

City of Madison Heights
Police and Fire Retirement System
Actuarial Valuation Report
June 30, 2022



Table of Contents

Page	Items
--	Cover Letter
	<i>Basic Financial Objective and Operation of the Retirement System</i>
A-1	Financial Objective
A-3	Financing Diagram
	<i>Valuation Results</i>
B-1	Computed Contributions
B-2	Reserves, Assets, and Unfunded Actuarial Accrued Liabilities
B-3	Derivation of Experience Gain (Loss)
B-4	Summary Statement of System Resources and Obligations
B-5	Comparative Statement
B-6	Comments, Recommendation and Conclusion
B-8	Other Observations
B-9	Risk Measures Summary
	<i>Summary of Benefit Provisions and Valuation Data</i>
C-1	Summary of Benefit Provisions
C-3	Retired Life Data
C-6	Inactive Vested Member Data
C-7	Active Member Data
C-10	Asset Information
C-11	Development of Funding Value of Retirement System Assets
	<i>Summary of Actuarial Cost Method and Assumptions</i>
D-1	Actuarial Cost Method
D-2	Actuarial Assumptions
D-7	Miscellaneous and Technical Assumptions
D-8	Glossary



December 8, 2022

Retirement Board
City of Madison Heights Police
and Fire Retirement System
Madison Heights, Michigan

Dear Board Members:

The results of the June 30, 2022 Annual Actuarial Valuation of the City of Madison Heights Police and Fire Retirement System are presented in this report.

This report was prepared at the request of the Board and is intended for use by the Retirement System and those designated or approved by the Board. This report may be provided to parties other than the System only in its entirety and only with the permission of the Board. GRS is not responsible for unauthorized use of this report.

The purposes of this valuation are to measure the System's funding progress and to determine the employer contribution rate for the fiscal year ending June 30, 2024. This report should not be relied on for any purpose other than the purposes described herein. Determinations of financial results, associated with the benefits described in this report, for purposes other than those identified above may be significantly different.

The contribution rate in this report is determined using the actuarial assumptions and methods disclosed in Section D of this report. This report includes risk metrics on page B-9 but does not include a more robust assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment.

This valuation assumed the continuing ability of the plan sponsor to make the contributions necessary to fund this plan. A determination regarding whether or not the plan sponsor is actually able to do so is outside our scope of expertise and was not performed.

The findings in this report are based on data and other information through June 30, 2022. This valuation was based upon information furnished by the System, concerning the Retirement System's benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal reasonability and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided.

This report was prepared using assumptions adopted by the Board. All actuarial assumptions used in this report are reasonable for the purposes of this valuation. All actuarial assumptions and methods used in the valuation follow the guidance in the applicable Actuarial Standards of Practice. Additional information about the actuarial assumptions is included in the section of this report entitled Summary of Actuarial Cost Method and Assumptions.


This report was prepared using our proprietary valuation model and related software which, in our professional judgment, has the capability to provide results that are consistent with the purposes of the valuation and has no material limitations or known weaknesses. We performed tests to ensure that the model reasonably represents that which is intended to be modeled.

This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. To the best of our knowledge, the information contained in this report is accurate and fairly presents the actuarial position of the City of Madison Heights Police and Fire Retirement System as of the valuation date. All calculations have been made in conformity with generally accepted actuarial principles and practices, with the Actuarial Standards of Practice issued by the Actuarial Standards Board, and with applicable statutes.

The signing actuaries are independent of the plan sponsor.

Gabriel, Roeder, Smith & Company will be pleased to review this valuation report with the Board of Trustees and to answer any questions pertaining to the valuation.

Respectfully submitted,
Gabriel, Roeder, Smith & Company



Brad Lee Armstrong, ASA, EA, FCA, MAAA



Jamal Adora, ASA, EA, MAAA

BLA/JA:dj

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SECTION A

BASIC FINANCIAL OBJECTIVE AND OPERATION OF THE RETIREMENT SYSTEM

Basic Financial Objective and Operation of the Retirement System

Benefit Promises Made Which Must Be Paid For. A retirement system is an orderly means of handing out, keeping track of, and financing contingent pension promises to a group of employees. As each member of the retirement system acquires a unit of service credit each member is, in effect, handed an "IOU" which reads: "The Employees Retirement System promises to pay you one unit of retirement benefits, payments in cash commencing when you retire."

The principal related financial question is: When shall the money required to cover the "IOU" be contributed? This year, when the benefit of the member's service is received? Or, some future year when the "IOU" becomes a cash demand?

The constitution of the State of Michigan is directed to the question:

"Financial benefits arising on account of service rendered in each fiscal year shall be funded during that year and such funding shall not be used for financing unfunded accrued liabilities."

Section 9(2) of Act 345 is also directed to the question:

"Sec. 9(2). - - - For the purpose of creating and maintaining a fund for the payment of the pensions and other benefits payable hereunder the said city, village or municipality, subject to the provisions of this act, shall appropriate, at the end of such regular intervals as may be adopted, quarterly, semi-annually, or annually, an amount sufficient to maintain actuarially determined reserves covering pensions payable or which might be payable on account of service performed and to be performed by active members and pensions being paid retired members and beneficiaries - - - ."

This retirement system meets this constitutional requirement by having as its **financial objective to establish and receive contributions, expressed as percents of active member payroll, which will remain approximately level from year-to-year** and will not have to be increased for future generations of taxpayers.

Translated into actuarial terminology, a level percent-of-payroll contribution objective means that the contribution rate must be at least:

Normal Cost (the current value of benefits likely to be paid on account of members' service being rendered in the current year)

... plus ...

Interest on the Unfunded Actuarial Accrued Liability (the difference between the actuarial accrued liability and current system assets)

... plus ...

Payment on the Unfunded Actuarial Accrued Liability (principal payments shall be determined using an amortization period of 30 years or less).

While this may meet a level percent-of-payroll contribution objective for an open plan, regular consideration should be given to increasing payments on the Unfunded Actuarial Accrued Liability until 100% funded status is reached.

A by-product of the level percent-of-payroll contribution objective is the accumulation of invested assets for varying periods of time. **Invested assets are a by-product of level percent-of-payroll contributions, not the objective.** Investment income becomes a major contributor to the retirement system and the amount is directly related to the amount of contributions and investment performance.

If contributions to the retirement system are less than the preceding amount, the difference, plus investment earnings not realized thereon, will have to be contributed at some later time, or, benefits will have to be reduced, to satisfy the fundamental fiscal equation under which all retirement programs must operate; that is:

$$B = C + I - E$$

The aggregate amount of **B**enefit payments to any group of members and their beneficiaries cannot exceed the sum of:

The aggregate amount of **C**ontributions received on behalf of the group

... plus ...

Interest earnings on contributions received and not required for immediate payment of benefits

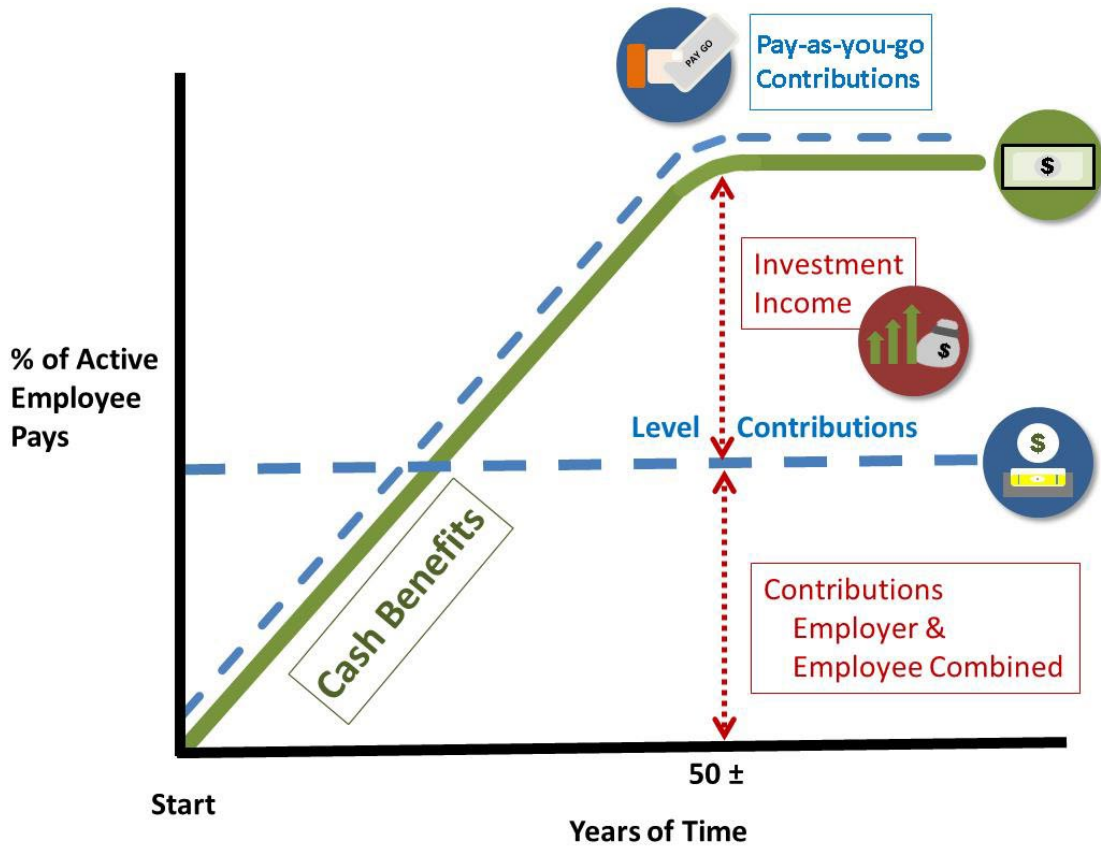
... minus ...

The **E**xpenses of operating the program.

There are retirement systems designed to defer the bulk of contributions far into the future. Lured by artificially low present contributions, the inevitable consequence of a relentlessly increasing contribution rate -- to a level greatly in excess of the level percent-of-payroll rate -- is ignored.

This method of financing is prohibited in Michigan by the state constitution.

Computed Contribution Rate Needed to Finance Benefits. From a given schedule of benefits and from the data furnished, the actuary calculates the contribution rate by means of an actuarial valuation - the technique of assigning monetary values to the risks assumed in operating a retirement system.



CASH BENEFITS LINE. This relentlessly increasing line is the fundamental reality of retirement plan financing. It happens each time a new benefit is added for future retirements (and happens regardless of the design for contributing for benefits).

LEVEL CONTRIBUTION LINE. Determining the level contribution line requires detailed assumptions concerning a variety of experiences in future decades, including:

- **Economic Risk Areas**
 - Rates of investment return
 - Rates of pay increase
 - Changes in active member group size
- **Non-Economic Risk Areas**
 - Ages at actual retirement
 - Rates of mortality
 - Rates of withdrawal of active members (turnover)
 - Rates of disability

SECTION B

VALUATION RESULTS

City's Computed Contributions for the Fiscal Year Beginning July 1, 2023

Contributions for	Contributions Expressed as Percents of Annual Pay					
	Department Heads	Police		Fire		Totals
		Command	Other	Command	Other	
NORMAL COST						
Age and service pensions	22.06 %	19.79 %	15.34 %	17.65 %	15.59 %	16.91 %
Disability pensions	0.98	1.23	1.41	1.32	1.48	1.36
Death pensions	<u>0.22</u>	<u>0.17</u>	<u>0.15</u>	<u>0.20</u>	<u>0.15</u>	<u>0.16</u>
Totals	23.26	21.19	16.90	19.17	17.22	18.43
MEMBERS' CONTRIBUTIONS						
Gross contributions	8.90	8.90	8.49	8.01	6.90	8.14
Less prospective refunds	<u>0.52</u>	<u>0.64</u>	<u>0.64</u>	<u>0.40</u>	<u>0.35</u>	<u>0.53</u>
Available for pensions	8.38	8.26	7.85	7.61	6.55	7.61
CITY'S NORMAL COST	14.88	12.93	9.05	11.56	10.67	10.82
UNFUNDED ACTUARIAL ACCRUED LIABILITIES*						
Retirees and beneficiaries						21.37
Active members						<u>27.52</u>
Totals						48.89
CITY'S TOTAL CONTRIBUTION (PENSIONS)						59.71 %
Administrative and Investment Expenses						7.60 %
CITY'S TOTAL CONTRIBUTION (PENSIONS & EXPENSES)						67.31 %

Retiree health insurance costs are not included in this report.

* Financed as a level percent-of-payroll over a closed period of 22 years.



Reserves, Assets, and Unfunded Actuarial Accrued Liabilities

In determining the actuarial accrued liabilities, the funding value of assets, \$46,873,248 were distributed as shown at the bottom of the page. Please see page C-10 for information concerning the reporting of assets, and page C-11 for the development of the Funding Value of Assets.

Reserve for	Reserves Allocated on a MVA Basis to		Reported Reserves Totals
	Active Member & Terminated Vested Actuarial Accrued Liabilities	Retired Life Actuarial Liabilities	
Employees Contributions	\$ 7,344,272		\$ 7,344,272
Employer Contributions	(32,458,585)	\$ 54,362,270	21,903,685
Retired Benefit Payments		14,072,310	14,072,310
Undistributed Investment Income			
Totals *	\$ (25,114,313)	\$ 68,434,580	\$ 43,320,267

* As reported.

The actuarial accrued liabilities were reduced by the Funding Value of Assets to determine the unfunded actuarial accrued liabilities as follows:

	Retired Lives	Active & Term. Vested Members	Totals
Computed Actuarial Accrued Liabilities	\$ 68,434,580	\$ 23,284,480	\$ 91,719,060
Funding Value of Assets (4-yr. smoothed market value)	46,873,248	0	46,873,248
Unfunded Actuarial Accrued Liabilities	\$ 21,561,332	\$ 23,284,480	\$ 44,845,812



Derivation of Experience Gain (Loss) Year Ended June 30, 2022

Actual experience will never (except by coincidence) coincide exactly with assumed experience. It is hoped that aggregate gains and losses will cancel each other over a period of years, but sizeable year-to-year fluctuations are common. Detail on the derivation of the experience gain (loss) is shown below, along with a year-by-year comparative schedule.

	Total
(1) UAAL* at start of year	\$ 44,393,018
(2) Employer normal cost from the last valuation	672,324
(3) Actual employer contributions	3,910,244
(4) Interest accrual: $[(1) + 1/2 [(2) - (3)]] \times .0675$	2,887,249
(5) Expected UAAL before changes: (1) + (2) - (3) + (4)	44,042,347
(6) Change from the benefit provision application	-
(7) Change from the revised actuarial assumptions and methods	-
(8) Expected UAAL after changes: (5) + (6) + (7)	44,042,347
(9) Actual UAAL at end of year	44,845,812
(10) Gain (loss): (8) - (9)	(803,465)
(11) Actuarial accrued liability at the start of the year	91,573,936
(12) Gain (loss) as a percent of actuarial accrued liabilities at start of year	(0.9)%

* *Unfunded Actuarial Accrued Liabilities.*

Valuation Date June 30,	Experience Gain (Loss) as % of Beginning Accrued Liability
	Total
2013	(1.5) %
2014	(2.3)
2015	(4.6)
2016	(2.3)
2017	(3.8)
2018	(1.7)
2019	(0.8)
2020	0.3
2021	2.9
2022	(0.9)



Summary Statement of Retirement System Resources and Obligations

Present Resources and Expected Future Resources*

A. Present valuation assets:	
1. Net assets from Retirement System financial statements	\$ 43,320,267
2. Market value adjustment	3,552,981
3. Valuation assets	<u>46,873,248</u>
B. Actuarial present value of expected future employer contributions:	
1. For normal costs	5,807,817
2. For unfunded actuarial accrued liability	44,845,812
3. Total of (1) + (2)	<u>50,653,629</u>
C. Actuarial present value of expected future member contributions	4,564,452
D. Total present and expected future resources	<u>\$ 102,091,329</u>

* Does not include administrative and investment expenses.

Actuarial Present Value of Expected Future Benefit Payments

A. To retirees and beneficiaries	\$ 68,434,580
B. To vested terminated members	2,344,995
C. To present active members:	
1. Allocated to service rendered prior to valuation date - actuarial accrued liability	20,939,485
2. Allocated to service likely to be rendered after valuation date	10,372,269
3. Total	<u>31,311,754</u>
D. Total actuarial present value of expected future benefit payments	<u>\$ 102,091,329</u>



Comparative Statement

Valuation Date June 30	Fiscal Year	Actuarial Accrued Liabilities & Reserves	Funding Value of Assets	Funded Ratio	Unfunded Actuarial Accrued Liabilities & Reserves			City's Contribution Rate		
					Dollars	Amortiz. Period	% of Payroll	Percents	Dollars	
									Recommended	Actual
2002 #	03-04	\$50,633,078	\$49,200,870	97.2 %	\$ 1,432,208	13	22.3 %	17.31 %	\$1,113,946	\$1,221,459
2003 #	04-05	51,665,535	48,919,496	94.7	2,746,039	12	43.5	20.49	1,292,438	1,513,225
2004 *#	05-06	56,133,839	48,976,377	87.2	7,157,462	20	102.4	23.15	1,618,638	1,656,681
2005	06-07	57,733,862	49,887,362	86.4	7,846,500	19	110.3	23.86	1,697,809	1,794,618
2006 @	07-08	59,879,584	51,533,008	86.1	8,346,576	25	118.2	22.88	1,615,365	1,745,795
2007	08-09	61,959,805	55,004,366	88.8	6,955,439	25	96.3	21.90	1,581,304	1,625,338
2008 *	09-10	61,187,814	57,130,630	93.4	4,057,184	25	53.4	17.48	1,327,971	1,589,770
2009 @	10-11	63,175,083	56,156,781	88.9	7,018,302	30	93.6	18.82	1,411,463	1,391,859
2010	11-12	63,161,498	54,888,388	86.9	8,273,110	30	120.9	19.92	1,363,478	1,240,859
2011 #	12-13	65,466,348	51,374,542	78.5	14,091,806	30	234.5	22.72	1,365,401	1,338,103
2012	13-14	67,929,700	47,691,751	70.2	20,237,949	30	356.5	27.82	1,711,368	1,566,747
2013 **	14-15	67,745,324	48,067,300	71.0	19,678,024	30	335.4	24.99	1,588,802	1,408,153
2014 @	15-16	70,493,480	49,322,706	70.0	21,170,774	30	380.7	27.94	1,683,896	1,698,569
2015 *#	16-17	78,426,714	47,383,538	60.4	31,043,176	29	587.7	39.35	2,252,379	2,473,172
2016 *	17-18	77,750,883	45,546,957	58.6	32,203,926	28	586.4	41.10	2,393,830	2,698,592
2017 *	18-19	81,945,548	44,678,218	54.5	37,267,330	27	673.5	48.04	2,809,141	3,262,859
2018 *	19-20	83,976,488	42,974,487	51.2	41,002,001	26	766.1	54.40	3,065,746	3,166,522
2019 *	20-21	90,142,843	43,297,793	48.0	46,845,050	25	815.5	59.68	3,596,592	3,923,348
2020	21-22	91,106,124	43,903,038	48.2	47,203,086	24	796.8	59.10	3,673,090	3,910,244
2021 **	22-23	91,573,936	47,180,918	51.5	44,393,018	23	717.1	54.70	3,569,689	
2022	23-24	91,719,060	46,873,248	51.1	44,845,812	22	791.4	59.71	3,606,957	

* Revised actuarial assumptions and methods.

** Changes in the application of the benefit provisions.

Retirement System was amended.

@ Amortization policy of Unfunded Actuarial Accrued Liabilities was changed.

The Ratio of Funding Value of Assets to Actuarial Accrued Liabilities is a traditional measure of a system's funding progress. Except in years when the system is amended or actuarial assumptions are revised, this ratio can be expected to increase gradually toward 100%, although this trend can be interrupted by experience losses.

The Ratio of Unfunded Actuarial Accrued Liabilities to Valuation Payroll is another relative index of condition. Unfunded actuarial accrued liabilities represent debt, while active member payroll represents the system's capacity to collect contributions to pay toward the debt. The lower the ratio, the greater the financial strength and vice-versa.



Comments, Recommendation and Conclusion

Comment A: The overall actuarial experience was less favorable than anticipated as shown on page B-3 due to investment experience on the basis of the Funding Value of Assets, retirees living longer than expected and more retirements than assumed. The losses were partially offset by lower salary increases among active members than expected. Market performance from 2019 to 2022 was smoothed over four years by the Board’s use of an asset smoothing technique for the purpose of adding more stability to the City’s contribution rate. The Funding Value of Assets are currently higher than the market value of assets. The contribution rate in this valuation would increase from 59.71% to 63.81% of payroll (excluding expenses) if it were based on a market value basis. Unrecognized losses in investment return from 2022 are scheduled to be recognized in coming valuations, putting upward pressure on contribution rates. However, portions of favorable returns from 2021 are scheduled to be recognized in the coming 2023 and 2024 valuations, which will somewhat offset this pressure.

Comment B: This report does not reflect service purchases that occurred after the valuation date. Those purchases will be reflected for reports with a June 30, 2023 measurement date. The service purchases were calculated to result in no cost to the system. Accordingly, we believe that they will not materially impact the Unfunded Actuarial Accrued Liability (UAAL) measured on June 30, 2023.

Comment C: A 22-year closed amortization period was used for this valuation. Historical funded ratios are shown on page B-5. As of June 30, 2022, the Retirement System’s funded ratio was 51.1% compared to 51.5% as of June 30, 2021. On a market value basis, the funded ratio would be 47.2% compared to 56.8% last year.

Comment D: The ratio of the Funding Value of Assets to the market value of assets is 108.2%. Over time, this ratio is intended to stay near 100%. However, highly volatile markets can create distortions in this ratio. The Board may wish to establish a “corridor” around the market value of assets such as 80% to 120%, so that the Funding Value of Assets does not deviate from the market value of assets by an unreasonably large amount. This is currently not a problem, which may make this an opportune time for the Board to consider taking actions.

Comment E: The retiree liability is only 68.5% funded. In addition, the amortization period (currently 22 years) exceeds the average expected future lifetime of the current retired members (which is approximately 20 years). We recommend that the Board consider lowering the amortization period for at least the portion of the unfunded liability attributable to retiree liability. For comparison, the table below provides the computed contribution rates if the unfunded retiree liabilities were to be amortized over a shorter time period.

Amortization Period		
Unfunded Retiree Liability	Unfunded Remaining Liability	Contribution Rate
10 years	22 years	77.52%
15	22	66.57%
20	22	61.17%
22	22	59.71%

Based on the current funding policy, the retiree liabilities are projected to be fully funded in 15 years and the Retirement System is projected to be 60% funded in 12 years.



Comments, Recommendation and Conclusion

Comment F: This valuation does not include funding requirements for retiree health care benefits (this is submitted in a separate report).

Comment G: Under Public Act 202 of 2017, beginning July 1, 2018, an actuarial experience study shall be conducted at least every 5 years. This will require an experience study to be performed prior to the issuance of the next valuation report. We look forward to working with the Board to assist with this requirement.

Conclusion: The City's contributions (member contributions are additional) to the City of Madison Heights Police and Fire Retirement System, for the fiscal year beginning July 1, 2023, have been computed to be 59.71% of active member payroll for pensions with an additional 7.60% for administrative and investment expenses.

It is the actuary's opinion that the required contribution rates determined by this actuarial valuation are sufficient to meet the Retirement System's funding objective, presuming the ongoing financial viability of the plan sponsor.

We are concerned about potential cash flow problems for the Retirement System. This is complicated by the Annuity Withdrawal provisions causing large disbursements over short periods of time. The assets in the Plan are not sufficient to cover current retiree liabilities and the ratio of assets (Market Value) to retiree benefit payroll is about seven. This means that approximately seven years of retiree benefit payments can be paid from current assets; the ability to make such payments beyond that period is heavily dependent upon future contributions and future investment return. Please take the time to read pages B-8, B-9, and B-10 which cover in more detail the risks the System is exposed to and the limits of what is within our control.

Other Observations

General Implications of Contribution Allocation Procedure or Funding Policy on Future Expected Plan Contributions and Funded Status

Given the plan's contribution allocation procedure, if all actuarial assumptions are met (including the assumption of the plan earning 6.75% on the Funding Value of Assets), it is expected that:

- 1) The unfunded actuarial accrued liabilities will be fully amortized after 22 years;
- 2) The funded status of the plan will increase gradually towards a 100% funded ratio; and
- 3) The unfunded accrued liability will increase for an extended period before beginning to decline. This is particularly true when the plan sponsor is contributing on a percent-of-payroll basis and there is no payroll growth.

Limitations of Funded Status Measurements

Unless otherwise indicated, a funded status measurement presented in this report is based upon the actuarial accrued liability and the Funding Value of Assets. Unless otherwise indicated, with regard to any funded status measurements presented in this report:

- 1) The measurement is inappropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations, in other words, of transferring the obligations to an unrelated third party in an arm's length market value type transaction.
- 2) The measurement is dependent upon the actuarial cost method which, in combination with the plan's amortization policy, affects the timing and amounts of future contributions. A funded status measurement in this report of 100% is not synonymous with no required future contributions. If the funded status were 100%, the plan would still require future normal cost contributions (i.e., contributions to cover the cost of the active membership accruing an additional year of service credit).
- 3) The measurement would produce a different result if the market value of assets were used instead of the Funding Value of Assets, unless the market value of assets is used in the measurement.

Limitations of Project Scope

Actuarial standards do not require the actuary to evaluate the ability of the plan sponsor or other contributing entity to make required contributions to the plan when due. Such an evaluation was not within the scope of this project and is not within the actuary's domain of expertise. Consequently, the actuary performed no such evaluation.

Risks to Future Employer Contribution Requirements

There are ongoing risks to future employer contribution requirements to which the Retirement System is exposed, such as:

- Actual and Assumed Investment Rate of Return
- Actual and Assumed Mortality Rates
- Amortization Policy



Risk Measures Summary (\$ in Thousands)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Actuarial	Market	Market		Market	Retiree	RetLiab /	AAL /	Assets /
Valuation	Accrued	Market	Value	Valuation	Funded	Liabilities	AAL	Payroll	Payroll
Date	Liabilities	Value of	Unfunded	Payroll	Ratio	(RetLiab)	(6)/(1)	(1)/(4)	(2)/(4)
(6/30)	(AAL)	Assets	AAL		(2)/(1)				
2012	\$ 67,930	\$ 45,299	\$ 22,631	\$ 5,677	66.7%	\$ 41,542	61.2%	1196.6%	797.9%
2013	67,745	45,451	22,294	5,867	67.1%	41,556	61.3%	1154.7%	774.7%
2014	70,493	49,685	20,808	5,562	70.5%	43,345	61.5%	1267.4%	893.3%
2015	78,427	45,922	32,505	5,282	58.6%	51,644	65.8%	1484.8%	869.4%
2016	77,751	41,606	36,145	5,492	53.5%	54,304	69.8%	1415.7%	757.6%
2017	81,946	42,365	39,581	5,533	51.7%	58,239	71.1%	1481.0%	765.7%
2018	83,976	42,665	41,311	5,352	50.8%	61,722	73.5%	1569.1%	797.2%
2019	90,143	43,441	46,702	5,744	48.2%	64,092	71.1%	1569.3%	756.3%
2020	91,106	42,711	48,395	5,924	46.9%	64,794	71.1%	1537.9%	721.0%
2021	91,574	52,001	39,573	6,191	56.8%	64,300	70.2%	1479.1%	839.9%
2022	91,719	43,320	48,399	5,666	47.2%	68,435	74.6%	1618.8%	764.6%

- (5)** The funded ratio is the most widely known measure of a plan's financial strength, but the trend in the funded ratio is much more important than the absolute ratio. The funded ratio should trend to 100%. As it approaches 100%, it is important to re-evaluate the level of investment risk in the portfolio and potentially to re-evaluate the assumed rate of return.
- (6) and (7)** The ratio of Retiree liabilities to total accrued liabilities gives an indication of the maturity of the system. As the ratio increases, cash flow needs increase, and the liquidity needs of the portfolio change. A ratio on the order of 50% indicates a maturing system.
- (8) and (9)** The ratios of liabilities and assets to payroll gives an indication of both maturity and volatility. Many systems have ratios between 500% and 700%. Ratios significantly above that range may indicate difficulty in supporting the benefit level as a level % of payroll.

Risk Measures Summary (\$ in Thousands)

Valuation Date (6/30)	(10) Portfolio Standard Deviation*	(11) Standard Deviation as % of Pay	(12) Unfunded AAL/Payroll	(13) Non-Investment Cash Flow (NICF)	(14) NICF / Assets (13)/(2)	(15) Market Rate of Return	(16) 5-Year Trailing Geometric Average
2012			398.6%	\$ (2,227)	-4.9%	5.4%	-0.8%
2013			374.1%	(2,227)	-4.5%	5.4%	1.1%
2014			615.4%	(2,266)	-4.9%	14.7%	8.2%
2015	14.7%	111.4%	658.1%	(3,757)	-9.0%	0.0%	6.4%
2016	12.6%	96.5%	715.4%	(3,853)	-9.1%	-1.1%	4.7%
2017	14.1%	112.4%	771.9%	(3,221)	-7.5%	10.0%	5.6%
2018	13.8%	110.0%	771.9%	(3,243)	-7.6%	8.7%	6.3%
2019	13.2%	99.8%	813.1%	(1,849)	-4.3%	6.3%	4.7%
2020	13.0%	93.7%	816.9%	(2,065)	-4.8%	3.1%	5.3%
2021	12.2%	102.5%	639.2%	(1,178)	-2.3%	24.9%	10.3%
2022	12.2%	93.3%	854.2%	(2,519)	-5.8%	-12.1%	5.5%

* Standard deviation of expected 1-year return based on the System's asset allocation and capital market assumptions shared with us by various investment consultants.

- (10) and (11)** The portfolio standard deviation measures the volatility of investment return. When multiplied by the ratio of assets to payroll it gives the effect of a one standard deviation asset move as a percent of payroll. This figure helps users understand the difficulty of dealing with investment volatility and the challenges volatility brings to sustainability. This ratio is likely to increase as the plan approaches full funding.
- (12)** The ratio of unfunded liability to payroll gives an indication of the plan sponsor's ability to actually pay off the unfunded liability. A ratio above approximately 300% or 400% may indicate difficulty in discharging the unfunded liability within a reasonable time frame.
- (13) and (14)** The ratio of Non-Investment Cash Flow to assets is an important measure of sustainability. Negative ratios are common and expected for a maturing system. In the longer term, this ratio should be on the order of approximately 4%. A ratio that is significantly more negative than that for an extended period could be a leading indicator of potential exhaustion of assets.
- (15) and (16)** Investment return is probably the largest single risk that most systems face. The year-by-year return and the 5-year geometric average both give an indication of the reasonableness of the system's assumed return. Of course, past performance is not a guarantee of future results. Market rate shown is based on actuarial estimation method and may differ from figures provided by the System's investment consultant.

SECTION C

SUMMARY OF BENEFIT PROVISIONS AND VALUATION DATA

Brief Summary of Act 345 Benefit Provisions (June 30, 2022)

Eligibility	Amount
Service Retirement	
<p>Members hired after 7/1/2009 (excluding Dept. Heads) Age 55 with 15 or more years of service or age 60 with 10 years of service.</p>	<p>Straight life pension equals 2.0% (2.5% if member has at least 25 years of service for all members or age 60 with 10 years of service for Fire Fighters (including Command)) of 3-year Average Final Compensation (AFC) times the first 25 years of service plus 1.0% of AFC times years of service in excess of 25 years.</p>
<p>Dept. Heads before 7/1/2019 and Other Members hired before 7/1/2009 25 or more years of service regardless of age or age 60 with 10 years of service.</p>	<p>Straight life pension equals 2.0% (2.8% if member has at least 25 years of service for all members or age 60 with 10 years of service for Fire Fighters (including Command)) of 3-year AFC times first 25 years of service plus 1.0% of AFC times years of service in excess of 25 years.</p>
<p>Department Heads promoted into the bargaining unit after July 1, 2019 have benefits as provided in the Police Command or Fire Fighters contract.</p>	
Deferred Retirement	
<p>10 or more years of service.</p>	<p>Computed as service retirement but based upon service, AFC and benefits in effect at termination. Benefit begins at the date retirement would have occurred had the member remained in employment.</p>
<p>Members hired on or after July 1, 2009 who leave the City prior to age 55 but with more than 10 years of service, are not eligible to draw their pension until age 60.</p>	
Death after Retirement Survivor's Pension	
<p>Payable to a surviving spouse, if any, upon the death of a retired member who was receiving a straight life pension which was effective July 1, 1975 or later.</p>	<p>Spouse's pension equals 60% of the straight life pension the deceased retiree was receiving.</p>
Non-Duty Death-in-Service Survivor's Pension	
<p>Payable to a surviving spouse, if any, upon the death of a member with 20 or more years of service.</p>	<p>Accrued straight life pension actuarially reduced in accordance with an Option I election.</p>
Duty Death-in-Service Survivor's Pension	
<p>Payable upon the expiration of Workers' Compensation to the survivors of a member who died in the line of duty.</p>	<p>Same amount that was paid by Workers' Compensation.</p>



Brief Summary of Act 345 Benefit Provisions (June 30, 2022)

Eligibility

Amount

Non-Duty Disability

Payable upon the total and permanent disability of a member with 5 or more years of service.

To earliest projected service retirement eligibility:
1.5% of AFC times years of service.

At earliest projected service retirement eligibility:
Same as Service Retirement Pension.

Duty Disability

Payable upon the total and permanent disability of a member in the line of duty.

To earliest projected service retirement eligibility:
50% of AFC.

At earliest projected service retirement eligibility:
Same as Service Retirement Pension with service credit from the date of disability to projected age of retirement eligibility.

Member Contributions

Fire Fighters (including Command): 8.90% if hired before 7/1/2009 and 6.90% if hired after 7/1/2009

Police (non-Command): 8.90% if hired before 7/1/2019 and 6.90% if hired after 7/1/2019

Police Command: 8.90% if hired before 7/1/2019 and 6.90% if hired after 7/1/2019

Department Heads: 8.90% if in the union prior to 7/1/2019 and benefits as provided in the Police Command or Fire Fighters contract if promoted into the union after 7/1/2019

Annual Interest Earned on Member Contributions

Department Heads: 3.50% if in the union prior to 7/1/2019

All others: 0.00% effective 1/1/2020

Annuity Withdrawal

Members retiring with 25-years of service may elect to receive a refund of accumulated contributions including interest. Upon election, the members pension is reduced by the actuarial equivalent of the refunded contributions. Actuarial equivalence is based on the Merrill Lynch Bond Index available at retirement.

Frozen Contributions Available for Annuity Withdrawal

Department Heads in the union prior to July 1, 2019 do not have a frozen amount.

Department Heads promoted into the union after July 1, 2019 have benefits as provided in the Police Command or Fire Fighters contract.

Police Command: For member in the union as of July 1, 2019 the amount is frozen as of June 30, 2022.

All other members have an amount that was frozen prior to the valuation date.

Effective July 1, 2019, annuity withdrawal was eliminated for new hires.



Retirees and Beneficiaries Added to and Removed from Rolls Comparative Statement

Year Ended June 30	Added to Rolls		Removed from Rolls		Rolls End of Year				% Incr. in		Present Value of Pensions
	No.	Annual Pensions	No.	Annual Pensions	No.	Active Per Retired	Annual Pensions		Annual Pensions	Average Pension	
							Dollars	% of Pay			
2003	3	\$ 122,791	2	\$ 15,098	102	1.0	\$ 2,914,931	46.2 %	3.8 %	\$ 28,578	\$ 31,583,764
2004	4	99,475	3	76,875	103	1.0	2,937,531	42.0	0.8	28,520	31,928,907
2005	1	23,232	3	79,834	101	1.0	2,880,929	40.5	(1.9)	28,524	30,919,712
2006	3	170,036	1	3,880	103	0.9	3,047,085	43.2	5.8	29,583	32,399,560
2007	2	93,031	4	83,266	101	0.9	3,056,850	42.3	0.3	30,266	32,176,238
2008	5	78,960	4	114,827	102	0.9	3,020,983	39.8	(1.2)	29,617	30,142,812
2009	3	82,044	1	25,502	104	0.9	3,077,525	41.0	1.9	29,592	30,340,870
2010	5	142,333	4	104,122	105	0.8	3,115,736	45.5	1.2	29,674	30,412,190
2011	12	634,045	2	32,757	115	0.7	3,717,024	61.9	19.3	32,322	37,300,027
2012	7	440,833	2	27,202	120	0.6	4,130,655	72.8	11.1	34,422	41,541,931
2013	4	195,238	4	148,883	120	0.6	4,177,010	71.2	1.1	34,808	41,555,510
2014	4	223,638	0	0	124	0.5	4,400,648	79.1	5.4	35,489	43,344,843
2015	11	483,755	4	73,399	131	0.5	4,811,004	91.1	9.3	36,725	51,643,558
2016	8	401,007	4	108,444	135	0.5	5,103,567	92.9	6.1	37,804	54,304,406
2017	6	300,680	0	0	141	0.5	5,404,247	97.7	5.9	38,328	58,238,711
2018	8	361,468	3	101,965	146	0.5	5,663,750	105.8	4.8	38,793	61,722,141
2019	1	14,104	1	23,507	146	0.5	5,654,347	98.4	(0.2)	38,728	64,091,619
2020	8	218,553	4	115,196	150	0.5	5,757,704	97.2	1.8	38,385	64,793,630
2021	4	109,154	3	97,246	151	0.5	5,769,611	93.2	0.2	38,209	64,300,299
2022	9	403,331	2	33,966	158	0.5	6,138,976	108.3	6.4	38,854	68,434,580



Retirees and Beneficiaries as of June 30, 2022 Tabulated by Type of Pensions Being Paid

Type of Pensions Being Paid	Number	Annual Pensions
Age and Service Pensions		
Regular pensions - benefit terminating at death of retiree	20	\$ 651,219
Regular pensions - automatic 60% to spouse	87	4,436,701
Regular pension - survivor	33	606,828
Option 1 pension	1	55,531
Option 2 pension - modified joint and survivor benefit	<u>0</u>	<u>0</u>
Total age and service pensions	141	\$ 5,750,279
Casualty Pensions		
Duty disability pensions	5	\$ 144,800
Non-duty disability pensions	3	89,570
Duty disability pension - survivor	4	47,019
Non-duty disability pension - survivor	0	0
Duty death pension - survivor	2	57,600
Non-duty death pensions - survivor	<u>3</u>	<u>49,708</u>
Total casualty pensions	<u>17</u>	<u>\$ 388,697</u>
Total Pensions Being Paid	158	\$ 6,138,976

Retirees and Beneficiaries as of June 30, 2022 Tabulated by Attained Ages

Attained Ages	No.	Annual Pensions
34	1	\$ 43,116
41	1	14,484
47	1	59,886
48	1	35,858
50	1	67,375
51	3	87,461
52	2	120,610
53	4	154,470
54	2	96,118
55	2	68,746
56	7	425,632
57	7	417,663
58	4	148,770
59	8	344,952
60	5	281,834
61	4	228,663
62	2	138,958
63	4	171,206
64	5	252,079
65	1	46,523
66	4	208,823
67	7	310,922
68	11	453,400
69	1	46,462
70	2	80,491
71	1	44,864
72	3	130,693
73	8	264,097
74	2	106,335
75	2	60,041
76	5	182,851
77	3	79,520
79	6	122,736
80	7	190,866
81	3	87,324
82	5	93,156
83	1	33,474
84	3	103,689
85	5	144,166
87	2	42,659
88	2	20,567
89	1	10,819
90	2	33,045
91	2	25,764
92	2	37,053
93	1	8,783
98	1	9,458
99	1	2,514
Totals	158	\$ 6,138,976



Vested Terminated Members as of June 30, 2022*

Tabulated by Attained Ages

Attained Ages	No.	Estimated Annual Pensions
40	1	\$ 21,903
43	1	16,518
47	2	65,046
49	1	39,909
50	1	17,054
57	1	36,724
Totals	7	\$ 197,154

* Includes members currently on leave of absence from service.

Active Members Included in Valuation by Division

Division	No.	Valuation Payroll	Average Pay
Police - Command	12	\$1,230,434	\$102,536
- Other	33	2,133,103	64,639
Fire - Command	8	708,719	88,590
- Other	21	1,360,045	64,764
Department Heads	2	234,184	117,092
Totals	76	\$5,666,485	\$ 74,559

Active Members Added to and Removed from Rolls

Year Ended June 30	Number Added During Year		Terminations										Active Members End of Year
			Normal Retirement		Disabled		Died-in-Service		Withdrawal				
	A	E	A	E	A	E	A	E	A	A	A	E	
2003	1	2	2	0.6	0	0.2	0	0.1	0	0	0	1.1	98
2004	1	1	1	1.0	0	0.2	0	0.1	0	0	0	1.1	98
2005	0	2	0	0.5	0	0.2	0	0.1	0	2	2	1.9	96
2006	1	3	3	0.4	0	0.3	0	0.1	0	0	0	1.6	94
2007	1	3	1	0.5	0	0.3	0	0.1	0	2	2	1.4	92
2008	0	0	0	0.4	0	0.3	0	0.1	0	0	0	1.3	92
2009	0	2	1	0.6	0	0.3	1	0.1	0	0	0	1.1	90
2010	0	8	1	0.6	1	0.4	0	0.2	0	6	6	1.0	82
2011	3	10	10	2.1	0	0.3	0	0.2	0	0	0	0.8	75
2012	4	9	7	1.5	0	0.3	0	0.2	2	0	2	0.7	70
2013	5	3	2	1.0	0	0.3	0	0.2	1	0	1	0.8	72
2014	2	6	4	3.0	0	0.3	0	0.1	0	2	2	1.3	68
2015	7	9	6	3.6	2	0.2	0	0.1	1	0	1	1.0	66
2016	13	7	6	2.8	0	0.1	0	0.0	0	1	1	1.4	72
2017	8	9	5	3.0	0	0.2	0	0.1	1	3	4	2.1	70
2018	8	8	5	2.3	0	0.2	0	0.1	0	3	3	2.1	70
2019	6	2	0	0.2	0	0.1	0	0.0	0	2	2	2.2	74
2020	9	4	2	0.2	0	0.2	0	0.1	1	1	2	2.2	79
2021	8	6	0	0.0	0	0.3	1	0.1	0	5	5	2.5	81
2022	8	13	6	2.5	0	0.2	0	0.1	1	6	7	2.4	76
5-Yr. Totals	39	33	13	5.2	0	1.0	1	0.4	2	17	19	11.4	
Expected for 2023				2.4		0.2		0.1				2.4	

A = actual
E = expected

Active Members in Valuation Comparative Schedule

Valuation		Valuation	Average	% Incr.	Age	Service
Date	No.					
June 30	No.	Payroll	Pay			
2003	98	\$ 6,307,652	\$ 64,364	(1.0) %	38.1 yrs.	10.8 yrs.
2004	98	6,991,955	71,346	10.8	38.8	11.6
2005	96	7,115,713	74,122	3.9	39.9	12.6
2006	94	7,060,160	75,108	1.3	40.2	13.0
2007	92	7,220,564	78,484	4.5	41.0	13.8
2008	92	7,597,087	82,577	5.2	42.0	14.8
2009	90	7,499,803	83,331	0.9	43.1	15.8
2010	82	6,844,767	83,473	0.2	44.1	16.8
2011	75	6,009,688	80,129	(4.0)	44.0	16.6
2012	70	5,676,851	81,098	1.2	43.8	16.2
2013	72	5,867,119	81,488	0.5	43.8	15.8
2014	68	5,561,732	81,790	0.4	44.2	16.3
2015	66	5,282,238	80,034	(2.1)	43.0	14.7
2016	72	5,491,632	76,273	(4.7)	41.1	12.4
2017	70	5,533,353	79,048	3.6	40.3	11.6
2018	70	5,352,132	76,459	(3.3)	39.3	10.8
2019	74	5,744,170	77,624	1.5	39.6	11.1
2020	79	5,923,918	74,986	(3.4)	39.1	10.4
2021	81	6,190,826	76,430	1.9	39.0	10.7
2022	76	5,666,485	74,559	(2.4)	38.1	9.9

Active Members as of June 30, 2022 by Near Age and Years of Service

Near Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
25-29	19							19	\$ 1,084,121
30-34	7	6						13	852,702
35-39	3	6	3	1				13	935,249
40-44	1	5		1	2			9	690,710
45-49		2			3	1		6	560,854
50-54		1			13			14	1,382,462
55-59					1			1	80,049
60+					1			1	80,338
Totals	30	20	3	2	20	1		76	\$ 5,666,485

While not used in the financial computations, the following group averages are computed and shown because of their general interest.

Age: 38.1 years
Service: 9.9 years
Annual Pay: \$74,559

Summary of Current Asset Information Furnished for the Valuation

Balance Sheet

Current Assets (Market Value)		Reserve for	
Cash	\$ 5,494,244	Employees Contributions	\$ 7,344,272
Accrued Interest & Dividends	50,711	Employer Contributions	21,903,685
Stocks	25,669,111	Retired Benefit Payments	14,072,310
Stock Mutual Funds	0	Undistributed Investment Income	0
U.S. Government Bonds	3,408,657		
Corporate Bonds	4,153,908		
Mortgages	0		
Agency Bonds	1,835,396		
Asset Backed Securities	1,978,210		
Receivables	730,030		
Accounts Payable	0		
Total Current Assets	\$ 43,320,267	Total Reserves *	\$ 43,320,267

* As reported.

Receipts and Disbursements

	2021-22	2020-21
Balance - July 1,	\$ 52,000,810	\$ 42,710,507
Receipts:		
Employees contributions	488,745	489,122
- for EE service purchase	0	0
Employer contributions	3,910,244	3,923,348
- for retiree health insurance	0	0
- for admin. & inv. expenses	430,813	397,685
Investment income	(6,161,364)	10,513,340
Disbursements:		
Benefit payments	4,979,425	4,815,676
Refund of member contributions	1,150,462	49,809
Retiree health insurance	51,211	44,937
Administrative expenses	430,813	397,685
Investment expenses	0	0
Other	737,070	725,085
Audit Adjustment	0	0
Balance June 30,	\$ 43,320,267	\$ 52,000,810



Development of Funding Value of Retirement System Assets

Year Ended June 30:	2020	2021	2022	2023	2024	2025
(A) Funding Value Beginning of Year	\$43,297,793	\$43,903,038	\$47,180,918			
(B) Market Value End of Year	42,710,507	52,000,810	43,320,267			
(C) Market Value Beginning of Year	43,440,744	42,710,507	52,000,810			
(D) Non Investment Net Cash Flow (EE + ER cont.) - (Ret. Ben. + Refunds)	(2,064,956)	(1,178,100)	(2,519,179)			
(E) Investment Income:						
(E1) Market Total: B-C-D	1,334,719	10,468,403	(6,161,364)			
(E2) Assumed Rate	6.75%	6.75%	6.75%	6.75%		
(E3) Amount for Immediate Recognition E2 * (A + D/2)	2,852,909	2,923,694	3,099,690			
(E4) Amount for Phased-In Recognition: E1-E3	(1,518,190)	7,544,709	(9,261,054)			
(F) Phased-In Recognition Investment Income:						
(F1) From Current Year = .25 x (E3)	(379,548)	1,886,177	(2,315,264)			
(F2) First Year Prior	(79,546)	(379,548)	1,886,177	(\$2,315,264)		
(F3) Second Year Prior	105,202	(79,546)	(379,548)	1,886,177	\$ (2,315,264)	
(F4) Third Year Prior	<u>171,184</u>	<u>105,203</u>	<u>(79,546)</u>	<u>(379,546)</u>	<u>1,886,178</u>	<u>\$ (2,315,262)</u>
(F5) Total Recognized Investment Gain	(182,708)	1,532,286	(888,181)	(808,633)	(429,086)	(2,315,262)
(G) Funding Value End of Year = (A) + (D) + (E3) + (F5)	\$43,903,038	\$47,180,918	\$46,873,248			
(H) Difference between Market & Funding Value	(1,192,531)	4,819,892	(3,552,981)			
(I) Recognized Rate of Return	6.3%	10.3%	4.8%			
(J) Ratio of Funding Value of Assets to Market Value	102.8%	90.7%	108.2%			
(K) Market Rate of Return	3.1%	24.9%	(12.1)%			

The Funding Value of Assets recognizes assumed investment income (line E3) fully each year. Differences between actual and assumed investment income (line E4) are phased-in over a closed four-year period. During periods when investment performance exceeds the assumed rate, Funding Value of Assets will tend to be less than Market Value. During periods when investment performance is less than the assumed rate, Funding Value of Assets will tend to be greater than Market Value. The Funding Value of Assets is **unbiased** with respect to Market Value. At any time, it may be either greater or less than Market Value. If actual and assumed rates of investment income are exactly equal for three consecutive years, the Funding Value will become equal to Market Value.



SECTION D

SUMMARY OF ACTUARIAL COST METHOD AND ASSUMPTIONS

Actuarial Cost Method

Normal cost and the allocation of benefit values between service rendered before and after the valuation date was determined using an individual *entry-age normal cost* method having the following characteristics:

- (i) The annual normal costs for each individual active member, payable from the date of employment to the date of retirement, are sufficient to accumulate the value of the member's benefit at the time of retirement; and
- (ii) Each annual normal cost is a constant percentage of the member's year-by-year projected covered pay.

Financing of Unfunded Actuarial Accrued Liabilities. Unfunded actuarial accrued liabilities (the portion of total liabilities not covered by present assets or expected future normal cost contributions) were amortized by level (principal or interest combined) percent-of-payroll contributions over a closed period of 22 years for the contribution rate beginning July 1, 2023.

Actuarial Assumptions

The actuary calculates the contribution requirements and benefit values of the Retirement System by applying actuarial assumptions to the benefit provisions and people information furnished, using the actuarial cost method described on the previous page. All actuarial assumptions used in this report are estimates of future experience, not market measures.

The principal areas of financial risk which require assumptions about future experiences are:

- (i) Long-term rates of investment return to be generated by the assets of the Retirement System.
- (ii) Patterns of pay increases to members.
- (iii) Rates of mortality among members, retirees and beneficiaries.
- (iv) Rates of withdrawal of active members (without entitlement to a retirement benefit).
- (v) Rates of disability among members.
- (vi) The age patterns of actual retirement.

In making a valuation, the actuary calculates the monetary effect of each assumption for as long as a present covered person survives - - a period of time which can be as long as a century.

Actual experience of the Retirement System will not coincide exactly with assumed experience, regardless of the wisdom of the assumptions, or the skill of the actuary and the precision of the many calculations made. Each valuation provides a complete recalculation of assumed future experience and takes into account all past differences between assumed and actual experience. The result is a continual series of adjustments (usually small) to the computed contribution rate.

From time-to-time it becomes appropriate to modify one or more of the assumptions, to reflect experience trends (but not random year-to-year fluctuations).

The rate of investment return was 6.75% a year, compounded annually (gross of investment and administrative expenses). This assumption is used to make money payable at one point in time equal in value to a different amount of money payable at another point in time. This assumption was first used for the June 30, 2019 valuation.

Experience over the last five years has been as illustrated below:

	Year Ending June 30,					5-Year Average
	2022	2021	2020	2019	2018	
1) Recognized rate*	4.8 %	10.3 %	6.3 %	5.2 %	3.6 %	6.0 %
2) Increase in CPI	9.1	5.4	0.6	1.6	2.9	3.9
3) Average salary increase	1.8	2.1	1.9	3.5	1.9	2.2
4) Real return						
- investment purposes	(4.3)	4.9	5.7	3.6	0.7	2.1
- funding purposes	3.0	8.2	4.4	1.7	1.7	3.8

* The recognized rate of return was computed using the approximate formula: $i = I$ divided by $1/2 (A+B-I)$, where I is realized investment income, A is the beginning of year asset value and B is the end of year asset value.

The rates of salary increase used for individual members are in accordance with the following table. This assumption is used to project a member's current salary to the salaries upon which benefit amounts will be based.

Salary Increase Assumptions for an Individual Member			
Sample Ages	Merit & Seniority	Base (Economic)	Increase Next Year
20	3.00 %	3.25 %	6.25 %
25	3.00	3.25	6.25
30	2.60	3.25	5.85
35	1.10	3.25	4.35
40	0.20	3.25	3.45
45	0.20	3.25	3.45
50	0.20	3.25	3.45
55	0.10	3.25	3.35
60	0.00	3.25	3.25

If the number of active members remains constant, then the total active member payroll will increase 3.25% annually, the base portion of the individual salary increase assumptions. This increasing payroll was recognized in amortizing unfunded actuarial accrued liabilities. The wage inflation assumption was first used for the June 30, 2019 valuation.

Price inflation is not directly used in the valuation. For purposes of assessing the reasonableness of the assumed rate of return, we assumed price inflation of 2.50% per year. This assumption was first used for the June 30, 2019 valuation.

The mortality table used to measure post-retirement mortality is the Pub-2010, Amount Weighted, Safety, Healthy Retiree tables for males and females. The corresponding Disabled and Employee tables were used to measure Disabled mortality and Pre-Retirement mortality, respectively. A base year of 2010 with future mortality improvements using scale MP-2018 was used. Additional margin for future mortality improvements are included in the projection scale. This assumption was first used for the June 30, 2019 valuation. Sample post retirement rates follow:

Sample Ages in 2022	Single Life Retirement Values			
	Present Value of \$1 Monthly for Life		Future Life Expectancy (Years)	
	Males	Females	Males	Females
45	\$165.93	\$167.84	41.09	43.15
50	159.76	162.12	35.91	37.91
55	151.62	154.69	30.82	32.79
60	141.30	145.47	25.91	27.87
65	128.80	134.22	21.27	23.19
70	113.99	120.52	16.96	18.77
75	96.95	104.39	13.02	14.67
80	78.51	86.67	9.58	11.04

For purposes of the pre-retirement death benefit, it was assumed that 100% of members were married at the time of death. 25% of pre-retirement deaths were assumed to be duty related.

Probabilities of retirement for members eligible to retire were:

Hired Before July 1, 2009			Hired On or After July 1, 2009		
Retirement Ages	Percent of Active Members Retiring within Next Year		Retirement Ages	Percent of Active Members Retiring within Next Year	
	Police	Fire & Dept. Heads		Police	Fire & Dept. Heads
45	40 %	20 %	55	62.5 %	50 %
46	40	20	56	47.5	30
47	40	20	57	47.5	30
48	40	20	58	47.5	30
49	40	20	59	47.5	30
50	40	20	60	100.0	100
51	35	15			
52	20	10			
53	15	10			
54	15	10			
55	15	10			
56	15	10			
57	15	10			
58	15	10			
59	25	20			
60	100	100			



Sample Rates of Separation from Active Employment before Retirement, Other than Death or Disability

Sample Ages	Years of Service	% of Active Members Separating within Next Year	
		Police	Fire & Dept. Heads
ALL	0	12.00 %	10.00 %
	1	9.00	7.00
	2	7.00	5.00
	3	5.00	4.00
	4	4.50	3.50
25	5 & Over	4.50	3.50
30		3.90	2.90
35		2.30	1.50
40		0.90	0.60
45		0.50	0.50
50		0.50	0.50
55		0.50	0.50
60	0.50	0.50	

Sample Rates of Disability

Sample Ages	Probabilities of Becoming Disabled During Next Year	
	Males	Females
20	0.07 %	0.03 %
25	0.09	0.05
30	0.10	0.07
35	0.14	0.13
40	0.21	0.19
45	0.32	0.28
50	0.52	0.45
55	0.92	0.76
60	1.53	1.10

50% of disabilities were assumed to be duty-related.

Summary of Assumptions Used June 30, 2022

Pensions in an Inflationary Environment

**Value of \$1,000/month Retirement Benefit
to an Individual Who Retires at Age 50
in an Environment of 3.25% Wage Inflation**

<u>Age</u>	<u>Value</u>
50	\$ 1,000
51	969
52	938
53	909
54	880
55	852
60	726
65	619
70	527
75	450
80	383
85	326

Miscellaneous and Technical Assumptions

Marriage Assumption	100% of members are assumed to be married for purposes of death-in-service benefits. 90% of members are assumed to be married at time of retirement for purposes of death after retirement benefits. Male spouses are assumed to be three-years older than females.
Pay Increase Timing	Beginning of (fiscal) year. This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date.
Decrement Timing	Decrements of all types are assumed to occur at the middle of the year.
Eligibility Testing	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
Benefit Service	Exact fractional service is used to determine the amount of benefit payable.
Decrement Relativity	Decrement rates are used directly from tabular rates, without adjustment for multiple decrement table effects.
Decrement Operation	Disability and mortality decrements do not operate during the first five years of service. Disability and separation do not operate during retirement eligibility.
Normal Form of Benefit	The assumed normal form of benefit is straight life for single members and joint and 60% survivor for married members.
Loads	Normal Retirement Present Values were loaded by 5% of age and service actuarial liabilities for Police and Fire hired before July 1, 2009 and 20% of age and service actuarial liabilities for Department Heads hired before July 1, 2009 for lump sums payable at retirement.
Incidence of Contributions	Contributions are assumed to be received continuously throughout the year based upon the computed percent-of-payroll shown in this report, and the actual payroll payable at the time contributions are made. New entrant normal cost contributions are applied to the funding of new entrant benefits.
Annuity Withdrawal	It was assumed that 100% of all future retirees will elect to withdraw their employee contributions at retirement resulting in a corresponding reduction to the monthly annuity. A 1.98% interest rate assumption was used to determine the annuity equivalent of the member contribution balance at retirement. This assumption was first used for the June 30, 2021 valuation and is based on the last available annuity withdrawal interest rate.
Data Adjustments	Base salary amounts were used for new active members who did not have annualized pay reported.

Glossary

Actuarial Accrued Liability	The difference between: (i) the actuarial present value of future plan benefits; and (ii) the actuarial present value of future normal cost. Sometimes referred to as "accrued liability" or "past service liability."
Accrued Service	The service credited under the plan which was rendered before the date of the actuarial valuation.
Actuarial Assumptions	Estimates of future plan experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and salary increases. Decrement assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.
Actuarial Cost Method	A mathematical budgeting procedure for allocating the dollar amount of the "actuarial present value of future plan benefits" between the actuarial present value of future normal cost and the actuarial accrued liability. Sometimes referred to as the "actuarial funding method."
Actuarial Equivalent	A single amount or series of amounts of equal value to another single amount or series of amounts, computed on the basis of the rate(s) of interest and mortality tables used by the plan.
Actuarial Present Value	The amount of funds presently required to provide a payment or series of payments in the future. It is determined by discounting the future payments at a predetermined rate of interest, taking into account the probability of payment.
Amortization	Paying off an interest-bearing liability by means of periodic payments of interest and principal, as opposed to paying it off with a lump sum payment.
Experience Gain (Loss)	A measure of the difference between actual experience and that expected based upon a set of actuarial assumptions during the period between two actuarial valuation dates, in accordance with the actuarial cost method being used.
Funding Value of Assets	Also referred to as actuarial value of assets, smoothed market value of assets, or valuation assets. Valuation assets recognize assumed investment return fully each year. Differences between actual and assumed investment return are phased-in over a closed four-year period. During periods when investment performance exceeds the assumed rate, valuation assets will tend to be less than market value. During periods when investment performance is less than the assumed rate, valuation assets will tend to be greater than market value. If assumed rates are exactly realized for three consecutive years, valuation assets will become equal to market value.

Glossary

- Normal Cost** The annual cost assigned, under the actuarial funding method, to current and subsequent plan years. Sometimes referred to as "current service cost." Any payment toward the unfunded actuarial accrued liability is not part of the normal cost.
- Plan Termination Liability** The actuarial present value of future plan benefits based on the assumption that there will be no further accruals for the future service and salary. The termination liability will generally be less than the liabilities computed on a "going concern" basis and is not normally determined in a routine actuarial valuation.
- Reserve Account** An account used to indicate that funds have been set aside for a specific purpose and are not generally available for other uses.
- UAAL** (Unfunded Actuarial Accrued Liability) The difference between the actuarial accrued liability and the Funding Value of Assets. Sometimes referred to as "unfunded accrued liability."
- Most retirement systems have unfunded actuarial accrued liability. An amount arises each time new benefits are added and each time an experience loss occurs.
- The existence of unfunded actuarial accrued liability is not in itself bad, any more than a mortgage on a house is bad. Unfunded actuarial accrued liability does not represent a debt that is payable today. What is important is the ability to control the amount of unfunded actuarial accrued liability and the trend in the amount (after due allowance for devaluation of the dollar).



December 8, 2022

Retirement Board
City of Madison Heights Police
and Fire Retirement System
300 West Thirteen Mile Road
Madison Heights, Michigan 48071

Attention: Ms. Linda A. Kunath, Finance Director/Treasurer

Dear Board Members:

Enclosed is the electronic report of the June 30, 2022 Actuarial Valuation of liabilities for the City of Madison Heights Police and Fire Retirement System.

We would be pleased to meet with you and the Board to discuss the report.

Sincerely,
Gabriel, Roeder, Smith & Company

A handwritten signature in black ink, appearing to read "Brad Lee Armstrong". The signature is fluid and cursive, with a long horizontal stroke at the end.

Brad Lee Armstrong, ASA, EA, FCA, MAAA

BLA:dj
Enclosure