Andover Contributory Retirement System

Actuarial Valuation and Review as of January 1, 2012

SEGAL

The Segal Company
116 Huntington Ave., 8th Floor Boston, MA 02116
T 617.424.7300 F 617.424.7390 www.segalco.com

July 27, 2012

Retirement Board
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, 2012. It summarizes the actuarial data used in the valuation, establishes the funding requirements for fiscal 2013 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 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.

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 for the Plan.

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

Sincerely,

THE SEGAL COMPANY

By: ______________________________

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

7640229v2/13556.001

SECTION 1

VALUATION SUMMARY

SECTION 2

VALUATION RESULTS

SECTION 3

SUPPLEMENTAL INFORMATION

SECTION 4

REPORTING INFORMATION

SEGAL

Purpose

This report has been prepared by The Segal Company to present a valuation of the Andover Contributory Retirement System as of January 1, 2012. The valuation was performed to determine whether the assets and contributions are sufficient to provide the prescribed benefits. The contribution requirements presented in this report are based on:

- The benefit provisions of M.G.L. Chapter 32;
- The characteristics of covered active participants, inactive participants, and retired participants and beneficiaries as of January 1, 2012;
- The assets of the Plan as of December 31, 2011;
- Economic assumptions regarding future salary increases and investment earnings; and
- Other actuarial assumptions, regarding employee terminations, retirement, death, etc.

Significant Issues in Valuation Year

The following key findings were the result of this actuarial valuation:

1. The actuarial valuation report as of January 1, 2012 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 2010 and 2011, the market value rates of return were 12.59% and -0.31%, 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 2010 and 2011 were 7.45% and -0.72% , respectively. The actuarial value of assets as of December 31, 2011 was $95.7 million, or 109.7% of the market value of assets of $87.3 million (as reported in the Annual Statement). As of December 31, 2009, the actuarial value of assets was 115.0% of the market value.
3. As indicated in Section 2, Subsection B of this report, the total unrecognized investment loss as of December 31, 2011 is $8,425,255. 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 Section 3, Exhibit F, 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 decreased from 8.00% to 7.75%.
   - The administrative expense assumption was increased from $125,000 for calendar 2010 to $190,000 for calendar 2012.
   - The pre-retirement mortality assumption was changed from the RP-2000 Employee Mortality Table to the RP-2000 Employee Mortality Table projected 12 years with Scale AA.
   - The mortality assumption for non-disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table to the RP-2000 Healthy Annuitant Mortality Table projected 12 years with Scale AA.

   Changing these assumptions resulted in a net increase in the unfunded actuarial accrued liability of $8,647,891 and a net increase in the employer normal cost of $340,929.

5. The following plan changes are included in this valuation:

   - As permitted by Section 27 of Chapter 131 of the Acts of 2010, the Board has increased the Section 101 annual allowance from $6,000 to $9,000.
   - As of June 30, 2012, annuity reimbursements, travel allowances, clothing allowances, tuition reimbursement and vacation sell-backs are no longer included in pensionable compensation.

6. The unfunded liability has increased from $75.2 million as of January 1, 2010 to $96.8 million as of January 1, 2012. The unfunded liability was expected to increase $5.3 million to $80.5 million. The additional increase of $16.3 million to $96.8 million was due to an investment loss on an actuarial basis of $9.0 million, partially offset by a miscellaneous experience gain of $1.3 million, plus $8.6 million due to the assumption changes noted earlier.

7. Last year, the Board approved a funding schedule that fully amortized the unfunded actuarial accrued liability as of June 30, 2040 with amortization payments that increase 4.0% per year. The annual increase in appropriation was limited to 8% per year through fiscal 2022. The funding schedule in Section 3, Exhibit F, also fully funds the System by June 30, 2040. The annual increase in the appropriation is limited to 8% per year through fiscal 2033. The fiscal 2013 appropriation is $5,563,000 and the fiscal 2014 appropriation is $6,008,040.

Summary of Key Valuation Results

	2012	2010
Contributions for fiscal year beginning July 1:		
Recommended for fiscal 2013 and fiscal 2011	$5,563,000	$4,769,310
Recommended for fiscal 2014 and fiscal 2012	6,008,040	5,151,000
Recommended for fiscal 2015 and fiscal 2013	6,488,683	5,563,000
Funding elements for plan year beginning January 1:		
Normal cost, including administrative expenses	$5,197,785	$4,485,825
Market value of assets	87,266,576	80,251,404
Actuarial value of assets	95,691,831	92,289,115
Actuarial accrued liability	192,533,656	167,447,259
Unfunded actuarial accrued liability	96,841,825	75,158,144
GASB 25/27 for fiscal year beginning July 1:		
Annual required contributions (ARC)	$5,563,000	$4,767,127
Actual contributions	--	4,767,127
Percentage of ARC contributed	--	100.00%
Funded ratio	49.70%	55.12%
Demographic data for plan year beginning January 1:		
Number of retired participants and beneficiaries	396	363
Number of inactive participants entitled to a return of their employee contributions	89	*
Number of inactive participants with a vested right to a deferred or immediate benefit	24	17
Number of active participants	701	707
Total salary	$32,806,789	$32,416,115
Average salary	46,800	45,850

** Not available.*

Note: 2010 results based on PERAC's January 1, 2010 valuation report.
Total salary shown for the January 1, 2012 valuation is 2011 earnings, annualized for new hires, and net of travel allowances, annuity reimbursements and vacation sell-backs.

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 four valuations can be seen in this chart.

CHART 1

Participant Population: 2003 – 2011

Year Ended December 31	Active Participants	Inactive Participants	Retired Participants and Beneficiaries
2003	720	99	334
2006	726	129	352
2009	707	*	363
2011	701	113	396

** 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 701 active participants with an average age of 48.7, average years of service of 12.1 years and average payroll of $46,800. The 707 active participants in the prior valuation had an average age of 48.4, average service of 12.0 years and average payroll of $45,850.

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

Inactive Participants

In this year's valuation, there were 24 participants with a vested right to a deferred or immediate vested benefit and 89 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, 2011

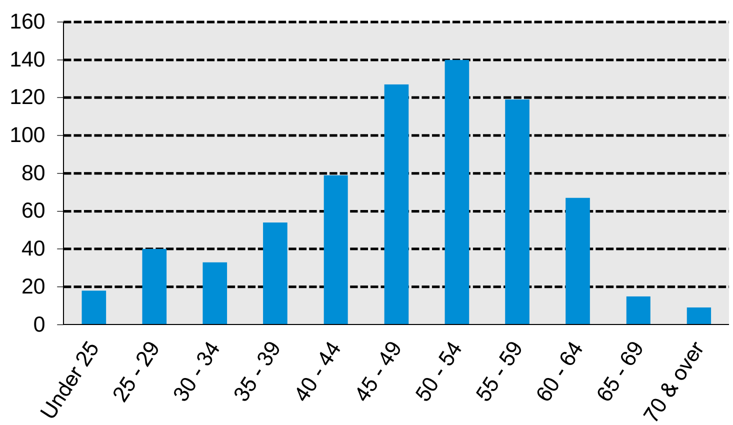
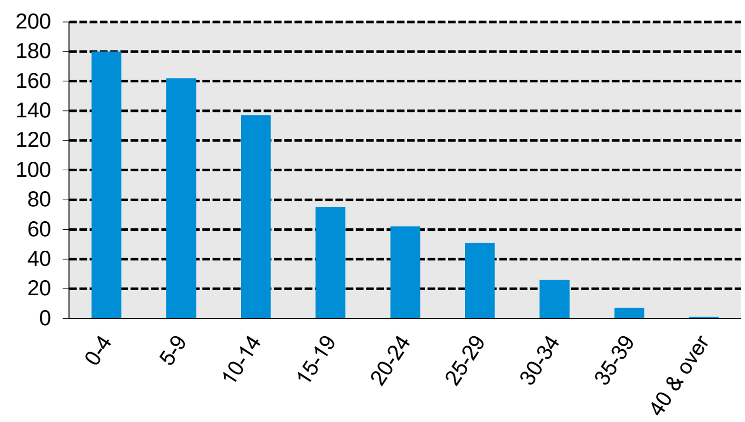


CHART 3

Distribution of Active Participants by Years of Service as of December 31, 2011



Retired Participants and Beneficiaries

As of December 31, 2011, 346 retired participants and 50 beneficiaries were receiving total monthly benefits of $826,171, excluding COLAs reimbursed by the Commonwealth. For comparison, in the previous valuation, there were 318 retired participants and 45 beneficiaries receiving monthly benefits of $682,353, excluding COLAs reimbursed by the Commonwealth.

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

CHART 4

Distribution of Retired Participants and Beneficiaries by Type and by Monthly Amount as of December 31, 2011

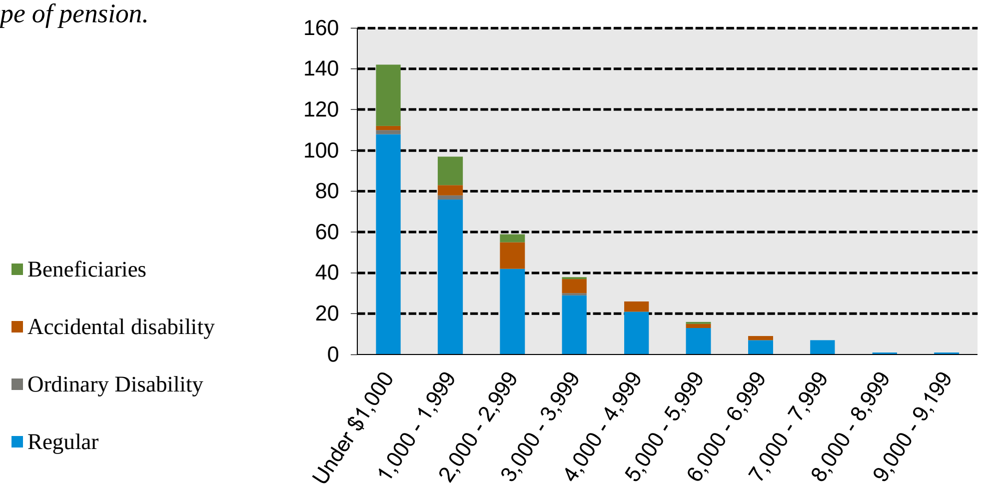
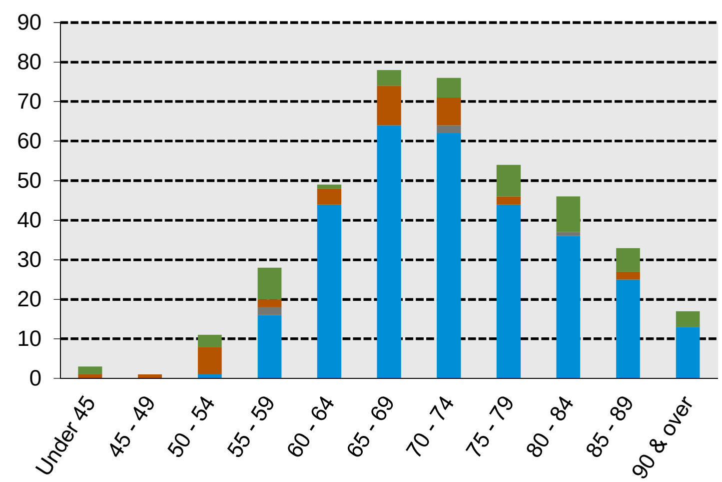


CHART 5

Distribution of Retired Participants and Beneficiaries by Type and by Age as of December 31, 2011



B. FINANCIAL INFORMATION

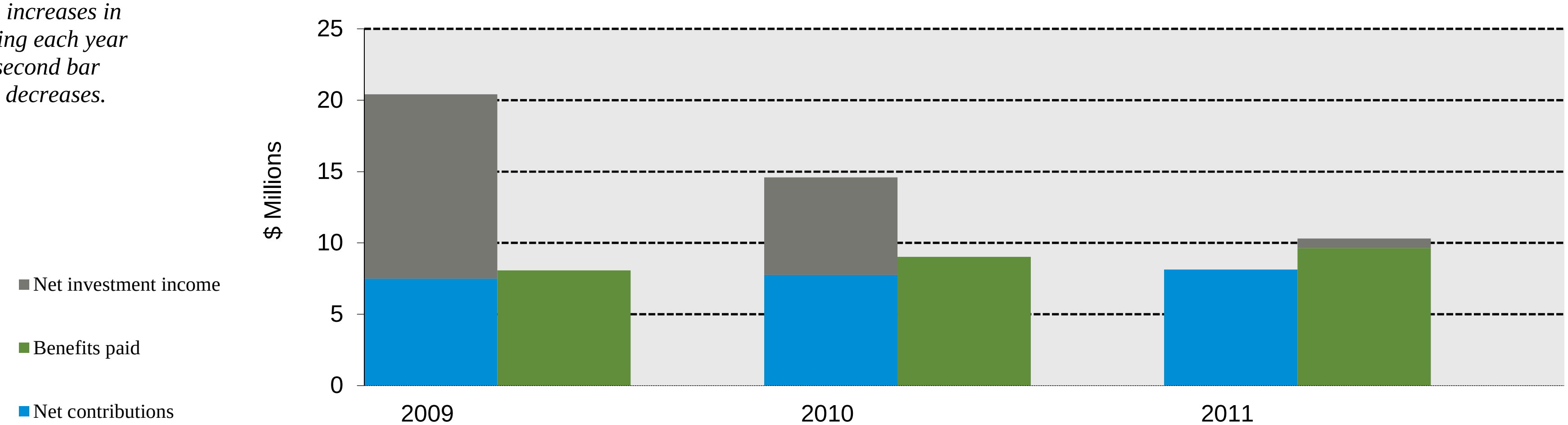
Retirement plan funding anticipates that, over the long term, both net contributions (less administrative expenses) and net investment earnings (less investment fees) will be needed to cover benefit payments.

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.

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

CHART 6

Comparison of Increases and Decreases in the Actuarial Value of Assets for Years Ended December 31, 2009 – 2011



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

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.

CHART 7

Determination of Actuarial Value of Assets

		Year Ended	
		December 31, 2011	**December 31, 2010**
1. Market value of assets, December 31, 2011		$87,266,576	$89,013,376
2. Calculation of unrecognized return*	Original Amount	Unrecognized Return	Unrecognized Return
(a) Year ended December 31, 2011	-$7,339,475	-$5,871,580	N/A
(b) Year ended December 31, 2010	3,651,831	2,191,099	$2,921,465
(c) Year ended December 31, 2009	6,147,699	2,459,080	3,688,619
(d) Year ended December 31, 2008	-36,019,266	-7,203,854	-14,407,707
(e) Year ended December 31, 2007	-5,242,736	N/A	-1,048,547
(f) Total unrecognized return		-8,425,255	-8,846,170
3. Preliminary actuarial value: (1) - (2f)		95,691,831	97,859,546
4. Adjustment to be within 15% corridor		0	0
5. Final actuarial value of assets as of December 31, 2011: (3) + (4)		95,691,831	$97,859,546
6. Actuarial value as a percentage of market value: (5) ÷ (1)		109.7%	109.9%
7. Amount deferred for future recognition: (1) - (5)		-8,425,255	-$8,846,170

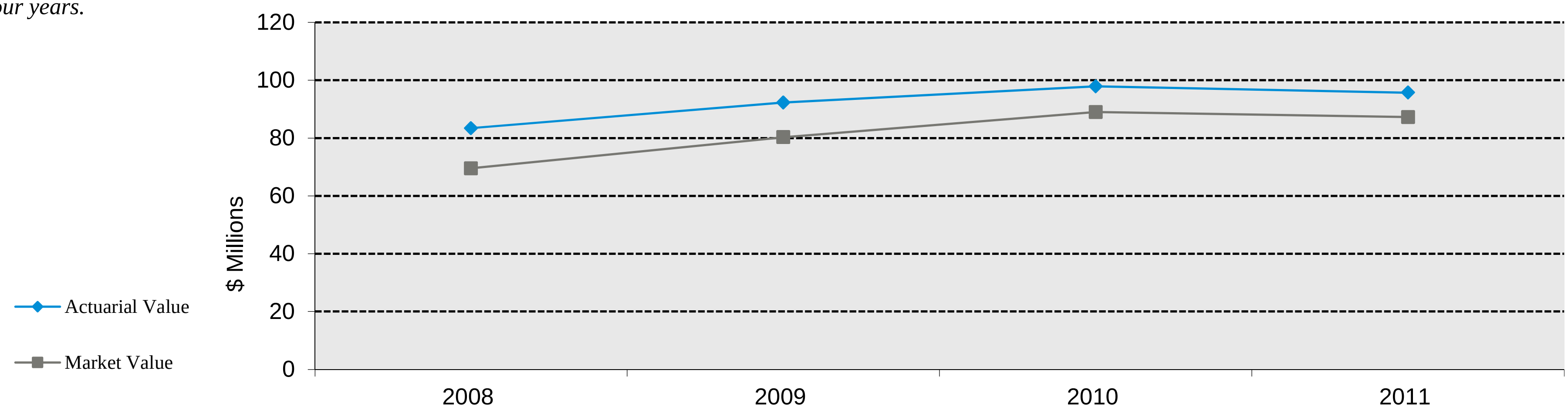
* *Unrecognized return is the difference between the total return and the expected return on a market value basis and is recognized over a five-year period.*

Both the actuarial value and market value of assets are representations of the Andover 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 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 four years.

CHART 8

Actuarial Value of Assets vs. Market Value of Assets as of December 31, 2008 – 2011



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 total experience loss over the two-year period ending December 31, 2011 is $7,736,608. 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, 2011

1.	Net loss from investments*	-$8,970,809
2.	Net loss from administrative expenses	-109,364
3.	Net gain from other experience	1,343,565
4.	Net experience loss: (1) + (2) + (3)	-$7,736,608

* *Details in Chart 10*

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 Andover Contributory Retirement System's investment policy. For valuation purposes, the assumed rate of return on the actuarial value of assets was 8.00% for 2011 and 2010. The actual rates of return on an actuarial basis for the 2011 and 2010 plan years were -0.72% and 7.45%, respectively.

Since the actual return for the last two years were less than the assumed return, the Andover Contributory Retirement System experienced an actuarial loss of $8,970,809 during the two-year period ending December 31, 2011 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, 2011	Year Ended December 31, 2010
1. Actual return	-$698,103	$6,830,019
2. Average value of assets	97,124,740	91,659,321
3. Actual rate of return: (1) ÷ (2)	-0.72%	7.45%
4. Assumed rate of return	8.00%	8.00%
5. Expected return: (2) x (4)	$7,769,980	$7,332,746
6. Actuarial gain/(loss): (1) – (5)	-$8,468,083	-$502,727

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 three years.

Based upon this experience and future expectations, we have decreased the assumed rate of return from 8.00% to 7.75%.

CHART 11

Investment Return – Actuarial Value vs. Market Value: 2009 - 2011

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
Total	$19,049,584		$21,053,189	

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

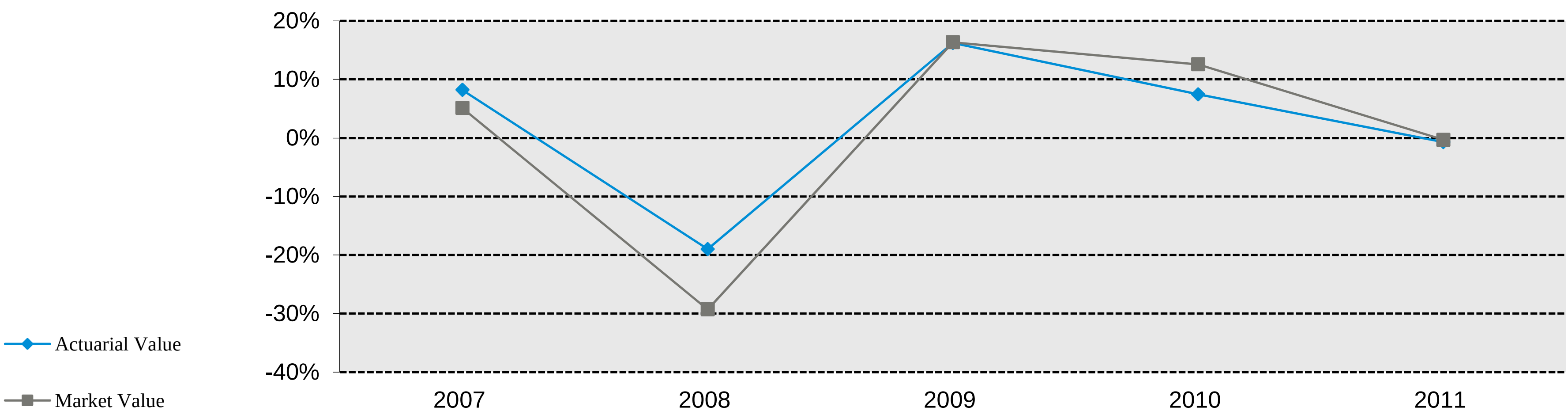
Administrative expenses for the years ended December 31, 2010 and 2011 were $187,872 and $169,016, respectively, compared to the assumption of $125,000 for 2010 and $130,625 for 2011. This resulted in a loss of $109,364 for the two-year period, including an adjustment for interest.

We have increased the administrative expense assumption to $190,000 for calendar 2012.

This chart illustrates how this leveling effect has actually worked over the years 2007 - 2011.

CHART 12

Market and Actuarial Rates of Return for Years Ended December 31, 2007 - 2011



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, 2011 amounted to $1,343,565, which is 0.7% of the actuarial accrued liability. This was primarily due to salary increases less than expected.

This valuation reflects the following changes in assumptions:

- The investment return assumption was decreased from 8.00% to 7.75%
- The administrative expense assumption was increased from $125,000 for calendar 2011 to $190,000 for calendar 2012.
- The pre-retirement mortality assumption was changed from the RP-2000 Employee Mortality Table to the RP-2000 Employee Mortality Table projected 12 years with Scale AA.
- The mortality assumption for non-disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table to the RP-2000 Healthy Annuitant Mortality Table projected 12 years with Scale AA.

Changing these assumptions resulted in a net increase in the unfunded actuarial accrued liability of $8,647,891 and a net increase in the employer normal cost of $340,929.

The following plan changes are included in this valuation:

- As permitted by Section 27 of Chapter 131 of the Acts of 2010, the Board has increased the Section 101annual allowance from $6,000 to $9,000.
- As of June 30, 2012, annuity reimbursements, travel allowances, clothing allowances, tuition reimbursement and vacation sell-backs are no longer included in pensionable compensation.

The Town has several 2010 unsettled contracts, which will be paid retroactively over the next year. We expect any loss from those retroactive salary increases to be offset by salary increases for 2012 and later years that are lower than the assumption for the entire System.

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.

The preliminary recommended contribution of $7,876,397 is based on a 28-year increasing amortization (4.0% per year) of the unfunded actuarial accrued liability before application of the 8% limit on the increase in the annual appropriation.

The fiscal 2013 appropriation is 8% larger than the fiscal 2012 appropriation, or $5,563,000. The fiscal 2014 appropriation is 8% larger than the fiscal 2013 appropriation, or $6,008,040. The funding schedule in Section 3, Exhibit F fully funds the Retirement System by June 30, 2040 with amortization payments increasing 4.0%. The annual increase in the appropriation is limited to 8% through fiscal 2033.

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

CHART 13

Recommended Contribution

	Year Beginning January 1		
	2012		2010
	Amount	% of Payroll	Amount
1. Total normal cost	$5,007,785	14.54%	$4,360,825
2. Administrative expenses	190,000	0.55%	125,000
3. Expected employee contributions	-3,215,162	-9.34%	-2,782,716
4. Employer normal cost: (1) + (2) + (3)	$1,982,623	5.76%	$1,703,109
5. Actuarial accrued liability	192,533,656		167,447,259
6. Actuarial value of assets	95,691,831		92,289,115
7. Unfunded actuarial accrued liability: (5) - (6)	$96,841,825		$75,158,144
8. Employer normal cost projected to July 1, 2012 and 2010, adjusted for timing*	2,103,812	5.98%	1,830,050
9. Projected unfunded actuarial accrued liability	100,524,426		78,164,460
10. Payment on projected unfunded actuarial accrued liability, adjusted for timing*	5,772,585	16.40%	4,439,489
11. Total recommended contribution: (8) + (10), adjusted for timing*	$7,876,397	22.37%	$6,269,549
12. Budgeted appropriation	5,563,000	15.80%	4,679,310
13. Projected payroll	$35,201,955		N/A

**Recommended contributions are assumed to be paid on January 1.*

E. INFORMATION REQUIRED BY THE GASB

Governmental Accounting Standards Board (GASB) reporting information provides standardized information for comparative purposes of governmental pension plans. This information allows a reader of the financial statements to compare the funding status of one governmental plan to another on relatively equal terms.

Critical information to the GASB is the historical comparison of the GASB required contribution to the actual contributions. This comparison demonstrates whether a plan is being funded within the range of the GASB reporting requirements. Chart14 below presents a graphical representation of this information for the Plan.

The other critical piece of information regarding the Plan's financial status is the funded ratio. This ratio compares the actuarial value of assets to the actuarial accrued liabilities of the Plan as calculated under GASB Standards. 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.

Although the GASB requires that the actuarial value of assets be used to determine the funded ratio, Chart15 shows the funded ratio calculated using both the actuarial value of assets (49.70%) and the market value of assets (45.33%).

The details regarding the calculations of these values and other GASB numbers may be found in Section 4, Exhibits II, III, and IV.

These graphs show key GASB factors.

CHART 14

Required Versus Actual Contributions

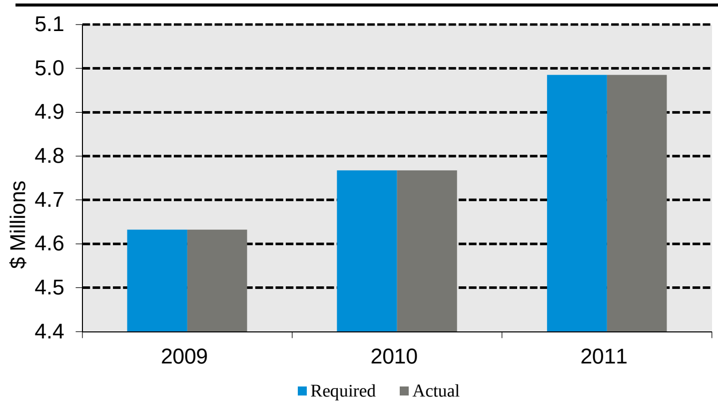


CHART 15

Funded Ratio

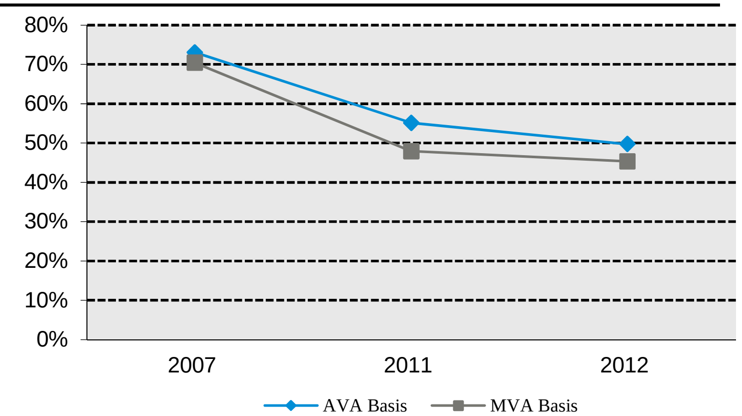


EXHIBIT A

Table of Plan Coverage

	Year Ended December 31		
Category	**2011**	**2009**	**Change From Prior Year**
Active participants in valuation:			
Number	701	707	-0.8%
Average age	48.7	48.4	N/A
Average service	12.1	12.0	N/A
Total payroll	$32,806,789	$32,416,115	1.2%
Average payroll	46,800	45,850	2.1%
Member contributions	32,188,766	30,482,305	5.6%
Inactive participants entitled to a return of their employee contributions	89	*	N/A
Inactive participants with a vested right to a deferred or immediate vested benefit	24	17	41.2%
Retired participants:			
Number in pay status	305	281	8.5%
Average age	72.7	72.8	N/A
Average monthly benefit	$2,152	$1,931	11.4%
Disabled participants:			
Number in pay status	41	37	8.5%
Average age	64.8	64.9	N/A
Average monthly benefit	$2,893	$2,580	12.1%
Beneficiaries in pay status:			
Number in pay status	50	45	11.1%
Average age	71.8	72.5	N/A
Average monthly benefit	$1,023	$981	4.3%

** Information not available.*

Note: Total payroll for calendar 2011 reflects annualized earnings for new hires and is net of travel allowances, annuity reimbursements and vacation sell-backs.

EXHIBIT B

Participants in Active Service as of December 31, 2011
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	18	18	- -	- -	- -	- -	- -	- -	- -	- -
	$27,006	$27,006	- -	- -	- -	- -	- -	- -	- -	- -
25 - 29	40	33	6	1	- -	- -	- -	- -	- -	- -
	$37,447	$35,256	$43,528	$73,281	- -	- -	- -	- -	- -	- -
30 - 34	33	10	17	6	- -	- -	- -	- -	- -	- -
	$51,605	$39,436	$54,592	$63,421	- -	- -	- -	- -	- -	- -
35 - 39	54	10	14	23	7	- -	- -	- -	- -	- -
	$54,468	$27,040	$42,167	$68,588	$71,855	- -	- -	- -	- -	- -
40 - 44	79	23	14	18	19	4	1	- -	- -	- -
	$52,330	$25,809	$43,922	$67,547	$74,330	$59,187	$60,692	- -	- -	- -
45 - 49	127	36	28	16	8	21	18	- -	- -	- -
	$46,274	$24,567	$32,625	$43,346	$57,412	$71,840	$78,741	- -	- -	- -
50 - 54	140	31	32	30	15	11	12	9	- -	- -
	$45,669	$30,327	$35,579	$41,254	$44,022	$80,103	$63,909	$85,442	- -	- -
55 - 59	119	16	33	27	13	9	11	8	1	1
	$44,251	$33,033	$29,521	$40,156	$42,817	$47,610	$82,912	$75,959	$116,884	$57,226
60 - 64	67	3	12	13	8	11	8	6	6	- -
	$51,952	$31,114	$39,520	$38,389	$44,999	$56,538	$61,156	$72,462	$84,701	- -
65 - 69	15	- -	6	2	3	3	- -	1	- -	- -
	$44,091	- -	$27,608	$58,863	$38,336	$64,426	- -	$69,710	- -	- -
70 & over	9	- -	- -	1	2	3	1	2	- -	- -
	$40,679	- -	- -	$28,961	$39,783	$39,357	$97,435	$21,039	- -	- -
Total	701	180	162	137	75	62	51	26	7	1
	$46,800	$29,747	$37,411	$50,425	$55,281	$64,327	$73,405	$73,970	$89,298	$57,226

EXHIBIT C

Summary Statement of Income and Expenses on an Actuarial Value Basis

	Year Ended December 31, 2011		Year Ended December 31, 2010	
Net assets at actuarial value at the beginning of the year:		$97,859,546		$92,289,115
Contribution income:				
Employer contributions	$4,984,957		$4,767,127	
Employee contributions	3,327,729		3,176,088	
Less administrative expenses	-169,016		-187,872	
Net contribution income		$8,143,670		$7,755,343
Net investment income		-698,103		6,830,019
Total income available for benefits		$7,445,567		$14,585,362
Less benefit payments:				
Pensions	-$9,535,894		-$8,791,201	
Net 3(8)(c) reimbursements	117,891		55,401	
Refunds, annuities, & Option B refunds	-195,278		-279,131	
Net benefit payments		-$9,613,281		-$9,014,931
Change in reserve for future benefits		-$2,167,714		$5,570,431
Net assets at actuarial value at the end of the year:		$95,691,831		$97,859,546

EXHIBIT D

Development of the Fund Through December 31, 2011

Year Ended December 31	Employer Contributions	Employee Contributions	Net Investment Return*	Administrative Expenses	Benefit Payments	Actuarial Value of Assets at End of Year
2009	$4,632,127	$3,041,540	$12,917,668	$172,240	$8,084,573	$92,289,115
2010	4,767,127	3,176,088	6,830,019	187,872	9,014,931	97,859,546
2011	4,984,957	3,327,729	-698,103	169,016	9,613,281	95,691,831

** Net of investment fees*

EXHIBIT E

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

	Year Ended			
	December 31, 2011		December 31, 2010	
1. Unfunded actuarial accrued liability at beginning of year		$77,785,068		$75,158,144
2. Normal cost at beginning of year		4,687,687		4,485,825
3. Total contributions		-8,312,686		-7,943,215
4. Interest				
(a) For whole year on (1) + (2)	$6,597,820		$6,371,518	
(b) For half year on (3)	-300,563		-287,204	
(c) Total interest		6,297,257		6,084,314
5. Expected unfunded actuarial accrued liability		$80,457,326		$77,785,068
6. Changes due to:				
(a) Experience loss	$7,736,608			
(b) Assumption changes	8,647,891			
(c) Total changes		16,384,499		
7. Unfunded actuarial accrued liability at end of year		$96,841,825		

EXHIBIT F

Funding Schedule - Fully Funded by 2040

(1) Fiscal Year Ended June 30	(2) Employer Normal Cost	(3) Amortization of Unfunded Actuarial Accrued Liability	(4) Total Plan Cost: (2) + (3)	(5) Unfunded Actuarial Accrued Liability at Beginning of Fiscal Year	(6) Total Plan Cost: % Increase
2013	$ 2,103,812	$3,459,188	$5,563,000	$100,524,426	- -
2014	2,198,484	3,809,556	6,008,040	112,534,636	8.00%
2015	2,297,416	4,191,267	6,488,683	117,101,648	8.00%
2016	2,400,800	4,606,978	7,007,778	122,950,034	8.00%
2017	2,508,836	5,059,564	7,568,400	129,527,086	8.00%
2018	2,621,734	5,552,138	8,173,872	134,510,756	8.00%
2019	2,739,712	6,088,070	8,827,782	139,378,233	8.00%
2020	2,862,999	6,671,006	9,534,005	144,075,904	8.00%
2021	2,991,834	7,304,891	10,296,725	148,542,237	8.00%
2022	3,126,467	7,993,996	11,120,463	152,706,851	8.00%
2023	3,267,158	8,742,942	12,010,100	156,489,500	8.00%
2024	3,414,180	9,556,728	12,970,908	159,798,941	8.00%
2025	3,567,818	10,440,763	14,008,581	162,531,693	8.00%
2026	3,728,370	11,400,897	15,129,267	164,570,662	8.00%
2027	3,896,147	12,443,461	16,339,608	165,783,631	8.00%
2028	4,071,474	13,575,303	17,646,777	166,021,589	8.00%
2029	4,254,690	14,803,829	19,058,519	165,116,891	8.00%
2030	4,446,151	16,137,050	20,583,201	162,881,244	8.00%
2031	4,646,228	17,583,629	22,229,857	159,103,470	8.00%
2032	4,855,308	19,152,938	24,008,246	153,547,064	8.00%
2033	5,073,797	20,855,109	25,928,906	145,947,491	8.00%
2034	5,302,118	22,308,257	27,610,375	135,610,256	6.48%
2035	5,540,713	23,200,587	28,741,300	122,963,478	4.10%
2036	5,790,045	24,128,611	29,918,656	108,410,312	4.10%
2037	6,050,597	25,093,755	31,144,352	91,765,963	4.10%
2038	6,322,874	26,097,505	32,420,379	72,829,830	4.10%
2039	6,607,403	27,141,405	33,748,808	51,384,228	4.10%
2040	6,904,736	28,227,062	35,131,798	27,192,995	4.10%

Notes: Recommended contributions are assumed to be paid on January 1.
Item (2) increases at 4.5% per year.
Item (3) increases at 4.0% per year beginning in fiscal 2035.
Assumes contribution of budgeted amount for fiscal year 2013.
Maximum increase in the appropriation from one year to the next is 8%.

EXHIBIT G

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) Turnover 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 equivalent of the accumulated normal costs allocated to the years before the valuation date.

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 50 beneficiaries in pay status)		396
2. Inactive participants with a right to a return of their contributions		89
3. Inactive participants with a vested right to a deferred or immediate benefit as of December 31, 2011		24
4. Participants active during the year ended December 31, 2011 with total accumulated contributions of $32,188,766 and projected payroll of $34,435,678		701
The actuarial factors as of the January 1, 2012 are as follows:		
1. Normal cost		$5,007,785
2. Administrative expenses		190,000
3. Expected employee contributions		-3,215,162
4. Employer normal cost: (1) + (2) + (3)		$1,982,623
5. Actuarial accrued liability		192,533,656
Retired participants and beneficiaries	$95,757,503	
Active participants	93,555,676	
Inactive participants	3,220,477	
6. Actuarial value of assets ($87,266,576 at market value as reported on the Annual Statement)		95,691,831
7. Unfunded actuarial accrued liability: (5) – (6)		96,841,825
The actuarial factors projected to July 1, 2012 are as follows:		
1. Employer normal cost projected to July 1, 2012, adjusted for timing		$2,103,812
2. Projected unfunded actuarial accrued liability		100,524,426
3. Payment on projected unfunded actuarial accrued liability (increasing 4.0% per year), adjusted for timing		5,772,585
4. Preliminary recommended contribution: (1) + (3), adjusted for timing		$7,876,397
5. Budgeted appropriation		$5,563,000
6. Projected payroll		$35,201,955

Note: Recommended contributions are assumed to be paid on January 1.

EXHIBIT II

Supplementary Information Required by the GASB – Schedule of Employer Contributions

Plan Year Ended December 31	Annual Required Contributions	Actual Contributions	Percentage Contributed
2009	$4,632,127	$4,632,127	100.0%
2010	4,767,127	4,767,127	100.0%
2011	4,984,957	4,984,957	100.0%

EXHIBIT III

Supplementary Information Required by the GASB – Schedule of Funding Progress

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded/ (Overfunded) AAL (UAAL) (b) - (a)	Funded Ratio (a) / (b)	Covered Payroll (c)	UAAL as a Percentage of Covered Payroll [(b) - (a)] / (c)
01/01/1998	$48,768,000	$71,164,000	$22,396,000	68.53%	$20,700,000	108.19%
01/01/1999	59,350,000	76,915,000	17,565,000	77.16%	21,631,000	81.20%
01/01/2001	69,752,000	86,928,000	17,176,000	80.24%	24,596,000	69.83%
01/01/2004	81,431,000	104,232,000	22,801,000	78.12%	27,551,000	82.76%
01/01/2007	99,952,824	136,899,310	36,946,486	73.01%	30,468,282	121.26%
01/01/2010	92,289,115	167,447,259	75,158,144	55.12%	32,416,115	231.85%
01/01/2012	95,691,831	192,533,656	96,841,825	49.70%	34,435,678	281.23%

** Information prior to 2010 taken from former actuaries' reports.*

EXHIBIT IV

Supplementary Information Required by the GASB

Valuation date	January 1, 2012
Actuarial cost method	Entry Age Normal Cost Method
Amortization method	The appropriation increases by 8% per year through fiscal 2033 and 6.48% from fiscal 2033 through 2034. Thereafter, amortization payments increase at 4%.
Remaining amortization period	28 years as of July 1, 2012
Asset valuation method	The market value of assets less unrecognized returns in each of the last five years. Unrecognized return is equal to the difference between the expected return and the actuarial investment return on a market value and is recognized over a five-year period. The actuarial value of assets is adjusted, if necessary, to be within 15% of the market value.
Actuarial assumptions:	
Investment rate of return	7.75% (Previously 8.00%)
Projected salary increases	Based on years of service, ranging from 7.00% decreasing to 4.75% after 9 years of service for Group 1, ranging from 7.00% decreasing to 5.00% after 7 years of service for Group 2 employees, and ranging from 8.00% decreasing to 5.25% after 8 years for Group 4 employees
Cost of living adjustments	3.00% of first $12,000 of retirement income
Plan membership:	
Retired participants and beneficiaries receiving benefits	396
Inactive participants entitled to a return of their employee contributions	89
Inactive participants with a vested right to a deferred or immediate benefit	24
Active participants	701
Total	1,210

EXHIBIT V

Actuarial Assumptions and Actuarial Cost Method

Mortality Rates:

Healthy:

Pre-Retirement: RP-2000 Employees Mortality Table projected 12 years with Scale AA (Previously, RP-2000 Employees Mortality)

Post-Retirement: RP-2000 Healthy Annuitant Mortality Table projected 12 years with Scale AA (Previously, RP-2000 Healthy Annuitant Mortality Table)

Disabled: RP-2000 Healthy Annuitant Mortality Table set forward 2 years

The above assumptions were determined to contain provisions appropriate to reasonably reflect future mortality improvement, based on a review of mortality experience of the plan.

Termination Rates before Retirement:

Groups 1 and 2 - Rate (%)

	Mortality		Disability
Age	**Male**	**Female**	
20	0.03	0.02	0.01
25	0.03	0.02	0.02
30	0.04	0.02	0.03
35	0.07	0.04	0.05
40	0.10	0.06	0.10
45	0.13	0.09	0.15
50	0.17	0.14	0.19
55	0.24	0.23	0.24
60	0.40	0.37	0.28

Notes: *55% of the disability rates shown represent accidental disability.*
40% 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		Disability
Age	Male	Female	
20	0.03	0.02	0.10
25	0.03	0.02	0.20
30	0.04	0.02	0.30
35	0.07	0.04	0.30
40	0.10	0.06	0.30
45	0.13	0.09	1.00
50	0.17	0.14	1.25
55	0.24	0.23	1.20
60	0.40	0.37	0.85

Notes: *90% of the disability rates shown represent accidental disability.*
40% 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		

Withdrawal Rates continued:

Years of Service	Groups 1 and 2
12	4.6
13	4.1
14	3.7
15	3.3
16 – 20	2.0
21 – 29	1.0
30+	0.0

Retirement Rates:

	Rate (%) Groups 1 and 2		
Age	Male	Female	Group 4
45 - 49	- -	- -	1.0%
50	1.0	1.5	2.0
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	2.5	6.5	10.0
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	25.0	20.0	100.0

	Rate (%) Groups 1 and 2		
Age	**Male**	**Female**	**Group 4**
67	25.0	20.0	100.0
68	30.0	25.0	100.0
69	30.0	20.0	100.0
70	100.0	100.0	100.0

Retirement Age for Inactive Vested Participants: Age 55 for Groups 1 and 2 and 45 for Group 4

Unknown Data for Participants: Same as those exhibited by participants with similar known characteristics.

Age of Spouse: Females are three years younger than their spouses.

Percent Married: 80%

Benefit Election: All participants are assumed to elect Option A.

Net Investment Return: 7.75% (Previously 8.00%)

Interest on Employee Contributions: 3.50%

Salary Increases:

Years of Service	Group 1	Group 2	Group 4
0	7.00%	7.00%	8.00%
1	6.50%	6.50%	7.50%
2	6.50%	6.50%	7.00%
3	6.00%	6.00%	6.50%
4	6.00%	6.00%	6.00%
5	5.50%	5.50%	6.00%
6	5.50%	5.50%	5.50%
7	5.00%	5.00%	5.50%
8	5.00%	5.00%	5.25%
9	4.75%	5.00%	5.25%
10+	4.75%	5.00%	5.25%

Administrative Expenses:	$190,000 for calendar 2012 increasing 4.5% per year (previously, $125,000 for calendar 2010).
Total Service	Total creditable service reported in the data.
2011 Salary:	2011 salaries are equal to salaries provided in the data, annualized for new hires, except for participants missing salary, whose salaries were calculated from annualized contributions divided by the contribution rates provided. Salaries were adjusted for travel allowances, annuity reimbursements and vacation sell-backs, which are no longer considered regular compensation after June 30, 2012.
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 (without phase-in). Unrecognized return is equal to the difference between the actual market value return and the expected market value return and is recognized over a five-year period, further adjusted, if necessary, to be within 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.
Changes in Assumptions:	The following actuarial assumptions were changed with this valuation: ➤ The investment return assumption was decreased from 8.00% to 7.75%. ➤ The administrative expense assumption was increased from $125,000 for calendar 2010 to $190,000 for calendar 2012. ➤ The pre-retirement mortality assumption was changed from the RP-2000 Employee Mortality Table to the RP-2000 Employee Mortality Table projected 12 years with Scale AA. ➤ The mortality assumption for non-disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table to the RP-2000 Healthy Annuitant Mortality Table projected 12 years with Scale AA.

EXHIBIT VI

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.)

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.

The maximum annual amount of the retirement allowance is 80 percent of the member's final three-year 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 leave with less than five years of credited service receive no interest on their contributions, and employees who leave with five but less than ten years receive one-half the rate of regular interest otherwise payable.

Retirement Benefits (Superannuation)

Members of Group 1, 2 or 4 may retire upon the attainment of age 55. For retirement at ages below 55, twenty years of creditable service is required.

Members 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).

Ordinary Disability Benefits

A member who is unable to perform his/her job due to a non-occupational disability will receive a retirement allowance if he/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, 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/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/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 $250 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 (previously, $6,000) per year in 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	The following plan changes are included in this valuation: ➤ As permitted by Section 27 of Chapter 131 of the Acts of 2010, the Board has increased the Section 101annual allowance from $6,000 to $9,000. ➤ As of June 30, 2012, annuity reimbursements, travel allowances, clothing allowances, tuition reimbursement and vacation sell-backs are no longer included in pensionable compensation.