January 1, 2017

Actuarial Valuation Report

Massachusetts Housing Finance Agency

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

June 21, 2017

Massachusetts Housing Finance Agency Employees' Retirement System
One Beacon Street
Boston, MA 02108

Dear Massachusetts Housing Finance Agency Retirement Board:

Stone Consulting, Inc. has performed a January 1, 2017 actuarial valuation of the Massachusetts Housing Finance Agency 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 Massachusetts Housing Finance Agency Retirement System's administrative staff. Although examined for general reasonableness, the data was not audited by the actuary. In addition, the administrative staff furnished financial statements that were not audited by the actuary or by the plan's auditors.

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

We anticipate over time the contribution level to increase as a percentage of payroll. The contribution rate is determined by adding the normal cost plus an amortization of the unfunded actuarial accrued liability. The normal cost is expected to remain at a level percentage of payroll. The length of the funding schedule contained in this actuarial valuation report is nine years (fully funded by 2026). The amortization of the unfunded liability is set to remain level for each year.

The contribution amount for Fiscal Year 2018 is $6,490,693 which is $369,427 greater than the anticipated contribution amount from the prior funding schedule. PERAC and GASB guidelines indicate that actuarial valuations should be conducted at least every other year. The Massachusetts Housing Finance Agency Retirement Board conducted their previous actuarial valuation effective January 1, 2015.

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.

This valuation report and valuation is intended to be used to determine the funding status of the retirement system and develop a funding schedule. Information to comply with the Government Accounting Standards Board accounting standards can be found in a separate stand-alone report.

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

	PAGE
Certification Letter	
Introduction	1
Valuation Summary	1
January 1, 2017 Actuarial Valuation Results	3
Data and History of Active Participants	4
Distribution of Plan Members	5
Valuation Methodology	7
Actuarial Accrued Liability and Funded Status	8
Charts of Selected Actuarial and Demographic Statistics	9
Development of Funding Schedule	9
Funding Schedule	11
Assumptions and Methodology Summary	12
Assets	13
Disclosure Information	14
PERAC Information Disclosure	15
Actuarial Methods and Assumptions	16
Summary of Principal Provisions	20
Glossary of Terms	23

Introduction

This report presents the results of the actuarial valuation of the Massachusetts Housing Finance Agency Retirement System. The valuation was performed at the request of the Retirement Board as of January 1, 2017 for the purpose of determining the contribution requirements for Fiscal Year 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, 2017);
- Economic assumptions regarding salary increases and investment earnings; and
- Other actuarial assumptions (e.g., withdrawals, retirement, death, etc.)

Valuation Summary

	January 1, 2017 Valuation	January 1, 2015 Valuation	Change
Contribution Fiscal 2018	$6,490,693	$6,121,266	$369,427 increase
Funding Schedule Length (as of Fiscal 2018)	9 years	5 years	4 year increase
Amortization Increase	0.00%	0.00%	Same
Funding Ratio	77%	79%	-2%
Interest Rate Assumption	7.50%	7.75%	-0.25%
Salary Increase Rate Assumption	Select and Ultimate: 5.00% increase in year one, 4.75% increase in years 2 and 3, 4.50% increase in years 4 and 5, 4.25% increase in years 6 and 7, 4.00% increase in years 8 and 9, 3.75% thereafter	Same select and ultimate assumption	No change

- The Fiscal Year 2018 contribution is $369,427 greater than the planned 2018 contribution. Stone Consulting, with agreement from the Retirement Board, values assets at market value, adjusted for payables and receivables.

- The System, over the two-year period from January 1, 2015 to December 31, 2016, experienced a 3.31% annual return on the market value of assets versus our assumption of 7.75%. There was a $10,064,640 net actuarial loss in calendar years 2015 and 2016. The System's asset portfolio, effective December 31, 2016 is approximately 69% equities and similar investments and 31% fixed income and short-term investments. The interest rate assumption was reduced to 7.50% to reflect anticipated future market performance. This change increased the actuarial accrued liability by $4.3 million.

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

- The salary increase assumption is based on a select and ultimate table, with a 5.00% increase in the first year of service, followed by 4.75% increases in years two and three, 4.50% increases in years four and five, 4.25% increases in years six and seven, 4.00% increases in years eight and nine, and 3.75% thereafter. This assumption has been maintained from the prior valuation. Total compensation changed by 2.5% over the prior valuation; however average annual compensation (compensation divided by number of active members) only changed by 1.6% or 0.8% per year.

- The salary increase assumption reflects prior experience including PERAC's 2002 local experience study, current expectations, and professional judgement.

- The funding level of the Massachusetts Housing Finance Agency Retirement System is 77% compared to 79% for the January 1, 2015 actuarial valuation. The funding level is estimated to be near the median for Massachusetts' Contributory Retirement Systems.

The schedule length is nine (9) years, a four-year increase compared to the 5 years remaining from the 7-year schedule from the January 1, 2012 valuation. The maximum period permitted under Section 22D of Chapter 32 of the Massachusetts General Laws is thirteen years (Fiscal 2030). The amortization of the unfunded liability is level for the duration of the schedule.

- Non-economic assumptions were changed from the January 1, 2015 actuarial valuation. The mortality assumption is based upon the RP-2014 White Collar Mortality Table projected generationally from the year 2006 using MP-2016. The previous assumption used the RP-2000 table projected from 2000 with Generational Mortality, Scale BB. The net effect of this change increased the liability by $4.1 million.

- This table was chosen to better reflect the white collar make up of the MHFA employees. White collar employees have lower mortality on average than blue collar employees. The RP-2014 is the most up-to-date table available. We were reluctant to use it in combination with the mortality projection scale MP-2014 as we felt that there was evidence that it was underestimating mortality. The Society of Actuaries have now issued the MP-2016 which incorporates additional experience since the underlying experience used to develop the RP-2014 table. We believe that this is a more appropriate table to use for MHFA System.

January 1, 2017 Actuarial Valuation Results

	January 1, 2017	January 1, 2015	Percentage Change
Funding			
Contribution for Fiscal 2018	$6,490,693		6.0%
Contribution for Fiscal 2018 based on current schedule		$6,121,266	
Members			
Actives			
a. Number	340	337	0.9%
b. Annual Compensation	$32,021,634	$31,240,295	2.5%
c. Average Annual Compensation	$94,181	$92,701	1.6%
d. Average Attained Age	50.3	50.5	-0.3%
e. Average Past Service	14.3	14.9	-3.8%
Retired, Disabled and Beneficiaries			
a. Number	151	130	16.2%
b. Total Benefits*	$6,511,424	$5,012,416	29.9%
c. Average Benefits*	$43,122	$38,557	11.8%
d. Average Age	70.6	70.1	0.6%
Inactives			
a. Number	57	44	29.5%
Normal Cost			
a. Total Normal Cost as of January 1, 2017	$3,437,119	$3,129,181	9.8%
b. Less Expected Members' Contributions	2,979,548	2,877,140	3.6%
c. Normal Cost to be funded by the Municipality	$457,571	$252,041	81.5%
d. Adjustment to July 1, 2017	8,501	4,682	81.5%
e. Administrative Expense Assumption	493,427	481,000	2.6%
f. Normal Cost Adjusted to July 1, 2017	$959,499	$737,723	30.1%
Actuarial Accrued Liability as of January 1, 2017			
a. Active Members	$95,678,968	$91,458,989	4.6%
b. Inactive Members	3,535,319	2,480,082	42.5%
c. Retired Members and Beneficiaries	67,930,858	50,596,891	34.3%
d. Total	$167,145,145	$144,535,962	15.6%
Unfunded Actuarial Accrued Liability			
a. Actuarial Accrued Liability as of January 1, 2017	$167,145,145	$144,535,962	15.6%
b. Less Actuarial Value of Assets as of January 1, 2017	128,396,579	113,875,239	12.8%
c. Unfunded Actuarial Accrued Liability as of January 1, 2017	$38,748,565	$30,660,723	26.4%
d. Adjustment to July 1, 2017	1,664,012	1,296,747	
e. Unfunded Actuarial Accrued Liability as of July 1, 2017	$40,412,577	$31,957,470	

*Excluding State reimbursed COLA

Data and History of Active Participants

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

Valuation Year	Number	Average Age	Average Past Service	Average Ann'l Compensation
2017	340	50.3	14.3	$94,181
2015	337	50.5	14.9	$92,701
2013	328	50.0	15.0	$85,501
2011	354	48.3	13.7	$84,023
2009	349	46.7	10.5	$81,592
2007	334	45.8	9.9	$76,532
2005	315	43.8	8.5	$71,966
2002	312	43.6	7.9	$65,134

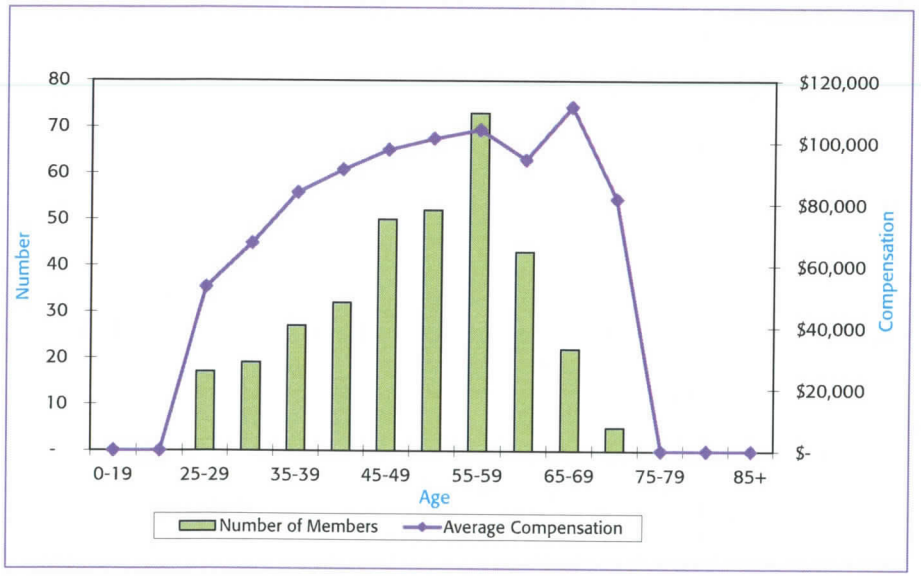
- Employee age has increased by 6.7 years and service has increased by 6.4 years over the course of the past fifteen years. This is consistent with the trend in the Commonwealth towards an aging of the employee population. Average annual compensation has grown by 44.6% (2.5% annually) over the same time period.

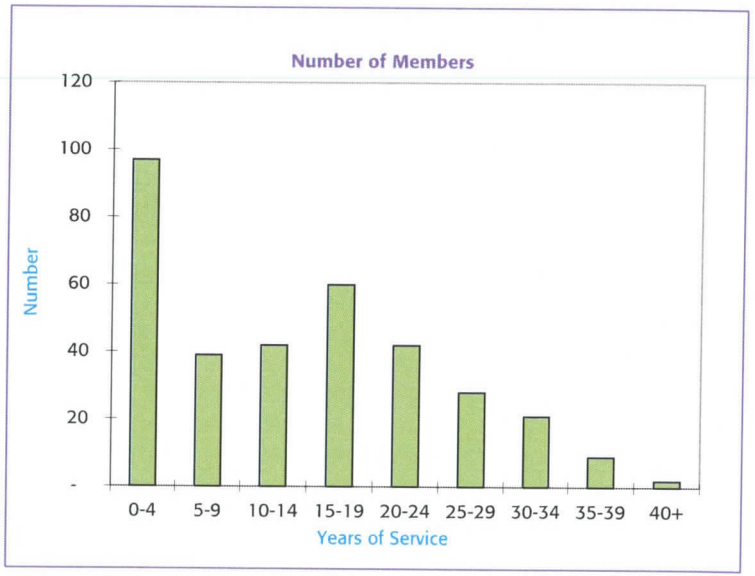
The charts on the following pages summarize demographic information regarding active and retiree members.

Distribution of Plan Members as of January 1, 2017

ACTIVE MEMBERS

AGE	0-4 Years	5-9 Years	10-14 Years	15-19 Years	20-24 Years	25-29 Years	30-34 Years	35-39 Years	40 + Years	Total	Total Compensation	Average Compensation
0-19	-	-	-	-	-	-	-	-	-	-	$ -	$ -
20-24	-	-	-	-	-	-	-	-	-	-	$ -	$ -
25-29	17	-	-	-	-	-	-	-	-	17	$ 901,661	$ 53,039
30-34	11	7	1	-	-	-	-	-	-	19	$ 1,278,469	$ 67,288
35-39	17	2	8	-	-	-	-	-	-	27	$ 2,260,880	$ 83,736
40-44	7	9	6	7	3	-	-	-	-	32	$ 2,918,325	$ 91,198
45-49	16	3	9	11	6	5	-	-	-	50	$ 4,882,911	$ 97,658
50-54	4	6	8	11	13	6	3	1	-	52	$ 5,262,229	$ 101,197
55-59	17	6	6	14	9	9	9	3	-	73	$ 7,600,607	$ 104,118
60-64	5	4	3	11	7	3	6	3	1	43	$ 4,055,119	$ 94,305
65-69	2	1	1	4	4	5	2	2	1	22	$ 2,453,239	$ 111,511
70-74	1	1	-	2	-	-	1	-	-	5	$ 408,193	$ 81,639
75-79	-	-	-	-	-	-	-	-	-	-	$ -	$ -
80-84	-	-	-	-	-	-	-	-	-	-	$ -	$ -
85+	-	-	-	-	-	-	-	-	-	-	$ -	$ -
TOTAL	**97**	**39**	**42**	**60**	**42**	**28**	**21**	**9**	**2**	**340**	**$ 32,021,634**	**$ 94,181**





stoneconsulting.inc

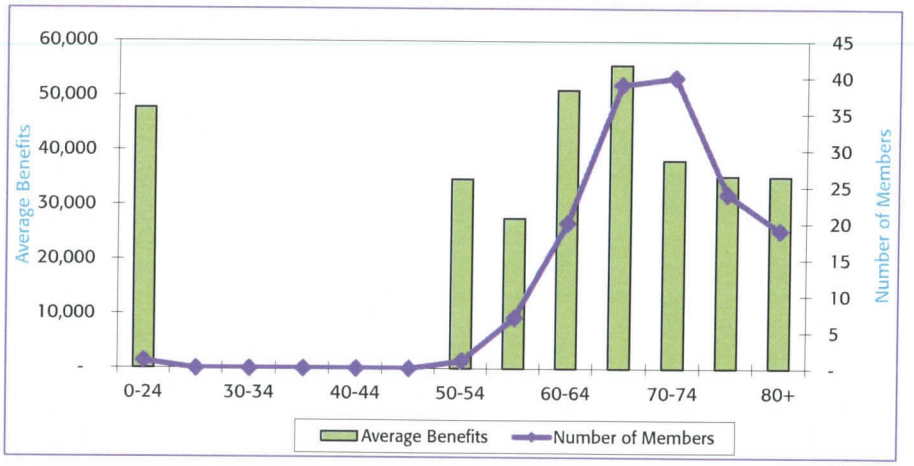
Distribution of Plan Members as of January 1, 2017

RETIRED MEMBERS

Retired Members and Beneficiaries			
Age	Number	Average Benefit	Total Benefit
0-24	1	47,713	47,713
25-29	-	-	-
30-34	-	-	-
35-39	-	-	-
40-44	-	-	-
45-49	-	-	-
50-54	1	34,745	34,745
55-59	7	27,551	192,859
60-64	20	51,064	1,021,286
65-69	39	55,635	2,169,784
70-74	40	38,225	1,528,997
75-79	23	35,359	813,266
80+	18	34,476	620,559
TOTAL	**149**	**$ 43,149**	**$ 6,429,209**

Disabled Members			
Age	Number	Average Benefit	Total Benefit
0-24	-	-	-
25-29	-	-	-
30-34	-	-	-
35-39	-	-	-
40-44	-	-	-
45-49	-	-	-
50-54	-	-	-
55-59	-	-	-
60-64	-	-	-
65-69	-	-	-
70-74	-	-	-
75-79	1	34,136	34,136
80+	1	48,079	48,079
TOTAL	**2**	**$ 41,107**	**$ 82,215**

Total			
Age	Number	Average Benefit	Total Benefit
0-24	1	47,713	47,713
25-29	-	-	-
30-34	-	-	-
35-39	-	-	-
40-44	-	-	-
45-49	-	-	-
50-54	1	34,745	34,745
55-59	7	27,551	192,859
60-64	20	51,064	1,021,286
65-69	39	55,635	2,169,784
70-74	40	38,225	1,528,997
75-79	24	35,308	847,401
80+	19	35,191	668,638
TOTAL	**151**	**$ 43,122**	**$ 6,511,424**



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, 2017	% of Payroll*
Gross Normal Cost (GNC)	$3,437,119	10.7%
Employees Contribution	$2,979,548	9.3%
Net Normal Cost (NNC)	$457,571	1.4%
Adjusted to Beginning of Fiscal Year 2018	$8,501	
Administrative Expense	$493,427	1.5%
Adjusted Net Normal Cost With Admin. Expense	$959,499	

*Payroll paid in 2016 for employees as of January 1, 2017 is $32,021,634. Payroll for new hires in 2016 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, 2017	Percentage Change
Active Actuarial Accrued Liability			$	95,678,968	4.6%
Superannuation	$	93,149,591			
Death	$	1,222,715			
Disability	$	607,519			
Withdrawal	$	699,143			
Retiree, Inactive, Survivor and Beneficiary Actuarial Accrued Liability			$	71,466,177	34.6%
Retirees and Beneficiaries	$	67,254,835			
Disabled	$	676,023			
Inactive	$	3,535,319			
Total Actuarial Accrued Liability (AAL)			$	167,145,145	15.6%
Actuarial Value of Assets (AVA)			$	128,396,579	12.8%
Unfunded Actuarial Accrued Liability			$	38,748,565	26.4%
Funded Ratio (AVA / AAL)					
2017 (7.50% interest rate):	77%				
2015 (7.75% interest rate):	79%				

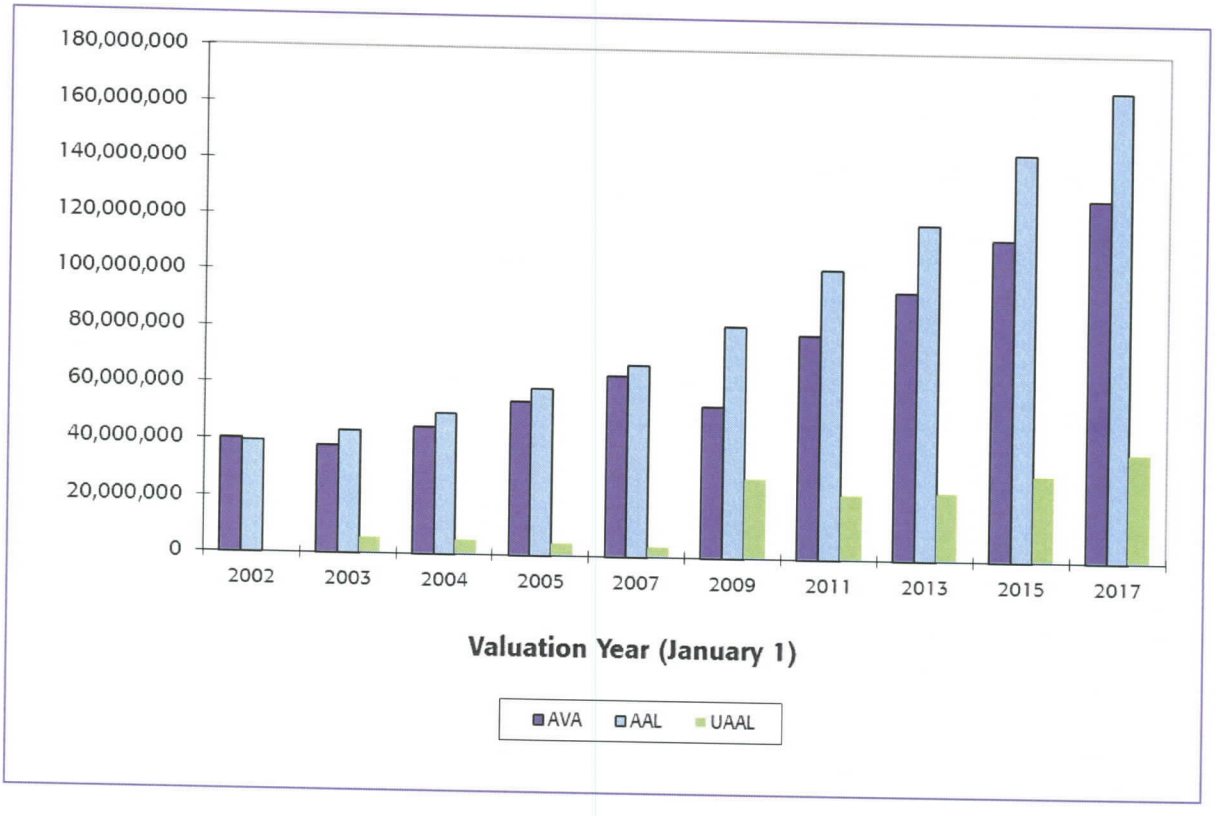
- Actuarial Accrued Liability (AAL) is the "price" of benefits attributable to benefits earned in past years, or in other words, represents today's value of all benefits earned by active and inactive members.

The total AAL is $167,145,145. This along with an actuarial value of assets of $128,396,579 produces a funded status of 77%. This compares to a funded status of 79% for the 2015 valuation.

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

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

Charts of Selected Actuarial and Demographic Statistics



Development of Funding Schedule

Net Employer Normal Cost for Fiscal 2018 (including admin. expenses)	$ 959,499
Net 3(8)(c) Payments	(362,169)
Amortization	5,893,363
Total Appropriation required for Fiscal 2018	$ 6,490,693

- 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 Massachusetts Housing Finance Agency 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 Massachusetts Housing Finance Agency Retirement System paid out minus what was received by the System.

- The contribution amount for Fiscal 2018 is $6,490,693. The funding schedule is presented on page 11. The schedule's length is nine (9) years (for the fresh start base), a four-year increase compared to the remainder of the 7-year schedule from the January 1, 2015 valuation. The maximum funding schedule length allowed by Section 22D of Chapter 32 of the Massachusetts General Laws is thirteen years to Fiscal 2030. Under Section 22F of Chapter 32 the funding schedule could extend to Fiscal 2040.

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

MASSACHUSETTS HOUSING FINANCE AGENCY CONTRIBUTORY RETIREMENT SYSTEM

FUNDING SCHEDULE

Fiscal Year	Normal Cost	Unfunded Actuarial Accrued Liability (UAAL)	Funding Amortization of UAAL	Net 3(8)(c) Payments	Schedule Contribution
2018	959,499	40,412,577	5,893,363	(362,169)	6,490,693
2019	995,480	37,108,155	5,893,363	(362,169)	6,526,674
2020	1,032,811	33,555,902	5,893,363	(362,169)	6,564,005
2021	1,071,541	29,737,230	5,893,363	(362,169)	6,602,735
2022	1,111,724	25,632,157	5,893,363	(362,169)	6,642,918
2023	1,153,414	21,219,204	5,893,363	(362,169)	6,684,608
2024	1,196,667	16,475,280	5,893,363	(362,169)	6,727,861
2025	1,241,542	11,375,561	5,893,363	(362,169)	6,772,736
2026	1,288,099	5,893,363	5,893,363	(362,169)	6,819,294
2027	1,336,403	-	-	(362,169)	974,235

Amortization of Unfunded Liability as of July 1, 2017

Year	Type	Original Amort. Amount	Percentage Increasing	Original # of Years	Current Amort. Amount	Years Remaining
2018	Fresh Start	5,893,363	0.00%	9	5,893,363	9

Notes on Amortization of Unfunded Liability

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

Assumptions and Methodology Summary

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

Valuation Date	January 1, 2017 Valuation
Interest Rate	7.50% (7.75% in prior valuation).
Salary Increase	5.00% increase in first year of service, 4.75% increases in years two and three, 4.50% increases in years four and five, 4.25% increases in years six and seven, 4.00% increases in years eight and nine, and 3.75% increases thereafter.
COLA	3% of $13,000
COLA Frequency	Granted every year
Mortality	RP-2014 White Collar Mortality Table projected generationally from the year 2006 using MP-2016. For members retired under an Accidental Disability (job-related), 40% of deaths are assumed to be from the same cause as the disability. Disabled mortality used the RP-2014 White Collar Mortality Table projected generationally from the year 2006 using MP-2016, ages set forward 2 years. (Prior valuation used RP-2000 Mortality Table projected from the year 2000 using Generational Mortality, Scale BB.)
Overall Disability	Groups 1 and 2 75% ordinary disability 25% 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	$493,427 budget estimated for FY 2018 provided by Massachusetts Housing Finance Agency Retirement Board.

Assets

	Cash	$	607,018.82
	Fixed Income Securities		17,111,317.07
	Pooled Domestic Equity Funds		45,057,715.68
	Pooled Global Equity Funds		10,653,996.32
	Pooled Domestic Fixed Income Funds		16,788,891.50
	Pooled International Fixed Income Funds		5,646,458.02
	Pooled Alternative Investments		15,894,558.95
	Pooled Real Estate Funds		16,531,607.00
A	Sub-Total:	$	128,291,563.36
	Interest Due and Accrued		96,175.08
	Prepaid Expenses		15,400.00
	Accounts Receivable		196,174.12
	Accounts Payable		-202,733.15
B	Sub-Total:	$	105,016.05
	Market Value of Assets [(A) + (B)]	$	128,396,579.41

- We were furnished with the System's annual report by the Board. The market value of assets as of December 31, 2016 (adjusted for payables and receivables) is $128,396,579.41.

- 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 7.50% interest rate assumption is within the reasonable assumption range. We encourage close monitoring for changes in investment performance against expectations.

Disclosure Information

SCHEDULES OF FUNDING PROGRESS
(Dollars In Thousands)

Actuarial Valuation Date	Actuarial Value of Assets A	Actuarial Accrued Liability B	Unfunded AAL (UAAL) B-A	Funded Ratio A/B	Covered Payroll C	UAAL as a % of Covered Payroll (B-A)/C
1/1/2017	$128,397	$167,145	$38,748	77%	$32,022	121%
1/1/2015	$113,875	$144,536	$30,661	79%	$31,240	98%
1/1/2013	$94,976	$119,096	$24,120	80%	$28,044	86%
1/1/2011	$79,406	$102,618	$23,213	77%	$29,744	78%
1/1/2009	$53,530	$82,086	$28,556	65%	$28,475	100%

NOTES TO SCHEDULES

Additional information as of the latest actuarial valuation follows:

Valuation Date	1/1/2017
Actuarial cost method	Entry Age Normal
Amortization method	Level amortization
Remaining amortization period	9 years for the fresh start base
Asset valuation method	Market value adjusted by accounts payable and receivables. Market value of assets is $128,396,579.41
<u>Actuarial assumptions:</u>	
Investment Rate of Return	7.50% per year
Projected Salary Increases	5.00% increase in first year of service, 4.75% increases in years two and three, 4.50% increases in years four and five, 4.25% increases in years six and seven, 4.00% increases in years eight and nine, and 3.75% increases thereafter.

PERAC Information Disclosure

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

The normal cost for employees on that date was:	$2,979,548	9.3% of payroll
The normal cost for the employer was:	$457,571	1.4% of payroll

The actuarial liability for active members was:	$95,678,968
The actuarial liability for retired members was (includes inactives):	$71,466,177
Total actuarial accrued liability:	$167,145,145
System assets as of that date (Market Value):	$128,396,579
Unfunded actuarial accrued liability:	$38,748,565

The ratio of system's assets to total actuarial liability was:	77%

As of that date the total covered employee payroll was:	$32,021,634

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

Investment Return:	7.50% 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)
1/1/2017	$128,397	$167,145	$38,748	77%	$32,022	121%
1/1/2015	$113,875	$144,536	$30,661	79%	$31,240	98%
1/1/2013	$94,976	$119,096	$24,120	80%	$28,044	86%
1/1/2011	$79,406	$102,618	$23,213	77%	$29,744	78%
1/1/2009	$53,530	$82,086	$28,556	65%	$28,475	100%

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.

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.

Asset Valuation Method

Market value of assets adjusted for payables and receivables.

ACTUARIAL ASSUMPTIONS

Investment Return

7.50% per year net of investment expenses.

Regular Interest Rate Credited to Annuity Savings Account

2% per year.

Salary Increases

Select and Ultimate assumption – 5.00% increase in first year of service, 4.75% increases in years two and three, 4.50% increases in years four and five, 4.25% increases in years six and seven, 4.00% increases in years eight and nine, and 3.75% increases thereafter.

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.

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.

Service	Rate of Withdrawal
0	15%
1	12%
2	10%
3	9%
4	8%
5	7.6%
10	5.4%
15	3.3%
20	2.0%
25	1.0%
30+	0.0%

Disability Prior to Retirement

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

Age	Rate of Disability
20	0.01%
25	0.02%
30	0.03%
35	0.06%
40	0.10%
45	0.15%
50	0.19%
55	0.24%
60	0.28%

Disability is assumed to be 75% ordinary and 25% accidental.

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:

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

Mortality

RP-2014 Healthy White Collar Mortality Table projected generationally from the year 2006 using MP-2016 (sex-distinct). (Prior valuation used RP-2000 Mortality Table projected from the year 2000 using Generational Mortality, Scale BB). During both employment and post-employment the healthy mortality table is used as it is a blended table.

Disabled Life Mortality

RP-2014 White Collar Mortality Table projected generationally from the year 2006 using MP-2016, set-forward by 2 years (sex-distinct). Death is assumed to be due to the same cause as the disability 40% of the time. (Prior valuation used RP-2000 Healthy Annuitant Mortality Table projected from the year 2000 using Generational Mortality, Scale BB).

Actuarial Methods and Assumptions
(Continued)

Family Composition

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

Administrative Expenses

Estimated budgeted amount of $493,427 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 3.75% per year.

Valuation Date

January 1, 2017.

Summary of Principal Provisions

1. PARTICIPANT

Participation is mandatory for all full-time employees whose employment commences before age 65.

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	Hired before April 2, 2012
2.5%	65+
2.4	64
2.3	63
2.2	62
2.1	61
2.0	60
1.9	59
1.8	58
1.7	57
1.6	56
1.5	55
	Hired after April 1, 2012*
2.5%	67+
2.35	66
2.20	65
2.05	64
1.90	63
1.75	62
1.60	61
1.45	60

*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 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.