January 1, 2020

Actuarial Valuation Report

Quincy Retirement System

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May 18, 2021

Quincy Retirement Board
1245 Hancock Street
Suite #39
Quincy, MA 02169

Dear Quincy Retirement Board:

Stone Consulting, Inc. has performed a January 1, 2020 actuarial valuation of the Quincy Retirement System. This valuation and report was prepared using generally accepted actuarial principles and practices.

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.

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.

- The contribution amount for Fiscal Year 2022 is $38,315,387, which is $748,487 greater than the anticipated contribution amount from the prior funding schedule.

- The length of the funding schedule contained in this actuarial valuation report is 15 years (fully funded in Fiscal Year 2036).

- The contribution is set to increase by 7.50% in the first three years, followed by 5.40% increases thereafter, except in the final year, when it decreases by 3.89%. We anticipate over time the contribution level to increase as a percentage of payroll.

PERAC and GASB guidelines indicate that actuarial valuations should be conducted at least every other year. The Quincy Retirement Board conducted their prior actuarial valuation effective January 1, 2018.

Stone Consulting, Inc. is completely independent of the City of Quincy and the Quincy Retirement System. This includes any of its officers and key personnel. Neither we or anyone else closely associated with us has any relationship with the City of Quincy or the Quincy Retirement System that would impair our independence, other than this or related assignments.

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. The use of these results may not be appropriate for all circumstances.

We, Lawrence Stone and Colin Edgar, are consultants for Stone Consulting, Inc. We are members 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	Colin Edgar
Member, American Academy of Actuaries	Associate, Society of Actuaries

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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, 2020 for the purpose of determining the contribution requirements for Fiscal Year 2022 and beyond. The contribution requirements are based on:

- The financial condition of the system as of December 31, 2019, based information from the Retirement System and their auditors, O'Connor and Drew;
- 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, 2020);
- Economic assumptions regarding salary increases and investment earnings; and
- Other actuarial assumptions (e.g., withdrawals, retirement, death, etc.)

Valuation Summary

Summary of Results and Experience

- Experience and Funding Schedule

  The contribution is set to increase by 7.50% in the first year, $748,487 greater than the anticipated contribution amount from the prior funding schedule. This is followed by another two years of 7.50% increases, and 5.40% increases for the remaining years, with the exception of the final year, when it decreases by 3.89%.

  The funding schedule finishes in FY2036, compared to the planned funding schedule from the 2018 valuation, which finished in FY2037.

  The funding ratio (based on Actuarial Value of Assets) increased from 45% to 46%. Based on the Market Value of Assets, the funding ratio increased from 46.9% to 47.4%.

- Assumptions/methodology:

  Changes to assumptions and plan provisions increased the liability by $16.1 million, including a change to the COLA Base and a reduction of the discount rate from 7.50% to 7.25%. Assumptions and valuation methodology are discussed in Appendix A, on page 16.

Summary of Changes to Assumptions, Methodology, and Plan Provisions

- The discount rate assumption is 7.25%
    - Previous valuation used 7.50%
    - Net effect of change in assumption increased the liability by $18.7 million (2.4%)
    - Reflects anticipated future market performance

- The mortality assumption is based upon the RP-2014 adjusted to 2006, projected generationally using MP-2019
    - Prior valuation used the same table, projected using MP-2016.
    - Net effect of the change in mortality assumption decreased the liability by $9.0 million (1.2%)

- The COLA Base was increased from $13,000 to $15,000
    - Net effect increased the liability by $6.3 million (0.8%)

Summary of Experience

- Average annual return in calendar 2018 and 2019 – 6.00% vs. a 7.50% assumption.
    - $7,978,211 net actuarial asset loss in calendar years 2018 and 2019

- The System's asset portfolio effective December 31, 2019 is approximately 26% fixed income and 74% equities and alternatives.

- Total compensation changed by 7.4% over the prior valuation
    - average annual compensation (compensation divided by number of active members) only changed by 3.7%
    - Salary gain of $2.6 million (less liability than expected when compared to salary projected from the prior valuation data with the prior assumption).

January 1, 2020 Actuarial Valuation Results

	January 1, 2020	January 1, 2018	Percentage Change
Funding			
Contribution for Fiscal 2022	$38,315,387		2.0%
Contribution for Fiscal 2022 based on current schedule		$37,566,900	
Members			
▪ Actives			
a. Number	1,546	1,494	3.5%
b. Annual Compensation	$101,716,416	$94,741,527	7.4%
c. Average Annual Compensation	$65,793	$63,415	3.7%
d. Average Attained Age	49.3	49.3	0.0%
e. Average Past Service	12.4	12.6	-1.6%
▪ Retired, Disabled and Beneficiaries			
a. Number	1,521	1,524	-0.2%
b. Total Benefits*	$47,622,405	$45,330,339	5.1%
c. Average Benefits*	$31,310	$29,744	5.3%
d. Average Age	75.0	74.6	0.5%
▪ Inactives			
a. Number	167	148	12.8%
▪ Vested Terminated Members			
a. Number	21	40	-47.5%
Normal Cost			
a. Total Normal Cost as of January 1, 2020	$15,422,209	$13,670,882	12.8%
b. Less Expected Members' Contributions	9,567,914	8,809,307	8.6%
c. Normal Cost to be funded by the Municipality	$5,854,295	$4,861,575	20.4%
d. Adjustment to July 1, 2021	354,747	294,592	20.4%
e. Administrative Expense Assumption	586,377	510,910	14.8%
f. Normal Cost Adjusted to July 1, 2021	$6,795,419	$5,667,077	19.9%
Actuarial Accrued Liability as of January 1, 2020			
a. Active Members	$329,194,932	$296,907,382	10.9%
b. Inactive Members	1,461,937	1,217,155	20.1%
c. Terminated Vested Members	2,498,635	5,199,329	-51.9%
d. Retired Members and Beneficiaries	455,265,554	430,145,059	5.8%
e. Total	$788,421,058	$733,468,925	7.5%
Unfunded Actuarial Accrued Liability			
a. Actuarial Accrued Liability as of January 1, 2020	$788,421,058	$733,468,925	7.5%
b. Less Actuarial Value of Assets as of January 1, 2020	361,711,746	330,036,650	9.6%
c. Unfunded Actuarial Accrued Liability as of January 1, 2020	$426,709,312	$403,432,275	5.8%
d. Adjustment to July 1, 2021	19,233,665	21,679,392	
e. Unfunded Actuarial Accrued Liability as of July 1, 2021	$445,942,977	$425,111,667	

*Excluding State reimbursed COLA

NOTE: for all tables in this report, totals may not sum due to rounding.

Development of Funding Schedule

The appropriation for Fiscal 2022 is as follows:

Net Employer Normal Cost for Fiscal 2022 (including admin. expenses)	$ 6,795,419
Net 3(8)(c) Payments	706,921
Amortization	30,813,047
Total Appropriation required for Fiscal 2022	$ 38,315,387

- The funding schedule is presented on the following page. The schedule's length is fifteen (15) years, a one-year reduction compared to the remainder of the 18-year schedule from the January 1, 2018 valuation.
- The maximum funding schedule length allowed by Section 22F of Chapter 32 of the Massachusetts General Laws is nineteen years to Fiscal 2040.
- The contribution increases by 7.50% in the first three years, followed by 5.40% increases thereafter, except in the final year, when it decreases by 3.89%. The contribution is assumed to be made at the beginning of the fiscal year.

The funding contribution is composed of three components:

- Net Normal Cost, including administrative expense
- Amortization of the Unfunded Liability
- Net 3(8)(c) payments

These three components are discussed in greater detail in the pages following the funding schedule.

Fiscal Year	Normal Cost	Unfunded Liability*	Funding Amortization of UAAL	Net 3(8)(c) Payments	Schedule Contribution**	% Change
2022	6,795,419	445,942,977	30,813,047	706,921	38,315,387	7.50%
2023	7,067,236	445,226,851	33,414,884	706,921	41,189,041	7.50%
2024	7,349,925	436,762,275	36,221,373	706,921	44,278,219	7.50%
2025	7,643,922	429,580,118	38,318,399	706,921	46,669,243	5.40%
2026	7,949,679	412,162,027	40,532,782	706,921	49,189,382	5.40%
2027	8,267,666	398,572,365	42,871,021	706,921	51,845,608	5.40%
2028	8,598,373	381,489,692	45,339,977	706,921	54,645,271	5.40%
2029	8,942,308	360,520,569	47,946,887	706,921	57,596,116	5.40%
2030	9,300,000	335,235,274	50,699,385	706,921	60,706,306	5.40%
2031	9,672,000	305,164,742	53,605,525	706,921	63,984,446	5.40%
2032	10,058,880	269,797,259	56,673,805	706,921	67,439,607	5.40%
2033	10,461,235	228,574,904	59,913,189	706,921	71,081,345	5.40%
2034	10,879,685	180,889,690	63,333,132	706,921	74,919,738	5.40%
2035	11,314,872	126,079,408	66,943,611	706,921	78,965,404	5.40%
2036	11,767,467	63,423,143	63,423,143	706,921	75,897,531	-3.89%
2037	12,238,166	-	-	706,921	12,945,087	-82.94%

Year	Type	Original Amort. Amount	Percentage Increasing	Original # of Years	Current Amort. Amount	Years Remaining
2005	ERI - HA(2002)	27,716	4.50%	24	57,046	7
2005	ERI - City(2002)	317,193	4.50%	24	652,869	7
2006	ERI - City(2003)	404,362	4.50%	23	796,448	7
2006	ERI - HA(2003)	24,895	4.50%	23	49,034	7
2022	Fresh Start	N/A	N/A	15	N/A	15

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 2022 and 2024:

2024	$	4,906,060
2026	$	7,466,166

** Contribution is set to be the amount resulting from a 7.5% increase on the prior year's contribution, followed by two years of 7.5% increases, and 5.4% increases thereafter. The contribution in FY2036 decreases by -3.89%.

Components of the Funding Schedule

Net Normal Cost

	January 1, 2020	% of Payroll*
Gross Normal Cost (GNC)	$ 15,422,209	15.2%
Employees Contribution	9,567,914	9.4%
Net Normal Cost (NNC)	$ 5,854,295	5.8%
Adjusted to Beginning of Fiscal Year 2022	354,747	
Administrative Expense	586,377	0.6%
Adjusted Net Normal Cost With Admin. Expense	$ 6,795,419	

- The gross normal cost (GNC) is the "price" of benefits accruing in the current year if the valuation assumptions are realized. For an individual, this is the value in benefits which they are earning with their current year of service.
- The GNC only relates to current actives; retirees are done earning their benefit and inactives are not earning any credited service.
- The GNC for the whole system is split into two parts: the portion which is paid for by the employees (Employee Contributions), and the portion which must be paid for by the Retirement System (Net Normal Cost, or NNC).
- The NNC is adjusted from January 1, 2020 to Fiscal 2022 by rolling it forward with a payroll increase factor of 4.00%.
- Finally, administrative expense is added to the adjusted NNC. This is the amount seen in the funding schedule.

*Payroll paid in 2019 for employees as of January 1, 2020 is $101,716,416. Payroll for new hires in 2019 was annualized.

Amortization of the Unfunded Actuarial Accrued Liability

				January 1, 2020	Percentage Change
Active Actuarial Accrued Liability			$	329,194,932	10.9%
Superannuation	$	300,910,521			
Death	$	6,965,766			
Disability	$	18,291,371			
Withdrawal	$	3,027,274			
Retiree, Inactive, Survivor and Beneficiary Actuarial Accrued Liability			$	459,226,126	5.2%
Retirees and Beneficiaries	$	373,180,790			
Disabled	$	82,084,764			
Vested	$	2,498,635			
Inactive	$	1,461,937			
Total Actuarial Accrued Liability (AAL)			$	788,421,058	7.5%
Actuarial Value of Assets (AVA)			$	361,711,746	9.6%
Unfunded Actuarial Accrued Liability			$	426,709,312	5.8%
Funded Ratio (AVA / AAL)					
2020 (7.25% interest rate):		46%			
2018 (7.50% interest rate):		45%			

- 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 $788,421,058. This along with an actuarial value of assets of $361,711,746 produces a funded status of 46%. This compares to a funded status of 45% for the 2018 valuation.

- The Unfunded AAL is the portion of the AAL which is not covered by the Plan assets. The UAAL for Quincy as of January 1, 2020 is $426,709,312. This is adjusted to July 1, 2021 to produce the Unfunded Liability seen in Fiscal Year 2022 in the funding schedule.

- In developing the funding schedule, we used a fresh start approach in which the unfunded actuarial accrued liability (UAAL), other than the UAAL due to past early retirement incentives, is reamortized instead of maintaining the existing amortization amount and separately amortizing the actuarial gain or loss. This can result in a funding schedule in which the changes in contribution amounts from year to year are more consistent.

- Quincy's funding schedule was developed by setting the contribution to increase by 7.50% from the Fiscal 2021 contribution, followed by another two years of 7.50% increases, and 5.40% increases thereafter. The remainder of each year's contribution apart from the Net Normal Cost and Net 3(8)(c)'s amortizes the unfunded liability.

Net 3(8)(c) Payments

- 3(8)(c) payments are benefits which 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 are the difference between what the Quincy Retirement System paid out minus what was received by the System, calculated based on the December 31, 2019 PERAC annual statement.
  - This was adjusted from the amount in the PERAC annual statement by adding 3(8)(c) payments to other systems that were not reflected in the annual statement

- The amount of net 3(8)(c) payments is assumed to remain level in future years.

Assets

- The assets are based on a draft of the audited financial statements prepared by O'Connor and Drew, the Board's auditor.

- The asset allocation is approximately 26% fixed income, cash, receivables and payables and 74% equities, alternative investments, hedge funds and similar types of investments.

Four-Year Asset Smoothing

1. Market value of assets including receivable/payable as of 01/01/2020 — $ 374,083,972

2. Phase-in of asset gains and losses

	Plan Year (1)	Original Amount (2)	Percent Unrecognized (3)	Amount Unrecognized (2) x (3)
a.	2019	$29,864,665	75%	$22,398,499
b.	2018	($37,842,876)	50%	($18,921,438)
c.	2017	$35,580,661	25%	$8,895,165
d.	2016	($13,189,891)	0%	$0
e.	2015	($23,695,036)	0%	$0
f.	Total	($9,282,477)		$12,372,226

3. Valuation assets without corridor as of 01/01/2020 (1. - 2.f.) — $ 361,711,746

4. Corridor Check
   a. 90% of Market Value — $ 336,675,575
   b. 110% of Market Value — $ 411,492,369

5. Valuation assets with corridor as of 01/01/2020 (3. within Corridor) — $ 361,711,746

6. Calculation of return on valuation assets

   a. Valuation assets as of 01/01/2018 — $ 330,036,650

   b. ER contribs + EE contribs - Ben Pymts - Expenses — $ (11,884,803)

   c. Actual return on valuation assets 5. - (6.a. + 6.b.) — $ 43,559,899

   d. Weighted value of valuation assets — $ 323,600,582

   e. Return on valuation assets (6.c. / 6.d.) — 13.46%

   f. Annualized return on valuation assets — 6.52%

APPENDICES

Appendix A – 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 for payables and receivables, adjusted to phase in investment gains compared to the expected market value and losses evenly over four years (shown on page 12). The asset valuation method adjusts the results to no less than 90% and no more than 110% of the market value of assets adjusted for 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 2022. The unfunded actuarial accrued liability is rolled forward with normal cost and further adjusted by anticipated contributions and interest.

ACTUARIAL ASSUMPTIONS

Valuation Date

January 1, 2020.

Investment Return

7.25% per year net of investment expenses (prior assumption was 7.50%).

Regular Interest Rate Credited to Annuity Savings Account

2% per year.

Actuarial Methods and Assumptions (Continued)

Cost-of-Living Increases

A 3% COLA on the first $15,000 of a member's retirement allowance is assumed to be granted every year.

Salary Increases

Select and 3.75% ultimate, 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

Total payroll is assumed to increase at 4.00% per year.

Credited Service

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

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 $586,377 for the Fiscal Year 2022 is added to the Normal Cost. 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.

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.

Contribution Timing

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

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%

In-Service Disability and Death

Both Disability and In-Service Death are 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-2014 adjusted to 2006, projected generationally using MP-2019 (sex-distinct). Prior valuation used the same mortality table, projected using MP-2016. During employment the healthy employee mortality table is used. Post-employment the healthy annuitant table is used.

Mortality for disabled retirees follows the same table as non-disabled retirees, set forward 2 years. Death is assumed to be due to the same cause as the disability 40% of the time.

Appendix B – 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.

Summary of Principal Provisions (Continued)

5. SERVICE RETIREMENT

a. Eligibility

Hired prior to April 2, 2012:
- Attainment of age 55 and completion of ten years of credited service,
- or at any age with completion of 20 years of service.
- If hired prior to 1978 or a member of Group 4, the completion of ten years of service is not required.

Hired after April 1, 2012:
- Group 1 – Age 60 and Completion of 10 years of credited service;
- Group 2 – Age 55 and completion of 10 years of service;
- Group 4 – Age 55.

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

Summary of Principal Provisions (Continued)

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.

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).

Summary of Principal Provisions(Continued)

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.

11. COST-OF-LIVING INCREASES

An increase of up to 3% applied to the first $15,000 of annual benefit. Funded by the Employer 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.

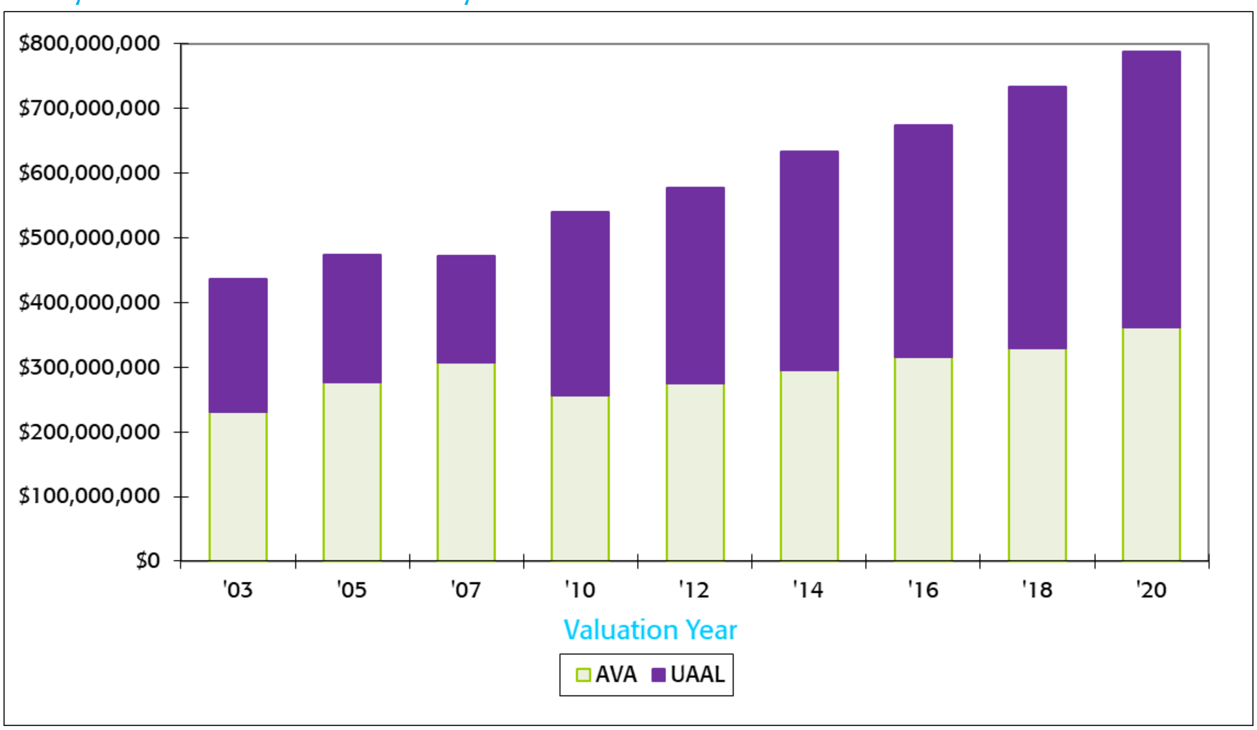
Appendix C – Charts of Selected Actuarial Statistics

History of Demographic Statistics

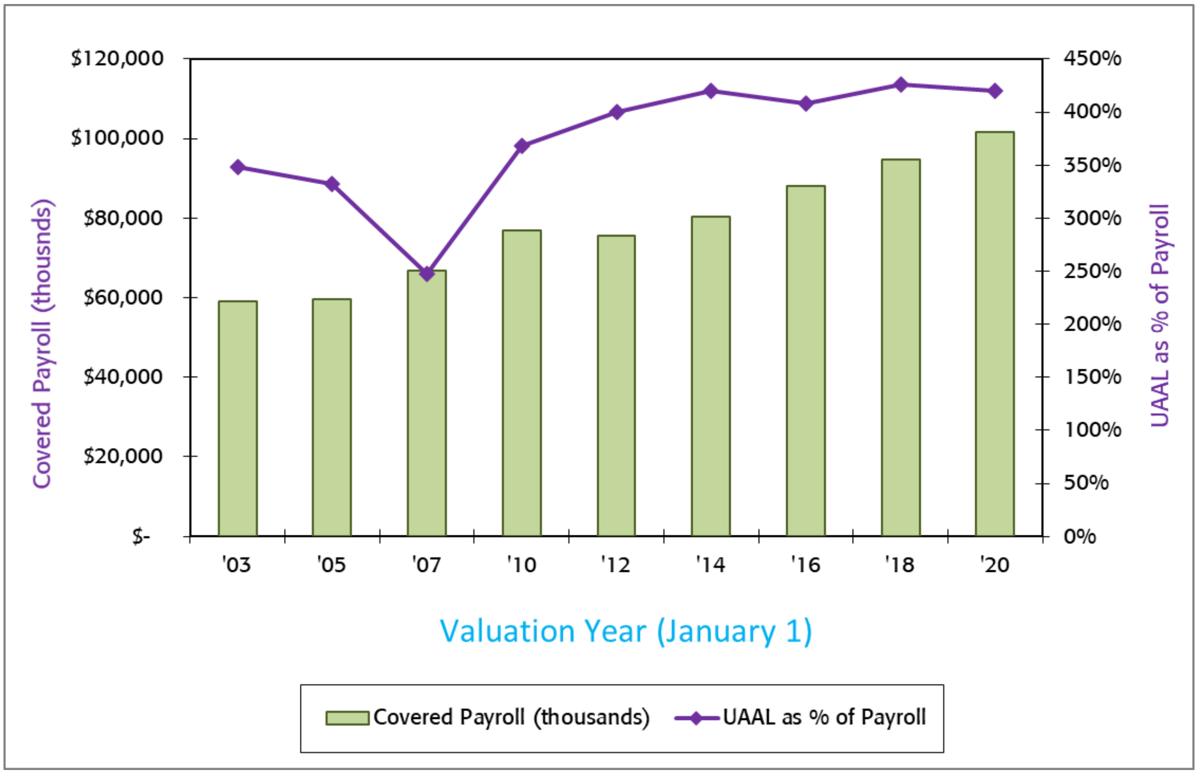
Valuation Year	Number	Average Age	Average Past Service	Average Ann'l Compensation
2020	1,546	49.3	12.4	$65,793
2018	1,494	49.3	12.6	$63,415
2016	1,416	49.6	13.0	$62,209
2014	1,356	49.7	13.4	$59,242
2012	1,324	49.7	13.6	$57,122
2010	1,419	49.1	12.5	$54,185
2007	1,426	47.4	11.3	$46,781
2005	1,339	47.0	11.4	$44,431
2003	1,384	46.9	11.8	$42,594
2001	1,459	47.8	12.8	$38,948

- Both employee age and service have begun to decrease in recent years, following years of increases. This pattern has appeared in the experience of several systems in the Commonwealth. Average annual compensation has grown by 68.9% (2.8% annually) over the past nineteen years.

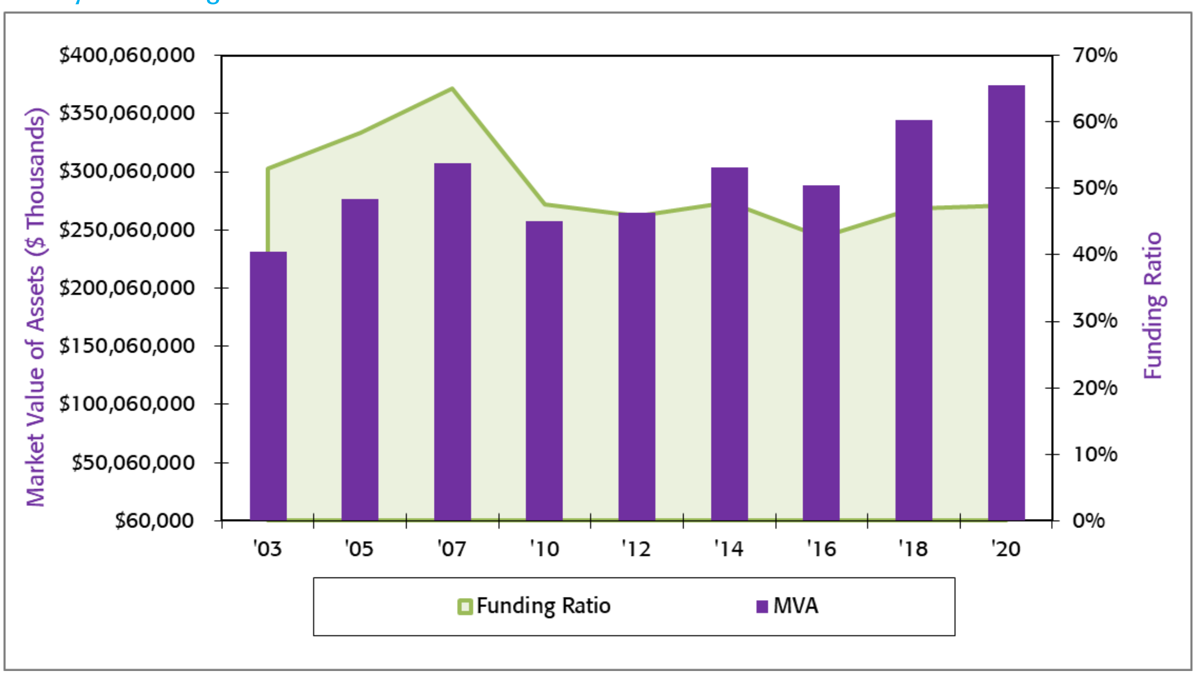
History of Assets and Unfunded Liability



History of Unfunded Liability and Covered Payroll

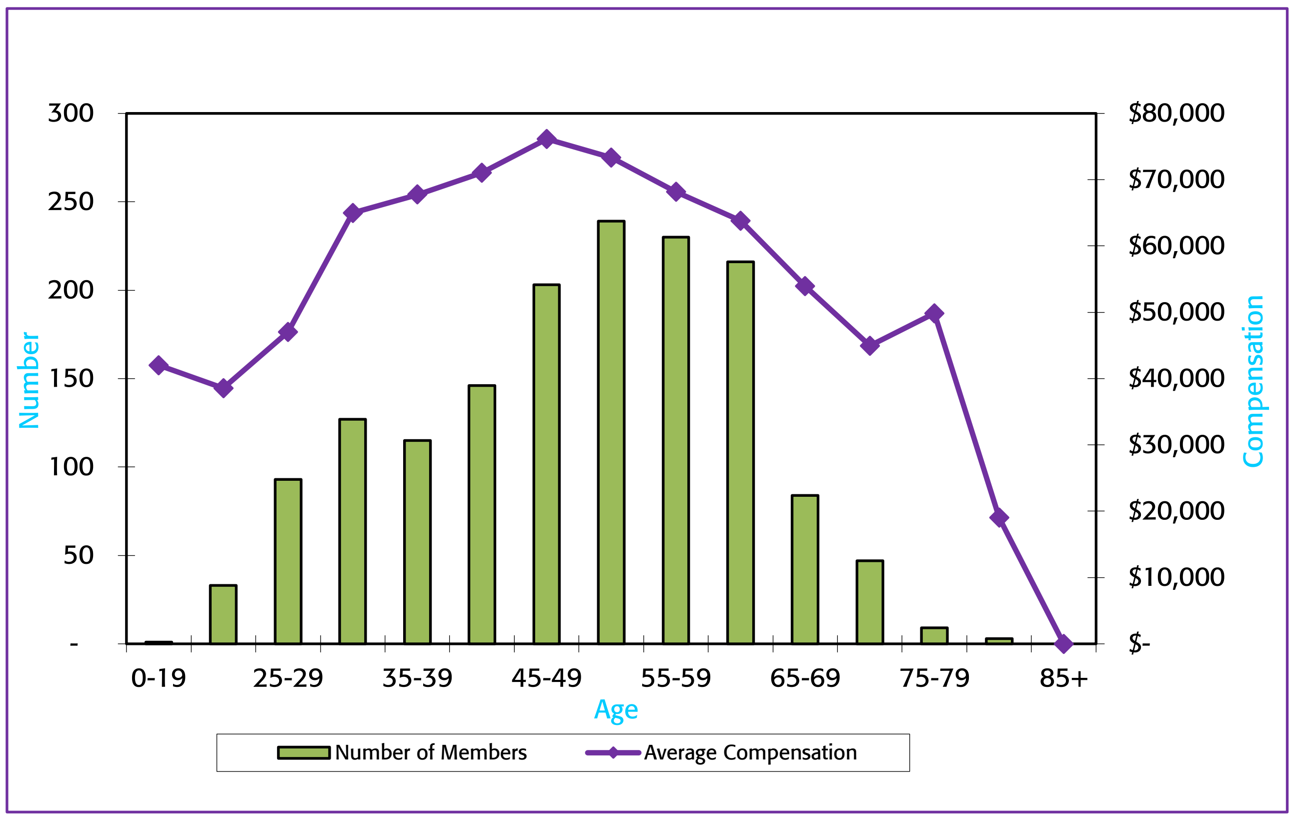


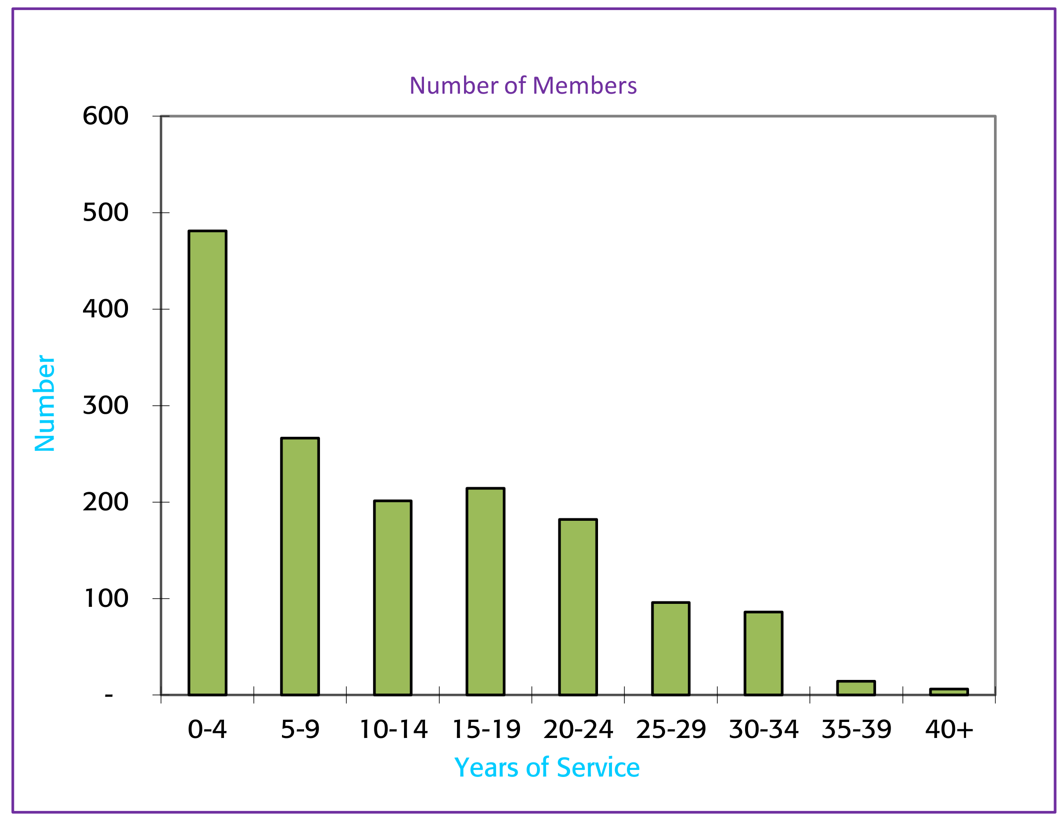
History of Funding Ratio based on Market Value of Assets



Distribution of Plan Members as of January 1, 2020
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	1	-	-	-	-	-	-	-	-	1	$ 42,014	$ 42,014
20-24	33	-	-	-	-	-	-	-	-	33	$ 1,272,080	$ 38,548
25-29	82	11	-	-	-	-	-	-	-	93	$ 4,373,651	$ 47,029
30-34	62	53	12	-	-	-	-	-	-	127	$ 8,253,966	$ 64,992
35-39	41	36	29	9	-	-	-	-	-	115	$ 7,792,166	$ 67,758
40-44	45	22	25	40	14	-	-	-	-	146	$ 10,371,350	$ 71,037
45-49	44	35	31	40	41	12	-	-	-	203	$ 15,456,569	$ 76,141
50-54	63	28	25	30	50	32	11	-	-	239	$ 17,529,051	$ 73,343
55-59	58	35	18	31	28	21	37	2	-	230	$ 15,687,849	$ 68,208
60-64	32	31	39	41	21	15	27	9	1	216	$ 13,787,022	$ 63,829
65-69	12	9	15	15	20	7	5	1	-	84	$ 4,531,495	$ 53,946
70-74	7	6	4	8	7	5	5	1	4	47	$ 2,113,545	$ 44,969
75-79	1	-	2	-	1	3	-	1	1	9	$ 448,617	$ 49,846
80-84	-	-	1	-	-	1	1	-	-	3	$ 57,041	$ 19,014
85+	-	-	-	-	-	-	-	-	-	-	$ -	$ -
TOTAL	481	266	201	214	182	96	86	14	6	1,546	$ 101,716,416	$ 65,793





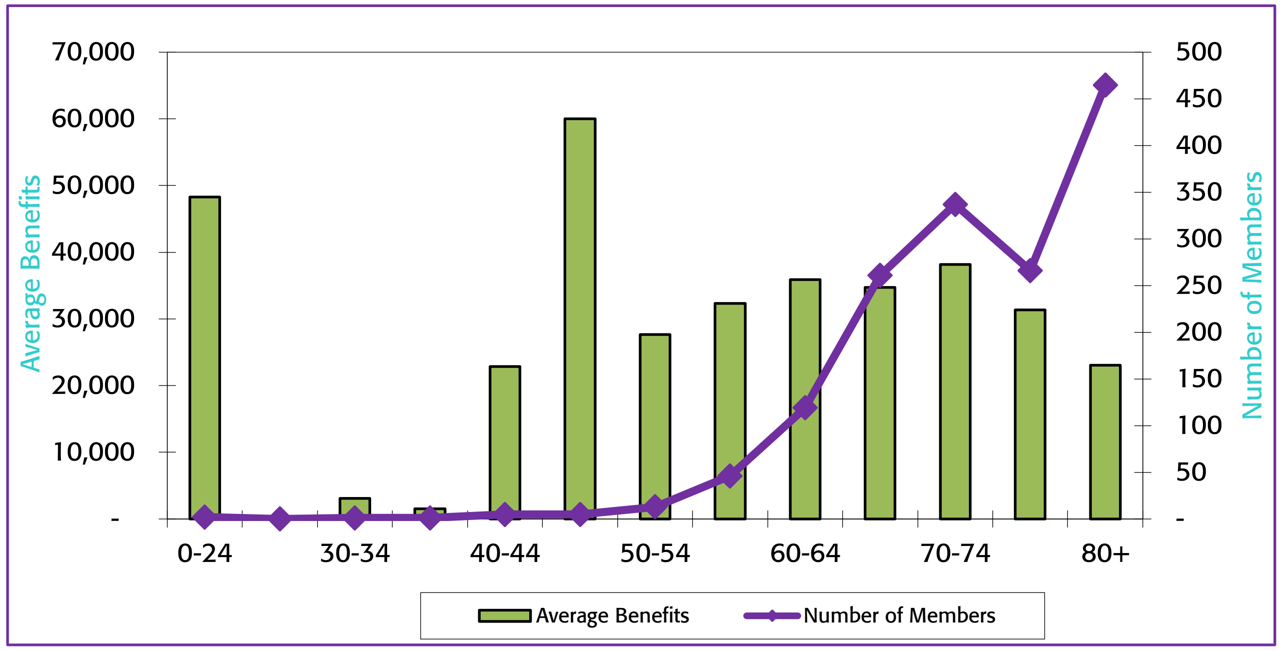
Distribution of Plan Members as of January 1, 2020

RETIRED MEMBERS

Retired Members and Beneficiaries			
Age	Number	Average Benefit	Total Benefit
0-24	2	48,272	96,544
25-29	-	-	-
30-34	1	3,120	3,120
35-39	1	1,506	1,506
40-44	3	13,452	40,355
45-49	-	-	-
50-54	6	18,870	113,221
55-59	29	23,649	685,829
60-64	100	32,261	3,226,138
65-69	230	32,529	7,481,590
70-74	310	36,912	11,442,812
75-79	239	30,545	7,300,221
80+	428	22,290	9,540,077
TOTAL	1,349	$ 29,601	$ 39,931,412

Disabled Members			
Age	Number	Average Benefit	Total Benefit
0-24	-	-	-
25-29	-	-	-
30-34	-	-	-
35-39	-	-	-
40-44	2	37,016	74,032
45-49	5	60,030	300,152
50-54	7	35,206	246,441
55-59	17	47,192	802,266
60-64	19	55,047	1,045,885
65-69	31	51,223	1,587,922
70-74	27	52,416	1,415,223
75-79	27	38,569	1,041,365
80+	37	31,830	1,177,706
TOTAL	172	$ 44,715	$ 7,690,994

Total			
Age	Number	Average Benefit	Total Benefit
0-24	2	48,272	96,544
25-29	-	-	-
30-34	1	3,120	3,120
35-39	1	1,506	1,506
40-44	5	22,877	114,387
45-49	5	60,030	300,152
50-54	13	27,666	359,662
55-59	46	32,350	1,488,096
60-64	119	35,899	4,272,023
65-69	261	34,749	9,069,512
70-74	337	38,154	12,858,035
75-79	266	31,359	8,341,586
80+	465	23,049	10,717,783
TOTAL	1,521	$ 31,310	$ 47,622,405



Benefits shown are net of State reimbursed COLA.

Appendix D – Glossary of Terms

- **Actuarial Accrued Liability**
  The portion of the Present Value of Benefits that is attributable to past service.

- **Actuarial Value of Assets**
  The value of assets based on the asset valuation method shown in the Actuarial Methods and Assumptions section of this report.

- **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.

- **Funding Ratio**
  The percentage of the accrued liability that is covered by the Actuarial Value of Assets.

- **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.

Disclosures

- Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as:
  - 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,
  - 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.

- Stone Consulting, Inc. was furnished member data by the Quincy Retirement System's administrative staff. Although examined under broad parameters for 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. With the assistance of the staff of the Quincy Retirement Board, we were able to develop a database sufficient for valuation purposes.

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

- Historically, 9% to 10% has been the expected long-term rate of return for equities, and 5% to 6% has been the expected long-term rate of return for fixed income securities. Many economists and investment professionals are projecting lower returns for equities and fixed income securities. In light of these projections, as well as historical investment returns, the 7.25% interest rate assumption is within the reasonable assumption range. We encourage close monitoring for changes in investment performance against expectations.

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

- All assumptions and methodologies were selected by the Quincy Retirement Board in conjunction with guidance provided by Stone Consulting, Inc.

- 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.

- The UAAL and funded ratio are measures of the plan's funded status. These measures reflect the plan's position as of January 1, 2020. 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.

PERAC Information Disclosure

The most recent actuarial valuation of the System was prepared by Stone Consulting, Inc. as of January 1, 2020

The normal cost for employees on that date was:	$9,567,914	9.4%	of payroll
The normal cost for the employer was:	$5,854,295	5.8%	of payroll

The actuarial liability for active members was:	$329,194,932
The actuarial liability for retired members was (includes inactives):	$459,226,126
Total actuarial accrued liability:	$788,421,058
System assets as of that date ($374,083,972 Market Value):	$361,711,746
Unfunded actuarial accrued liability:	$426,709,312

The ratio of system's assets to total actuarial liability was:	46%

As of that date the total covered employee payroll was:	$101,716,416

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

Investment Return:	7.25% per annum
Rate of Salary Increase:	Select and Ultimate (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)
1/1/2020	$361,712	$788,421	$426,709	46%	$101,716	420%
1/1/2018	$330,037	$733,469	$403,432	45%	$94,742	426%
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%