January 1, 2021

Actuarial Valuation Report

Melrose Retirement System

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

December 3, 2021

Melrose Retirement System
City Hall
562 Main Street
Melrose, MA 02176

To the Melrose Retirement Board:

Stone Consulting, Inc. has performed a January 1, 2021 actuarial valuation of the Melrose Retirement System. This valuation and report were 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.

Stone Consulting, Inc. is completely independent of the City of Melrose and the Melrose 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 Melrose or the Melrose Retirement System that would impair our independence, other than this or related assignments such as actuarial valuations of Other Post-Employment Benefits (OPEB).

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
Member, American Academy of Actuaries

Colin Edgar
Member, American Academy of Actuaries

TABLE OF CONTENTS

Report Summary

This report presents the results of the actuarial valuation of the Melrose Retirement System as of January 1, 2021. The valuation was performed at the request of the Retirement Board for the purpose of determining the contribution requirements for Fiscal Year 2023 and beyond.

Summary of Results and Experience

- Experience and Funding Schedule

  The funding appropriation for Fiscal Year 2023 is $6,867,798, which is $422,314 less than the projected contribution for FY2023 from the prior valuation, as of January 1, 2019, and $55,504 more than the FY2022 contribution. The length of the schedule is 15 years, which is consistent with the 15 years remaining from the 17-year schedule in the 2019 report. The full schedule is shown on page 3.

- Assumptions/methodology:

  Two assumptions were changed: the mortality assumption was updated and the discount rate was reduced from 7.50% to 7.25%. These changes increased the Actuarial Accrued Liability by $1.3 million in total.

  Assumptions and valuation methodology are discussed in Appendix A, starting on page 19.

Contribution requirements are based on the financial condition of the system as of December 31, 2020, as well as actuarial liability results, which are based on:

- 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, 2021);
- Economic assumptions regarding salary increases and investment earnings; and
- Other actuarial assumptions (e.g., withdrawals, retirement, death, etc.)

Format of the Report

- The funding schedule is shown on page 3, followed by an explanation of the actuarial results, funding schedule components, and a history of the funding schedules used by the System.
- Full actuarial valuation results are shown on page 18, with prior results included for comparison. The Melrose Retirement Board conducted their previous actuarial valuation effective January 1, 2019.

Development of Funding Schedule

The employer funding contribution consists of three parts:

- Net Normal Cost: this is the amount of liability generated by active employees earning another year of service, offset by employee contributions, and includes administrative expense.

- Amortization: this is the amount of the Unfunded Liability that will be paid off by this contribution.

- Net 3(8)(c) Payments: these are benefit payments made to other systems for service earned as a member of the Melrose Retirement System.

The appropriation for Fiscal 2023 is as follows:

Net Employer Normal Cost for Fiscal 2023 (including admin. expenses)	$	1,652,525
Net 3(8)(c) Payments		53,423
Amortization		5,161,850
Total Appropriation required for Fiscal 2023	$	6,867,798

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

- The schedule's length is fifteen (15) years which is consistent with the 15 years remaining from the 17-year schedule from the January 1, 2019 valuation. The maximum funding schedule length allowed by Section 22F of Chapter 32 of the Massachusetts General Laws is eighteen years to Fiscal 2040.

- Melrose's funding schedule was developed using an amortization increase rate of 4.00%. This means that in years following FY2023, the amount of liability amortized by the contribution is set to increase by 4.00% annually, compared to the $5,161,850 figure shown in the table above.

The schedule is shown on the following page.

MELROSE RETIREMENT SYSTEM

FUNDING SCHEDULE

Fiscal Year	Unfunded Liability	Net Normal Cost	Funding Amortization of UAAL	Amortization of Recognized Asset Loss/(Gain)	Net 3(8)(c) Payments	Schedule Contribution
2023	62,976,750	1,652,525	5,161,850	-	53,423	6,867,798
2024	62,006,481	1,726,889	5,368,324	-	53,423	7,148,635
2025	59,112,059	1,804,599	5,583,057	(150,032)	53,423	7,291,047
2026	57,570,763	1,885,806	5,806,379	(156,033)	53,423	7,589,575
2027	53,137,587	1,970,667	6,038,634	(431,064)	53,423	7,631,660
2028	50,975,942	2,059,347	6,280,180	(448,306)	53,423	7,944,643
2029	48,417,014	2,152,017	6,531,387	(466,238)	53,423	8,270,589
2030	45,422,375	2,248,858	6,792,642	(484,888)	53,423	8,610,036
2031	41,950,431	2,350,057	7,064,348	(504,283)	53,423	8,963,544
2032	37,956,167	2,455,809	7,346,922	(524,455)	53,423	9,331,699
2033	33,390,893	2,566,321	7,640,799	(545,433)	53,423	9,715,110
2034	28,201,953	2,681,805	7,946,431	(567,250)	53,423	10,114,409
2035	22,332,423	2,802,486	8,264,288	(589,940)	53,423	10,530,257
2036	15,720,786	2,928,598	8,594,860	(613,538)	53,423	10,963,343
2037	8,300,575	3,060,385	8,938,654	(638,079)	53,423	11,414,383
2038	(0)	3,198,103	-	-	53,423	3,251,525

Amortization of Unfunded Liability as of July 1, 2022

Year	Type*	Original Base	Original Amort. Amount	Percentage Increasing	Original # of Years	Current Amort. Amount	Years Remaining
2023	Fresh Start	62,976,750	5,161,850	4.00%	15	5,161,850	15
2025	Asset Gain	(1,632,364)	(150,032)	4.00%	13	-	13
2027	Asset Gain	(2,547,060)	(268,789)	4.00%	11	-	11

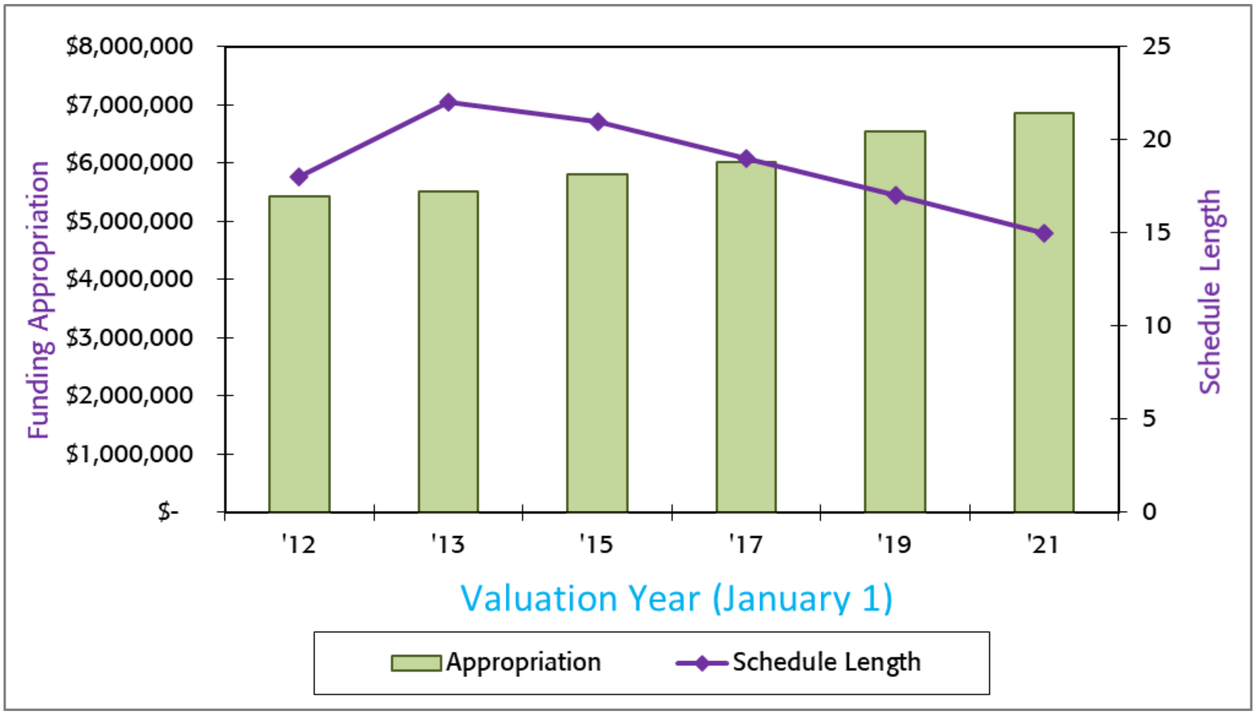
* Asset Gain/Loss is the amount recognized by the smoothing method in the year shown

Bases in the funding schedule:

- Fresh Start amortization of the unfunded liability: 15 years.
- Deferred recognition of assets gains and losses, recognized in the contributions over the course of the amortization period.

History of Funding Effort

Below is a history of the length of funding schedule used by the Melrose Retirement System, and the amount of the initial contribution for each funding schedule.

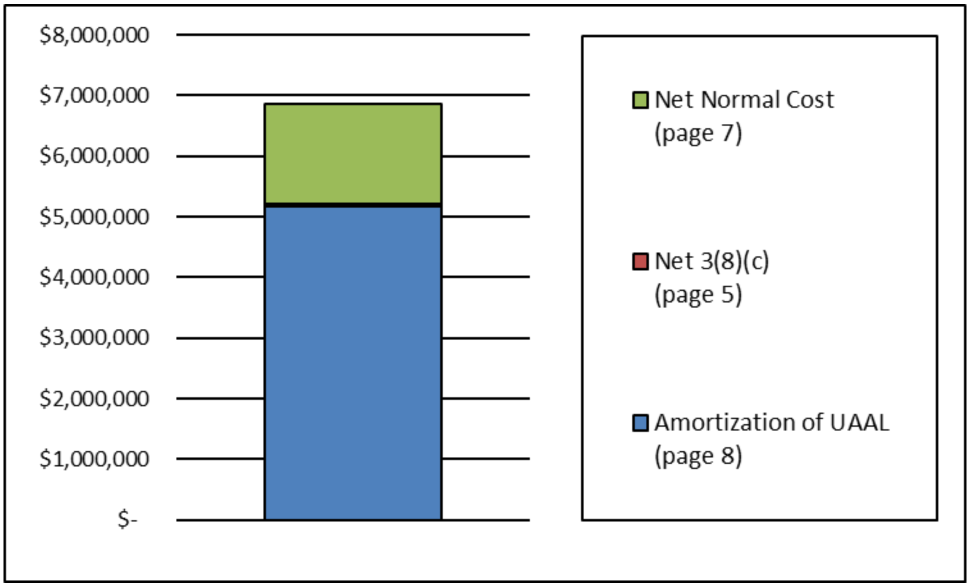


The funding objective of the plan is to fully fund the system while attempting to maintain a stable contribution amount for the upcoming fiscal year that is consistent with prior funding schedules or if employer finances allow it, to increase the contribution amount. This funding objective is being met.

The following pages discuss the components that make up the contribution, and how they are calculated from the actuarial results.

Components of Funding Appropriation

Components of the funding contribution are compared below, and discussed on the following pages.



Net 3(8)(c) Payments

- 3(8)(c) payments are benefits which the Melrose Retirement System pays to or receives from other retirement boards for service that a retiree had with a different retirement system.

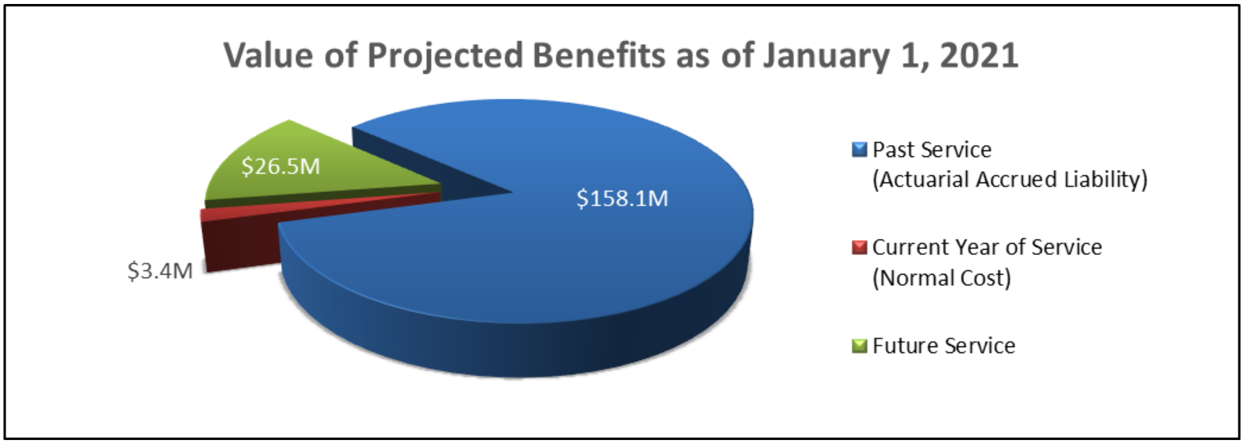
- The net amount is equal to what the Melrose Retirement System pays out, less what the MRS receives from other systems, based on the most recent PERAC annual statement:

3(8)(c) payments made to other systems	$ 328,542
3(8)(c) payments received from other systems	(275,119)
Net payments	$ 53,423

- For the funding schedule, the amount of net payments is assumed to remain level in future years.

Development of Actuarial Results

Actuarial liabilities are calculated based on benefits that members are projected to receive in the future. The value of projected benefits is divided between past service, future service, and the current year of service.



The actuarial funding method (in this case, entry age normal), assigns values to each of these periods of service.

- Past service: The Actuarial Accrued Liability (AAL), is the portion of the benefit value that is associated with past service; this can be thought of as the "price" of benefits already earned by members of the system.

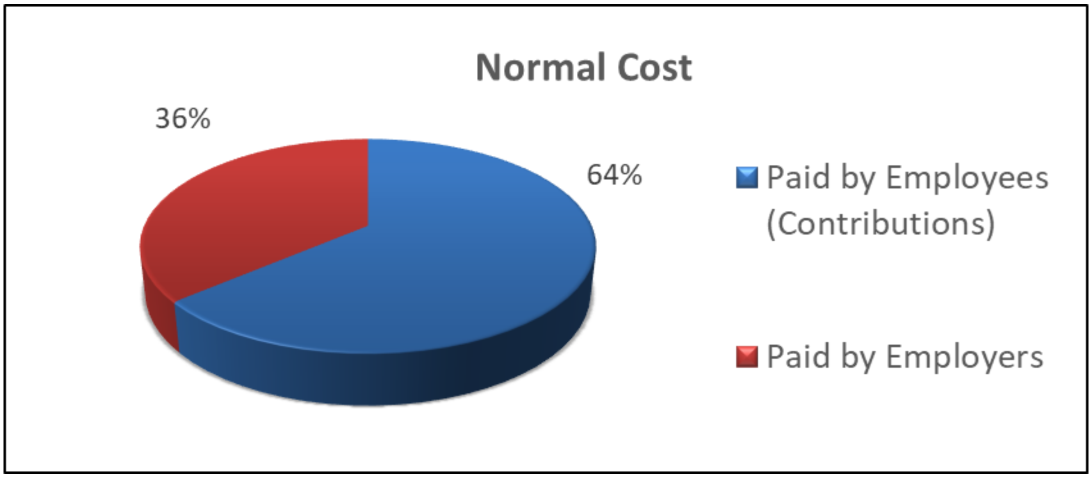
- Current year: The "price" of benefits being earned during the current year is referred to as the Normal Cost (NC). This includes only the actives, as neither inactives nor retirees are earning any additional service.

- Future service: The amount for future service is not included in the liability, as those years of service have not yet been earned.

For retirees, the "past service" amount accounts for the entire value of their benefits; they have completed their careers, and will earn no more service during the current year or any future years.

Net Normal Cost

The entire Normal Cost is not borne by the Employers; a significant portion is paid by employee contributions. The portion of the Normal Cost not covered by employee contributions is the amount that must be paid through funding appropriations; this is the Net Normal Cost.



The Net Normal Cost as seen in the funding schedule is calculated by adjusting for timing, and adding in the administrative expense. The calculation is shown below, and compared to the covered active payroll:

	January 1, 2021	% of Payroll*
Gross Normal Cost (GNC)	$ 3,412,962	15.0%
Employees Contribution	2,176,488	9.6%
Net Normal Cost (NNC)	$ 1,236,474	5.4%
Adjustment to beginning of Fiscal Year 2023**	84,394	
Administrative Expense	331,658	1.5%
Adjusted Net Normal Cost With Admin. Expense	$ 1,652,525	

* Payroll paid in 2020 for employees as of January 1, 2021 is $22,734,319. Payroll for new hires in 2020 was annualized.

** The NNC is adjusted from January 1, 2021 to Fiscal 2023 by rolling it forward with a payroll increase factor of 4.50%.

Unfunded Liability

The Unfunded Actuarial Accrued Liability (UAAL) is the portion of the AAL that is not covered by the value of the plan assets.

This is adjusted from the date of the valuation to the date of the contribution (July 1, 2022) to produce the Unfunded Liability seen in Fiscal Year 2023 in the funding schedule.

The liability results were as follows:

	January 1, 2021
Actuarial Accrued Liability	
a. Active Members	$ 62,025,488
b. Inactive Members	2,424,762
c. Retired Members and Beneficiaries	96,118,649
d. Total	$ 160,568,899
Unfunded Actuarial Accrued Liability	
a. Actuarial Accrued Liability	$ 160,568,899
b. Less Actuarial Value of Assets	99,443,158
c. Unfunded Actuarial Accrued Liability	$ 61,125,740
d. Adjustment to FY2023	1,851,010
e. Unfunded Actuarial Accrued Liability as of FY2023	$ 62,976,750

In developing the funding schedule, we used a "fresh start" approach in which the UAAL (not counting Early Retirement Incentives) is amortized from scratch instead of maintaining the existing amortization amount and separately amortizing gains and losses. <u>This can result in a schedule in which the changes in contribution amounts from year to year are more consistent.</u>

The UAAL and funding ratio are measures of the plan's funded status, which reflect the plan's position as of January 1, 2021. 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. However, we believe these measures, in conjunction with the plan's funding schedule, are appropriate for assessing the amount of future contributions.

Active Liability by Decrement

An active member can incur liabilities for the Retirement System in one of four ways:

- They can retire (if eligible),
- They can become disabled and collect a disability benefit,
- They can die, or
- They can terminate service and withdraw their ASF balance or receive a deferred retirement benefit

Active members have a portion of their liability associated with each of these four outcomes. The Accrued Liability for active members is divided as follows:

Active Actuarial Accrued Liability	
Superannuation Retirement	$ 56,354,611
Death	1,386,934
Disability	3,487,017
Withdrawal	796,926
TOTAL	$ 62,025,488

Demographic Results

Actives	
a. Number	406
b. Annual Compensation	$22,734,319
c. Average Annual Compensation	$55,996
d. Average Attained Age	46.5
e. Average Past Service	10.2
Retired, Disabled and Beneficiaries	
a. Number	397
b. Total Benefits (excluding State COLA)	$9,899,497
c. Average Benefits	$24,936
d. Average Age	74.1
Inactives	
a. Number	286

- Total compensation changed by 5.5% over the prior valuation (two years)
  - Average annual compensation changed by 10.7%
  - Salary gain of $786 thousand compared to projected experience

History of Demographic Statistics

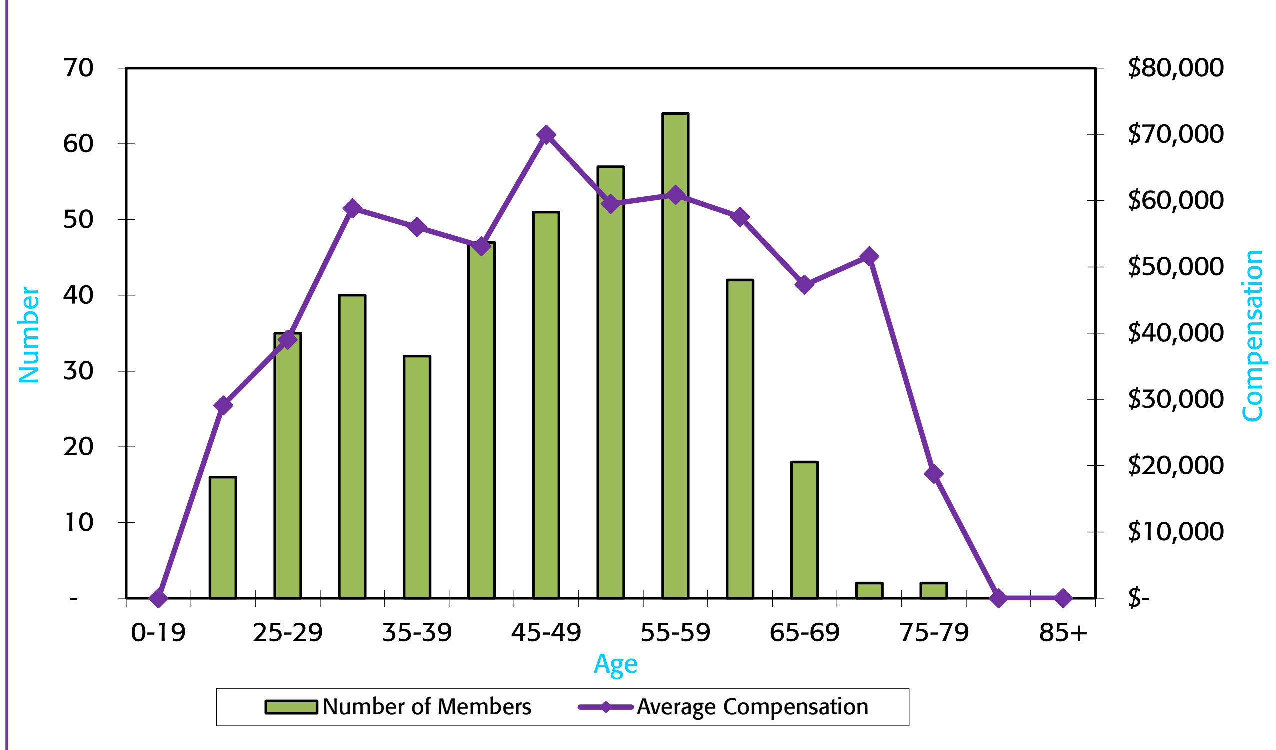
Valuation Year	Actives	Average Age	Average Past Service	Average Annual Pay
2021	406	46.5	10.2	$55,996
2019	426	46.2	10.0	$50,594
2017	428	47.9	11.0	$47,907
2015	432	48.0	11.1	$44,660
2013	427	48.5	10.8	$41,896
2012	423	48.4	10.5	$40,990
2010	412	48.1	10.1	$40,153
2008	433	47.5	9.9	$35,713

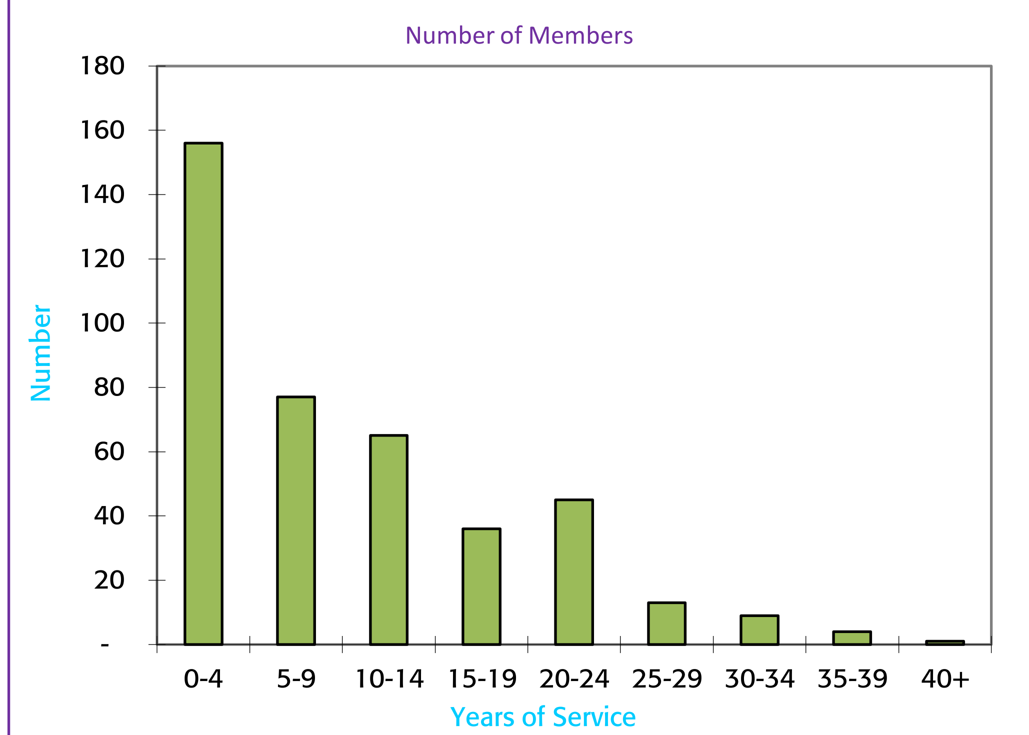
- Average annual compensation has grown by 56.8% (3.5% annually) over the past thirteen years.

Distribution of Plan Members as of January 1, 2021

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	16	-	-	-	-	-	-	-	-	16	$ 465,107	$ 29,069
25-29	31	4	-	-	-	-	-	-	-	35	$ 1,365,092	$ 39,003
30-34	19	17	4	-	-	-	-	-	-	40	$ 2,353,972	$ 58,849
35-39	15	8	8	1	-	-	-	-	-	32	$ 1,792,441	$ 56,014
40-44	24	10	6	7	-	-	-	-	-	47	$ 2,495,311	$ 53,092
45-49	17	7	7	8	12	-	-	-	-	51	$ 3,568,225	$ 69,965
50-54	12	8	15	5	10	5	2	-	-	57	$ 3,390,962	$ 59,491
55-59	15	10	11	8	11	4	3	2	-	64	$ 3,894,617	$ 60,853
60-64	5	7	10	7	5	4	3	1	-	42	$ 2,416,981	$ 57,547
65-69	1	3	4	-	7	-	1	1	1	18	$ 850,870	$ 47,271
70-74	1	1	-	-	-	-	-	-	-	2	$ 103,227	$ 51,614
75-79	-	2	-	-	-	-	-	-	-	2	$ 37,513	$ 18,757
80-84	-	-	-	-	-	-	-	-	-	-	$ -	$ -
85+	-	-	-	-	-	-	-	-	-	-	$ -	$ -
TOTAL	156	77	65	36	45	13	9	4	1	406	$ 22,734,319	$ 55,996





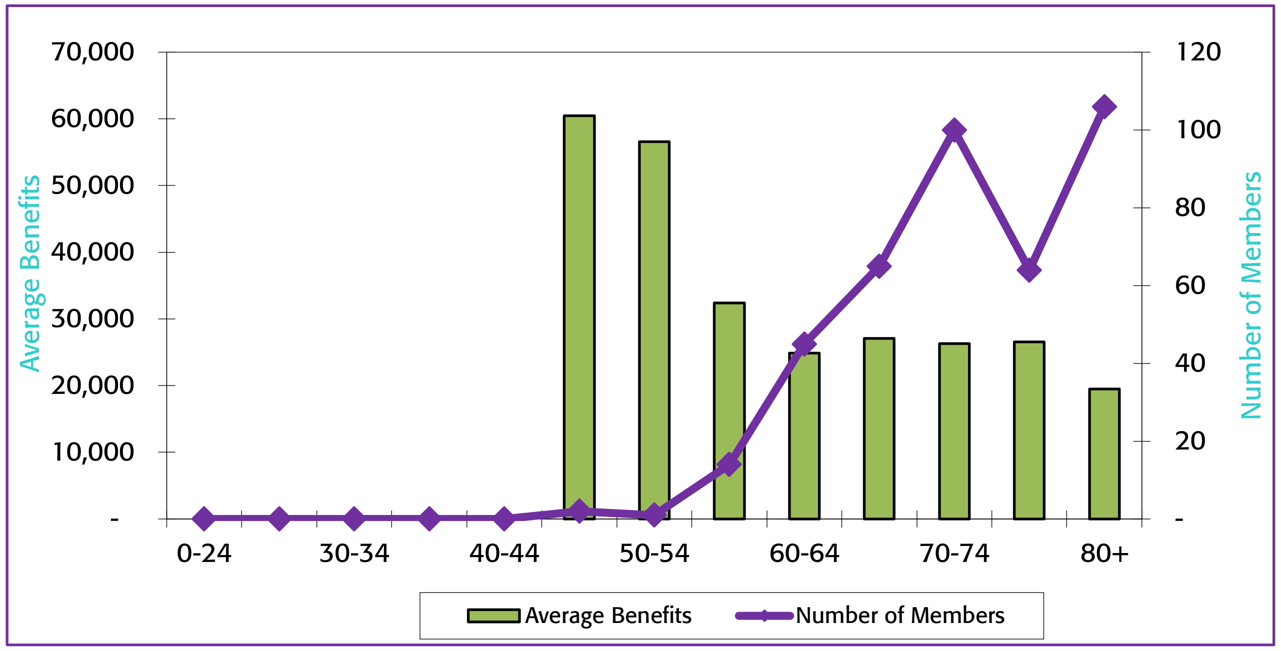
Distribution of Plan Members as of January 1, 2021

RETIRED MEMBERS

Retired Members and Beneficiaries			
Age	Number	Average Benefit	Total Benefit
0-24	-	-	-
25-29	-	-	-
30-34	-	-	-
35-39	-	-	-
40-44	-	-	-
45-49	-	-	-
50-54	-	-	-
55-59	12	31,469	377,633
60-64	43	24,752	1,064,357
65-69	59	26,589	1,568,775
70-74	85	24,346	2,069,424
75-79	61	26,029	1,587,750
80+	102	19,407	1,979,535
TOTAL	**362**	**$ 23,888**	**$ 8,647,474**

Disabled Members			
Age	Number	Average Benefit	Total Benefit
0-24	-	-	-
25-29	-	-	-
30-34	-	-	-
35-39	-	-	-
40-44	-	-	-
45-49	2	60,469	120,938
50-54	1	56,594	56,594
55-59	2	38,038	76,075
60-64	2	26,812	53,625
65-69	6	31,648	189,889
70-74	15	37,381	560,714
75-79	3	36,785	110,354
80+	4	20,959	83,835
TOTAL	**35**	**$ 35,772**	**$ 1,252,023**

Total			
Age	Number	Average Benefit	Total Benefit
0-24	-	-	-
25-29	-	-	-
30-34	-	-	-
35-39	-	-	-
40-44	-	-	-
45-49	2	60,469	120,938
50-54	1	56,594	56,594
55-59	14	32,408	453,708
60-64	45	24,844	1,117,982
65-69	65	27,056	1,758,664
70-74	100	26,301	2,630,138
75-79	64	26,533	1,698,104
80+	106	19,466	2,063,370
TOTAL	**397**	**$ 24,936**	**$ 9,899,497**



Benefits shown are net of State reimbursed COLA.

Assets

	Cash	$	5,099,981.55
	Pooled Alternative Investments		11,676.71
	PRIT Cash		71,032.87
	PRIT FUND		98,439,891.17
A	Sub-Total:	$	103,622,582.30
B	Sub-Total:	$	0.00
	Market Value of Assets [(A) + (B)]	$	103,622,582.30

- The asset allocation is approximately 20% fixed income, cash, receivables and payables and 80% equities, alternative investments, hedge funds and similar types of investments.

- Annual return in calendar years 2019-2020: 13.0% on market value of assets vs. a 7.50% assumption.
  - $9,611,653 net actuarial gain in Calendar Years 2019 and 2020

Actuarial Value of Assets

For its Actuarial Value of Assets (AVA), Melrose uses a five-year asset smoothing method which recognizes gains and losses over a five-year period. For example: for a gain in 2018, 20% would be recognized in 2019, and another 20% in 2020, 2021, and 2022; the final 20% would be recognized in 2023. The annual return over the past two years for the AVA is 7.82%.

The calculation of the smoothed asset value is shown on the following page.

Five-Year Asset Smoothing

1. Market value of assets including receivable/payable as of 01/01/2021 — $ 103,622,582

2. Phase-in of asset gains and losses

	Plan Year (1)	Original Amount (2)	Percent Unrecognized (3)	Amount Unrecognized (2) x (3)
a.	2020	$3,123,646	80%	$2,498,917
b.	2019	$6,488,007	60%	$3,892,804
c.	2018	($8,687,692)	40%	($3,475,077)
d.	2017	$6,313,899	20%	$1,262,780
e.	2016	($842,362)	0%	$0
f.	2015	($5,613,694)	0%	$0
g.	Total	($6,395,498)		$4,179,424

3. Valuation assets without corridor as of 01/01/2021 (1. - 2.g.) — $ 99,443,158

4. Corridor Check
   a. 90% of Market Value — $ 93,260,324
   b. 110% of Market Value — $ 113,984,841

5. Valuation assets with corridor as of 01/01/2021 (3. within Corridor) — $ 99,443,158

6. Calculation of return on valuation assets

   a. Valuation assets as of 01/01/2019 — $ 88,573,603

   b. ER contribs + EE contribs - Ben Pymts - Expenses — $ (3,255,453)

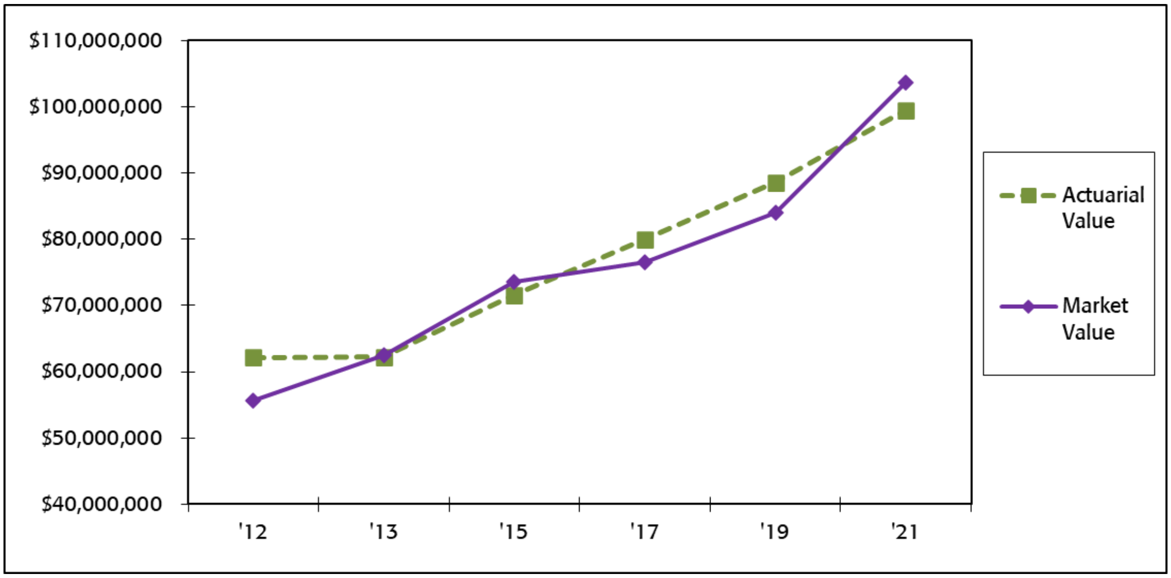
   c. Actual return on valuation assets 5. - (6.a. + 6.b.) — $ 14,125,009

   d. Weighted value of valuation assets — $ 86,945,876

   e. Return on valuation assets (6.c. / 6.d.) — 16.25%

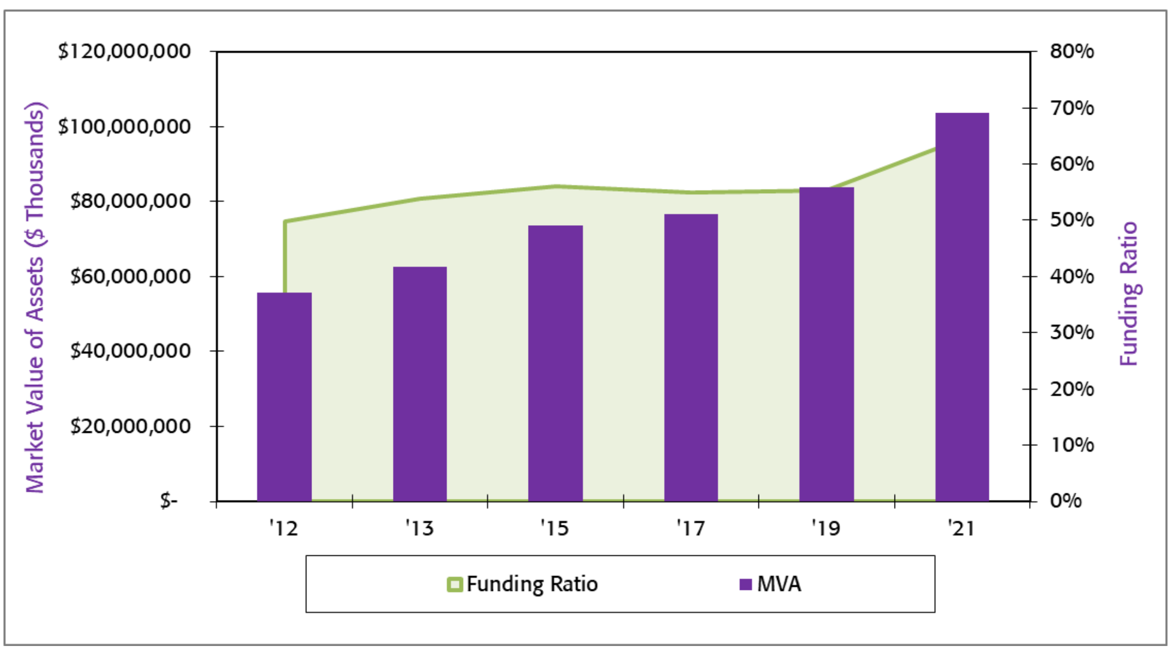
   f. Annualized return on (actuarial value of) assets — 7.82%

The benefit of using an asset smoothing method is that it results in a more stable value of the financial condition of the Plan. This is illustrated by the chart below, which displays a history of the Actuarial Value and Market Value of Assets over the past six valuations.



Funding Ratio

The following displays the history of the funding ratio for the past six valuations, based on Market Value of Assets. The Market Value for each year is shown to accompany the funding ratio. We show the market value of assets as that is the amount of assets actually available to pay for benefits.



Risk

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

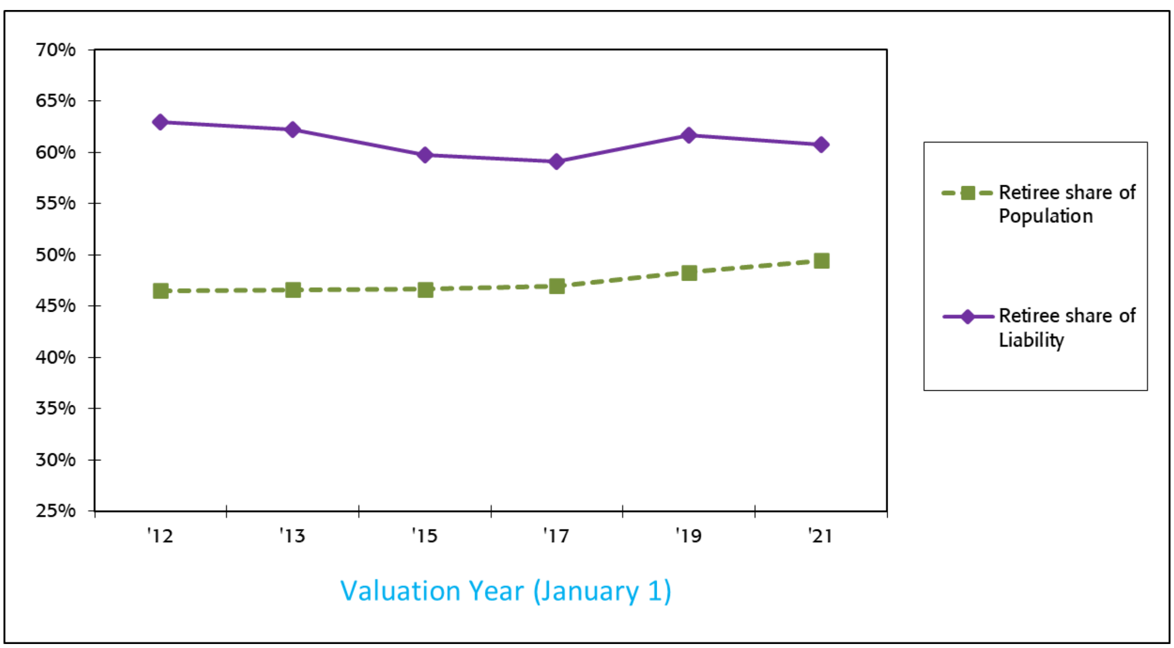
- Plan experience differing from that anticipated by the economic or demographic assumptions,
- Changes in economic or demographic assumptions,
- Increases or decreases expected as part of natural operation of the methodology used for these measurements such as additional contribution requirements based 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. GASB Statement 67 and 68 reports for the Melrose Retirement System contain alternate results to measure the impact of increases or decreases in the discount rate.

Maturity

One important concern is the maturity of the system. Systems with a greater portion of their liability stemming from current retirees whose benefits already being paid are likely to experience greater impact from short-term asset experience, as high payouts in the near future leave less of the current assets will be available to benefit from investment returns further in the future.

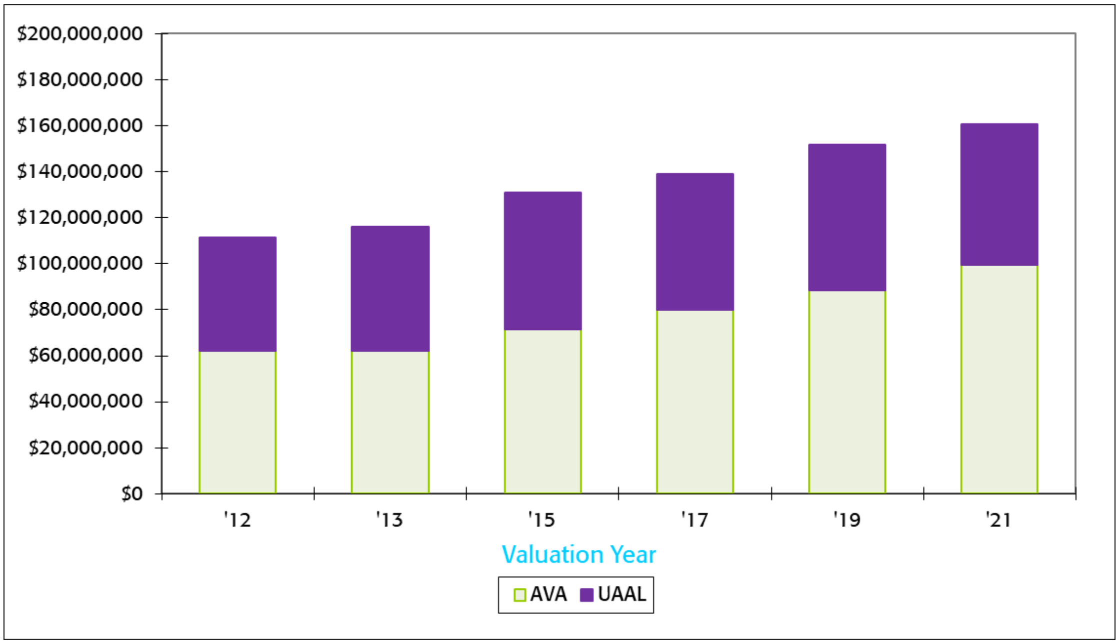
Below is a history of the retiree's percentage of the covered population and liability; both have been relatively stable over the course of the past six valuations.



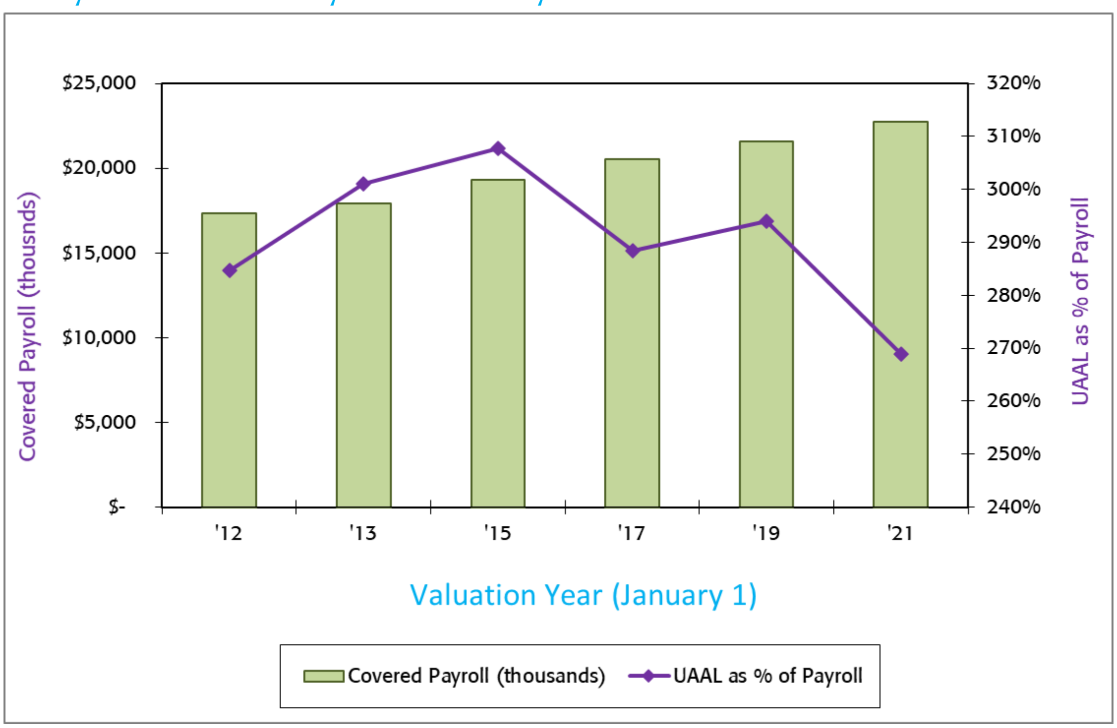
Historical Experience

The following charts display Melrose's history of Actuarial Assets and Unfunded Liability; the second chart compares the unfunded liability to covered payroll.

History of Assets and Unfunded Liability



History of Unfunded Liability and Covered Payroll



Comparative Results

	January 1, 2021	January 1, 2019	Percentage Change
Funding			
Contribution for Fiscal 2023	$6,867,798	$7,290,112	-5.8%
Members			
▪ Actives			
a. Number	406	426	-4.7%
b. Annual Compensation	$22,734,319	$21,553,090	5.5%
c. Average Annual Compensation	$55,996	$50,594	10.7%
d. Average Attained Age	46.5	46.2	0.8%
e. Average Past Service	10.2	10.0	1.8%
▪ Retired, Disabled and Beneficiaries			
a. Number	397	398	-0.3%
b. Total Benefits*	$9,899,497	$9,548,369	3.7%
c. Average Benefits*	$24,936	$23,991	3.9%
d. Average Age	74.1	74.4	-0.4%
▪ Inactives			
a. Number	286	219	30.6%
Normal Cost			
a. Total Normal Cost as of January 1, 2021	$ 3,412,962	$ 3,124,876	9.2%
b. Less Expected Members' Contributions	2,176,488	2,041,029	6.6%
c. Normal Cost to be funded by the Municipality	$ 1,236,474	$ 1,083,847	14.1%
d. Adjustment to July 1, 2022	84,394	73,977	14.1%
e. Administrative Expense Assumption	331,658	310,862	6.7%
f. Normal Cost Adjusted to July 1, 2022	$ 1,652,525	$ 1,468,686	12.5%
Actuarial Accrued Liability			
a. Active Members	$ 62,025,488	$ 57,490,026	7.9%
b. Inactive Members	2,424,762	1,978,165	22.6%
c. Retired Members and Beneficiaries	96,118,649	92,461,851	4.0%
d. Total	$160,568,899	$151,930,042	5.7%
Unfunded Actuarial Accrued Liability			
a. Actuarial Accrued Liability	$160,568,899	$151,930,042	5.7%
b. Less Actuarial Value of Assets	99,443,158	88,573,603	12.3%
c. Unfunded Actuarial Accrued Liability	$ 61,125,740	$ 63,356,439	-3.5%
d. Adjustment to FY2023	1,851,010	2,830,847	
e. Unfunded Actuarial Accrued Liability as of FY2023	$ 62,976,750	$ 66,187,286	

* Excluding State reimbursed COLA

APPENDICES

Appendix A – Actuarial Methods and Assumptions

All assumptions and methodologies were either set by statute or selected by the Melrose Retirement Board in conjunction with guidance provided by Stone Consulting, Inc.

Stone Consulting, Inc. was furnished member and financial data by the Melrose Retirement System's administrative staff. Although examined under broad parameters for reasonableness, the data was not audited by the actuary. With the assistance of the staff of the Melrose Retirement Board, we were able to develop a database sufficient for valuation purposes.

ASSUMPTION AND METHODOLOGY CHANGES SINCE PRIOR VALUATION

Two assumptions were changed from the prior valuation:

- Discount rate: this was reduced from 7.50% to 7.25%, increasing the accrued liability by $3.8 million
- Mortality: updating the mortality projection scale from MP-2016 to MP-2020 reduced the liability by $2.5 million

All other assumptions and methods were maintained from the prior valuation.

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. The use of the Entry Age Normal actuarial funding method is consistent with the requirements of Chapter 32 of the Massachusetts General Laws.

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 five years (shown on page 14). 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 2023. The unfunded actuarial accrued liability is rolled forward with normal cost and further adjusted by anticipated contributions and interest.

Actuarial Methods and Assumptions (Continued)

ACTUARIAL ASSUMPTIONS

Valuation Date

January 1, 2021.

Investment Return

7.25% per year net of investment expenses (previously 7.50%).

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

Cost-of-Living Increases

A 3% COLA on the first $12,000 of a member's retirement allowance is assumed to be granted every year.

Salary Increases

Select and Ultimate salary increases, based on occupation, union status, and years of credited service:

- Group 1 & 2, union: 5.5% in years 1-8; 5.75% in years 9-13; 3.75% in all other years
- Group 1 & 2, non-union: 4.5% in years 1-8; 4.75% in years 9-13; 3.75% in all other years
- Police: 7.9% in year 1; 7.6% in year 2; 5.3% in year 3; 5.75% in years 10, 15, and 20; 3.75% in all other years
- Fire: 7.8% in year 1; 7.5% in year 2; 8.5% in year 3; 3.75% in all other years

This is consistent with the prior valuation.

Step increases are assumed to be part of the salary increase assumption. The total payroll is assumed to increase at 4.50% per year. The salary increase assumption reflects prior experience including PERAC's 2002 local experience study, current expectations, and professional judgement.

Actuarial Methods and Assumptions (Continued)

Regular Interest Rate Credited to Annuity Savings Account

2% 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 $331,658 for the Fiscal Year 2023 is added to the Normal Cost. The administrative expense does not include investment manager and custodial fees. These fees are considered part of the discount 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.

In-Service Disability and Death

Both Disability and In-Service Death are assumed to be 45% ordinary and 55% accidental for Group 1 and 2, and 10% ordinary and 90% accidental for Group 4.

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%

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 and projected generationally with MP-2020 (sex-distinct). During employment the healthy employee mortality table is used. Post-employment the healthy annuitant table is used. The prior valuation used the same mortality table, projected using MP-2016.

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 $12,000 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 – 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.

PERAC Information Disclosure

The most recent actuarial valuation of the System was prepared by Stone Consulting, Inc. as of January 1, 2021

The normal cost for employees on that date was:	$2,176,488	9.6% of payroll
The normal cost for the employer was:	$1,236,474	5.4% of payroll

The actuarial liability for active members was:	$62,025,488
The actuarial liability for retired members was (includes inactives):	$98,543,411
Total actuarial accrued liability:	$160,568,899
System assets as of that date ($103,622,582.30 Market Value):	$99,443,158
Unfunded actuarial accrued liability:	$61,125,740

The ratio of system's assets to total actuarial liability was:	62%

As of that date the total covered employee payroll was:	$22,734,319

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

Investment Return:	7.25% 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)
1/1/2021	$99,443	$160,569	$61,126	62%	$22,734	269%
1/1/2019	$88,574	$151,930	$63,356	58%	$21,553	294%
1/1/2017	$80,014	$139,161	$59,147	57%	$20,504	288%
1/1/2015	$71,561	$130,950	$59,389	55%	$19,293	308%
1/1/2013	$62,208	$116,078	$53,870	54%	$17,889	301%