiaries in pay status)		39
2. Participants active during the year ended December 31, 2017		66
3. Inactive participants entitled to a return of their employee contributions		25
4. Inactive participants with a vested right to a deferred or immediate benefit		2
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$366,266
2. Administrative expenses		19,839
3. Expected employee contributions		<u>-296,068</u>
4. Employer normal cost: (1) + (2) + (3)		\$90,037
5. Actuarial accrued liability		15,515,365
Retired participants and beneficiaries	\$6,628,809	
Active participants	8,575,198	
Inactive participants	<u>311,358</u>	
6. Actuarial value of assets		7,019,378
7. Unfunded actuarial accrued liability: (5) – (6)		8,495,987
8. Reallocated unfunded actuarial accrued liability		<u>142,189</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$8,638,176
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$93,158	2.99%
2. Projected unfunded actuarial accrued liability	8,956,252	
3. Payment on projected unfunded actuarial accrued liability	565,940	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$659,098	21.13%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	646,913	20.74%
9. Projected payroll	3,119,512	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$96,772	\$100,524
2. Payment on projected unfunded actuarial accrued liability	620,145	669,125
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$716,917	\$769,649
6. Total Actuarially Determined Contribution, payable on July 1	704,071	755,859

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Nashoba Vally THSD		4900
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 2 beneficiaries in pay status)		18
2. Participants active during the year ended December 31, 2017		21
3. Inactive participants entitled to a return of their employee contributions		5
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$143,887
2. Administrative expenses		7,794
3. Expected employee contributions		-100,636
4. Employer normal cost: (1) + (2) + (3)		\$51,045
5. Actuarial accrued liability		4,708,850
Retired participants and beneficiaries	\$2,768,345	
Active participants	1,909,849	
Inactive participants	<u>30,656</u>	
6. Actuarial value of assets		1,232,943
7. Unfunded actuarial accrued liability: (5) – (6)		3,475,907
8. Reallocated unfunded actuarial accrued liability		<u>43,154</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$3,519,061
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$52,814	5.05%
2. Projected unfunded actuarial accrued liability	3,648,640	
3. Payment on projected unfunded actuarial accrued liability	218,688	
4. Payment on 2002 ERI	4,824	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$276,326	26.42%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	271,217	25.93%
9. Projected payroll	1,045,924	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$54,761	\$56,779
2. Payment on projected unfunded actuarial accrued liability	253,148	273,142
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$307,909	\$329,921
6. Total Actuarially Determined Contribution, payable on July 1	302,392	324,010

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – N. Chelmsford Water		5000
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 1 beneficiary in pay status)		1
2. Participants active during the year ended December 31, 2017		8
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		1
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$53,534
2. Administrative expenses		2,900
3. Expected employee contributions		<u>-52,983</u>
4. Employer normal cost: (1) + (2) + (3)		\$3,451
5. Actuarial accrued liability		2,877,148
Retired participants and beneficiaries	\$60,072	
Active participants	2,764,156	
Inactive participants	<u>52,920</u>	
6. Actuarial value of assets		2,020,519
7. Unfunded actuarial accrued liability: (5) – (6)		856,629
8. Reallocated unfunded actuarial accrued liability		<u>26,367</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$882,996
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$3,571	0.60%
2. Projected unfunded actuarial accrued liability	915,510	
3. Payment on projected unfunded actuarial accrued liability	41,537	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$45,108	7.64%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	44,274	7.50%
9. Projected payroll	590,586	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$3,772	\$3,984
2. Payment on projected unfunded actuarial accrued liability	64,574	69,674
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$68,346	\$73,658
6. Total Actuarially Determined Contribution, payable on July 1	67,121	72,338

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – North Middlesex RSD		5100
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 7 beneficiaries in pay status)		90
2. Participants active during the year ended December 31, 2017		166
3. Inactive participants entitled to a return of their employee contributions		88
4. Inactive participants with a vested right to a deferred or immediate benefit		8
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$634,111
2. Administrative expenses		34,347
3. Expected employee contributions		<u>-471,351</u>
4. Employer normal cost: (1) + (2) + (3)		\$197,107
5. Actuarial accrued liability		23,959,114
Retired participants and beneficiaries	\$11,407,708	
Active participants	11,704,312	
Inactive participants	<u>847,094</u>	
6. Actuarial value of assets		12,231,948
7. Unfunded actuarial accrued liability: (5) – (6)		11,727,166
8. Reallocated unfunded actuarial accrued liability		<u>219,571</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$11,946,737
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$203,938	3.96%
2. Projected unfunded actuarial accrued liability	12,386,641	
3. Payment on projected unfunded actuarial accrued liability	766,023	
4. Payment on 2002 ERI	23,037	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$992,998	19.27%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	974,640	18.92%
9. Projected payroll	5,151,966	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$211,583	\$219,510
2. Payment on projected unfunded actuarial accrued liability	857,210	924,913
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$1,068,793	\$1,144,423
6. Total Actuarially Determined Contribution, payable on July 1	1,049,643	1,123,918

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Shawsheen Valley RVS		5300
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 4 beneficiaries in pay status)		43
2. Participants active during the year ended December 31, 2017		55
3. Inactive participants entitled to a return of their employee contributions		19
4. Inactive participants with a vested right to a deferred or immediate benefit		2
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$327,545
2. Administrative expenses		17,742
3. Expected employee contributions		<u>-257,535</u>
4. Employer normal cost: (1) + (2) + (3)		\$87,752
5. Actuarial accrued liability		14,264,844
Retired participants and beneficiaries	\$7,677,336	
Active participants	6,245,516	
Inactive participants	<u>341,992</u>	
6. Actuarial value of assets		6,304,676
7. Unfunded actuarial accrued liability: (5) – (6)		7,960,168
8. Reallocated unfunded actuarial accrued liability		<u>130,729</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$8,090,897
The actuarial factors projected to FY19 are as follows:		
	Amount	% of Payroll
1. Projected employer normal cost	\$90,793	3.35%
2. Projected unfunded actuarial accrued liability	8,388,821	
3. Payment on projected unfunded actuarial accrued liability	566,036	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	17,329	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$674,158	24.88%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	661,694	24.42%
9. Projected payroll	2,709,591	
The actuarial factors projected to FY20 and FY21 are as follows:		
	FY20	FY21
1. Projected employer normal cost	\$94,269	\$97,876
2. Payment on projected unfunded actuarial accrued liability	575,824	621,303
3. Payment on 2003 ERI	17,329	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$687,422	\$719,179
6. Total Actuarially Determined Contribution, payable on July 1	675,105	706,293

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – South Middlesex RVTs		5400
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 3 beneficiaries in pay status)		38
2. Participants active during the year ended December 31, 2017		49
3. Inactive participants entitled to a return of their employee contributions		15
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$303,393
2. Administrative expenses		16,434
3. Expected employee contributions		<u>-231,072</u>
4. Employer normal cost: (1) + (2) + (3)		\$88,755
5. Actuarial accrued liability		13,096,872
Retired participants and beneficiaries	\$5,826,297	
Active participants	7,168,041	
Inactive participants	<u>102,534</u>	
6. Actuarial value of assets		6,547,166
7. Unfunded actuarial accrued liability: (5) – (6)		6,549,706
8. Reallocated unfunded actuarial accrued liability		<u>120,025</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$6,669,731
The actuarial factors projected to FY19 are as follows:		
	Amount	% of Payroll
1. Projected employer normal cost	\$91,831	3.72%
2. Projected unfunded actuarial accrued liability	6,915,324	
3. Payment on projected unfunded actuarial accrued liability	496,433	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$588,264	23.82%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	577,388	23.38%
9. Projected payroll	2,469,419	
The actuarial factors projected to FY20 and FY21 are as follows:		
	FY20	FY21
1. Projected employer normal cost	\$95,302	\$98,902
2. Payment on projected unfunded actuarial accrued liability	474,517	511,995
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$569,819	\$610,897
6. Total Actuarially Determined Contribution, payable on July 1	559,609	599,951

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Sudbury Water District		5500
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 1 beneficiary in pay status)		3
2. Participants active during the year ended December 31, 2017		10
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		1
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$85,004
2. Administrative expenses		4,604
3. Expected employee contributions		<u>-84,500</u>
4. Employer normal cost: (1) + (2) + (3)		\$5,108
5. Actuarial accrued liability		4,815,366
Retired participants and beneficiaries	\$1,222,332	
Active participants	3,282,389	
Inactive participants	<u>310,645</u>	
6. Actuarial value of assets		3,059,391
7. Unfunded actuarial accrued liability: (5) – (6)		1,755,975
8. Reallocated unfunded actuarial accrued liability		<u>44,130</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$1,800,105
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$5,285	0.59%
2. Projected unfunded actuarial accrued liability	1,866,389	
3. Payment on projected unfunded actuarial accrued liability	125,581	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$130,866	14.67%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	128,447	14.40%
9. Projected payroll	892,036	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$5,593	\$5,916
2. Payment on projected unfunded actuarial accrued liability	128,677	138,841
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$134,270	\$144,757
6. Total Actuarially Determined Contribution, payable on July 1	131,864	142,163

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Tewksbury Housing Authority		5600
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 1 beneficiary in pay status)		6
2. Participants active during the year ended December 31, 2017		8
3. Inactive participants entitled to a return of their employee contributions		1
4. Inactive participants with a vested right to a deferred or immediate benefit		1
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$57,488
2. Administrative expenses		3,114
3. Expected employee contributions		<u>-44,587</u>
4. Employer normal cost: (1) + (2) + (3)		\$16,015
5. Actuarial accrued liability		2,790,941
Retired participants and beneficiaries	\$1,712,597	
Active participants	951,309	
Inactive participants	<u>127,035</u>	
6. Actuarial value of assets		1,258,146
7. Unfunded actuarial accrued liability: (5) – (6)		1,532,795
8. Reallocated unfunded actuarial accrued liability		<u>25,577</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$1,558,372
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$16,570	3.63%
2. Projected unfunded actuarial accrued liability	1,615,754	
3. Payment on projected unfunded actuarial accrued liability	105,506	
4. Payment on 2002 ERI	3,446	
5. Payment on 2003 ERI	5,535	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$131,057	28.73%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	128,634	28.20%
9. Projected payroll	456,215	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$17,201	\$17,855
2. Payment on projected unfunded actuarial accrued liability	110,606	119,342
3. Payment on 2003 ERI	5,535	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$133,342	\$137,197
6. Total Actuarially Determined Contribution, payable on July 1	130,953	134,739

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Wayland Housing Authority		5700
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		2
2. Participants active during the year ended December 31, 2017		4
3. Inactive participants entitled to a return of their employee contributions		1
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$32,069
2. Administrative expenses		1,737
3. Expected employee contributions		<u>-28,174</u>
4. Employer normal cost: (1) + (2) + (3)		\$5,632
5. Actuarial accrued liability		1,581,357
Retired participants and beneficiaries	\$200,113	
Active participants	1,380,694	
Inactive participants	<u>550</u>	
6. Actuarial value of assets		954,880
7. Unfunded actuarial accrued liability: (5) – (6)		626,477
8. Reallocated unfunded actuarial accrued liability		<u>14,492</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$640,969
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$5,827	1.95%
2. Projected unfunded actuarial accrued liability	664,571	
3. Payment on projected unfunded actuarial accrued liability	40,193	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$46,020	15.40%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	45,169	15.11%
9. Projected payroll	298,860	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$6,068	\$6,318
2. Payment on projected unfunded actuarial accrued liability	46,147	49,791
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$52,215	\$56,109
6. Total Actuarially Determined Contribution, payable on July 1	51,279	55,104

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Hopkinton Housing Authority		5800
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		2
2. Participants active during the year ended December 31, 2017		2
3. Inactive participants entitled to a return of their employee contributions		1
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$9,294
2. Administrative expenses		503
3. Expected employee contributions		<u>-6,652</u>
4. Employer normal cost: (1) + (2) + (3)		\$3,145
5. Actuarial accrued liability		1,046,480
Retired participants and beneficiaries	\$1,005,433	
Active participants	15,219	
Inactive participants	<u>25,828</u>	
6. Actuarial value of assets		580,812
7. Unfunded actuarial accrued liability: (5) – (6)		465,668
8. Reallocated unfunded actuarial accrued liability		<u>9,590</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$475,258
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$3,254	4.52%
2. Projected unfunded actuarial accrued liability	492,758	
3. Payment on projected unfunded actuarial accrued liability	34,860	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$38,114	52.92%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	37,409	51.94%
9. Projected payroll	72,023	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$3,375	\$3,500
2. Payment on projected unfunded actuarial accrued liability	33,849	36,523
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$37,224	\$40,023
6. Total Actuarially Determined Contribution, payable on July 1	36,557	39,306

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Sudbury Housing Authority		6000
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		3
2. Participants active during the year ended December 31, 2017		2
3. Inactive participants entitled to a return of their employee contributions		2
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$21,655
2. Administrative expenses		1,173
3. Expected employee contributions		-14,989
4. Employer normal cost: (1) + (2) + (3)		\$7,839
5. Actuarial accrued liability		870,380
Retired participants and beneficiaries	\$756,288	
Active participants	112,945	
Inactive participants	<u>1,147</u>	
6. Actuarial value of assets		430,237
7. Unfunded actuarial accrued liability: (5) – (6)		440,143
8. Reallocated unfunded actuarial accrued liability		<u>7,977</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$448,120
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$8,111	5.42%
2. Projected unfunded actuarial accrued liability	464,621	
3. Payment on projected unfunded actuarial accrued liability	22,856	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$30,967	20.71%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	30,394	20.32%
9. Projected payroll	149,541	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$8,409	\$8,718
2. Payment on projected unfunded actuarial accrued liability	32,643	35,221
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$41,052	\$43,939
6. Total Actuarially Determined Contribution, payable on July 1	40,316	43,152

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Wilmington Housing Authority		6100
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		4
2. Participants active during the year ended December 31, 2017		3
3. Inactive participants entitled to a return of their employee contributions		1
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$17,951
2. Administrative expenses		972
3. Expected employee contributions		<u>-12,650</u>
4. Employer normal cost: (1) + (2) + (3)		\$6,273
5. Actuarial accrued liability		631,921
Retired participants and beneficiaries	\$347,501	
Active participants	283,321	
Inactive participants	<u>1,099</u>	
6. Actuarial value of assets		294,582
7. Unfunded actuarial accrued liability: (5) – (6)		337,339
8. Reallocated unfunded actuarial accrued liability		<u>5,791</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$343,130
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$6,490	4.90%
2. Projected unfunded actuarial accrued liability	355,765	
3. Payment on projected unfunded actuarial accrued liability	20,633	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	3,544	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$30,667	23.13%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	30,100	22.71%
9. Projected payroll	132,568	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$6,730	\$6,979
2. Payment on projected unfunded actuarial accrued liability	24,272	26,189
3. Payment on 2003 ERI	3,544	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$34,546	\$33,168
6. Total Actuarially Determined Contribution, payable on July 1	33,927	32,574

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Acton Housing Authority		6200
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 1 beneficiary in pay status)		4
2. Participants active during the year ended December 31, 2017		6
3. Inactive participants entitled to a return of their employee contributions		2
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$42,439
2. Administrative expenses		2,299
3. Expected employee contributions		<u>-37,814</u>
4. Employer normal cost: (1) + (2) + (3)		\$6,924
5. Actuarial accrued liability		1,901,374
Retired participants and beneficiaries	\$805,897	
Active participants	1,091,738	
Inactive participants	<u>3,739</u>	
6. Actuarial value of assets		1,141,553
7. Unfunded actuarial accrued liability: (5) – (6)		759,821
8. Reallocated unfunded actuarial accrued liability		<u>17,425</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$777,246
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$7,164	1.83%
2. Projected unfunded actuarial accrued liability	805,866	
3. Payment on projected unfunded actuarial accrued liability	67,339	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$74,503	19.05%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	73,126	18.70%
9. Projected payroll	391,078	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$7,465	\$7,778
2. Payment on projected unfunded actuarial accrued liability	54,609	58,922
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$62,074	\$66,700
6. Total Actuarially Determined Contribution, payable on July 1	60,962	65,505

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Burlington Housing Authority		6300
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		2
2. Participants active during the year ended December 31, 2017		2
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$18,677
2. Administrative expenses		1,012
3. Expected employee contributions		<u>-12,943</u>
4. Employer normal cost: (1) + (2) + (3)		\$6,746
5. Actuarial accrued liability		849,981
Retired participants and beneficiaries	\$615,170	
Active participants	234,811	
Inactive participants	<u>0</u>	
6. Actuarial value of assets		771,762
7. Unfunded actuarial accrued liability: (5) – (6)		78,219
8. Reallocated unfunded actuarial accrued liability		<u>7,790</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$86,009
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$6,980	5.34%
2. Projected unfunded actuarial accrued liability	89,176	
3. Payment on projected unfunded actuarial accrued liability	-66	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$6,914	5.29%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	6,786	5.19%
9. Projected payroll	130,645	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$7,237	\$7,503
2. Payment on projected unfunded actuarial accrued liability	6,588	7,108
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$13,825	\$14,611
6. Total Actuarially Determined Contribution, payable on July 1	13,577	14,349

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Ayer Housing Authority		6400
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		1
2. Participants active during the year ended December 31, 2017		2
3. Inactive participants entitled to a return of their employee contributions		2
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$13,511
2. Administrative expenses		732
3. Expected employee contributions		-11,366
4. Employer normal cost: (1) + (2) + (3)		\$2,877
5. Actuarial accrued liability		1,064,519
Retired participants and beneficiaries	\$692,954	
Active participants	367,802	
Inactive participants	<u>3,763</u>	
6. Actuarial value of assets		280,463
7. Unfunded actuarial accrued liability: (5) – (6)		784,056
8. Reallocated unfunded actuarial accrued liability		<u>9,756</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$793,812
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$2,977	2.56%
2. Projected unfunded actuarial accrued liability	823,042	
3. Payment on projected unfunded actuarial accrued liability	67,112	
4. Payment on 2002 ERI	3,544	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$73,633	63.44%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	72,272	62.26%
9. Projected payroll	116,076	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$3,095	\$3,218
2. Payment on projected unfunded actuarial accrued liability	55,637	60,031
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$58,732	\$63,249
6. Total Actuarially Determined Contribution, payable on July 1	57,680	62,116

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Holliston Housing Authority		6500
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		1
2. Participants active during the year ended December 31, 2017		1
3. Inactive participants entitled to a return of their employee contributions		1
4. Inactive participants with a vested right to a deferred or immediate benefit		1
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$9,886
2. Administrative expenses		535
3. Expected employee contributions		<u>-5,958</u>
4. Employer normal cost: (1) + (2) + (3)		\$4,463
5. Actuarial accrued liability		355,499
Retired participants and beneficiaries	\$118,936	
Active participants	152,495	
Inactive participants	<u>84,068</u>	
6. Actuarial value of assets		209,865
7. Unfunded actuarial accrued liability: (5) – (6)		145,634
8. Reallocated unfunded actuarial accrued liability		<u>3,258</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$148,892
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$4,618	7.62%
2. Projected unfunded actuarial accrued liability	154,375	
3. Payment on projected unfunded actuarial accrued liability	15,108	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$19,726	32.56%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	19,361	31.96%
9. Projected payroll	60,575	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$4,784	\$4,955
2. Payment on projected unfunded actuarial accrued liability	10,301	11,115
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$15,085	\$16,070
6. Total Actuarially Determined Contribution, payable on July 1	14,815	15,782

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Littleton Housing Authority		6600
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		2
2. Participants active during the year ended December 31, 2017		2
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$14,280
2. Administrative expenses		773
3. Expected employee contributions		-8,509
4. Employer normal cost: (1) + (2) + (3)		\$6,544
5. Actuarial accrued liability		694,933
Retired participants and beneficiaries	\$587,841	
Active participants	107,092	
Inactive participants	<u>0</u>	
6. Actuarial value of assets		232,487
7. Unfunded actuarial accrued liability: (5) – (6)		462,446
8. Reallocated unfunded actuarial accrued liability		6,369
9. Total unfunded actuarial accrued liability: (7) + (8)		\$468,815
The actuarial factors projected to FY19 are as follows:		
	Amount	% of Payroll
1. Projected employer normal cost	\$6,771	7.55%
2. Projected unfunded actuarial accrued liability	486,078	
3. Payment on projected unfunded actuarial accrued liability	28,754	
4. Payment on 2002 ERI	4,824	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$40,349	44.99%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	39,603	44.15%
9. Projected payroll	89,691	
The actuarial factors projected to FY20 and FY21 are as follows:		
	FY20	FY21
1. Projected employer normal cost	\$7,014	\$7,265
2. Payment on projected unfunded actuarial accrued liability	33,449	36,091
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$40,463	\$43,356
6. Total Actuarially Determined Contribution, payable on July 1	39,738	42,579

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Westford Housing Authority		6700
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		2
2. Participants active during the year ended December 31, 2017		2
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$20,485
2. Administrative expenses		1,110
3. Expected employee contributions		-12,583
4. Employer normal cost: (1) + (2) + (3)		\$9,012
5. Actuarial accrued liability		933,857
Retired participants and beneficiaries	\$679,108	
Active participants	254,749	
Inactive participants	0	
6. Actuarial value of assets		414,641
7. Unfunded actuarial accrued liability: (5) – (6)		519,216
8. Reallocated unfunded actuarial accrued liability		8,558
9. Total unfunded actuarial accrued liability: (7) + (8)		\$527,774
The actuarial factors projected to FY19 are as follows:		
	Amount	% of Payroll
1. Projected employer normal cost	\$9,324	7.32%
2. Projected unfunded actuarial accrued liability	547,208	
3. Payment on projected unfunded actuarial accrued liability	29,894	
4. Payment on 2002 ERI	6,793	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	0	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$46,011	36.14%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	45,160	35.47%
9. Projected payroll	127,319	
The actuarial factors projected to FY20 and FY21 are as follows:		
	FY20	FY21
1. Projected employer normal cost	\$9,660	\$10,008
2. Payment on projected unfunded actuarial accrued liability	37,737	40,717
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	0	0
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$47,397	\$50,725
6. Total Actuarially Determined Contribution, payable on July 1	46,548	49,816

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Shirley Water District		6800
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 1 beneficiary in pay status)		1
2. Participants active during the year ended December 31, 2017		3
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$16,308
2. Administrative expenses		883
3. Expected employee contributions		<u>-19,520</u>
4. Employer normal cost: (1) + (2) + (3)		<u>-\$2,329</u>
5. Actuarial accrued liability		993,371
Retired participants and beneficiaries	\$74,246	
Active participants	919,125	
Inactive participants	<u>0</u>	
6. Actuarial value of assets		646,068
7. Unfunded actuarial accrued liability: (5) – (6)		347,303
8. Reallocated unfunded actuarial accrued liability		<u>9,104</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$356,407
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	<u>-\$2,410</u>	<u>-1.15%</u>
2. Projected unfunded actuarial accrued liability	369,531	
3. Payment on projected unfunded actuarial accrued liability	23,819	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$21,409	10.25%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	21,013	10.06%
9. Projected payroll	208,963	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	<u>-\$2,462</u>	<u>-\$2,515</u>
2. Payment on projected unfunded actuarial accrued liability	25,553	27,571
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$23,091	\$25,056
6. Total Actuarially Determined Contribution, payable on July 1	22,677	24,607

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Tyngsboro Housing Authority		6900
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		2
2. Participants active during the year ended December 31, 2017		3
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$20,901
2. Administrative expenses		1,132
3. Expected employee contributions		<u>-15,937</u>
4. Employer normal cost: (1) + (2) + (3)		\$6,096
5. Actuarial accrued liability		728,654
Retired participants and beneficiaries	\$399,952	
Active participants	328,702	
Inactive participants	<u>0</u>	
6. Actuarial value of assets		235,640
7. Unfunded actuarial accrued liability: (5) – (6)		493,014
8. Reallocated unfunded actuarial accrued liability		<u>6,678</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$499,692
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$6,307	3.85%
2. Projected unfunded actuarial accrued liability	518,092	
3. Payment on projected unfunded actuarial accrued liability	29,970	
4. Payment on 2002 ERI	4,332	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$40,609	24.79%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	39,858	24.33%
9. Projected payroll	163,840	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$6,546	\$6,793
2. Payment on projected unfunded actuarial accrued liability	35,760	38,585
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$42,306	\$45,378
6. Total Actuarially Determined Contribution, payable on July 1	41,548	44,565

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Pepperell Housing Authority		7000
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		1
2. Participants active during the year ended December 31, 2017		2
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$13,000
2. Administrative expenses		704
3. Expected employee contributions		<u>-9,506</u>
4. Employer normal cost: (1) + (2) + (3)		\$4,198
5. Actuarial accrued liability		336,108
Retired participants and beneficiaries	\$241,306	
Active participants	94,802	
Inactive participants	<u>0</u>	
6. Actuarial value of assets		160,023
7. Unfunded actuarial accrued liability: (5) – (6)		176,085
8. Reallocated unfunded actuarial accrued liability		<u>3,080</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$179,165
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$4,343	4.39%
2. Projected unfunded actuarial accrued liability	185,762	
3. Payment on projected unfunded actuarial accrued liability	10,290	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$14,633	14.80%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	14,362	14.52%
9. Projected payroll	98,896	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$4,505	\$4,673
2. Payment on projected unfunded actuarial accrued liability	12,967	13,992
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$17,472	\$18,665
6. Total Actuarially Determined Contribution, payable on July 1	17,159	18,331

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Groton Housing Authority		7100
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		0
2. Participants active during the year ended December 31, 2017		1
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$6,226
2. Administrative expenses		337
3. Expected employee contributions		<u>-3,017</u>
4. Employer normal cost: (1) + (2) + (3)		\$3,546
5. Actuarial accrued liability		46,067
Retired participants and beneficiaries	\$ 0	
Active participants	46,067	
Inactive participants	<u>0</u>	
6. Actuarial value of assets		59,114
7. Unfunded actuarial accrued liability: (5) – (6)		<u>-13,047</u>
8. Reallocated unfunded actuarial accrued liability		422
9. Total unfunded actuarial accrued liability: (7) + (8)		<u>-\$12,625</u>
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$3,669	10.98%
2. Projected unfunded actuarial accrued liability	-13,090	
3. Payment on projected unfunded actuarial accrued liability	-385	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$3,284	9.83%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	3,223	9.65%
9. Projected payroll	33,415	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$3,798	\$3,932
2. Payment on projected unfunded actuarial accrued liability	-938	-1,013
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$2,860	\$2,919
6. Total Actuarially Determined Contribution, payable on July 1	2,809	2,867

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Tyngsboro Water District		7200
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		1
2. Participants active during the year ended December 31, 2017		7
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$26,929
2. Administrative expenses		1,459
3. Expected employee contributions		<u>-19,802</u>
4. Employer normal cost: (1) + (2) + (3)		\$8,586
5. Actuarial accrued liability		1,136,432
Retired participants and beneficiaries	\$243,670	
Active participants	892,762	
Inactive participants	<u>0</u>	
6. Actuarial value of assets		742,190
7. Unfunded actuarial accrued liability: (5) – (6)		394,242
8. Reallocated unfunded actuarial accrued liability		<u>10,415</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$404,657
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$8,884	4.23%
2. Projected unfunded actuarial accrued liability	419,557	
3. Payment on projected unfunded actuarial accrued liability	25,505	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$34,389	16.38%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	33,753	16.08%
9. Projected payroll	209,931	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$9,215	\$9,560
2. Payment on projected unfunded actuarial accrued liability	29,124	31,424
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$38,339	\$40,984
6. Total Actuarially Determined Contribution, payable on July 1	37,652	40,250

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – North Reading Housing Authority		7400
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		2
2. Participants active during the year ended December 31, 2017		3
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$13,294
2. Administrative expenses		720
3. Expected employee contributions		-7,906
4. Employer normal cost: (1) + (2) + (3)		\$6,108
5. Actuarial accrued liability		343,397
Retired participants and beneficiaries	\$170,624	
Active participants	172,773	
Inactive participants	0	
6. Actuarial value of assets		200,492
7. Unfunded actuarial accrued liability: (5) – (6)		142,905
8. Reallocated unfunded actuarial accrued liability		3,147
9. Total unfunded actuarial accrued liability: (7) + (8)		\$146,052
The actuarial factors projected to FY19 are as follows:		
	Amount	% of Payroll
1. Projected employer normal cost	\$6,320	7.19%
2. Projected unfunded actuarial accrued liability	151,430	
3. Payment on projected unfunded actuarial accrued liability	10,382	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	0	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$16,702	19.01%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	16,393	18.66%
9. Projected payroll	87,845	
The actuarial factors projected to FY20 and FY21 are as follows:		
	FY20	FY21
1. Projected employer normal cost	\$6,546	\$6,781
2. Payment on projected unfunded actuarial accrued liability	10,426	11,250
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	0	0
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$16,972	\$18,031
6. Total Actuarially Determined Contribution, payable on July 1	16,668	17,708

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – West Groton Water		7500
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		0
2. Participants active during the year ended December 31, 2017		3
3. Inactive participants entitled to a return of their employee contributions		0
4. Inactive participants with a vested right to a deferred or immediate benefit		0
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$10,860
2. Administrative expenses		588
3. Expected employee contributions		-10,939
4. Employer normal cost: (1) + (2) + (3)		\$ 509
5. Actuarial accrued liability		165,110
Retired participants and beneficiaries	\$ 0	
Active participants	165,110	
Inactive participants	0	
6. Actuarial value of assets		139,601
7. Unfunded actuarial accrued liability: (5) – (6)		25,509
8. Reallocated unfunded actuarial accrued liability		1,513
9. Total unfunded actuarial accrued liability: (7) + (8)		\$27,022
The actuarial factors projected to FY19 are as follows:		
	Amount	% of Payroll
1. Projected employer normal cost	\$ 527	0.44%
2. Projected unfunded actuarial accrued liability	28,017	
3. Payment on projected unfunded actuarial accrued liability	532	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	0	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$1,059	0.88%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	1,039	0.87%
9. Projected payroll	120,104	
The actuarial factors projected to FY20 and FY21 are as follows:		
	FY20	FY21
1. Projected employer normal cost	\$ 561	\$ 597
2. Payment on projected unfunded actuarial accrued liability	2,030	2,190
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	0	0
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$2,591	\$2,787
6. Total Actuarially Determined Contribution, payable on July 1	2,545	2,737

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Unit Results		
Summary of Actuarial Valuation Results – Ayer-Shirley RSD		7600
The valuation was made with respect to the following data supplied to us:		
1. Retired participants as of the valuation date (including 0 beneficiaries in pay status)		19
2. Participants active during the year ended December 31, 2017		122
3. Inactive participants entitled to a return of their employee contributions		31
4. Inactive participants with a vested right to a deferred or immediate benefit		4
The actuarial factors as of January 1, 2018 are as follows:		
1. Normal cost		\$467,377
2. Administrative expenses		25,316
3. Expected employee contributions		<u>-347,552</u>
4. Employer normal cost: (1) + (2) + (3)		\$145,141
5. Actuarial accrued liability		13,212,656
Retired participants and beneficiaries	\$4,285,642	
Active participants	8,524,653	
Inactive participants	<u>402,361</u>	
6. Actuarial value of assets		8,861,286
7. Unfunded actuarial accrued liability: (5) – (6)		4,351,370
8. Reallocated unfunded actuarial accrued liability		<u>121,086</u>
9. Total unfunded actuarial accrued liability: (7) + (8)		\$4,472,456
The actuarial factors projected to FY19 are as follows:		
	<u>Amount</u>	<u>% of Payroll</u>
1. Projected employer normal cost	\$150,171	3.97%
2. Projected unfunded actuarial accrued liability	4,637,141	
3. Payment on projected unfunded actuarial accrued liability	304,238	
4. Payment on 2002 ERI	0	
5. Payment on 2003 ERI	0	
6. Payment on 2010 ERI	<u>0</u>	
7. Total FY19 Actuarially Determined Contribution: (1) + (3) + (4) + (5) + (6)	\$454,409	12.02%
8. Total FY19 Actuarially Determined Contribution, payable on July 1	446,008	11.80%
9. Projected payroll	3,779,328	
The actuarial factors projected to FY20 and FY21 are as follows:		
	<u>FY20</u>	<u>FY21</u>
1. Projected employer normal cost	\$155,801	\$161,639
2. Payment on projected unfunded actuarial accrued liability	320,269	345,565
3. Payment on 2003 ERI	0	0
4. Payment on 2010 ERI	<u>0</u>	<u>0</u>
5. Total Actuarially Determined Contribution: (1) + (2) + (3) + (4)	\$476,070	\$507,204
6. Total Actuarially Determined Contribution, payable on July 1	467,540	498,116

Note: Actuarially Determined Contributions are assumed to be paid on July 1 and December 31, unless otherwise noted.

Section 4: Supplemental Information

EXHIBIT A – TABLE OF PLAN COVERAGE

Category	Year Ended December 31		Change From Prior Year
	2017	2015	
Active participants in valuation:			
• Number	9,168	9,072	1.1%
• Average age	48.1	48.2	-0.1
• Average years of service	11.5	11.6	-0.1
• Total payroll for prior year*	\$451,777,105	\$421,085,856	7.3%
• Average payroll*	49,278	46,416	6.2%
• Member contributions	430,795,611	398,738,544	8.0%
• Number with unknown age information	9	17	-47.1%
Inactive participants due a refund of employee contributions	2771	2640	5.0%
Inactive participants with a vested right to a deferred or immediate benefit	343	321	6.9%
Retired participants:			
• Number in pay status	4,532	4,291	5.6%
• Average age	73.4	73.5	-0.1
• Average monthly benefit	\$2,172	\$2,072	4.8%
Disabled participants:			
• Number in pay status	433	434	-0.2%
• Average age	66.8	66.1	0.7
• Average monthly benefit	\$2,911	\$2,793	4.2%
Beneficiaries:			
• Number in pay status	566	602	-6.0%
• Average age	75.3	75.3	0
• Average monthly benefit	\$1,313	\$1,213	8.2%

* Payroll figures are for the prior calendar year and reflect annualized salaries for participants hired during the year.

**EXHIBIT B – PARTICIPANTS IN ACTIVE SERVICE AS OF DECEMBER 31, 2017
BY AGE, YEARS OF SERVICE, AND AVERAGE PAYROLL**

Age	Years of Service									
	Total	0-4	5-9	10-14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 & over
Under 25	348	343	5	--	--	--	--	--	--	--
	\$30,606	\$30,573	\$32,882	--	--	--	--	--	--	--
25 - 29	756	675	79	2	--	--	--	--	--	--
	\$39,686	\$38,177	\$52,313	\$50,052	--	--	--	--	--	--
30 - 34	683	367	233	80	3	--	--	--	--	--
	\$49,338	\$42,150	\$56,542	\$60,351	\$75,543	--	--	--	--	--
35 - 39	678	281	143	173	78	3	--	--	--	--
	\$53,075	\$39,468	\$55,870	\$64,294	\$71,144	\$77,599	--	--	--	--
40 - 44	763	308	118	139	151	45	2	--	--	--
	\$51,230	\$34,212	\$47,710	\$61,947	\$70,673	\$77,761	\$70,067	--	--	--
45 - 49	1,277	390	195	183	225	205	72	7	--	--
	\$54,410	\$32,646	\$40,662	\$55,696	\$68,301	\$79,685	\$88,022	\$83,823	--	--
50 - 54	1,559	365	269	281	240	132	162	104	6	--
	\$52,154	\$33,187	\$37,751	\$44,358	\$54,623	\$73,265	\$87,421	\$86,207	\$110,970	--
55 - 59	1,524	267	209	315	322	138	92	134	43	4
	\$49,821	\$33,814	\$40,485	\$42,181	\$44,485	\$60,324	\$75,505	\$84,651	\$90,297	\$82,188
60 - 64	1,060	106	126	213	259	160	86	68	28	14
	\$49,396	\$36,791	\$41,940	\$41,781	\$44,858	\$52,246	\$62,904	\$76,138	\$89,904	\$85,278
65 - 69	367	29	36	64	92	61	46	26	5	8
	\$45,596	\$24,965	\$43,377	\$45,269	\$45,627	\$48,209	\$46,172	\$56,720	\$53,906	\$68,041
70 & over	144	7	5	23	28	24	26	14	11	6
	\$42,930	\$21,637	\$36,680	\$38,995	\$38,692	\$48,266	\$46,129	\$42,766	\$50,964	\$58,281
Unknown	9	3	4	--	--	1	--	--	1	--
	\$40,251	\$39,212	\$36,151	--	--	\$31,893	--	--	\$68,124	--
Total	9,168	3,141	1,422	1,473	1,398	769	486	353	94	32
	\$49,278	\$35,695	\$45,577	\$49,762	\$54,470	\$65,739	\$74,731	\$79,735	\$84,725	\$75,520

EXHIBIT C – SUMMARY STATEMENT OF INCOME AND EXPENSES ON A MARKET VALUE BASIS

	Year Ended December 31, 2017	Year Ended December 31, 2015
Net assets at market value at the beginning of the year	\$1,182,420,196	\$1,104,482,897
Contribution income:		
• Employer contributions	\$115,377,205	\$107,032,211
• Employee contributions	44,841,008	42,841,461
• Federal grant reimbursement and other contributions	183,914	35,496
• Less administrative expenses	<u>-3,234,147</u>	<u>-3,460,782</u>
Net contribution income	157,167,980	146,448,386
Investment income:		
• Interest, dividends and other income	\$13,955,684	\$12,980,020
• Asset appreciation	181,954,378	67,740,707
• Less investment fees	<u>-6,366,088</u>	<u>-5,803,178</u>
Net investment income	<u>\$189,543,974</u>	<u>\$74,917,549</u>
Total income available for benefits	\$346,711,954	\$221,365,935
Less benefit payments:		
• Pensions, refunds and net transfers	<u>-\$143,888,471</u>	<u>-\$139,064,866</u>
• Net 3(8)(c) reimbursements	<u>-6,892,460</u>	<u>-4,363,770</u>
Net benefit payments	<u>-\$150,780,931</u>	<u>-\$143,428,636</u>
Change in reserve for future benefits	\$195,931,023	\$77,937,299
Net assets at market value at the end of the year	\$1,378,351,219	\$1,182,420,196

EXHIBIT D – DEVELOPMENT OF THE FUND THROUGH DECEMBER 31, 2017 AND COMPARISON OF EMPLOYER AND EMPLOYEE CONTRIBUTIONS

Year Ended December 31	Employer Contributions	Employee Contributions	Other Contributions	Net Investment Return	Administrative Expenses	Benefit Payments	Market Value of Assets at Year-End	Actuarial Value of Assets at Year-End	Actuarial Value as a Percent of Market Value	Employee Contributions as a Percent of Total Contributions
2008	\$71,923,886	\$31,686,242	\$126,432	-\$208,326,323	\$2,930,164	\$92,969,048	\$595,575,478	\$714,690,573	120.0%	30.54%
2009	78,120,707	33,567,538	91,414	80,318,175	2,814,190	95,775,164	689,083,958	819,987,914	119.0%	30.03%
2010	76,087,532	35,031,485	59,431	85,309,569	3,042,747	101,242,424	781,286,804	847,368,886	108.5%	31.51%
2011	78,594,607	35,094,482	67,607	1,488,563	3,075,272	106,060,828	787,395,962	862,323,395	109.5%	30.85%
2012	81,896,208	35,766,080	37,240	101,170,082	3,051,893	116,194,523	887,019,156	875,989,750	98.8%	30.39%
2013	88,252,356	38,568,968	34,756	124,783,005	3,170,834	121,473,992	1,014,013,415	967,146,018	95.4%	30.40%
2014	93,368,685	39,806,980	32,261	74,962,895	3,540,884	125,082,678	1,093,560,674	1,062,517,426	97.2%	29.88%
2015	99,792,642	40,870,163	27,839	7,817,250	3,290,167	134,295,505	1,104,482,897	1,141,122,663	103.3%	29.05%
2016	107,032,211	42,841,461	35,496	74,917,549	3,460,782	143,428,636	1,182,420,196	1,229,393,319	104.0%	28.58%
2017	115,377,205	44,841,008	183,914	189,543,974	3,234,147	150,780,931	1,378,351,219	1,339,085,622	97.2%	27.96%

Note: On a market basis, net of investment fees.

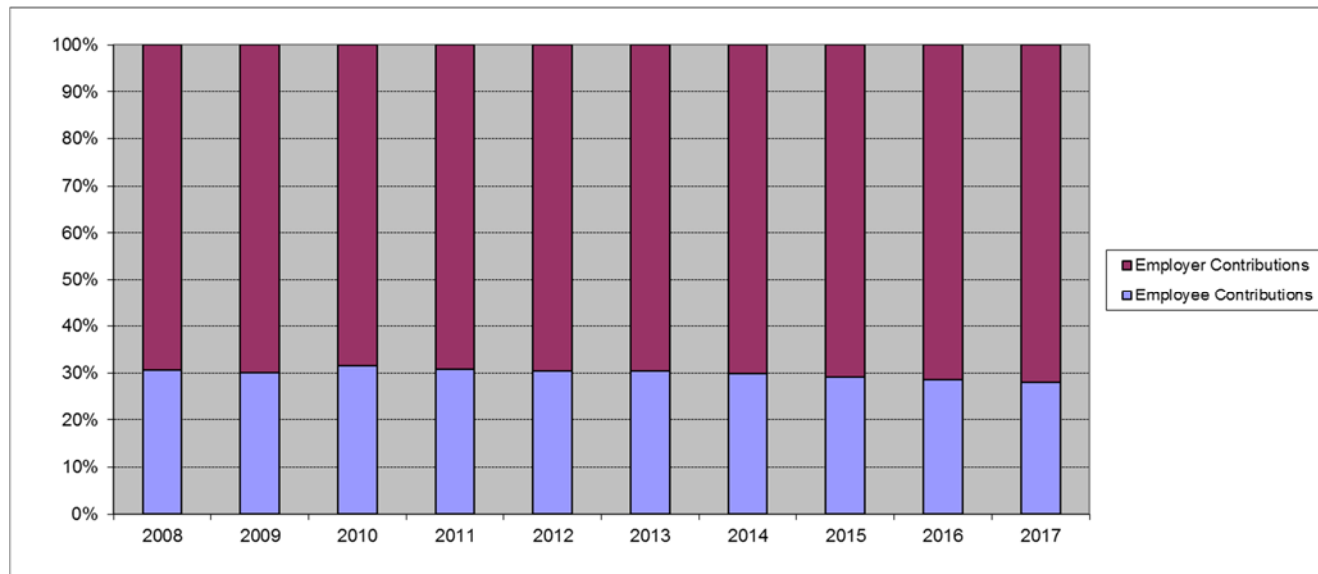


EXHIBIT E – TABLE OF AMORTIZATION BASES

Type	Outstanding Balance as of July 1, 2018	Annual Fiscal 2019 Payment	Outstanding Balance as of July 1, 2019	Annual Fiscal 2020 Payment	Rate of Increase	Years Remaining as of July 1, 2018
2002 ERI	\$1,640,041	\$1,669,963	- -	- -	0.0%	1.00
2003 ERI	1,383,465	729,812	\$716,735	\$729,812	0.0%	2.00
2010 ERI	213,678	60,429	165,906	60,429	0.0%	4.00
Remaining unfunded liability	<u>1,508,916,321</u>	<u>95,743,140</u>	<u>1,521,005,329</u>	<u>104,451,043</u>	N/A	17.00
Total	\$1,512,153,505	\$98,203,344	\$1,521,887,970	\$105,241,284		

Notes: Payments assumed to be made on July 1 and December 31.

Payment on remaining unfunded liability reflects adjustment to set fiscal 2019 appropriation to budgeted amount.

Total payment for fiscal 2020 is calculated to increase 6.5% over fiscal 2019.

EXHIBIT F – DEFINITIONS OF PENSION TERMS

The following list defines certain technical terms for the convenience of the reader:

Actuarial Accrued Liability for Actives:	The equivalent of the accumulated normal costs allocated to the years before the valuation date.
Actuarial Accrued Liability for Pensioners and Beneficiaries:	The single-sum value of lifetime benefits to existing pensioners and beneficiaries. This sum takes account of life expectancies appropriate to the ages of the annuitants and the interest that the sum is expected to earn before it is entirely paid out in benefits.
Actuarial Cost Method:	A procedure allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability that are used to determine the actuarially determined contribution.
Actuarial Gain or Loss:	A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates. Through the actuarial assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted, or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., assets earn more than projected, salary increases are less than assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results yield in actuarial liabilities that are larger than projected. Actuarial gains will shorten the time required for funding of the actuarial balance sheet deficiency while actuarial losses will lengthen the funding period.
Actuarially Equivalent:	Of equal actuarial present value, determined as of a given date and based on a given set of Actuarial Assumptions.
Actuarial Present Value (APV):	The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. Each such amount or series of amounts is: Adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.) Multiplied by the probability of the occurrence of an event (such as survival, death, disability, withdrawal, etc.) on which the payment is conditioned, and Discounted according to an assumed rate (or rates) of return to reflect the time value of money.

Actuarial Present Value of Future Plan Benefits:	The Actuarial Present Value of benefit amounts expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age, anticipated future compensation, and future service credits. The Actuarial Present Value of Future Plan Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive members entitled to either a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.
Actuarial Valuation:	The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial Valuation for a governmental retirement system typically also includes calculations of items needed for compliance with GASB, such as the Actuarially Determined Contribution (ADC) and the Net Pension Liability (NPL).
Actuarial Value of Assets (AVA):	The value of the Fund's assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly plans use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the ADC.
Actuarially Determined:	Values that have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.
Actuarially Determined Contribution (ADC):	The employer's periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation, determined under the Plan's funding policy. The ADC consists of the Employer Normal Cost and the Amortization Payment.
Amortization Method:	A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization Payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.
Amortization Payment:	The portion of the pension plan contribution, or ADC, that is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.

Assumptions or Actuarial Assumptions:	The estimates upon which the cost of the Fund is calculated, including: <u>Investment return</u> - the rate of investment yield that the Fund will earn over the long-term future; <u>Mortality rates</u> - the death rates of employees and pensioners; life expectancy is based on these rates; <u>Retirement rates</u> - the rate or probability of retirement at a given age or service; <u>Disability rates</u> - the probability of disability retirement at a given age; <u>Withdrawal rates</u> - the rates at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement; <u>Salary increase rates</u> - the rates of salary increase due to inflation and productivity growth.
Closed Amortization Period:	A specific number of years that is counted down by one each year, and therefore declines to zero with the passage of time. For example, if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc. See Open Amortization Period.
Decrements:	Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or withdrawal.
Defined Benefit Plan:	A retirement plan in which benefits are defined by a formula applied to the member's compensation and/or years of service.
Defined Contribution Plan:	A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.
Employer Normal Cost:	The portion of the Normal Cost to be paid by the employer. This is equal to the Normal Cost less expected member contributions.
Experience Study:	A periodic review and analysis of the actual experience of the Fund that may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified as deemed appropriate by the Actuary.
Funded Ratio:	The ratio of the actuarial value of assets (AVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a market funded ratio, using the market value of assets (MVA), rather than the AVA.
GASB 67 and GASB 68:	Governmental Accounting Standards Board (GASB) Statements No. 67 and No. 68. These are the governmental accounting standards that set the accounting rules for public retirement systems and the employers that sponsor or contribute to them. Statement No. 68 sets the accounting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 67 sets the rules for the systems themselves.

Investment Return:	The rate of earnings of the Fund from its investments, including interest, dividends and capital gain and loss adjustments, computed as a percentage of the average value of the fund. For actuarial purposes, the investment return often reflects a smoothing of the capital gains and losses to avoid significant swings in the value of assets from one year to the next.
Net Pension Liability (NPL):	The Net Pension Liability is equal to the Total Pension Liability minus the Plan Fiduciary Net Position.
Normal Cost:	That portion of the Actuarial Present Value of pension plan benefits and expenses allocated to a valuation year by the Actuarial Cost Method. Any payment in respect of an Unfunded Actuarial Accrued Liability is not part of Normal Cost (see Amortization Payment). For pension plan benefits that are provided in part by employee contributions, Normal Cost refers to the total of employee contributions and employer Normal Cost unless otherwise specifically stated.
Open Amortization Period:	An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. If the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year. In theory, if an Open Amortization Period with level percentage of payroll is used to amortize the Unfunded Actuarial Accrued Liability, the UAAL will never decrease, but will become smaller each year, in relation to covered payroll, if the actuarial assumptions are realized.
Plan Fiduciary Net Position:	Market value of assets.
Total Pension Liability (TPL):	The actuarial accrued liability under the entry age normal cost method and based on the blended discount rate as described in GASB 67 and 68.
Unfunded Actuarial Accrued Liability:	The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative, in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus.
Valuation Date or Actuarial Valuation Date:	The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Plan Benefits is determined. The expected benefits to be paid in the future are discounted to this date.



Section 5: Actuarial Valuation Basis

EXHIBIT I – ACTUARIAL ASSUMPTIONS AND ACTUARIAL COST METHOD

Net Investment Return:	7.50% (previously, 7.75%). The net investment return assumption is a long-term estimate derived from historical data, current and recent market expectations, and professional judgment. As part of the analysis, a building block approach was used that reflects inflation expectations and anticipated risk premiums for each of the portfolio's asset classes, as well as the Plan's target asset allocation.			
Salary Increases:	Years of Service	Group 1	Group 2	Group 4
	0	6.00%	6.00%	7.00%
	1	5.50%	5.50%	6.50%
	2	5.50%	5.50%	6.00%
	3	5.25%	5.25%	5.75%
	4	5.25%	5.25%	5.25%
	5	4.75%	4.75%	5.25%
	6	4.75%	4.75%	4.75%
	7	4.50%	4.50%	4.75%
	8	4.50%	4.50%	4.50%
	9	4.25%	4.25%	4.50%
	10	4.25%	4.25%	4.50%
	11	4.00%	4.25%	4.50%
	12+	4.00%	4.25%	4.50%
Includes an allowance for inflation of 3.25% (previously, 3.5%). Previously, 4.25% for Group 1 employees with 9 or more years of service, 4.50% for Group 2 employees with 7 or more years of service, and 4.75% for Group 4 employees with more than 6 years of service. The salary scale assumption is a long-term estimate derived from historical data, current and recent market expectations, and professional judgment.				
Interest on Employee Contributions:	3.5%			

Administrative Expenses:	\$3,500,000 for calendar 2018, increasing 3.25% per year (previously, \$3,500,000 for calendar 2016, increasing 3.5% per year) The administrative expense assumption is based on information on expected expenses provided by the Retirement System.
Mortality Rates:	<i>Pre-Retirement:</i> RP-2014 Blue Collar Employee Mortality Table projected generationally with Scale MP-2017 (previously, RP-2000 Employee Mortality Table projected generationally from 2009 with Scale BB2D) <i>Healthy Retiree:</i> RP-2014 Blue Collar Healthy Annuitant Mortality Table projected generationally with Scale MP-2017 (previously, RP-2000 Healthy Annuitant Mortality Table projected generationally from 2009 with Scale BB2D) <i>Disabled Retiree:</i> RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year and projected generationally with Scale MP-2017 (previously, RP-2000 Healthy Annuitant Mortality Table projected generationally from 2015 with Scale BB2D) The mortality tables reasonably reflect the projected mortality experience of the Plan as of the measurement date based on historical and current demographic data. As part of the analysis, a comparison was made between the actual number of retiree deaths and the projected number based on the prior year's assumptions over the most recent eight years. The mortality tables were then adjusted to future years using generational projection under Scale MP-2017 to reflect future mortality improvement.

Termination Rates before Retirement:

Age	Groups 1 and 2 - Rate (%)				
	Mortality				Disability
	Current		Previous		
	Male	Female	Male	Female	
20	0.05	0.02	0.03	0.02	0.02
25	0.06	0.02	0.04	0.02	0.02
30	0.06	0.02	0.04	0.03	0.03
35	0.07	0.03	0.08	0.05	0.06
40	0.08	0.04	0.11	0.07	0.10
45	0.13	0.07	0.15	0.11	0.15
50	0.22	0.12	0.21	0.17	0.19
55	0.36	0.19	0.30	0.25	0.24
60	0.61	0.27	0.49	0.39	0.28

Notes: Mortality rates do not reflect generational projection.
55% of the disability rates shown represent accidental disability.
20% of the accidental disabilities will die from the same cause as the disability.
55% of the death rates shown represent accidental death.

Age	Group 4 - Rate (%)				
	Mortality				Disability
	Current		Previous		
	Male	Female	Male	Female	
20	0.05	0.02	0.03	0.02	0.20
25	0.06	0.02	0.04	0.02	0.20
30	0.06	0.02	0.04	0.03	0.30
35	0.07	0.03	0.08	0.05	0.30
40	0.08	0.04	0.11	0.07	0.30
45	0.13	0.07	0.15	0.11	1.00
50	0.22	0.12	0.21	0.17	1.25
55	0.36	0.19	0.30	0.25	1.20
60	0.61	0.27	0.49	0.39	0.85

Notes: Mortality rates do not reflect generational projection.

90% of the disability rates shown represent accidental disability.

60% of the accidental disabilities will die from the same cause as the disability.

90% of the death rates shown represent accidental death.

The termination rates and disability rates were based on historical and current demographic data, adjusted to reflect economic conditions of the area and estimated future experience and professional judgment. As part of the analysis, a comparison was made between the actual number of terminations and disability retirements and the projected number based on the prior year's assumptions over the past eight years.

Withdrawal Rates:

Rate per year (%)			
Years of Service	Groups 1 and 2	Years of Service	Group 4
0	15.0	0 – 10	1.5
1	12.0	11+	0.0
2	10.0		
3	9.0		
4	8.0		
5 – 9	7.6		
10 – 14	5.4		
15 – 19	3.3		
20 – 24	2.0		
25 - 29	1.0		
30+	0.0		

The termination rates and disability rates were based on historical and current demographic data, adjusted to reflect economic conditions of the area and estimated future experience and professional judgment. As part of the analysis, a comparison was made between the actual number of terminations and disability retirements and the projected number based on the prior years' assumption over the most recent eight years.

Retirement Rates:	Rate per year (%)			
	Groups 1 and 2			Group 4
	Age	Male	Female	
	45 – 49	--	--	1.0
	50 – 54	--	--	2.0
	55 – 59	2.0	5.5	15.0
	60 – 61	12.0	5.0	20.0
	62 – 64	30.0	15.0	25.0
	65 – 68	40.0	15.0	100.0
	69	50.0	20.0	--
	70	100.0	100.0	--
	The retirement rates were based on historical and current demographic data, adjusted to reflect economic conditions of the area and estimated future experience and professional judgment. As part of the analysis, a comparison was made between the actual number of retirements by age and the projected number based on the prior years' assumption over the most recent eight years.			
Retirement Rates for Inactive Vested Participants:	Age 60 for Group 1 and Group 2 members and age 55 for participants hired prior to April 2, 2012. For participants hired April 2, 2012 or later, 60 for Group 1, 55 for Group 2 and 50 for Group 4. The retirement age for inactive vested participants was based on historical and current demographic data, adjusted to reflect economic conditions of the area and estimated future experience and professional judgment.			
Unknown Data for Participants:	Same as those exhibited by participants with similar known characteristics. If not specified, participants are assumed to be male.			
Family Composition:	75% of participants are assumed to be married. None are assumed to have dependent children. Females are assumed to be three years younger than their male spouses.			
Benefit Election:	All participants are assumed to elect Option A. The benefit election reflects the fact that all benefit options are actuarially equivalent.			
2017 Salary:	2017 salaries are equal to salaries provided in the data, except for actives missing salary and employees with less than one year of service, where salaries are calculated from annualized contributions divided by the contribution rates provided.			
Total Service:	Total creditable service reported in the data.			
Net 3(8)(c) Liability:	No liability is valued for benefits paid to or received from other municipal systems.			

Actuarial Value of Assets:	Market value of assets as reported in the System's Annual Statement less unrecognized return in each of the last five years. Unrecognized return is equal to the difference between the actual market value return and the expected market value return and is recognized over a five-year period, further adjusted, if necessary, to be within 20% of the market value.
Actuarial Cost Method:	Entry Age Normal Actuarial Cost Method. Entry Age is the attained age of the participant less Total Service as defined above. Normal Cost and Actuarial Accrued Liability are calculated on an individual basis and are allocated by salary. Normal Cost is determined using the plan of benefits applicable to each participant.
Justification for Change in Actuarial Assumptions:	Based on past experience and future expectations, the following actuarial assumption were changed as of January 1, 2018: • The investment return assumption was lowered from 7.75% to 7.50%. • The mortality assumption for non-disabled participants was updated from the RP-2000 Employee and Healthy Annuitant Mortality Tables projected generationally from 2009 with Scale BB2D to the RP-2014 Blue Collar Employee and Healthy Annuitant Mortality Tables projected generationally with Scale MP-2017. • The mortality assumption for disabled participants was updated from the RP-2000 Healthy Annuitant Mortality Table projected generationally from 2015 with Scale BB2D to the RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year and projected generationally with Scale MP-2017. • The salary increase assumption, which varies by years of service and by Group, was lowered by 0.25% to 4.00% for Group 1 employees with 11 or more years of service, 4.25% for Group 2 employees with 9 or more years of service and 4.50% for Group 4 employees with 8 or more years of service. • The administrative expense assumption was changed from \$3,500,000 for calendar 2016, increasing 3.5% per year, to \$3,500,000 for calendar 2018, increasing 3.25% per year.

EXHIBIT II – SUMMARY OF PLAN PROVISIONS

This exhibit summarizes the major provisions of the Plan included in the valuation. It is not intended to be, nor should it be interpreted as, a complete statement of all plan provisions.

Plan Year:	January 1 through December 31																																																							
Plan Status:	Ongoing																																																							
Retirement Benefits:	Employees covered by the Contributory Retirement Law are classified into one of four groups depending on job classification. Group 1 comprises most positions in state and local government. It is the general category of public employees. Group 4 comprises mainly police and firefighters. Group 2 is for other specified hazardous occupations. (Officers and inspectors of the State Police are classified as Group 3.) For employees hired prior to April 2, 2012, the annual amount of the retirement allowance is based on the member's final three-year average salary multiplied by the number of years and full months of creditable service at the time of retirement and multiplied by a percentage according to the following table based on the age of the member at retirement: <table><tr><th colspan="4">Age Last Birthday at Date of Retirement</th></tr><tr><th>Percent</th><th>Group 1</th><th>Group 2</th><th>Group 4</th></tr><tr><td>2.5</td><td>65 or over</td><td>60 or over</td><td>55 or over</td></tr><tr><td>2.4</td><td>64</td><td>59</td><td>54</td></tr><tr><td>2.3</td><td>63</td><td>58</td><td>53</td></tr><tr><td>2.2</td><td>62</td><td>57</td><td>52</td></tr><tr><td>2.1</td><td>61</td><td>56</td><td>51</td></tr><tr><td>2.0</td><td>60</td><td>55</td><td>50</td></tr><tr><td>1.9</td><td>59</td><td>--</td><td>49</td></tr><tr><td>1.8</td><td>58</td><td>--</td><td>48</td></tr><tr><td>1.7</td><td>57</td><td>--</td><td>47</td></tr><tr><td>1.6</td><td>56</td><td>--</td><td>46</td></tr><tr><td>1.5</td><td>55</td><td>--</td><td>45</td></tr></table> A member's final three-year average salary is defined as the greater of the highest consecutive three-year average annual rate of regular compensation and the average annual rate of regular compensation received during the last three years of creditable service prior to retirement.				Age Last Birthday at Date of Retirement				Percent	Group 1	Group 2	Group 4	2.5	65 or over	60 or over	55 or over	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	--	49	1.8	58	--	48	1.7	57	--	47	1.6	56	--	46	1.5	55	--	45
Age Last Birthday at Date of Retirement																																																								
Percent	Group 1	Group 2	Group 4																																																					
2.5	65 or over	60 or over	55 or over																																																					
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2.0	60	55	50																																																					
1.9	59	--	49																																																					
1.8	58	--	48																																																					
1.7	57	--	47																																																					
1.6	56	--	46																																																					
1.5	55	--	45																																																					

For employees hired on April 2, 2012 or later, the annual amount of the retirement allowance is based on the member's final five-year average salary multiplied by the number of years and full months of creditable service at the time of retirement and multiplied by a percentage according to the following tables based on the age and years of creditable service of the member at retirement:

For members with less than 30 years of creditable service: Age Last Birthday at Date of Retirement			
Percent	Group 1	Group 2	Group 4
2.50	67 or over	62 or over	57 or over
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

For members with 30 years of creditable service or greater: Age Last Birthday at Date of Retirement			
Percent	Group 1	Group 2	Group 4
2.500	67 or over	62 or over	57 or over
2.375	66	61	56
2.250	65	60	55
2.125	64	59	54
2.000	63	58	53
1.875	62	57	52
1.750	61	56	51
1.625	60	55	50

A member's final five-year average salary is defined as the greater of the highest consecutive five-year average annual rate of regular compensation and the average annual rate of regular compensation received during the last five years of creditable service prior to retirement.

	For employees who became members after January 1, 2011, regular compensation is limited to 64% of the federal limit found in 26 U.S.C. 401(a)(17). In addition, regular compensation for members who retire after April 2, 2012 will be limited to prohibit “spiking” of a member’s salary to increase the retirement benefit. For all employees, the maximum annual amount of the retirement allowance is 80 percent of the member’s final average salary. Any member who is a veteran also receives an additional yearly retirement allowance of \$15 per year of creditable service, not exceeding \$300. The veteran allowance is paid in addition to the 80 percent maximum.										
Employee Contributions:	<table><tr><th>Date of Hire</th><th>Contribution Rate</th></tr><tr><td>Prior to January 1, 1975</td><td>5%</td></tr><tr><td>January 1, 1975 – December 31, 1983</td><td>7%</td></tr><tr><td>January 1, 1984 – June 30, 1996</td><td>8%</td></tr><tr><td>July 1, 1996 onward</td><td>9%</td></tr></table>	Date of Hire	Contribution Rate	Prior to January 1, 1975	5%	January 1, 1975 – December 31, 1983	7%	January 1, 1984 – June 30, 1996	8%	July 1, 1996 onward	9%
	Date of Hire	Contribution Rate									
	Prior to January 1, 1975	5%									
	January 1, 1975 – December 31, 1983	7%									
	January 1, 1984 – June 30, 1996	8%									
July 1, 1996 onward	9%										
	In addition, employees hired after December 31, 1978 contribute an additional 2 percent of salary in excess of \$30,000. Employees hired after 1983 who voluntarily withdraw their contributions with less than 10 ten years of credited service receive 3% interest on their contributions. Employees in Group 1 hired on or after April 2, 2012 with 30 years of creditable service or greater will pay a base contribution rate of 6%.										
Retirement Benefits (Superannuation):	Members of Group 1, 2 or 4 hired prior to April 2, 2012 may retire upon the attainment of age 55. For retirement at ages below 55, twenty years of creditable service is required. Members hired prior to April 2, 2012 who terminate before age 55 with ten or more years of creditable service are eligible for a retirement allowance upon the attainment of age 55 (provided they have not withdrawn their accumulated deductions from the Annuity Savings Fund of the System). Members of Group 1 hired April 2, 2012 or later may retire upon the attainment of age 60. Members of Group 2 or 4 hired April 2, 2012 or later may retire upon the attainment of age 55. Members of Group 4 may retire upon attainment of age 50 with ten years of creditable service. Members hired April 2, 2012 or later who terminate before age 55 (60 for members of Group 1) with ten or more years of creditable service are eligible for a retirement allowance upon the attainment of age 55 (60 for members of Group 1) provided they have not withdrawn their accumulated deductions from the Annuity Savings Fund of the System.										
Ordinary Disability Benefit:	A member who is unable to perform his or her job due to a non-occupational disability will receive a retirement allowance if he or she has ten or more years of creditable service and has not reached age 55. The annual amount of such allowance shall be determined as if the member retired for superannuation at age 55 (age 60 for Group 1 members hired on or after April 2, 2012), based on the amount of creditable service at the date of disability. For veterans, there is a minimum benefit of 50 percent of the member’s most recent year’s pay plus an annuity based on his or her own contributions.										

Accidental Disability Benefit:	For a job-connected disability, the benefit is 72 percent of the member's most recent annual pay plus an annuity based on his or her own contributions, plus additional amounts for surviving children. Benefits are capped at 75 percent of annual rate of regular compensation for employees who become members after January 1, 1988.
Death Benefits:	In general, the beneficiary of an employee who dies in active service will receive a refund of the employee's own contributions. Alternatively, if the employee were eligible to retire on the date of death, a spouse's benefit will be paid equal to the amount the employee would have received under Option C. The surviving spouse of a member who dies with two or more years of credited service has the option of a refund of the employee's contributions or a monthly benefit regardless of eligibility to retire, if they were married for at least one year. There is also a minimum widow's pension of \$500 per month, and there are additional amounts for surviving children. If an employee's death is job-connected, the spouse will receive 72 percent of the member's most recent annual pay, in addition to a refund of the member's accumulated deductions, plus additional amounts for surviving children. However, in accordance with Section 100 of Chapter 32, the surviving spouse of a police officer, firefighter or corrections officer is killed in the line of duty will be eligible to receive an annual benefit equal to the maximum salary held by the member at the time of death. Upon the death of a job-connected disability retiree who retired prior to November 7, 1996 and could not elect an Option C benefit, a surviving spouse will receive an allowance of \$12,000 per year if the member dies for a reason unrelated to cause of disability.
"Heart And Lung Law" And Cancer Presumption:	Any case of hypertension or heart disease resulting in total or partial disability or death to a uniformed fireman, permanent member of a police department, or certain employees of a county correctional facility is presumed to have been suffered in the line of duty, unless the contrary is shown by competent evidence. Any case of disease of the lungs or respiratory tract resulting in total disability or death to a uniformed fireman is presumed to have been suffered in the line of duty, unless the contrary is shown by competent evidence. There is an additional presumption for uniformed firemen that certain types of cancer are job-related if onset occurs while actively employed or within five years of retirement.
Options:	Members may elect to receive a full retirement allowance payable for life under Option A. Under Option B a member may elect to receive a lower monthly allowance in exchange for a guarantee that at the time of death any contributions not expended for annuity payments will be refunded to the beneficiary. Option C allows the member to take a lesser retirement allowance in exchange for providing a survivor with two-thirds of the lesser amount. Option C pensioners will have benefits converted from a reduced to a full retirement if the beneficiary predeceases the retiree.
Post-Retirement Benefits:	The Board has adopted the provisions of Section 51 of Chapter 127 of the Acts of 1999, which provide that the Retirement Board may approve an annual COLA in excess of the Consumer Price Index but not to exceed a 3% COLA on the first \$14,000 of a retirement allowance. Cost-of-living increases granted prior to July 1, 1998 are reimbursed by the Commonwealth and not reflected in this report.
Changes in Plan Provisions:	None.

