January 1, 2016

Actuarial Valuation Report

Quincy Retirement System

Lawrence B. Stone

stoneconsulting, inc
5 West Mill Street, Suite 4
Medfield, Massachusetts 02052
T: 508.359.9600 F: 508.359.0190
Lstone@stoneconsult.com

stoneconsulting,inc

March 7, 2017

Quincy Retirement Board
1250 Hancock Street
Suite 506S
Quincy, MA 02169

Dear Quincy Retirement Board:

Stone Consulting, Inc. has performed a January 1, 2016 actuarial valuation of the Quincy Retirement System. This valuation and report was prepared using generally accepted actuarial principles and practices and meets the parameters set by the Governmental Accounting Standards Board. To the best of our knowledge, this report is complete and accurate, and the assumptions used represent our best estimate of anticipated experience of the system except where noted in the text.

As part of performing the valuation, Stone Consulting, Inc. was furnished member data by the Quincy Retirement System's administrative staff. Although examined for general reasonableness, the data was not audited by the actuary. In addition, the administrative staff furnished financial statements that were not audited by the actuary or by the plan's auditors. However, the plan auditor (O'Connor and Drew, P.C.) has revised the amount of assets and we have used the revised amount in this valuation report.

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

We anticipate over time the contribution level to increase as a percentage of payroll. The contribution rate is determined by adding the normal cost plus an amortization of the unfunded actuarial accrued liability. The normal cost is expected to remain at a level percentage of payroll. The length of the funding schedule contained in this actuarial valuation report is 19 years (fully funded by 2036). The total appropriation is set to increase by 8.75% in the first two years, followed by two years of 7.50% increases, and 5.40% increases thereafter, with the exception of the final year, when it decreases by 31.95%.

The contribution amount for Fiscal Year 2018 is $28,360,805 which is $873,643 greater than the anticipated contribution amount from the prior funding schedule. PERAC and GASB guidelines indicate that actuarial valuations should be conducted at least biennially. The Quincy Retirement Board conducted their previous actuarial valuation effective January 1, 2014.

5 West Mill Street, Suite 4 • Medfield, Massachusetts 02052 • T: 508.359.9600 • Lstone@stoneconsult.com

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions, changes in economic or demographic assumptions, increases or decreases expected as part of natural operation of the methodology used for these measurements such as additional contribution requirements based on the plan's funded status, and changes in plan provisions or applicable law. As part of the valuation, we have not performed an analysis of the potential range of future measurements.

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

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

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

Lawrence B. Stone

Lawrence B. Stone
Member, American Academy of Actuaries

TABLE OF CONTENTS

Introduction

This report presents the results of the actuarial valuation of the Quincy Retirement System. The valuation was performed at the request of the Retirement Board as of January 1, 2016 for the purpose of determining the contribution requirements for Fiscal Year 2018 and beyond. The contribution requirements are based on:

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

Valuation Summary

	January 1, 2016 Valuation	January 1, 2014 Valuation	Change
Contribution Fiscal 2018	$28,360,805	$27,487,162	$873,643 increase
Funding Schedule Length (as of Fiscal 2018)	19 years	19 years	Same
Contribution Increase	Varies	5.40%	N/A
Funding Ratio	47%	47%	0%
Interest Rate Assumption	7.75%	8.00%	-0.25%
Salary Increase Rate Assumption	Select and 3.75% Ultimate Rate	Different Select and 3.75% Ultimate	See below

- The salary increase assumption is based on a select and ultimate table. As in the prior valuation, an ultimate rate of 3.75% was used. The steps used in the current valuation are as follows:

Year	1	2	3	10	28	29
Group 1 & 2	3.0%	3.0%	3.0%	4.0%	-	-
Fire	19.1%	16.03%	-	-	5.0%	5.0%
Police	21.0%	4.73%	-	-	5.0%	5.0%

The prior valuation used the following steps:

Year	1	2	3
Group 1 & 2	7.75%	7.75%	7.75%
Fire	18.75%	15.75%	4.0%
Police	20.74%	4.48%	4.0%

The effect of the change increased the liability by $3.6 million.

January 1, 2016 Actuarial Valuation Results

	January 1, 2016	January 1, 2014	Percentage Change
Funding			
Contribution for Fiscal 2018	$28,360,805		3.2%
Contribution for Fiscal 2018 based on current schedule		$27,487,162	
Members			
Actives			
a. Number	1,416	1,356	4.4%
b. Annual Compensation	$88,087,250	$80,332,777	9.7%
c. Average Annual Compensation	$62,209	$59,242	5.0%
d. Average Attained Age	49.6	49.7	-0.2%
e. Average Past Service	13.0	13.4	-3.0%
Retired, Disabled and Beneficiaries			
a. Number	1,520	1,567	-3.0%
b. Total Benefits*	$43,144,867	$41,896,035	3.0%
c. Average Benefits*	$28,385	$26,736	6.2%
d. Average Age	73.9	73.7	0.2%
Inactives			
a. Number	206	180	14.4%
Normal Cost			
a. Total Normal Cost as of January 1, 2016	$12,174,786	$10,424,753	16.8%
b. Less Expected Members' Contributions	8,166,538	7,347,049	11.2%
c. Normal Cost to be funded by the Municipality	$4,008,248	$3,077,704	30.2%
d. Adjustment to July 1, 2017	242,884	186,497	30.2%
e. Administrative Expense Assumption	509,093	518,154	-1.7%
f. Normal Cost Adjusted to July 1, 2017	$4,760,225	$3,782,355	25.9%
Actuarial Accrued Liability as of January 1, 2016			
a. Active Members	$271,405,304	$238,189,691	13.9%
b. Inactive Members	1,107,885	1,161,483	-4.6%
c. Retired Members and Beneficiaries	396,458,087	391,379,587	1.3%
d. Total	$674,955,608	$633,797,711	6.5%
Unfunded Actuarial Accrued Liability			
a. Actuarial Accrued Liability as of January 1, 2016	$674,955,608	$633,797,711	6.5%
b. Less Actuarial Value of Assets as of January 1, 2016	315,824,962	296,239,378	6.6%
c. Unfunded Actuarial Accrued Liability as of January 1, 2016	$359,130,645	$337,558,333	6.4%
d. Adjustment to July 1, 2017	21,674,274	21,445,373	
e. Unfunded Actuarial Accrued Liability as of July 1, 2017	$380,804,919	$359,003,706	

*Excluding State reimbursed COLA

Data and History of Active Participants

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

Valuation Year	Number	Average Age	Average Past Service	Average Ann'l Compensation
2016	1,416	49.6	13.0	$62,209
2014	1,356	49.7	13.4	$59,242
2012	1,324	49.7	13.6	$57,122
2010	1,419	49.1	12.5	$54,185
2007	1,426	47.4	11.3	$46,781
2005	1,339	47.0	11.4	$44,431
2003	1,384	46.9	11.8	$42,594
2001	1,459	47.8	12.8	$38,948

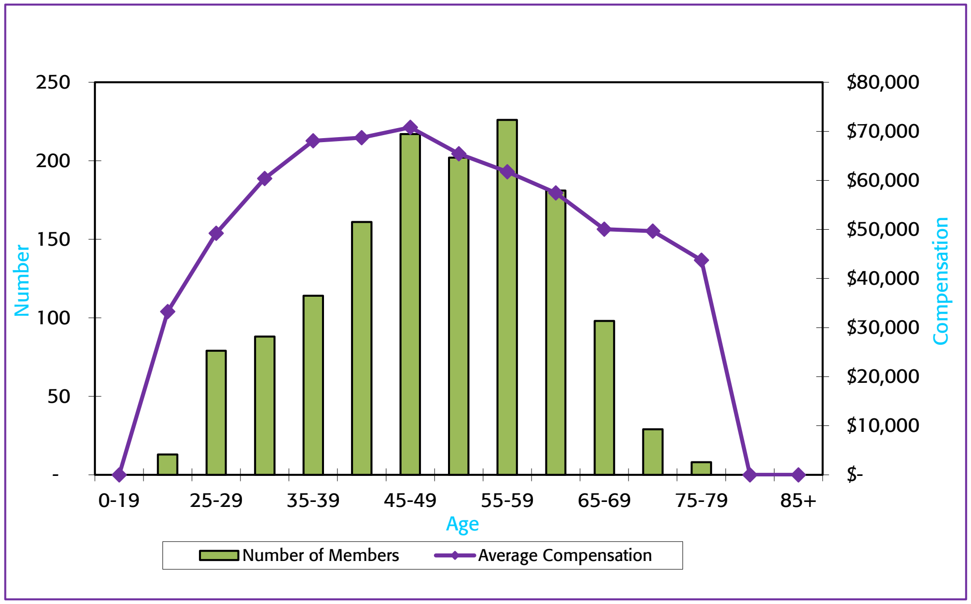
- Employee age has increased by 1.8 years and service has increased by 0.2 years over the course of the past fifteen years. This is consistent with the trend in the Commonwealth towards an aging of the employee population. Average annual compensation has grown by 59.7% (3.2% annually) over the same time period.

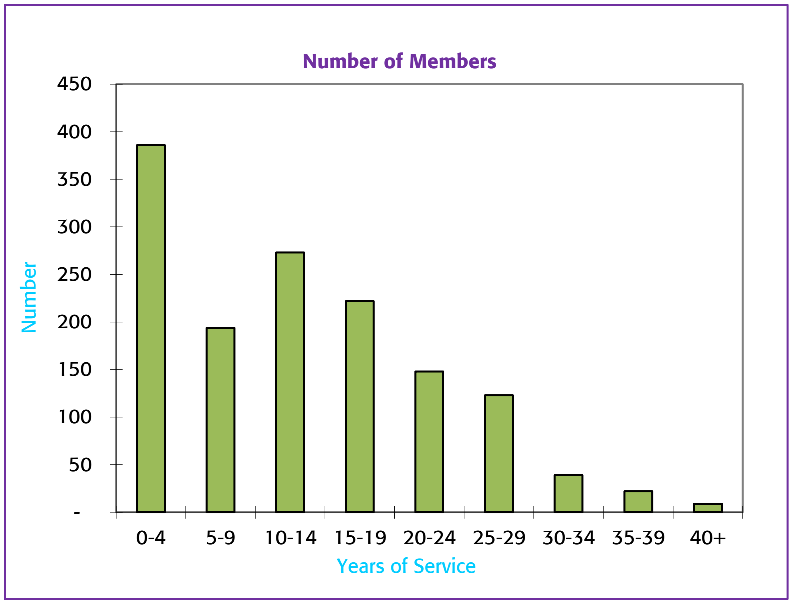
The charts on the following pages summarize demographic information regarding active and retiree members.

Distribution of Plan Members as of January 1, 2016

ACTIVE MEMBERS

AGE	0-4 Years	5-9 Years	10-14 Years	15-19 Years	20-24 Years	25-29 Years	30-34 Years	35-39 Years	40 + Years	Total	Total Compensation	Average Compensation
0-19	-	-	-	-	-	-	-	-	-	-	$ -	$ -
20-24	13	-	-	-	-	-	-	-	-	13	$ 432,644	$ 33,280
25-29	71	7	1	-	-	-	-	-	-	79	$ 3,888,044	$ 49,216
30-34	56	22	10	-	-	-	-	-	-	88	$ 5,312,108	$ 60,365
35-39	40	23	42	8	1	-	-	-	-	114	$ 7,761,614	$ 68,084
40-44	40	25	45	43	8	-	-	-	-	161	$ 11,064,795	$ 68,725
45-49	47	28	40	54	35	13	-	-	-	217	$ 15,364,788	$ 70,805
50-54	45	23	30	25	36	39	4	-	-	202	$ 13,214,980	$ 65,421
55-59	39	28	43	34	27	35	15	5	-	226	$ 13,952,175	$ 61,735
60-64	19	29	39	36	18	15	10	10	5	181	$ 10,398,694	$ 57,451
65-69	14	5	17	20	14	13	7	4	4	98	$ 4,907,564	$ 50,077
70-74	2	3	6	1	6	6	3	2	-	29	$ 1,440,012	$ 49,656
75-79	-	1	-	1	3	2	-	1	-	8	$ 349,831	$ 43,729
80-84	-	-	-	-	-	-	-	-	-	-	$ -	$ -
85+	-	-	-	-	-	-	-	-	-	-	$ -	$ -
TOTAL	**386**	**194**	**273**	**222**	**148**	**123**	**39**	**22**	**9**	**1,416**	**$ 88,087,250**	**$ 62,209**





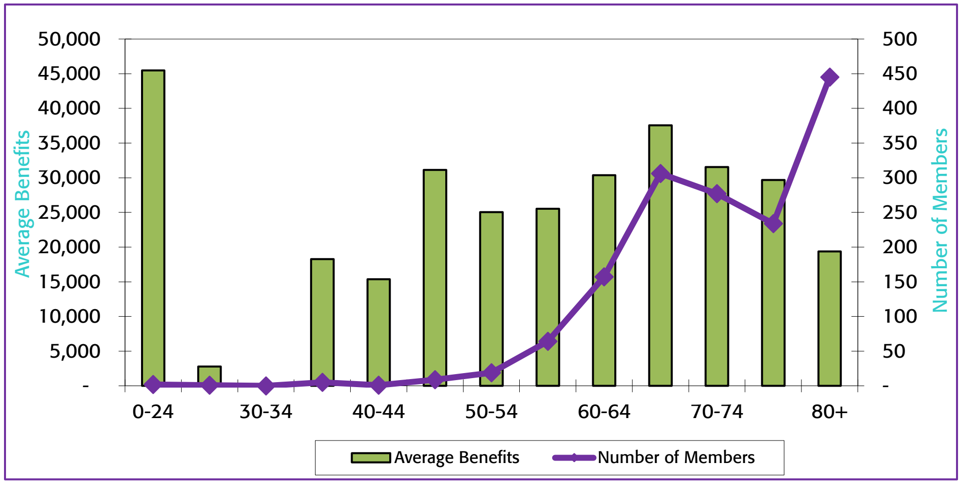
Distribution of Plan Members as of January 1, 2016

RETIRED MEMBERS

Retired Members and Beneficiaries			
Age	Number	Average Benefit	Total Benefit
0-24	2	45,486	90,972
25-29	1	2,772	2,772
30-34	-	-	-
35-39	3	7,024	21,073
40-44	1	15,357	15,357
45-49	2	11,256	22,512
50-54	10	17,156	171,560
55-59	54	22,888	1,235,929
60-64	132	26,797	3,537,165
65-69	278	36,637	10,185,173
70-74	248	30,825	7,644,562
75-79	204	28,499	5,813,850
80+	421	18,930	7,969,688
TOTAL	1,356	$ 27,073	$ 36,710,613

Disabled Members			
Age	Number	Average Benefit	Total Benefit
0-24	-	-	-
25-29	-	-	-
30-34	-	-	-
35-39	2	35,145	70,289
40-44	-	-	-
45-49	7	36,813	257,694
50-54	9	33,820	304,382
55-59	10	39,748	397,479
60-64	25	49,208	1,230,189
65-69	28	46,523	1,302,644
70-74	29	37,720	1,093,890
75-79	30	37,742	1,132,269
80+	24	26,892	645,419
TOTAL	164	$ 39,233	$ 6,434,254

Total			
Age	Number	Average Benefit	Total Benefit
0-24	2	45,486	90,972
25-29	1	2,772	2,772
30-34	-	-	-
35-39	5	18,273	91,363
40-44	1	15,357	15,357
45-49	9	31,134	280,206
50-54	19	25,050	475,942
55-59	64	25,522	1,633,408
60-64	157	30,365	4,767,354
65-69	306	37,542	11,487,817
70-74	277	31,547	8,738,452
75-79	234	29,684	6,946,119
80+	445	19,360	8,615,106
TOTAL	1,520	$ 28,385	$ 43,144,867



Benefits shown are net of State reimbursed COLA.

stoneconsulting,inc

Valuation Methodology

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

NORMAL COST

	January 1, 2016	% of Payroll*
Gross Normal Cost (GNC)	$ 12,174,786	13.8%
Employees Contribution	8,166,538	9.3%
Net Normal Cost (NNC)	4,008,248	4.6%
Adjusted to Beginning of Fiscal Year 2018	242,884	
Administrative Expense	509,093	0.6%
Adjusted Net Normal Cost With Admin. Expense	$ 4,760,225	

*Payroll paid in 2015 for employees as of January 1, 2016 is $88,087,250. Payroll for new hires in 2015 was annualized.

- The gross normal cost (GNC) is the "price" of benefits accruing in the current year if the assumptions underlying the normal cost were realized.
- An individual normal cost represents that part of the cost of a member's future benefits that are assigned to the current year as if the costs are to remain level as a percentage of the member's pay. Benefits payable under all circumstances (i.e., retirement, death, disability, and withdrawals) are included in this calculation.
- Anticipated employee contributions to be made during the year are subtracted from the GNC to determine employer normal cost, or net normal cost (NNC).
- Administrative expenses added to the NNC. The administrative expense does not include investment manager and custodial fees. These fees are considered part of the interest rate assumption that is net of fees.

Actuarial Accrued Liability and Funded Status

				January 1, 2016	Percentage Change
Active Actuarial Accrued Liability			$	271,405,304	13.9%
Superannuation	$	247,335,258			
Death	$	5,747,330			
Disability	$	16,215,385			
Withdrawal	$	2,107,331			
Retiree, Inactive, Survivor and Beneficiary Actuarial Accrued Liability			$	397,565,973	1.3%
Retirees and Beneficiaries	$	330,506,254			
Disabled	$	65,111,539			
Inactive	$	1,107,885			
Total Actuarial Accrued Liability (AAL)			$	674,955,608	6.5%
Actuarial Value of Assets (AVA)			$	315,824,962	6.6%
Unfunded Actuarial Accrued Liability			$	359,130,645	6.4%
Funded Ratio (AVA / AAL)					
2016 (7.75% interest rate):		47%			
2014 (8.00% interest rate):		47%			

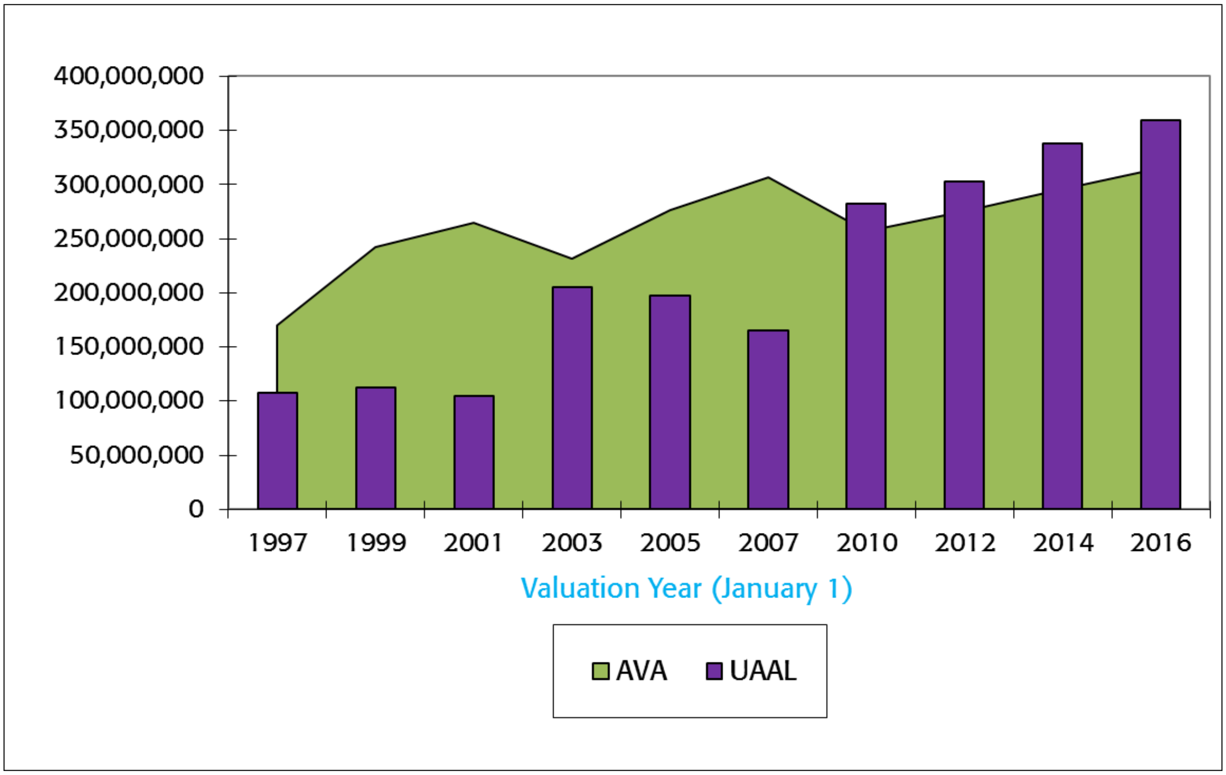
- Actuarial Accrued Liability (AAL) is the "price" of benefits attributable to benefits earned in past years, or in other words, represents today's value of all benefits earned by active and inactive members.

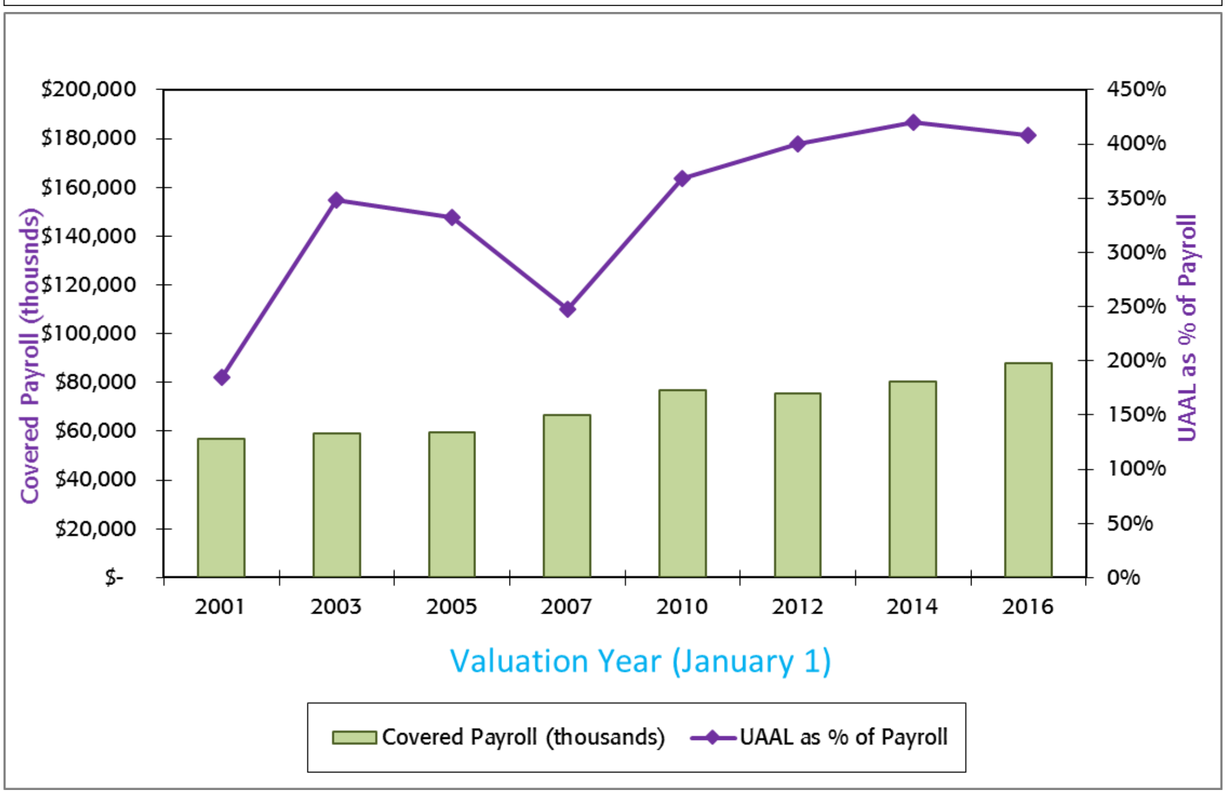
The total AAL is $674,955,608. This along with an actuarial value of assets of $315,824,962 produces a funded status of 47%. This compares to a funded status of 47% for the 2014 valuation.

The UAAL and funded ratio are measures of the plan's funded status. These measures reflect the plan's position as of January 1, 2016. We believe these measures, by themselves, are not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations or assessing the need for or the amount of future contributions. However, we believe these measures, in conjunction with the plan's funding schedule, are appropriate for assessing the amount of future contributions.

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

Charts of Selected Actuarial and Demographic Statistics





Development of Funding Schedule

Net Employer Normal Cost for Fiscal 2018 (including admin. expenses)	4,760,225
Net 3(8)(c) Payments	177,107
Amortization	23,423,473
Total Appropriation required for Fiscal 2018	28,360,805

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

- The contribution amount for Fiscal 2018 is $28,360,805. The funding schedule is presented on page 11. The schedule's length is nineteen (19) years (for the fresh start base) which is equal to the remainder of the 19 year schedule from the January 1, 2014 valuation. The maximum funding schedule length allowed by Section 22F of Chapter 32 of the Massachusetts General Laws is twenty-three years to Fiscal 2040.

- The contribution in the first year is the result of an increase of 8.75% compared to the prior year's contribution. This is followed by another 8.75% increase, two years of 7.50% increases, and 5.40% contributions thereafter. The contribution in the final year (Fiscal 2036) decreases by 31.95%. The remainder of each year's contribution after net 3(8)(c) payments and the Normal Cost is used to reduce the unfunded liability.

FUNDING SCHEDULE

Fiscal Year	Net Normal Cost with Expenses	Unfunded Liability*	Funding Amortization of UAAL	Net 3(8)(c) Payments	Schedule Contribution**	% Change
2018	4,760,225	380,804,919	23,423,473	177,107	28,360,805	8.75%
2019	4,950,634	385,078,509	25,714,634	177,107	30,842,375	8.75%
2020	5,148,659	401,841,482	27,829,787	177,107	33,155,554	7.50%
2021	5,354,606	402,997,602	30,110,507	177,107	35,642,220	7.50%
2022	5,568,790	407,709,603	31,821,003	177,107	37,566,900	5.40%
2023	5,791,542	405,019,967	33,626,864	177,107	39,595,513	5.40%
2024	6,023,203	400,176,069	35,533,360	177,107	41,733,670	5.40%
2025	6,264,131	392,902,519	37,546,050	177,107	43,987,289	5.40%
2026	6,514,697	382,896,595	39,670,798	177,107	46,362,602	5.40%
2027	6,775,284	369,825,796	41,913,791	177,107	48,866,183	5.40%
2028	7,046,296	353,325,185	44,281,553	177,107	51,504,956	5.40%
2029	7,328,148	332,994,513	46,780,969	177,107	54,286,224	5.40%
2030	7,621,274	308,395,094	49,419,299	177,107	57,217,680	5.40%
2031	7,926,125	279,046,418	52,204,203	177,107	60,307,435	5.40%
2032	8,243,170	244,422,487	55,143,760	177,107	63,564,036	5.40%
2033	8,572,896	203,947,828	58,246,491	177,107	66,996,494	5.40%
2034	8,915,812	156,993,191	61,521,386	177,107	70,614,305	5.40%
2035	9,272,445	102,870,870	64,977,926	177,107	74,427,478	5.40%
2036	9,643,342	40,829,648	40,829,648	177,107	50,650,097	-31.95%
2037	10,029,076	-	-	177,107	10,206,183	-79.85%

Amortization of Unfunded Liability as of July 1, 2017

Year	Type	Original Amort. Amount	Percentage Increasing	Original # of Years	Current Amort. Amount	Years Remaining
2005	ERI - HA(2002)	27,716	4.50%	24	48,587	11
2005	ERI - City(2002)	317,193	4.50%	24	556,060	11
2006	ERI - City(2003)	404,362	4.50%	23	678,349	11
2006	ERI - HA(2003)	24,895	4.50%	23	41,763	11
2018	Fresh Start	N/A	N/A	19	N/A	19

Notes on Amortization of Unfunded Liability

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

* Includes recognition of the following asset gains/(losses) in Fiscal 2020 and 2022:

2020	$	(14,626,908)
2022	$	(5,923,759)

** Contribution is set to be the amount resulting from a 8.75% increase on the prior year contribution for the first two years, followed by two years of 7.50% increases, and 5.4% increases thereafter. The contribution decreases by 31.95% in the final year.

Assumptions and Methodology Summary

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

Valuation Date	January 1, 2016 Valuation
Interest Rate	7.75% (same as prior valuation).
Salary Increase	3.75% Ultimate rate, with the following steps: • Group 1 and 2: 3.0% steps in years 1-3, 4.0% step in year 10 • Fire: 19.1% in year 1, 16.03% in year 2, 5.0% in years 28-29 • Police: 21.0% in year 1, 4.73% in year 2, 5.0% in years 28-29
COLA	3% of 13,000
COLA Frequency	Granted every year
Mortality	RP-2000 mortality table projected from the year 2009 with generational mortality, Scale BB. For members retired under an Accidental Disability (job-related), 40% of deaths are assumed to be from the same cause as the disability. Disabled mortality RP-2000 mortality table projected from the year 2009 with generational mortality, Scale BB, ages set forward 2 years. Prior valuation used the same assumption projected from the year 2000.
Overall Disability	Groups 1 and 2 50% ordinary disability 50% accidental disability Group 4 10% ordinary disability 90% accidental disability
Retirement Rates	Groups 1 and 2 Ages 55 – 70 Group 4 Ages 50 – 65
Administrative Expense	$509,093 budget estimated for FY 2018 provided by Quincy Retirement Board.

Assets

	Cash	$	3,625,679.17
	Equities		3,828,909.65
	Pooled Domestic Equity Funds		66,501,430.82
	Pooled International Equity Funds		76,132,914.37
	Pooled Domestic Fixed Income Funds		59,592,718.57
	Pooled International Fixed Income Funds		8,487,431.64
	Pooled Global Fixed Income Funds		8,772,565.62
	Pooled Alternative Investments		22,288,194.68
	Pooled Real Estate Funds		31,767,871.85
	Hedge Funds		5,974,054.63
	PRIT FUND		3,370,903.02
A	Sub-Total:	$	290,342,674.02
	Interest Due and Accrued		114.65
	Accounts Receivable		5,040,710.38
	Accounts Payable		(109,203.67)
B	Sub-Total:	$	4,931,621.36
	Market Value of Assets [(A) + (B)]	$	295,274,295.38

- We were furnished with the System's annual report by the Board. The market value of assets as of December 31, 2015 (adjusted for payables and receivables) is $295,274,295.38.

- The asset allocation is approximately 31% fixed income, cash, receivables and payables and 69% equities, alternative investments, hedge funds and similar types of investments. Historically, 10 to 11% has been the expected long-term rate of return for equities, and 6% to 7% has been the expected long-term rate of return for fixed income securities. Many economists and investment professionals are projecting lower returns of 6.25% to 9.00% for equities and 3.65 to 6.00% for fixed income securities. In light of these projections, as well as historical investment returns, the 7.75% interest rate assumption is within the reasonable assumption range. We encourage close monitoring for changes in investment performance against expectations.

- Actuarial value of assets (AVA) of $315,824,962 is based on a four-year smoothing method. Investment gains or losses above or below the expected rate of investment return are recognized over 4 years, 25% per year. The AVA must be no more than 110% of the market value of assets and no less than 90% of the market value of assets.

Calculation of Valuation Assets as of January 1, 2016

FOUR-YEAR ASSET SMOOTHING

1. Market value of assets including receivable/payable as of 01/01/2016 — 295,274,295

2. Phase-in of asset gains and losses

	Plan Year (1)	Original Amount (2)	Percent Unrecognized (3)	Amount Unrecognized (2) x (3)
a.	2015	($23,695,036)	75%	($17,771,277)
b.	2014	($10,698,714)	50%	($5,349,357)
c.	2013	$10,279,869	25%	$2,569,967
d.	2012	$9,982,804	0%	$0
e.	2011	($19,901,549)	0%	$0
f.	Total	($34,032,626)		($20,550,667)

3. Valuation assets without corridor as of 01/01/2016 (1. - 2.f.) — $315,824,962

4. Corridor Check
   a. 90% of Market Value — $265,746,866
   b. 110% of Market Value — $324,801,725

5. Valuation assets with corridor as of 01/01/2016 (3. within Corridor) — $315,824,962

6. Calculation of return on valuation assets
   a. Valuation assets as of 01/01/2014 — $296,239,378
   b. ER contribs + EE contribs - Ben Pymts - Expenses — $(22,192,667)
   c. Actual return on valuation assets 5. - (6.a. + 6.b.) — $41,778,251
   d. Weighted value of valuation assets — $285,143,045
   e. Return on valuation assets (6.c. / 6.d.) — 14.7%
   f. Annualized return on assets — 7.1%

Disclosure Information

SCHEDULES OF FUNDING PROGRESS
(Dollars In Thousands)

Actuarial Valuation Date	Actuarial Value of Assets A	Actuarial Accrued Liability B	Unfunded AAL (UAAL) B-A	Funded Ratio A/B	Covered Payroll C	UAAL as a % of Covered Payroll (B-A)/C
1/1/2016	$315,825	$674,956	$359,131	47%	$88,087	408%
1/1/2014	$296,239	$633,798	$337,558	47%	$80,333	420%
1/1/2012	$275,220	$577,612	$302,391	48%	$75,630	400%
1/1/2010	$257,135	$539,914	$282,779	48%	$76,888	368%
1/1/2007	$307,082	$472,269	$165,187	65%	$66,710	248%

NOTES TO SCHEDULES

Additional information as of the latest actuarial valuation follows:

Valuation Date	1/1/2016
Actuarial cost method	Entry Age Normal
Amortization method	Varying contribution increases
Remaining amortization period	19 years for the fresh start base
Asset valuation method	Market value adjusted by accounts payable and receivables adjusted to phase in over 4 years investment gains or losses above or below the expected rate of investment return. The actuarial value of assets must be no less than 90% of the adjusted market value nor more than 110% of the adjusted market value. Market value of assets is $288,215,405.38
Actuarial assumptions:	
Investment Rate of Return	7.75% per year
Projected Salary Increases	3.75% Ultimate rate, with the following steps: • Group 1 and 2: 3.0% steps in years 1-3, 4.0% step in year 10 • Fire: 19.1% in year 1, 16.03% in year 2, 5.0% in years 28-29 • Police: 21.0% in year 1, 4.73% in year 2, 5.0% in years 28-29

PERAC Information Disclosure

The most recent actuarial valuation of the System was prepared by Stone Consulting, Inc. as of January 1, 2016

The normal cost for employees on that date was:	$8,166,538	9.3% of payroll
The normal cost for the employer was:	$4,008,248	4.6% of payroll

The actuarial liability for active members was:	$271,405,304
The actuarial liability for retired members was (includes inactives):	$397,565,973
Total actuarial accrued liability:	$674,955,608
System assets as of that date ($295,274,295.38 Market Value):	$315,824,962
Unfunded actuarial accrued liability:	$359,130,645

The ratio of system's assets to total actuarial liability was:	47%

As of that date the total covered employee payroll was:	$88,087,250

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

Investment Return:	7.75% per annum
Rate of Salary Increase:	Select and ultimate rate (3.75% ultimate rate)

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

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded AAL (UAAL) (b-a)	Funded Ratio (a/b)	Covered Payroll (c)	UAAL as a % of Covered Payroll ((b-a)/c)
1/1/2016	$315,825	$674,956	$359,131	47%	$88,087	408%
1/1/2014	$296,239	$633,798	$337,558	47%	$80,333	420%
1/1/2012	$275,220	$577,612	$302,391	48%	$75,630	400%
1/1/2010	$257,135	$539,914	$282,779	48%	$76,888	368%
1/1/2007	$307,082	$472,269	$165,187	65%	$66,710	248%

Actuarial Methods and Assumptions

ACTUARIAL METHODS

Actuarial Cost Method

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

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

Asset Valuation Method

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

Fiscal Year Adjustment

The actuarial results are adjusted by the valuation interest rate and salary scale to the beginning of Fiscal Year 2018. The unfunded actuarial accrued liability is rolled forward with normal cost and further adjusted by anticipated contributions and interest.

ACTUARIAL ASSUMPTIONS

Investment Return

7.75% per year net of investment expenses.

Regular Interest Rate Credited to Annuity Savings Account

2% per year.

Salary Increases

3.75% Ultimate rate, with the following steps:
- Group 1 and 2: 3.0% steps in years 1-3, 4.0% step in year 10
- Fire: 19.1% in year 1, 16.03% in year 2, 5.0% in years 28-29
- Police: 21.0% in year 1, 4.73% in year 2, 5.0% in years 28-29

Actuarial Methods and Assumptions
(Continued)

Withdrawal Prior to Retirement

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

Rate of Withdrawal

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

Disability Prior to Retirement

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

Rate of Disability

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

Disability is assumed to be 50% ordinary and 50% accidental for Group 1 and 2 and 10% ordinary and 90% accidental for Group 4.

Actuarial Methods and Assumptions
(Continued)

Rates of Retirement

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

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

Mortality

RP-2000 mortality table projected from the year 2009 with generational mortality, Scale BB (sex-distinct). Prior valuation used the same assumption projected from the year 2000. During employment the healthy employee mortality table is used. Post-employment the healthy annuitant table is used. In-service death is assumed to be 55% accidental for group 1 and 2 and 90% accidental for group 4.

Disabled Life Mortality

RP-2000 mortality table projected from the year 2009 with generational mortality, Scale BB for healthy annuitants, set-forward by 2 years (sex-distinct). Death is assumed to be due to the same cause as the disability 40% of the time. Prior valuation used the same assumption projected from the year 2000.

Actuarial Methods and Assumptions
(Continued)

Family Composition

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

Cost-of-Living Increases

A 3% COLA on the first 13,000 of a member's retirement allowance is assumed to be granted every year.

Administrative Expenses

Estimated budgeted amount of $509,093 for the Fiscal Year 2018 excluding investment management fees and custodial fee is added to the Normal Cost.

Net 3(8)(c)

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

Step Increases

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

Credited Service

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

Contribution Timing

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

Total Payroll Increase

The total payroll is assumed to increase at 4.00% per year.

Valuation Date

January 1, 2016.

Summary of Principal Provisions

1. PARTICIPANT

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

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

2. MEMBER CONTRIBUTIONS

Member contributions vary depending upon date hired as follows:

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

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

3. PAY

a. Pay

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

b. Average Pay

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

4. CREDITED SERVICE

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

5. SERVICE RETIREMENT

a. Eligibility

Completion of 20 years of credited service or attainment of age 55 and completion of 10 years of credited service. If hired prior to 1978 or a member of group 4, attainment of age 55.

Summary of Principal Provisions (Continued)

b. Retirement Allowance

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

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

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

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

6. DEFERRED VESTED RETIREMENT

a. Eligibility

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

b. Retirement Allowance

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

Summary of Principal Provisions (Continued)

7. ORDINARY DISABILITY RETIREMENT

a. Eligibility

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

b. Retirement Allowance

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

8. ACCIDENTAL DISABILITY RETIREMENT

a. Eligibility

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

b. Retirement Allowance

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

9. NON-OCCUPATIONAL DEATH

a. Eligibility

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

b. Retirement Allowance

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

10. OCCUPATIONAL DEATH

a. Eligibility

Dies as a result of an occupational injury.

b. Benefit Amount

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

Summary of Principal Provisions
(Continued)

11. COST-OF-LIVING INCREASES

An increase of up to 3% applied to the first 13,000 of annual benefit. Funded by the Municipality from Fiscal Year 1999. Percentage increase is voted on each year by the Retirement Board. Cost-of-living increases granted during Fiscal Year 1982 through Fiscal 1998 are reimbursed by the Commonwealth.

12. OPTIONAL FORMS OF PAYMENT

- Option A

Allowance payable monthly for the life of the member.

- Option B

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

- Option C

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

Glossary of Terms

- Actuarial Accrued Liability

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

- Actuarial Assets

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

- ### Actuarial Assumptions

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

- ### Actuarial Cost Method

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

- ### GASB

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

- ### Normal Cost

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

- ### PERAC

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

- ### Present Value of Benefits

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

- ### PRIT

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

- ### Unfunded Actuarial Accrued Liability

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