Segal Consulting

Town of Andover Contributory Retirement System

Actuarial Valuation and Review as of January 1, 2016

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August 18, 2016

Board of Trustees
Town of Andover Contributory Retirement System
36 Bartlet Street
Andover, MA 01810

Dear Board Members:

We are pleased to submit this Actuarial Valuation and Review as of January 1, 2016. It summarizes the actuarial data used in the valuation, establishes the funding requirements for fiscal 2017 and later years and analyzes the preceding two years' experience.

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 Town of Andover Contributory Retirement System. That assistance is gratefully acknowledged.

The measurements shown in this actuarial valuation may not be applicable for other purposes. 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 (such as the end of an amortization period); and changes in plan provisions or applicable law.

An actuarial valuation is a measurement at a specific date – it is not a prediction of a plan's future financial condition. We have not been retained to perform an analysis of the potential range of financial measurements, except where otherwise noted.

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 the 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 of the Plan.

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

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SECTION 2

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Purpose

This report has been prepared by Segal Consulting to present a valuation of the Town of Andover Contributory Retirement System as of January 1, 2016. The valuation was performed to determine whether the assets and contributions are sufficient to provide the prescribed benefits and to provide certain disclosure information required by Governmental Accounting Standards Board Statements No. 67 and 68 as of December 31, 2015. 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 January 1, 2016;
- The assets of the System as of December 31, 2015;
- Economic assumptions regarding future salary increases and investment earnings; and
- Other actuarial assumptions, regarding employee terminations, retirement, death, etc.

Significant Issues in Valuation Year

1. The actuarial valuation report as of January 1, 2016 is based on financial information as of that date. Changes in the value of assets subsequent to that date, to the extent that they exist, are not reflected.
2. During the plan years ended 2014 and 2015, the market value rates of return were 7.47% and 0.87%, 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 2014 and 2015 were 9.63% and 7.28% , respectively. The actuarial value of assets as of December 31, 2015 was $118.6 million, or 102.5% of the market value of assets of $115.7 million (as reported in the Annual Statement). As of December 31, 2013, the actuarial value of assets was 94.6% of the market value.
3. As indicated in Section 2, Subsection B of this report, the total unrecognized investment loss as of December 31, 2015 is $2,914,752. This investment loss 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 gains derived from future experience. This implies that earning the assumed rate of investment return (net of expenses) per year on a market value basis will result in investment losses on the actuarial value of assets in the next few years. The funding schedule shown in Chart 16 reflects the deferred investment losses in accordance with the asset valuation method adopted by the Board.

4. The following actuarial assumptions were changed with this valuation:
   - The investment return assumption was lowered from 7.75% to 7.25%.
   - The mortality assumption for non-disabled participants was changed from the RP-2000 Employee and Healthy Annuitant Mortality Tables projected generationally from 2010 using Scale AA to the RP-2000 Employee and Healthy Annuitant Mortality Tables projected generationally from 2009 using Scale BB2D.
   - The mortality assumption for disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table set forward two years projected generationally from 2010 using Scale AA to the RP-2000 Healthy Annuitant Mortality Table projected generationally from 2015 using Scale BB2D.
   - The administrative expense assumption was increased from $250,000 for calendar year 2014 to $300,000 for calendar year 2016.

   The changes in assumptions increased the unfunded liability by $17.0 million and increased the normal cost by $662,000.
5. The unfunded liability was expected to increase from $110.6 million as of January 1, 2014, to $117.0 million as of January 1, 2016. The actual unfunded liability as of January 1, 2016 of $128.9 million is $11.9 million higher, which is primarily due to the assumption changes of $17.0 million described above partially offset by an experience gain of $5.1 million described in Subsection C of Section 2.
6. Because the fiscal 2017 appropriation has already been budgeted at $8,648,400, the results of this valuation will first be reflected in the fiscal 2018 appropriation. The funding schedule in Chart 16 fully funds the System by June 30, 2032 with appropriations increasing 10.00% per year. In the prior funding schedule, the fiscal 2016 appropriation was set equal to the fiscal 2015 appropriation increased by 8.00% plus $1,000,000 and increasing 8.00% per year thereafter.
7. On a market value basis, the funded ratio has decreased from 51.09% as of January 1, 2014 to 46.73% as of January 1, 2016. On an actuarial basis, the funded ratio has decreased from 48.33% as of January 1, 2014 to 47.91% as of January 1, 2016.

8. Section 5 shows the disclosure information required by Governmental Standards Accounting Board (GASB) Statements No. 67 and 68.

   - It is important to note that the new GASB rules only redefine pension liability and expense for financial reporting purposes, and do not apply to contribution amounts for pension funding purposes. Employers and plans can still develop and adopt funding policies under current practices.
   - The Net Pension Liability (NPL) is equal to the difference between the Total Pension Liability (TPL) and the Plan's Fiduciary Net Position. The Plan's Fiduciary Net Position is equal to the market value of assets and therefore, the NPL measure is very similar to an Unfunded Actuarial Accrued Liability (UAAL) on a market value basis. The NPL increased from $108.4 million as of December 31, 2014 to $131.8 million as of December 31, 2015 and the Plan's Fiduciary Net Position as a percent of the TPL decreased from 51.53% to 46.73%.
   - The NPL was measured as of December 31, 2015 and 2014 and determined based upon the results of the actuarial valuations as of January 1, 2016 and January 1, 2014 respectively.
   - The discount rates used to determine the TPL and NPL was 7.25% as of December 31, 2015 and 7.75% as of December 31, 2014.

Summary of Key Valuation Results

	2016	2014
Contributions for fiscal year beginning July 1:		
Recommended for fiscal 2017 and 2015	$8,648,400	$6,488,683
Recommended for fiscal 2018 and 2016	9,513,240	8,007,778
Recommended for fiscal 2019 and 2017	10,464,565	8,648,400
Funding elements for plan year beginning January 1:		
Normal cost, including administrative expenses	$5,989,614	$5,080,379
Market value of assets	115,652,255	109,334,010
Actuarial value of assets	118,567,007	103,423,064
Actuarial accrued liability	247,500,391	214,000,142
Unfunded actuarial accrued liability	128,933,384	110,577,078
Funded ratio based on market value of assets	46.73%	51.09%
Funded ratio based on actuarial value of assets	47.91%	48.33%
Demographic data for plan year beginning January 1:		
Number of retired participants and beneficiaries	432	413
Number of inactive participants entitled to a return of their employee contributions	98	101
Number of inactive participants with a vested right to a deferred or immediate benefit	20	26
Number of active participants	728	733
Total payroll	$36,946,467	$34,938,514
Average payroll	50,751	47,665

Notes: *Calendar year 2015 payroll figures were reduced by 13.25% for Firefighters hired before January 1, 2012 and reduced by 11% for Firefighters hired after January 1, 2012 but before June 30, 2013 to reflect retroactive payments made in 2015.*

Calendar year 2013 payroll figures were reduced by 1% for Superior Officers, Patrolmen, Dispatchers and AFSCME participants to reflect retroactive payments made in 2013. Calendar year 2013 payroll figures for Department Heads and Firefighters were increased by 3.80% and 2.77%, respectively, to reflect unsettled bargaining agreements.

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 Town of Andover Contributory 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 Town of Andover Contributory Retirement System. Town of Andover Contributory 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 Town of Andover Contributory 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.
- Sections of this report may include actuarial results that are not rounded, but that does not imply precision.
- If the Town of Andover Contributory 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 Town of Andover Contributory 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 Plan, it is not a fiduciary in its capacity as actuaries and consultants with respect to the Plan.

A. 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 3, Exhibits A and B.

A historical perspective of how the participant population has changed over the past six valuations can be seen in this chart.

CHART 1

Participant Population: 2003 – 2015

Year Ended December 31	Active Participants	Inactive Participants*	Retired Participants and Beneficiaries	Ratio of Actives to Non-Actives
2003	720	99	334	0.60
2006	726	129	352	0.66
2009	707	--*	363	0.54
2011	701	113	396	0.73
2013	733	127	413	0.74
2015	728	118	432	0.76

**Information not available*

Active Participants

Plan costs are affected by the age, years of service and payroll of active participants. In this year's valuation, there were 728 active participants with an average age of 49.2, average years of service of 12.7 years and average payroll of $50,571. The 733 active participants in the prior valuation had an average age of 48.6, average service of 12.1 years and average payroll of $47,665.

Among the active participants, there were none with unknown age and/or service information.

Inactive Participants

In this year's valuation, there were 20 participants with a vested right to a deferred or immediate vested benefit and 98 participants entitled to a return of their employee contributions.

These graphs show a distribution of active participants by age and by years of service.

CHART 2

Distribution of Active Participants by Age as of December 31, 2015

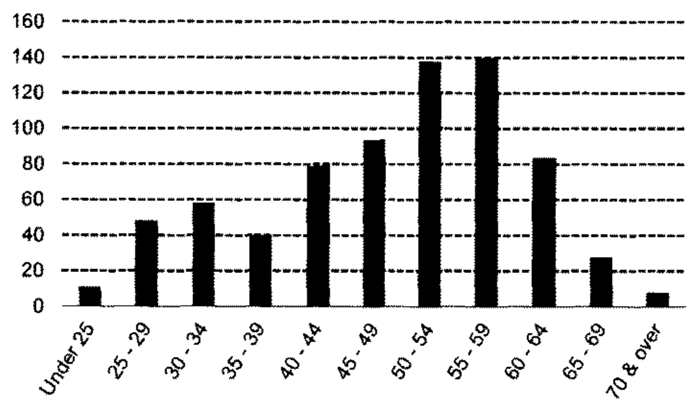
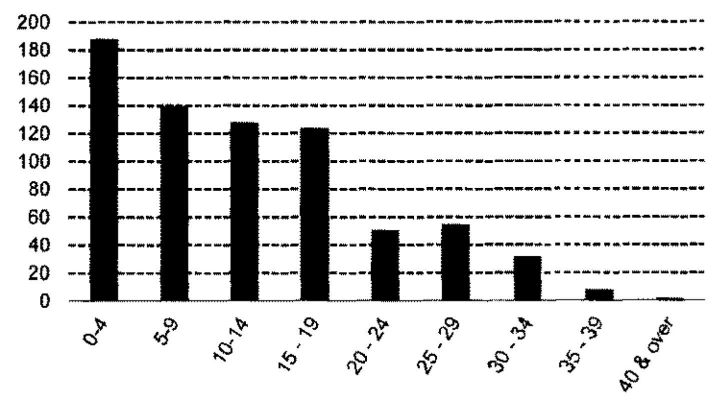


CHART 3

Distribution of Active Participants by Years of Service as of December 31, 2015



Retired Participants and Beneficiaries

As of December 31, 2015, 385 retired participants and 47 beneficiaries were receiving total monthly benefits of $1,025,694, excluding COLAs reimbursed by the Commonwealth. For comparison, in the previous valuation, there were 365 retired participants and 48 beneficiaries receiving monthly benefits of $936,202.

These graphs show a distribution of the current retired participants and beneficiaries based on their monthly amount and age, by type of pension.

■ Beneficiaries

■ Accidental Disability

■ Ordinary Disability

■ Regular

CHART 4

Distribution of Retired Participants and Beneficiaries by Type and by Monthly Amount as of December 31, 2015

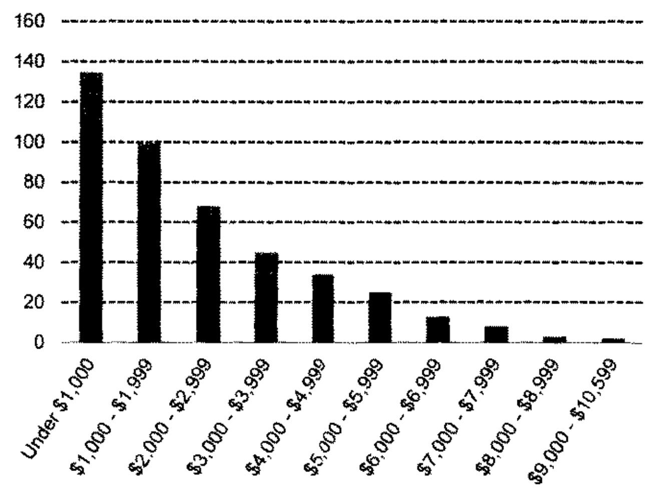
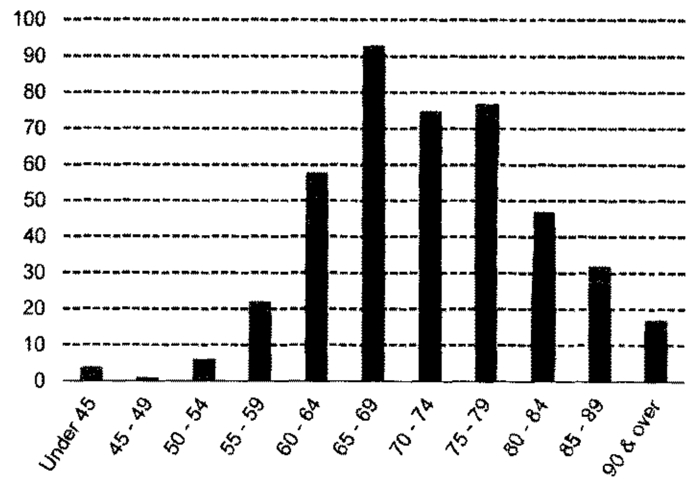


CHART 5

Distribution of Retired Participants and Beneficiaries by Type and by Age as of December 31, 2015



B. FINANCIAL INFORMATION

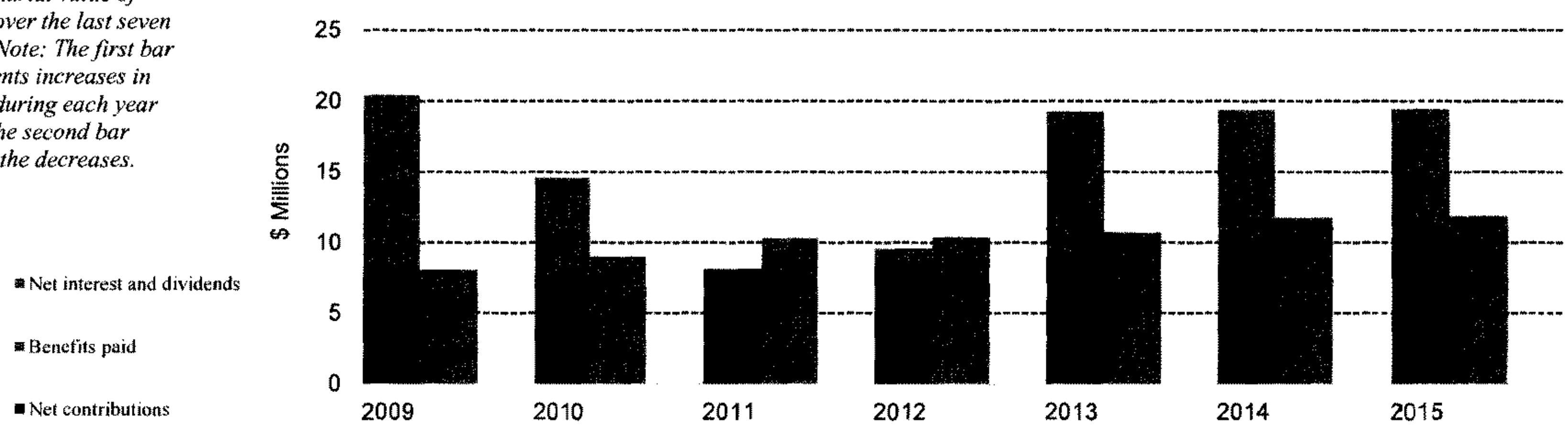
Retirement plan funding anticipates that, over the long term, both contributions (less administrative expenses) and net investment earnings (less investment fees) will be needed to cover benefit payments.

Retirement plan assets change as a result of the net impact of these income and expense components. Additional financial information, including a summary of these transactions for the valuation year, is presented in Section 3, Exhibits C and D.

CHART 6

Comparison of Increases and Decreases in the Actuarial Value of Assets for Years Ended December 31, 2009 – 2015

The chart depicts the components of changes in the actuarial value of assets over the last seven years. Note: The first bar represents increases in assets during each year while the second bar details the decreases.



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.

The chart shows the determination of the actuarial value of assets as of the valuation date.

CHART 7

Determination of Actuarial Value of Assets

	Year Ended				
	December 31, 2015			**December 31, 2014**	
1. Market value of assets, at the end of the year			$115,652,255		$115,185,769
2. Calculation of unrecognized return*	Original Amount	Unrecognized Return		Unrecognized Return	
(a) Year ended December 31, 2015	-$7,906,589	-$6,325,271		N/A	
(b) Year ended December 31, 2014	-301,213	-180,728		-240,970	
(c) Year ended December 31, 2013	6,643,426	2,657,370		3,986,055	
(d) Year ended December 31, 2012	4,669,383	933,877		1,867,753	
(e) Year ended December 31, 2011	-7,339,475	N/A		-1,467,895	
(f) Total unrecognized return			-2,914,752		4,144,943
3. Preliminary actuarial value: (1) - (2f)			118,567,007		111,040,826
4. Adjustment to be within 15% corridor			0		0
5. Final actuarial value of assets as of the end of the year: (3) + (4)			$118,567,007		$111,040,826
6. Actuarial value as a percentage of market value: (5) ÷ (1)			102.5%		96.4%
7. Amount deferred for future recognition: (1) - (5)			-$2,914,752		$4,144,943

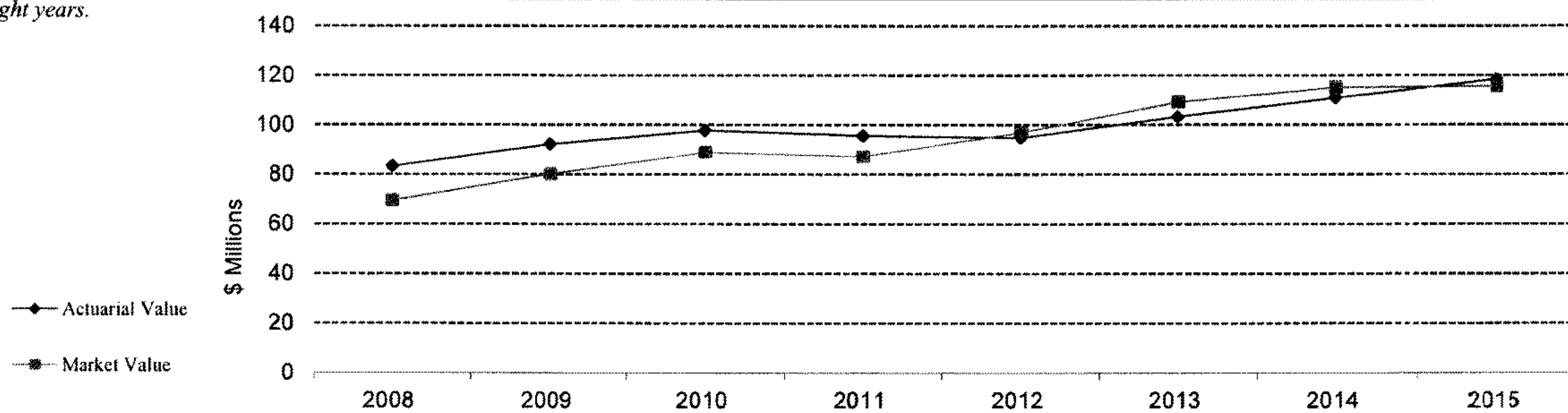
**Unrecognized return is the difference between total return and the expected return on a market value basis and is recognized over a five-year period.*

Both the actuarial value and market value of assets are representations of the Town of Andover Contributory 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 Town of Andover Contributory 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.

This chart shows the change in the actuarial value of assets versus the market value over the past eight years.

CHART 8

Actuarial Value of Assets vs. Market Value of Assets as of December 31, 2008 – 2015



C. ACTUARIAL EXPERIENCE

To calculate the required 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 $5,082,417. A discussion of the major components of the actuarial experience is on the following pages.

This chart provides a summary of the actuarial experience over the past two years.

CHART 9

Actuarial Experience for Two-Year Period Ended December 31, 2015

1.	Net gain from investments*	$1,397,228
2.	Net gain from administrative expenses	8,263
3.	Net gain from other experience**	3,676,926
4.	Net experience gain: (1) + (2) + (3)	$5,082,417

* *Details in Chart 10*

** *Details in Chart 13*

Investment Rate of Return

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 Town of Andover Contributory Retirement System's investment policy. For valuation purposes, the assumed rate of return on the actuarial value of assets was 7.75% for 2015 and 2014. The actual rates of return on an actuarial basis for the 2015 and 2014 plan years were 7.28% and 9.63%, respectively.

Since the actual return for the year was greater than the assumed return, the Town of Andover Contributory Retirement System's experienced an actuarial gain of $1,397,227 during the two-year period ending December 31, 2015 with regard to its investments.

This chart shows the gain/(loss) due to investment experience.

CHART 10

Actuarial Value Investment Experience

	Year Ended	
	December 31, 2015	**December 31, 2014**
1. Actual return	$8,059,343	$9,851,614
2. Average value of assets	110,774,245	102,306,138
3. Actual rate of return: (1) ÷ (2)	7.28%	9.63%
4. Assumed rate of return	7.75%	7.75%
5. Expected return: (2) x (4)	$8,585,004	$7,928,726
6. Actuarial gain/(loss): (1) – (5)	-$525,661	$1,922,888

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 market value investment return for the last seven years, including five-year and seven-year averages.

Based upon this experience and future expectations, we have lowered the assumed rate of return from 7.75% to 7.25%.

CHART 11

Investment Return – Actuarial Value vs. Market Value: 2009 - 2015

Year Ended December 31	Actuarial Value Investment Return		Market Value Investment Return	
	Amount	Percent	Amount	Percent
2009	$12,917,668	16.22%	$11,308,818	16.33%
2010	6,830,019	7.45	10,021,560	12.59
2011	-698,103	-0.72	-277,189	-0.31
2012	917,606	0.97	11,364,955	13.15
2013	10,199,718	10.85	14,088,571	14.67
2014	9,851,614	9.63	8,085,611	7.47
2015	8,059,343	7.28	999,648	0.87
Total	$48,077,864		$55,591,973	
	Five-year average return	5.68%		6.94%
	Seven-year average return	7.17%		8.65%

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

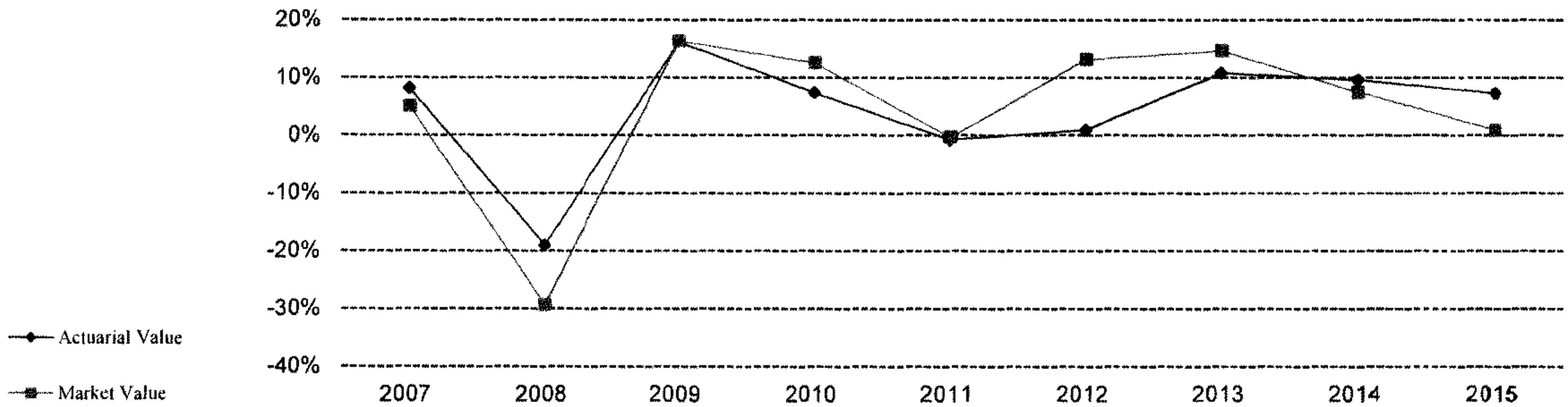
Subsection B described the actuarial asset valuation method that gradually takes into account fluctuations in the market value rate of return. The effect of this is to stabilize the actuarial rate of return, which contributes to leveling pension plan costs.

Administrative Expenses
Administrative expenses for the years ended December 31, 2014 and 2015 were $240,330 and $262,001, respectively, compared to the assumption of $250,000 for calendar 2014 and $260,000 for calendar 2015. This resulted in a gain of $8,263 for the two-year period, including an adjustment for interest. Based on the 2016 expense budget, we have increased the assumption to $300,000 for calendar year 2016.

This chart illustrates how this leveling effect has actually worked over the years 2007 - 2015.

CHART 12

Market and Actuarial Rates of Return for Years Ended December 31, 2007 - 2015



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 the participants,
- retirement experience (earlier or later than expected),
- mortality (more or fewer deaths than expected),
- the number of disability retirements, and
- salary increases different than assumed.

The net gain from this other experience for the two-year period ending December 31, 2015 amounted to $3,676,926, which is 1.5% of the actuarial accrued liability.

A brief summary of the demographic gain(loss) experience of the Town of Andover Contributory Retirement System for the two-year period ending December 31, 2015 is shown in the chart below.

The valuation reflects the following changes in assumptions:

- The investment return assumption was lowered from 7.75% to 7.25%.
- The mortality assumption for non-disabled participants was changed from the RP-2000 Employee and Healthy Annuitant Mortality Tables projected generationally from 2010 using Scale AA to the RP-2000 Employee and Healthy Annuitant Mortality Tables projected generationally from 2009 using Scale BB2D.
- The mortality assumption for disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table set forward two years projected generationally from 2010 using Scale AA to the RP-2000 Healthy Annuitant Mortality Table projected generationally from 2015 using Scale BB2D.
- The administrative expense assumption was increased from $250,000 for calendar year 2014 to $300,000 for calendar year 2016.

The changes in assumptions increased the unfunded liability by $17.0 million and increased the normal cost by $662,000.

The chart shows elements of the experience gain/(loss) for the most recent years.

CHART 13

Experience Due to Changes in Demographics for Two-Year Period Ended December 31, 2015

1.	Fewer deaths than expected amongst retired members and beneficiaries	-$518,148
2.	Salary increases less than expected for continuing actives	5,349,818
3.	Miscellaneous loss partially due to a transfer into the System with high service	-1,151,744
4.	Total	$3,676,926

The unfunded liability was expected to increase from $110.6 million as of January 1, 2014 to $117.0 million as of January 1, 2016. The actual unfunded liability as of January 1, 2016 of $128.9 million is $11.9 million higher than expected as detailed in Chart 14 below:

CHART 14

Development of Unfunded Actuarial Accrued Liability and (Gain)/Loss

	Year Ended			
	December 31, 2015		December 31, 2014	
1. Unfunded actuarial accrued liability at beginning of year		$114,485,103		$110,577,078
2. Normal cost at beginning of year, including administrative expenses		5,291,520		5,080,379
3. Total contributions		-11,666,794		-9,792,651
4. Interest				
(a) For whole year on (1) + (2)	$9,282,688		$8,963,453	
(b) For half year on (3)	-408,830		-343,156	
(c) Total interest		8,873,858		8,620,297
5. Expected unfunded actuarial accrued liability		$116,983,687		$114,485,103
6. Changes due to:				
(a) Experience gain	-$5,082,417		--	
(b) Assumptions	17,032,114		--	
(c) Total changes		11,949,697		--
7. Unfunded actuarial accrued liability at end of year		$128,933,384		--

D. RECOMMENDED CONTRIBUTION

The amount of annual contribution required to fund the Plan is comprised of an employer normal cost payment and a payment on the unfunded actuarial accrued liability.

Because the fiscal 2017 appropriation has already been budgeted at $8,648,400, the results of this valuation will first be reflected in the fiscal 2018 appropriation.

The funding schedule in Chart 16 fully funds the System by June 30, 2032 with appropriations increasing 10.00% per year.

The chart compares this valuation's recommended contribution with the prior valuation.

CHART 15
Recommended Contribution

	Year Beginning January 1			
	2016		2014	
1. Total normal cost	$5,689,614	14.75%	$4,830,379	13.24%
2. Administrative expenses	300,000	0.78%	250,000	0.69%
3. Expected employee contributions	-3,698,637	-9.59%	-3,449,126	-9.45%
4. Employer normal cost: (1) + (2) + (3)	$2,290,977	5.94%	$1,631,253	4.47%
5. Actuarial accrued liability	247,500,391		214,000,142	
6. Actuarial value of assets	118,567,007		103,423,064	
7. Unfunded actuarial accrued liability: (5) - (6)	$128,933,384		$110,577,078	
8. Employer normal cost projected to July 1, 2016 and 2014, respectively, adjusted for timing	2,344,358	5.97%	1,673,938	4.49%
9. Projected unfunded actuarial accrued liability	133,525,444		114,781,990	
10. Payment on projected unfunded actuarial accrued liability, adjusted for timing	6,304,042	16.06%	4,814,745	12.91%
11. Total recommended contribution: (8) + (10)	$8,648,400	22.03%	$6,488,638	17.40%
12. Projected payroll as of July 1	$39,252,617		$37,300,835	

Notes: Recommended contributions are assumed to be paid on August 1.
Recommended contributions are set equal to the budgeted amounts determined with the previous valuation.

CHART 16

Funding Schedule - Fully funded by June 30, 2032 with appropriations increasing 10.00% per year

(1) Fiscal Year Ended June 30	(2) Employer Normal Cost	(3) Amortization of Remaining Liability	(4) Total Plan Cost: (2) + (3)	(5) Total Unfunded Actuarial Accrued Liability at Beginning of Fiscal Year	(6) Total Plan Cost % Increase
2017	$2,344,358	$6,304,042	$8,648,400	$133,525,444	--
2018	2,435,450	7,077,790	9,513,240	136,246,163	10.00%
2019	2,530,060	7,934,505	10,464,565	139,359,569	10.00%
2020	2,628,324	8,882,697	11,511,021	143,144,659	10.00%
2021	2,730,382	9,931,741	12,662,123	146,014,685	10.00%
2022	2,836,380	11,091,955	13,928,335	146,010,905	10.00%
2023	2,946,470	12,374,699	15,321,169	144,769,758	10.00%
2024	3,060,808	13,792,478	16,853,286	142,070,886	10.00%
2025	3,179,557	15,359,057	18,538,614	137,664,621	10.00%
2026	3,302,888	17,089,588	20,392,476	131,268,517	10.00%
2027	3,430,976	19,000,747	22,431,723	122,563,495	10.00%
2028	3,564,003	21,110,893	24,674,896	111,189,561	10.00%
2029	3,702,159	23,440,226	27,142,385	96,741,048	10.00%
2030	3,845,640	26,010,984	29,856,624	78,761,336	10.00%
2031	3,994,653	28,847,633	32,842,286	56,736,993	10.00%
2032	4,149,407	30,267,297	34,416,704	30,091,271	4.79%
2033	4,310,124	--	4,310,124	--	-87.48%

Notes: Recommended contributions are assumed to be paid August 1.

Item (2) reflects 3.5% grown 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 unfunded actuarial accrued liability reflects deferred investment losses.

Assumes contribution of budgeted amount for fiscal 2017.

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

EXHIBIT A

Table of Plan Coverage

Category	Year Ended December 31 2015	Year Ended December 31 2013	Change From Prior Year
Active participants in valuation:			
Number	728	733	-0.7%
Average age	49.2	48.6	N/A
Average years of service	12.7	12.1	N/A
Total payroll	$36,946,467	$34,938,514	5.7%
Average payroll	50,751	47,665	6.5%
Member contributions	38,672,112	35,125,935	10.1%
Inactive participants entitled to a return of their employee contributions	98	101	-3.0%
Inactive participants with a vested right to a deferred or immediate vested benefit	20	26	-23.1%
Retired participants:			
Number in pay status	346	326	6.1%
Average age	73.0	73.3	N/A
Average monthly benefit	$2,422	$2,327	4.1%
Disabled participants:			
Number in pay status	39	39	0.0%
Average age	66.0	65.5	N/A
Average monthly benefit	$3,326	$3,174	4.8%
Beneficiaries in pay status:			
Number in pay status	47	48	-2.1%
Average age	70.5	71.5	N/A
Average monthly benefit	$1,236	$1,123	10.1%

Notes: Calendar year 2015 payroll figures were reduced by 13.25% for Firefighters hired before January 1, 2012 and reduced by 11% for Firefighters hired after January 1, 2012 but before June 30, 2013 to reflect retroactive payments made in 2015.

Calendar year 2013 payroll figures were reduced by 1% for Superior Officers, Patrolmen, Dispatchers and AFSCME participants to reflect retroactive payments made in 2013. Calendar year 2013 payroll figures for Department Heads and Firefighters were increased by 3.80% and 2.77%, respectively, to reflect unsettled bargaining agreements.

EXHIBIT B

Participants in Active Service as of December 31, 2015
By Age, Years of Service, and Average Payroll

		Years of Service								
Age	Total	0-4	5-9	10-14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 & over
Under 25	11	11	--	--	--	--	--	--	--	--
	$29,256	$29,256	--	--	--	--	--	--	--	--
25 - 29	48	46	2	--	--	--	--	--	--	--
	$35,166	$35,436	$28,944	--	--	--	--	--	--	--
30 - 34	58	28	22	7	1	--	--	--	--	--
	$56,304	$49,425	$66,524	$53,174	$45,955	--	--	--	--	--
35 - 39	40	10	10	13	7	--	--	--	--	--
	$61,136	$44,374	$64,748	$65,705	$71,433	--	--	--	--	--
40 - 44	79	25	11	11	26	6	--	--	--	--
	$53,768	$30,206	$38,223	$59,979	$73,506	$83,530	--	--	--	--
45 - 49	94	17	20	18	14	15	10	--	--	--
	$56,102	$27,571	$33,463	$57,362	$74,324	$86,897	$75,913	--	--	--
50 - 54	138	23	29	23	18	10	23	12	--	--
	$50,956	$28,263	$34,852	$42,626	$52,426	$59,815	$82,250	$79,763	--	--
55 - 59	140	21	23	28	33	8	11	11	5	--
	$49,067	$31,493	$42,516	$39,872	$47,513	$61,726	$78,024	$71,225	$82,061	--
60 - 64	84	5	19	20	16	8	7	6	2	1
	$48,049	$32,569	$35,298	$37,148	$47,258	$56,389	$63,634	$91,986	$69,214	$116,625
65 - 69	28	2	3	7	7	3	2	3	--	1
	$47,706	$18,362	$30,119	$45,726	$39,185	$44,315	$120,857	$62,553	--	$52,006
70 & over	8	--	1	1	2	1	2	--	1	--
	$53,892	--	$57,698	$28,390	$45,808	$53,853	$86,909	--	$25,761	--
Total	728	188	140	128	124	51	55	32	8	2
	$50,751	$34,651	$43,328	$47,710	$57,511	$69,304	$79,457	$77,507	$71,812	$84,316

EXHIBIT C

Summary Statement of Income and Expenses on an Actuarial Value Basis

	Year Ended December 31, 2015		Year Ended December 31, 2014	
Net assets at actuarial value at the beginning of the year		$111,040,826		$103,423,064
Contribution income:				
Employer contributions	$8,007,778		$6,281,397	
Employee contributions	3,659,016		3,511,254	
Less administrative expenses	-262,001		-240,330	
Net contribution income		11,404,793		9,552,321
Net investment income:		8,059,343		9,851,614
Total income available for benefits		$19,464,136		$19,403,935
Less benefit payments:				
Pensions, annuities, refunds and net transfers	-$11,928,506		-$11,776,358	
Net 3(8)(c) reimbursements	-15,449		-9,815	
Workers Compensation Settlements	6,000		0	
Net benefit payments		-$11,937,955		-$11,786,173
Change in reserve for future benefits		$7,526,181		$7,617,762
Net assets at actuarial value at the end of the year		$118,567,007		$111,040,826

EXHIBIT D

Development of the Fund Through December 31, 2015

Year Ended December 31	Employer Contributions	Employee Contributions	Other Contributions	Net Investment Return*	Administrative Expenses	Benefit Payments	Actuarial Value of Assets at End of Year
2009	$4,632,127	$3,041,540	$0	$12,917,668	$172,240	$8,084,573	$92,289,115
2010	4,767,127	3,176,088	0	6,830,019	187,872	9,014,931	97,859,546
2011	4,984,957	3,327,729	0	-698,103	169,016	9,613,281	95,691,831
2012	5,383,550	3,500,046	4,022	917,606	226,532	10,405,291	94,865,232
2013	5,814,431	3,488,657	0	10,199,718	215,643	10,729,331	103,423,064
2014	6,281,397	3,511,254	0	9,851,614	240,330	11,786,173	111,040,826
2015	8,007,778	3,659,016	0	8,059,343	262,001	11,937,955	118,567,007

** Net of investment fees*

EXHIBIT E
Department Results

	Water Department	Sewer Department	Housing Authority	School – Cafeteria Workers	School – All Others	All Other	Total
Active Participants							
Number	24	3	7	38	325	331	728
Annual payroll projected for calendar 2016	$1,617,709	$197,010	$387,409	893,972	$11,033,523	$24,453,523	$38,583,218
Average age	50.1	50.4	51.0	52.6	49.6	48.2	49.2
Average service	20.3	16.0	16.6	7.0	9.5	15.7	12.7
Normal cost	$167,490	$24,864	$46,810	145,745	$1,572,546	$3,732,159	$5,689,614
Administrative expenses	8,831	1,311	2,468	7,685	82,917	196,788	300,000
Expected employee contributions	148,319	19,871	36,656	81,866	1,027,333	2,384,592	3,698,637
Employer normal cost	28,002	6,304	12,622	71,564	628,130	1,544,355	2,290,977
Accrued liability	6,601,330	583,898	1,357,161	1,611,677	25,871,439	84,202,505	120,228,010
Retired Participants							
Number	8	3	4	18	145	254	432
Total benefits	$308,025	$93,689	$66,383	$138,943	$2,009,645	$9,691,642	$12,308,327
Average benefits	38,503	31,230	16,596	7,719	13,860	38,156	28,491
Accrued liability	3,207,529	858,355	648,610	1,454,165	20,279,508	97,904,550	124,352,717
Vested Participants							
Number	1	- -	2	2	6	9	20
Accrued liability	$201,674	- -	$472,222	344,617	$351,175	$1,108,804	$2,478,492
Inactive Participants							
Number	1	- -	2	5	82	8	98
Employee contribution balance	$10,905	- -	$15,599	$11,634	$323,946	$79,088	$441,172
Appropriation for Fiscal Year Ending							
2017	$287,416	$53,820	$66,704	$144,556	$1,743,357	$6,352,547	$8,648,400
2018	316,508	47,960	84,752	173,888	2,006,850	6,883,282	9,513,240
2019	348,159	52,756	93,227	191,277	2,207,535	7,571,611	10,464,565

Notes: Administrative expenses are allocated in proportion to normal cost.

Fiscal 2018 appropriations are based on employer normal cost shown and amortization payments allocated proportionally to the actuarial accrued liability.

Fiscal 2017 appropriations are equal to the previously budgeted amounts determined with the prior valuation.

EXHIBIT F
Definitions of Pension Terms

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

Assumptions or actuarial assumptions: The estimates on which the cost of the Plan is calculated including:

(a) Investment return — the rate of investment yield that the Plan will earn over the long-term future;

(b) Mortality rates — the death rates of employees and pensioners; life expectancy is based on these rates;

(c) Retirement rates — the rate or probability of retirement at a given age;

(d) Withdrawal rates — the rates at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement.

Normal cost: The amount of contributions required to fund the benefit allocated to the current year of service.

Actuarial accrued liability for actives: The value of all projected benefit payments for current members less the portion that will be paid by future normal costs.

Actuarial accrued liability for pensioners: The single-sum value of lifetime benefits to existing pensioners. This sum takes account of life expectancies appropriate to the ages of the pensioners and the interest that the sum is expected to earn before it is entirely paid out in benefits.

Unfunded actuarial accrued liability: The extent to which the actuarial accrued liability of the Plan exceeds the assets of the Plan. There are many approaches to paying off the unfunded actuarial accrued liability, from meeting the interest accrual only to amortizing it over a specific period of time.

Amortization of the unfunded actuarial accrued liability: Payments made over a period of years equal in value to the Plan's unfunded actuarial accrued liability.

Investment return: The rate of earnings of the Plan 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.

EXHIBIT I

Summary of Actuarial Valuation Results

The valuation was made with respect to the following data supplied to us:			
1.	Retired participants as of the valuation date (including 47 beneficiaries in pay status)		432
2.	Participants active during the year ended December 31, 2015 with total accumulated contributions of $38,672,112 and projected payroll of $38,583,218		728
3.	Inactive participants entitled to a return of their employee contributions as of December 31, 2015		98
4.	Inactive participants with a vested right to a deferred or immediate benefit as of December 31, 2015		20
The actuarial factors as of January 1, 2016 are as follows:			
1.	Total normal cost		$5,689,614
2.	Administrative expenses		300,000
3.	Expected employee contributions		-3,698,637
4.	Employer normal cost: (1) + (2) + (3)		$2,290,977
5.	Actuarial accrued liability		247,500,391
	Retired participants and beneficiaries	$124,352,717	
	Active participants	120,228,010	
	Inactive participants	2,919,664	
6.	Actuarial value of assets ($115,652,255 at market value as reported in the Annual Statement)		118,567,007
7.	Unfunded actuarial accrued liability: (5) – (6)		$128,933,384
The actuarial factors projected to July 1, 2016 are as follows:			
1.	Employer normal cost, adjusted for timing		$2,344,358
2.	Projected unfunded actuarial accrued liability		133,525,444
3.	Payment on projected unfunded actuarial accrued liability, adjusted for timing		6,304,042
4.	Recommended contribution: (1) + (3)		$8,648,400
5.	Projected payroll		$39,252,617
6.	Total recommended contribution as a percentage of projected payroll: (4) ÷ (5)		22.03%

Notes: Recommended contribution is assumed to be paid August 1.
Recommended contribution is set equal to the budgeted amount determined with the previous valuation.

EXHIBIT II

Funded Ratio

A critical piece of information regarding the System's financial status is the funded ratio. This ratio compares the actuarial value of assets to the actuarial accrued liabilities of the System as calculated. High ratios indicate a well-funded plan with assets sufficient to cover the plan's actuarial accrued liabilities. Lower ratios may indicate recent changes to benefit structures, funding of the plan below actuarial requirements, poor asset performance, or a variety of other factors.

These measurements are not necessarily appropriate or assessing the sufficiency of System assets to cover the estimated cost of settling the System's benefit obligation or the need for or the amount of future contributions.

On a market value basis, the funded ratio has decreased from 51.09% as of January 1, 2014 to 46.73% as of January 1, 2016. On an actuarial value basis, the funded ratio has decreased from 48.33% as of January 1, 2014 to 47.91% as of January 1, 2016.

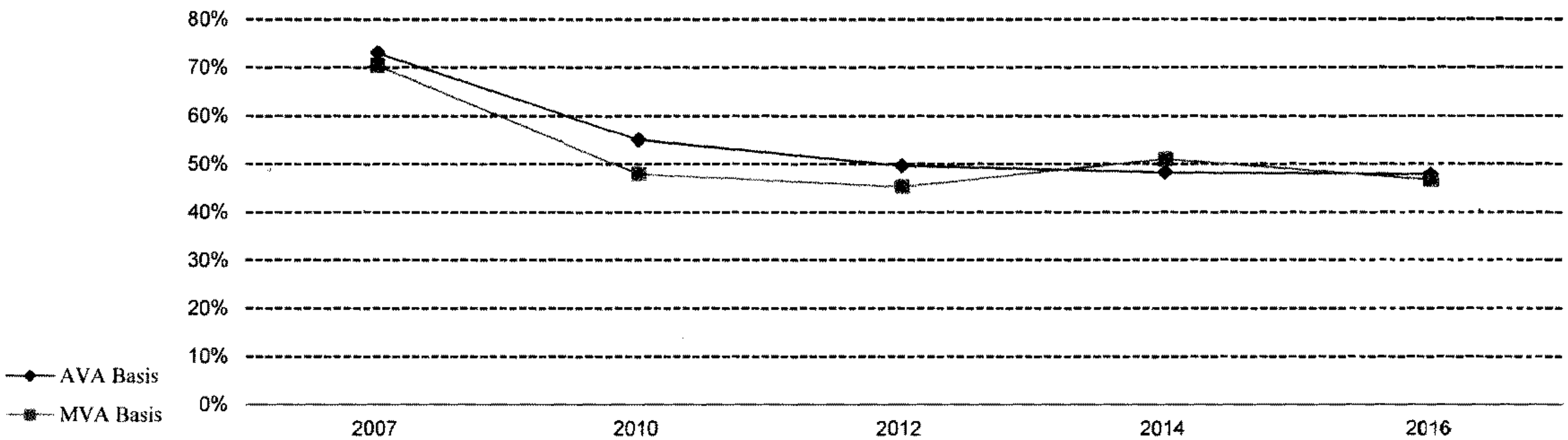


EXHIBIT III

Actuarial Assumptions and Actuarial Cost Method

Mortality Rates:

Healthy:

Pre-Retirement	RP-2000 Employee Mortality Table projected generationally from 2009 using Scale BB2D (Previously, RP-2000 Employee Mortality Table projected generationally from 2010 using Scale AA)
Post-Retirement	RP-2000 Healthy Annuitant Mortality Table projected generationally from 2009 using Scale BB2D (Previously, RP-2000 Healthy Annuitant Mortality Table projected generationally from 2010 using Scale AA)
Disabled:	RP-2000 Healthy Annuitant Mortality Table projected generationally from 2015 using Scale BB2D (Previously, RP-2000 Healthy Annuitant Mortality Table set forward two years projected generationally from 2010 using Scale AA)

The underlying tables with the generational projection to the ages of participants as of the measurement date reasonably reflect the 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 years' assumptions over the past six years. The mortality tables were then adjusted to future years using the generational projection under Scale BB2D to reflect future mortality improvement between the measurement date and those years.

Termination Rates before Retirement:

Groups 1 and 2 – Rate (%)

	Mortality		
Age	**Male**	**Female**	**Disability**
20	0.03	0.02	0.01
25	0.04	0.02	0.02
30	0.04	0.03	0.03
35	0.08	0.05	0.06
40	0.11	0.07	0.10
45	0.15	0.11	0.15
50	0.21	0.17	0.19
55	0.30	0.25	0.24
60	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.

Group 4 – Rate (%)

	Mortality		
Age	**Male**	**Female**	**Disability**
20	0.03	0.02	0.10
25	0.04	0.02	0.20
30	0.04	0.03	0.30
35	0.08	0.05	0.30
40	0.11	0.07	0.30
45	0.15	0.11	1.00
50	0.21	0.17	1.25
55	0.30	0.25	1.20
60	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.

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	7.6		
6	7.5		
7	6.7		
8	6.3		
9	5.9		
10	5.4		
11	5.0		
12	4.6		
13	4.1		
14	3.7		
15	3.3		
16 – 20	2.0		
21 – 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 past six years.

Retirement Rates:

Age	Rate per year (%) Groups 1 and 2 Male	Groups 1 and 2 Female	Group 4
45 – 49	- -	- -	1.0
50 – 51	1.0	1.5	2.0
52	1.0	2.0	2.0
53	1.0	2.5	5.0
54	2.0	2.5	7.5
55	2.0	5.5	15.0
56 – 57	2.5	6.5	10.0
58	5.0	6.5	10.0
59	6.5	6.5	15.0
60	12.0	5.0	20.0
61	20.0	13.0	20.0
62	30.0	15.0	25.0
63	25.0	12.5	25.0
64	22.0	18.0	30.0
65	40.0	15.0	100.0
66 – 67	25.0	20.0	- -
68	30.0	25.0	- -
69	30.0	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 past six years.

Retirement Age for Inactive Vested Participants:	For participants hired prior to April 2, 2012, 55 for Groups 1 and 2 and 45 for Group4. 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.
Family Composition:	80% of participants are assumed to be married. None are assumed to have dependent children. Females are assumed to be three years younger than their spouses.
Benefit Election:	All participants are assumed to elect Option A. The benefit election reflects the fact that all benefit options are actuarially equivalent.
Net Investment Return:	7.25% (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%	4.75%
9+	4.25%	4.50%	4.75%

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: 3.50%

Administrative Expenses: $300,000 for calendar 2016, increasing 3.50% per year (previously, $250,000 for calendar 2014, increasing 4.0% per year).

The administrative expense assumption is based on information on expenses provided by the Retirement System.

Total Service: Total creditable service reported in the data.

2015 Salary: 2015 salaries are equal to salaries provided in the data except for new hires where salaries are annualized based on date of hire. The salaries for Firefighters hired before January 1, 2012 were reduced by 13.25% and the salaries for Firefighters hired after January 1, 2012 but before June 30, 2013, were reduced by 11.00% to reflect retroactive payment made in 2015.

Net 3(8)(c) Liability: No liability is valued for benefits paid to or received from other municipal retirement 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 is recognized over a five-year period, further adjusted, if necessary, to be within 15% of the market value.
Actuarial Cost Method:	Entry Age Normal Actuarial Cost Method. Entry Age is the attained age of the participant minus total creditable service. 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 Changes in Assumptions:	Based on past experience and future expectations, the following actuarial assumptions were changed: ➤ The investment return assumption was lowered from 7.75% to 7.25%. ➤ The mortality assumption for non-disabled participants was changed from the RP-2000 Employee and Healthy Annuitant Mortality Tables projected generationally from 2010 using Scale AA to the RP-2000 Employee and Healthy Annuitant Mortality Tables projected generationally from 2009 using Scale BB2D. ➤ The mortality assumption for disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table set forward two years projected generationally from 2010 using Scale AA to the RP-2000 Healthy Annuitant Mortality Table projected generationally from 2015 using Scale BB2D. ➤ The administrative expense assumption was increased from $250,000 for calendar year 2014 to $300,000 for calendar year 2016.

EXHIBIT IV

Summary of Plan Provisions

This exhibit summarizes the major provisions of Chapter 32 of the Laws of Massachusetts.

Plan Year: January 1 – December 31

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:

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

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.

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

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 Benefits

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 be 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 $9,000 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 $12,000 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.

EXHIBIT 1

Net Pension Liability

The components of the net pension liability of the Town of Andover Contributory Retirement System are as follows:

	December 31, 2015	December 31, 2014
Total pension liability	$247,500,391	$223,546,999
Plan fiduciary net position	115,652,255	115,185,770
System's net pension liability	131,848,136	108,361,229
Plan fiduciary net position as a percentage of the total pension liability*	46.73%	51.53%

* *These funded percentages are not necessarily appropriate for assessing the sufficiency of Plan assets to cover the estimated cost of settling the Plan's benefit obligation or the need for or the amount of future contributions.*

Actuarial assumptions. The total pension liability as of December 31, 2015 was determined by an actuarial valuation as of December 31, 2015, using the following actuarial assumptions, applied to all periods included in the measurement:

Inflation	3.50% (previously, 4.00%)
Salary increases	Varies by length of service with ultimate rates of 4.25% for Group 1, 4.50% for Group 2 and 4.75% for Group 4
Investment rate of return	7.25% (previously, 7.75%), net of pension plan investment expense, including inflation
Cost of Living Adjustment	3% of first $12,000
Healthy:	
Pre-Retirement:	RP-2000 Employee Mortality Table projected generationally from 2009 using Scale BB2D (previously, RP-2000 Employee Mortality Table projected generationally from 2010 using Scale AA)
Post-Retirement:	RP-2000 Healthy Annuitant Mortality Table projected generationally from 2009 using Scale BB2D (previously, RP-2000 Healthy Annuitant Mortality Table projected generationally from 2010 using Scale AA)
Disabled:	RP-2000 Healthy Annuitant Mortality Table projected generationally from 2015 with Scale BB2D (previously, RP-2000 Healthy Annuitant Mortality Table set forward two years projected generationally from 2010 with Scale AA)

The long-term expected rate of return on pension plan investments was determined using a building-block method in which best-estimate ranges of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation. Best estimates of arithmetic real rates of return for each major asset class included in the pension plan's target asset allocation as of December 31, 2015 are summarized in the following table:

Asset Class	Long-Term Expected Real Rate of Return
Cash	1.11%
Domestic equity	6.49%
International developed markets equity	7.16%
International emerging markets equity	9.46%
Core fixed income	1.68%
High-yield fixed income	4.76%
Real estate	4.37%
Commodities	4.13%
Hedge fund, GTAA, Risk parity	3.60%
Private equity	11.04%

Discount rate sensitivity

Discount rate: The discount rate used to measure the total pension liability was 7.25%. The projection of cash flows used to determine the discount rate assumed plan member contributions will be made at the current contribution rate and that contributions will be made at rates equal to the actuarially determined contribution rates. Based on those assumptions, the pension plan's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

Sensitivity of the net pension liability to changes in the discount rate. The following presents the net pension liability, calculated using the discount rate of 7.25%, as well as what the net pension liability would be if it were calculated using a discount rate that is 1-percentage-point lower (6.25%) or 1-percentage-point higher (8.25%) than the current rate:

	1% Decrease (6.25%)	Current Discount (7.25%)	1% Increase (8.25%)
Town of Andover Contributory Retirement System's net pension liability as of December 31, 2015	$161,039,481	$131,848,136	$107,229,308

EXHIBIT 2

Schedule of Changes in the Net Pension Liability – Last Ten Years

	Year End December 31,									
	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006
Total pension liability										
Service cost	$5,031,130	$4,830,379								
Interest	17,252,209	16,502,651								
Differences between expected and actual experience	-3,424,106	0								
Changes of assumptions	17,032,114	0								
Changes of benefit terms	0	0	(Historical information prior to implementation of GASB 67/68 is not required)							
Benefit payments, including refunds of employee contributions	-11,937,955	-11,786,173								
Net change in total pension liability	$23,953,392	$9,546,857								
Total pension liability - beginning	223,546,999	214,000,142								
Total pension liability - ending (a)	$247,500,391	$223,546,999								
Plan fiduciary net position										
Contributions - employer	$8,007,778	$6,281,397								
Contributions - employee	3,659,016	3,511,254								
Net investment income	999,647	8,085,611								
Benefit payments, including refunds of employee contributions	-11,937,955	-11,786,173	(Historical information prior to implementation of GASB 67/68 is not required)							
Administrative expenses	-262,001	-240,330								
Net change in fiduciary net position	$466,485	$5,851,759								
Plan fiduciary net position - beginning	115,185,770	109,334,010								
Plan fiduciary net position - ending (b)	$115,652,255	$115,185,770								
Net pension liability – ending: (a)-(b)	$131,848,136	$108,361,230								
Plan's fiduciary net position as a percentage of the total pension liability	46.73%	51.53%	(Historical information prior to implementation of GASB 67/68 is not required)							
Covered-employee payroll	$36,946,467	$36,488,870								
Net pension liability as a percentage of covered-employee payroll	356.86%	296.97%								

Note: Covered-employee payroll for 2015 and 2014 as estimated in the January 1, 2016 and January 1, 2014 funding valuation reports, respectively.
Covered-employee payroll for 2014 has been restated to reflect a change in the definition of covered payroll under GASB Statement No. 82.

EXHIBIT 3
Schedule of Contributions – Last Ten Years

	Year End December 31,									
	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006
Actuarially determined contribution	$8,007,778	$6,281,397								
Contributions in relation to the actuarially determined contribution	8,007,778	6,281,397								
Contribution deficiency (excess)	$0	$0								
Covered-employee payroll	36,946,467	36,488,870								
Contributions as a percentage of covered-employee payroll	21.67%	17.21%	(Historical information prior to implementation of GASB 67/68 is not required)							

Note: Actuarially determined contributions for 2015 and 2014 are based on results from the January 1, 2014 and January 1, 2012 actuarial valuations, respectively, which determined budgeted appropriations.

EXHIBIT 4

Pension Expense and Deferred Outflows/Inflows of Resources Related to Pensions

A. Pension expense for the year ended June 30, 2016

Service cost	$5,031,130
Interest	17,252,209
Contributions – employee	-3,659,016
Projected earnings on pension plan investments	-8,906,237
Administrative expenses	262,001
Recognized portion of current-period difference between expected and actual experience	-570,684
Recognized portion of current-period difference between projected and actual earnings on pension plan investments	1,581,318
Recognized portion of current year period assumption change	2,838,686
Recognized portion of current year period plan change	0
Recognition of deferred outflows of resources	60,243
Recognition of deferred inflows of resources	0
Pension expense for fiscal year ended June 30, 2016	$13,889,650

B. Deferred outflows/inflows of resources related to pensions

	Deferred Outflows of Resources	Deferred Inflows of Resources
Differences between expected and actual experience	$0	$2,853,422
Changes of assumptions	14,193,428	0
Net difference between projected and actual earnings on pension plan investments	6,505,999	0
Total	$20,699,427	$2,853,422

C. Projected recognition of deferred outflows/(inflows)

Year Ended June 30,	Recognition
2017	$3,909,563
2018	3,909,563
2019	3,909,561
2020	3,849,320
2021	2,267,998
Thereafter	0

EXHIBIT 5

Determination of Proportionate Share

Employer Name	FY 2015 Total Appropriation	Percent of FY 2015 Total Appropriation	Share of NPL as of January 1, 2015	FY 2016 Total Appropriation	Percent of FY 2016 Total Appropriation	Share of NPL as of January 1, 2016
Town of Andover	$4,629,178	73.696631%	$79,858,575	$5,881,988	73.453435%	$96,846,985
Water Department	176,160	2.804472%	3,038,960	266,126	3.323344%	4,381,767
Sewer Department	52,810	0.840737%	911,033	49,833	0.622307%	820,500
Housing Authority	47,503	0.756249%	819,481	61,763	0.771288%	1,016,929
School – Cafeteria Workers	105,340	1.677015%	1,817,234	133,848	1.671475%	2,203,809
School – All Other	1,270,406	20.224896%	21,915,946	1,614,220	20.158151%	26,578,146
Grand Totals:	**$6,281,397**	**100.000000%**	**$108,361,229**	**$8,007,778**	**100.000000%**	**$131,848,136**

EXHIBIT 6

Determination of Pension Amounts by Employer as of June 30, 2016

Employer Name	Employer's Proportionate Share Allocation (1)	Net Pension Liability (2)	Covered Employee Payroll (3)	Discount Rate Sensitivity: 1% Decrease (6.25%) (4)	Discount Rate Sensitivity: Current Discount Rate (7.25%) (5)	Discount Rate Sensitivity: 1% Increase (8.25%) (6)
Town of Andover	73.453435%	$96,846,985	$23,397,023	$118,289,030	$96,846,985	$78,763,610
Water Department	3.323344%	4,381,767	1,553,036	5,351,896	4,381,767	3,563,599
Sewer Department	0.622307%	820,500	188,978	1,002,160	820,500	667,295
Housing Authority	0.771288%	1,016,929	370,839	1,242,078	1,016,929	827,047
School – Cafeteria Workers	1.671475%	2,203,809	856,590	2,691,735	2,203,809	1,792,311
School – All Other	20.158151%	26,578,146	10,580,001	32,462,582	26,578,146	21,615,446
Grand Totals:	**100.000000%**	**$131,848,136**	**$36,946,467**	**$161,039,481**	**$131,848,136**	**$107,229,308**

Employer Name	Schedule of Contributions				Pension Expense		
	Statutory Required Contribution (7)	Contributions In Relation to the Statutory Required Contribution (8)	Contribution Deficiency/ (Excess) (9)	Contributions as a Percentage of Covered Employee Payroll (10)	Proportionate Share of Plan Pension Expense (11)	Net Amortization of Deferred Amounts from Changes in Proportion and Differences Between Employer Contributions and Proportionate Share of Contributions (12)	Total Employer Pension Expense (13)
Town of Andover	$5,881,988	-$5,881,988	$0	25.14%	$10,202,425	-$43,824	$10,158,601
Water Department	266,126	-266,126	0	17.14%	461,601	93,501	555,102
Sewer Department	49,833	-49,833	0	26.37%	86,436	-39,361	47,075
Housing Authority	61,763	-61,763	0	16.65%	107,129	2,710	109,839
School – Cafeteria Workers	133,848	-133,848	0	15.63%	232,162	-998	231,164
School – All Other	1,614,220	-1,614,220	0	15.26%	2,799,897	-12,028	2,787,869
Grand Totals:	**$8,007,778**	**-$8,007,778**	**$0**	**21.67%**	**$13,889,650**	**$0**	**$13,889,650**

Employer Name	Deferred Outflows of Resources: Differences Between Expected and Actual Experience (14)	Net Difference Between Projected and Actual Investment Earnings on Pension Plan Investments (15)	Changes of Assumptions (16)	Changes in Proportion and Differences Between Employer Contributions and Proportionate Share of Contributions (17)	Total Deferred Outflows of Resources (18)	Deferred Inflows of Resources: Differences Between Expected and Actual Experience (19)	Net Difference Between Projected and Actual Investment Earnings on Pension Plan Investments (20)	Changes of Assumptions (21)	Changes in Proportion and Differences Between Employer Contributions and Proportionate Share of Contributions (22)	Total Deferred Inflows of Resources (23)
Town of Andover	$0	$4,778,880	$10,425,560	$0	$15,204,440	$2,095,937	$0	$0	$219,119	$2,315,056
Water Department	0	216,217	471,696	467,505	1,155,418	94,829	0	0	0	94,829
Sewer Department	0	40,487	88,327	0	128,814	17,757	0	0	196,806	214,563
Housing Authority	0	50,180	109,472	13,549	173,201	22,008	0	0	0	22,008
School – Cafeteria Workers	0	108,746	237,240	0	345,986	47,694	0	0	4,592	52,686
School – All Other	0	1,311,489	2,861,133	0	4,172,622	575,197	0	0	60,137	635,334
Grand Totals:	**$0**	**$6,505,999**	**$14,193,428**	**$481,054**	**$21,180,481**	**$2,853,422**	**$0**	**$0**	**$481,054**	**$3,334,476**

	Deferred Inflows/(Outflows) Recognized In Future Pension Expense (Year Ended June 30):					
Employer Name	2017 (24)	2018 (25)	2019 (26)	2020 (27)	2021 (28)	Thereafter (29)
Town of Andover	$2,827,884	$2,827,884	$2,827,883	$2,783,634	$1,622,099	$0
Water Department	223,430	223,429	223,429	221,427	168,874	0
Sewer Department	-15,032	-15,031	-15,032	-15,406	-25,248	0
Housing Authority	32,864	32,864	32,864	32,399	20,202	0
School – Cafeteria Workers	64,349	64,349	64,350	63,342	36,910	0
School – All Other	776,068	776,068	776,067	763,924	445,161	0
Grand Totals:	**$3,909,563**	**$3,909,563**	**$3,909,561**	**$3,849,320**	**$2,267,998**	**$0**

EXHIBIT 7
Notes to Required Supplementary Information

Valuation date	Actuarial determined contributions for fiscal 2018 and 2019 are determined with the January 1, 2016 actuarial valuation.
Actuarial cost method	Entry Age Normal Cost Method
Amortization method	Appropriation increasing 10.00% per year
Remaining amortization period	As of July 1, 2016, 16 years
Asset valuation method	The difference between the expected return and the actual investment return on a market value basis is recognized over a five-year period. Asset value is adjusted, if necessary to be within 15% of the market value.
Actuarial assumptions:	
Investment rate of return	7.25% (previously, 7.75%)
Discount rate	7.25% (previously, 7.75%)
Inflation rate	3.50% (previously, 4.00%)
Projected salary increases	Varies by length of service with ultimate rates of 4.25% for Group 1, 4.50% for Group 2 and 4.75% for Group 4
Cost of living adjustments	3% of first $12,000
Plan membership:	
Retired participants and beneficiaries receiving benefits	432
Inactive participants entitled to a return of their employee contributions	98
Inactive participants with a vested right to a deferred or immediate benefit	20
Active participants	728
Total	1,278

Changes in Assumptions:

The following changes were effective January 1, 2014:

- The actuarial cost method was changed to better reflect the impact of the plan changes effective for employees hired on or after April 2, 2012.
- The assumed rates of salary increases were revised to more accurately reflect recent experience.
- The administrative expense assumption was increased from $190,000 for calendar year 2012 to $250,000 for calendar year 2014.
- The pre-retirement mortality assumption was changed from the RP-2000 Employee Mortality Table projected 12 years with Scale AA to the RP-2000 Employee Mortality Table projected generationally using Scale AA from 2010.
- The mortality assumption for non-disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table projected 12 years with Scale AA to the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA from 2010.
- The mortality assumption for disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table set forward two years to the RP-2000 Healthy Annuitant Mortality Table set forward two years projected generationally using Scale AA from 2010.
- The assumed percentage of deaths that are of the same cause as the accidental disability was decreased from 40% to 20% for Group 1 and 2 members and increased from 40% to 60% for Group 4 members.

The following changes are effective January 1, 2016:

- The investment return assumption was lowered from 7.75% to 7.25%.
- The mortality assumption for non-disabled participants was changed from the RP-2000 Employee and Healthy Annuitant Mortality Tables projected generationally from 2010 using Scale AA to the RP-2000 Employee and Healthy Annuitant Mortality Tables projected generationally from 2009 using Scale BB2D.
- The mortality assumption for disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table set forward two years projected generationally from 2010 using Scale AA to the RP-2000 Healthy Annuitant Mortality Table projected generationally from 2015 using Scale BB2D.
- The administrative expense assumption was increased from $250,000 for calendar year 2014 to $300,000 for calendar year 2016.

Changes in Plan Provisions:

The following changes were effective January 1, 2014:

- Members hired on or after April 2, 2012 are covered by the provisions of Chapter 32 as amended by of Chapter 176 of the Acts of 2011 and Chapter 139 of the Acts of 2012.
- As permitted by Section 29 of Chapter 176 of the Acts of 2011, the Board has increased the Section 12 monthly allowance from $250 to $500.

Appendix A
Glossary

Definitions of certain terms *as they are used in Statement 68;* the terms may have different meanings in other contexts.

Active employees:	Individuals employed at the end of the reporting or measurement period, as applicable.
Actual contributions:	Cash contributions recognized as additions to a pension plan's fiduciary net position.
Actuarial present value of projected benefit payments:	Projected benefit payments discounted to reflect the expected effects of the time value (present value) of money and the probabilities of payment.
Actuarial valuation:	The determination, as of a point in time (the actuarial valuation date), of the service cost, total pension liability, and related actuarial present value of projected benefit payments for pensions performed in conformity with Actuarial Standards of Practice unless otherwise specified by the GASB.
Actuarial valuation date:	The date as of which an actuarial valuation is performed.
Actuarially determined contribution:	A target or recommended contribution to a defined benefit pension plan for the reporting period, determined in conformity with Actuarial Standards of Practice based on the most recent measurement available when the contribution for the reporting period was adopted.
Ad hoc cost-of-living adjustments (ad hoc COLAs):	Cost-of-living adjustments that require a decision to grant by the authority responsible for making such decisions.
Ad hoc postemployment benefit changes:	Postemployment benefit changes that require a decision to grant by the authority responsible for making such decisions.
Agent employer:	An employer whose employees are provided with pensions through an agent multiple-employer defined benefit pension plan.

Agent multiple-employer defined benefit pension plan (agent pension plan): A multiple-employer defined benefit pension plan in which pension plan assets are pooled for investment purposes but separate accounts are maintained for each individual employer so that each employer's share of the pooled assets is legally available to pay the benefits of only its employees.

Allocated insurance contract: A contract with an insurance company under which related payments to the insurance company are currently used to purchase immediate or deferred annuities for individual employees. Also may be referred to as an annuity contract.

Automatic cost-of-living adjustments (automatic COLAs): Cost-of-living adjustments that occur without a requirement for a decision to grant by a responsible authority, including those for which the amounts are determined by reference to a specified experience factor (such as the earnings experience of the pension plan) or to another variable (such as an increase in the consumer price index).

Automatic postemployment benefit changes: Postemployment benefit changes that occur without a requirement for a decision to grant by a responsible authority, including those for which the amounts are determined by reference to a specified experience factor (such as the earnings experience of the pension plan) or to another variable (such as an increase in the consumer price index).

Closed period: A specific number of years that is counted from one date and declines to zero with the passage of time. For example, if the recognition period initially is five years on a closed basis, four years remain after the first year, three years after the second year, and so forth.

Collective deferred outflows of resources and deferred inflows of resources related to pensions: Deferred outflows of resources and deferred inflows of resources related to pensions arising from certain changes in the collective net pension liability.

Collective net pension liability: The net pension liability for benefits provided through (1) a cost-sharing pension plan or (2) a single-employer or agent pension plan in circumstances in which there is a special funding situation.

Collective pension expense:	Pension expense arising from certain changes in the collective net pension liability.
Contributions:	Additions to a pension plan's fiduciary net position for amounts from employers, nonemployer contributing entities (for example, state government contributions to a local government pension plan), or employees. Contributions can result from cash receipts by the pension plan or from recognition by the pension plan of a receivable from one of these sources.
Cost-of-living adjustments:	Postemployment benefit changes intended to adjust benefit payments for the effects of inflation.
Cost-sharing employer:	An employer whose employees are provided with pensions through a cost-sharing multiple-employer defined benefit pension plan.
Cost-sharing multiple-employer defined benefit pension plan (cost-sharing pension plan):	A multiple-employer defined benefit pension plan in which the pension obligations to the employees of more than one employer are pooled and pension plan assets can be used to pay the benefits of the employees of any employer that provides pensions through the pension plan.
Covered-employee payroll:	The payroll of employees that are provided with pensions through the pension plan.
Deferred retirement option program (DROP):	A program that permits an employee to elect a calculation of benefit payments based on service credits and salary, as applicable, as of the DROP entry date. The employee continues to provide service to the employer and is paid for that service by the employer after the DROP entry date; however, the pensions that would have been paid to the employee (if the employee had retired and not entered the DROP) are credited to an individual employee account within the defined benefit pension plan until the end of the DROP period.
Defined benefit pension plans:	Pension plans that are used to provide defined benefit pensions.

Defined benefit pensions: Pensions for which the income or other benefits that the employee will receive at or after separation from employment are defined by the benefit terms. The pensions may be stated as a specified dollar amount or as an amount that is calculated based on one or more factors such as age, years of service, and compensation. (A pension that does not meet the criteria of a defined contribution pension is classified as a defined benefit pension for purposes of Statement 68.)

Defined contribution pension plans: Pension plans that are used to provide defined contribution pensions.

Defined contribution pensions: Pensions having terms that (1) provide an individual account for each employee; (2) define the contributions that an employer is required to make (or the credits that it is required to provide) to an active employee's account for periods in which that employee renders service; and (3) provide that the pensions an employee will receive will depend only on the contributions (or credits) to the employee's account, actual earnings on investments of those contributions (or credits), and the effects of forfeitures of contributions (or credits) made for other employees, as well as pension plan administrative costs, that are allocated to the employee's account.

Discount rate: The single rate of return that, when applied to all projected benefit payments, results in an actuarial present value of projected benefit payments equal to the total of the following:

1. The actuarial present value of benefit payments projected to be made in future periods in which (a) the amount of the pension plan's fiduciary net position is projected (under the requirements of Statement 68) to be greater than the benefit payments that are projected to be made in that period and (b) pension plan assets up to that point are expected to be invested using a strategy to achieve the long-term expected rate of return, calculated using the long-term expected rate of return on pension plan investments.
2. The actuarial present value of projected benefit payments not included in (1), calculated using the municipal bond rate.

Entry age actuarial cost method:	A method under which the actuarial present value of the projected benefits of each individual included in an actuarial valuation is allocated on a level basis over the earnings or service of the individual between entry age and assumed exit age(s). The portion of this actuarial present value allocated to a valuation year is called the *normal cost.* The portion of this actuarial present value not provided for at a valuation date by the actuarial present value of future normal costs is called the *actuarial accrued liability.*
Inactive employees:	Terminated individuals that have accumulated benefits but are not yet receiving them, and retirees or their beneficiaries currently receiving benefits.
Measurement period:	The period between the prior and the current measurement dates.
Multiple-employer defined benefit pension plan:	A defined benefit pension plan that is used to provide pensions to the employees of more than one employer.
Net pension liability:	The liability of employers and nonemployer contributing entities to employees for benefits provided through a defined benefit pension plan.
Nonemployer contributing entities:	Entities that make contributions to a pension plan that is used to provide pensions to the employees of other entities. For purposes of Statement 68, employees are not considered nonemployer contributing entities.
Other postemployment benefits:	All postemployment benefits other than retirement income (such as death benefits, life insurance, disability, and long-term care) that are provided separately from a pension plan, as well as postemployment healthcare benefits, regardless of the manner in which they are provided. Other postemployment benefits do not include termination benefits.
Pension plans:	Arrangements through which pensions are determined, assets dedicated for pensions are accumulated and managed, and benefits are paid as they come due.
Pensions:	Retirement income and, if provided through a pension plan, postemployment benefits other than retirement income (such as death benefits, life insurance, and disability benefits). Pensions do not include postemployment healthcare benefits and termination benefits.

Plan members:	Individuals that are covered under the terms of a pension plan. Plan members generally include (1) employees in active service (active plan members) and (2) terminated employees who have accumulated benefits but are not yet receiving them and retirees or their beneficiaries currently receiving benefits (inactive plan members).
Postemployment:	The period after employment.
Postemployment benefit changes:	Adjustments to the pension of an inactive employee.
Postemployment healthcare benefits:	Medical, dental, vision, and other health-related benefits paid subsequent to the termination of employment.
Projected benefit payments:	All benefits estimated to be payable through the pension plan to current active and inactive employees as a result of their past service and their expected future service.
Public employee retirement system:	A special-purpose government that administers one or more pension plans; also may administer other types of employee benefit plans, including postemployment healthcare plans and deferred compensation plans.
Real rate of return:	The rate of return on an investment after adjustment to eliminate inflation.
Service costs:	The portions of the actuarial present value of projected benefit payments that are attributed to valuation years.
Single employer:	An employer whose employees are provided with pensions through a single-employer defined benefit pension plan.
Single-employer defined benefit pension plan (single-employer pension plan):	A defined benefit pension plan that is used to provide pensions to employees of only one employer.
Special funding situations:	Circumstances in which a nonemployer entity is legally responsible for making contributions directly to a pension plan that is used to provide pensions to the employees of another entity or entities and either of the following conditions exists: The amount of contributions for which the nonemployer entity legally is responsible is *not* dependent upon one or more events or circumstances unrelated to the pensions. The nonemployer entity is the only entity with a legal obligation to make contributions directly to a pension plan.

Termination benefits:	Inducements offered by employers to active employees to hasten the termination of services, or payments made in consequence of the early termination of services. Termination benefits include early-retirement incentives, severance benefits, and other termination-related benefits.
Total pension liability:	The portion of the actuarial present value of projected benefit payments that is attributed to past periods of employee service in conformity with the requirements of Statement.