

**City of Madison Heights
Police and Fire Retirement System
Actuarial Valuation Report
June 30, 2020**



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March 12, 2021

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

Dear Board Members:

The results of the June 30, 2020 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, 2022. 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, 2020. 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.

Retirement Board
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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.

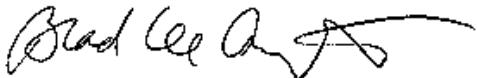
This report was prepared using our proprietary valuation model and related software which, in our professional judgment, has the capability to provide results that are consistent with the purposes of the valuation and has no material limitations or known weaknesses. We performed tests to ensure that the model reasonably represents that which is intended to be modeled. We are relying on the GRS Actuaries and Internal Software, Training, and Processes Team who developed and maintain the model.

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,



Brad Lee Armstrong, ASA, EA, FCA, MAAA



Jamal Adora, ASA, EA, MAAA

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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 **Benefit** payments to any group of members and their beneficiaries cannot exceed the sum of:

The aggregate amount of **Contributions** received on behalf of the group

... plus ...

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

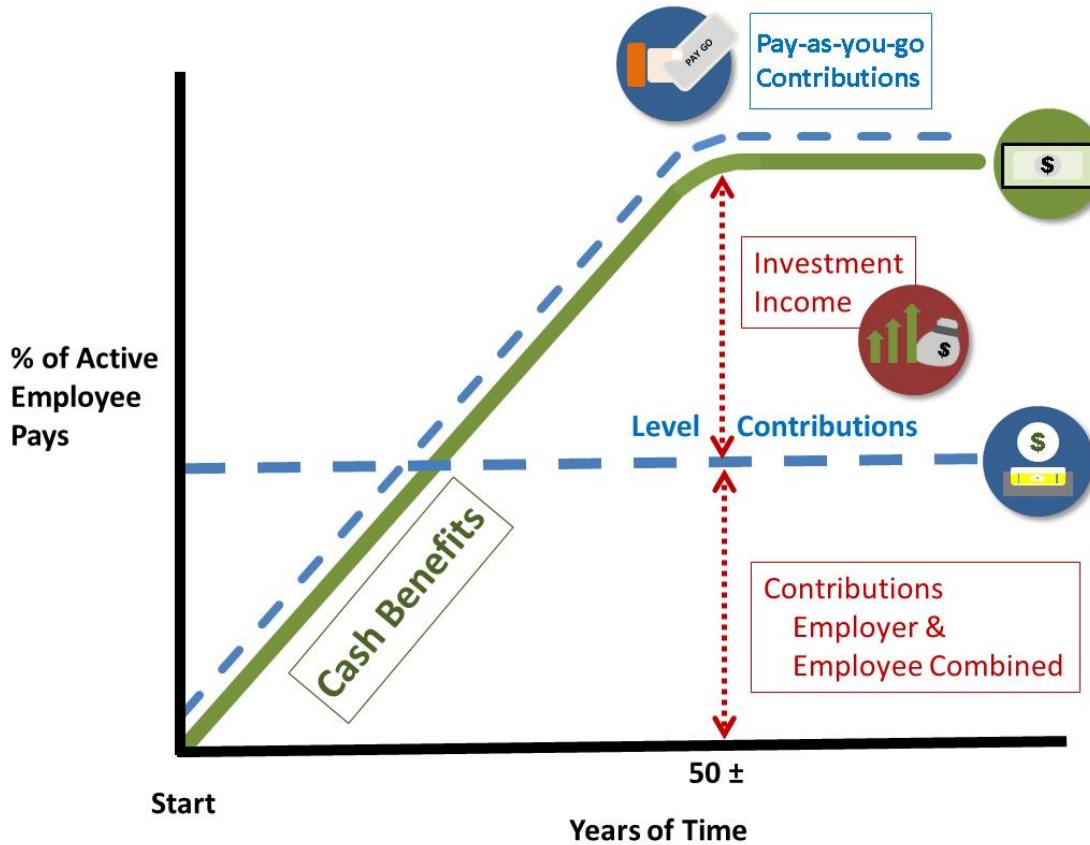
... minus ...

The **Expenses** 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, 2021

Contributions for	Department Heads	Contributions Expressed as Percents of Annual Pay					
		Police		Fire		Totals	
		Command	Other	Command	Other		
NORMAL COST							
Age and service pensions	21.48 %	20.33 %	17.25 %	18.54 %	16.44 %	18.09 %	
Disability pensions	0.97	1.20	1.49	1.49	1.65	1.45	
Death pensions	<u>0.21</u>	<u>0.18</u>	<u>0.15</u>	<u>0.20</u>	<u>0.18</u>	<u>0.17</u>	
Totals	22.66	21.71	18.89	20.23	18.27	19.71	
MEMBERS' CONTRIBUTIONS							
Gross contributions	8.90	8.90	8.90	8.90	8.90	8.90	
Less prospective refunds	<u>0.56</u>	<u>0.69</u>	<u>0.68</u>	<u>0.45</u>	<u>0.48</u>	<u>0.60</u>	
Available for pensions	8.34	8.21	8.22	8.45	8.42	8.30	
CITY'S NORMAL COST	14.32	13.50	10.67	11.78	9.85	11.41	
UNFUNDED ACTUARIAL ACCRUED LIABILITIES*							
Retirees and beneficiaries						18.75	
Active members						<u>28.94</u>	
Totals						47.69	
CITY'S TOTAL CONTRIBUTION (PENSIONS)						59.10 %	
Administrative and Investment Expenses						6.47 %	
CITY'S TOTAL CONTRIBUTION (PENSIONS & EXPENSES)						65.57 %	

Retiree health insurance costs are not included in this report.

* *Financed as a level percent-of-payroll over a closed period of 24 years.*

Valuation Assets and Unfunded Actuarial Accrued Liabilities

In financing the actuarial accrued liabilities, the funding value of assets, \$43,903,038 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.

Market Value	Present Reserves Reported for			Totals
	Member	Retired	Life	
	Actuarial	Accrued	Actuarial	
	Liabilities	Liabilities	Liabilities	
Employees Contributions	\$ 7,910,637			\$ 7,910,637
Employer Contributions	(29,993,760)	\$ 45,058,470		15,064,710
Retired Benefit Payments			19,735,160	19,735,160
Undistributed Investment Income				
Totals *	\$ (22,083,123)	\$ 64,793,630		\$ 42,710,507

* As reported.

Assets were applied against actuarial accrued liabilities in determining unfunded actuarial accrued liabilities as follows:

	Retired	Active	
	Lives	Members	Totals
Computed Actuarial Accrued Liabilities	\$ 64,793,630	\$ 26,312,494	\$ 91,106,124
Applied Assets (4-yr. smoothed market value)	43,903,038	0	43,903,038
Unfunded Actuarial Accrued Liabilities	\$ 20,890,592	\$ 26,312,494	\$ 47,203,086

Derivation of Experience Gain (Loss)

Year Ended June 30, 2020

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	\$ 46,845,050
(2) Employer normal cost from the last valuation	673,791
(3) Actual employer contributions	3,166,522
(4) Interest accrual: [(1) + 1/2 [(2) - (3)]] x .0675	3,077,911
(5) Expected UAAL before changes: (1) + (2) - (3) + (4)	47,430,230
(6) Change from the benefit provision application	-
(7) Change from the revised actuarial assumptions and methods	-
(8) Expected UAAL after changes: (5) + (6) + (7)	47,430,230
(9) Actual UAAL at end of year	47,203,086
(10) Gain (loss): (8) - (9)	227,144
(11) Actuarial accrued liability at the start of the year	90,142,843
(12) Gain (loss) as a percent of actuarial accrued liabilities at start of year	0.3%

* *Unfunded Actuarial Accrued Liabilities.*

Valuation Date June 30,	Experience Gain (Loss)	
	as % of Beginning Accrued Liability	
	Total	
2011	(9.0) %	
2012	(8.5)	
2013	(1.5)	
2014	(2.3)	
2015	(4.6)	
2016	(2.3)	
2017	(3.8)	
2018	(1.7)	
2019	(0.8)	
2020	0.3	

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	\$ 42,710,507
2. Market value adjustment	1,192,531
3. Valuation assets	<u>43,903,038</u>

B. Actuarial present value of expected future employer contributions:

1. For normal costs	6,260,602
2. For unfunded actuarial accrued liability	47,203,086
3. Total of (1) + (2)	<u>53,463,688</u>

C. Actuarial present value of expected future member contributions	5,232,327
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D. Total present and expected future resources	<u>\$ 102,599,053</u>
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* Does not include administrative and investment expenses.

Actuarial Present Value of Expected Future Benefit Payments

A. To retirees and beneficiaries	\$ 64,793,630
B. To vested terminated members	2,634,608
C. To present active members:	
1. Allocated to service rendered prior to valuation date - actuarial accrued liability	23,677,886
2. Allocated to service likely to be rendered after valuation date	<u>11,492,929</u>
3. Total	<u>35,170,815</u>
D. Total actuarial present value of expected future benefit payments	<u>\$ 102,599,053</u>

Comparative Statement

Valuation Date June 30	Fiscal Year	Actuarial Accrued Liabilities & Reserves		Actuarial Accrued Assets		Funded Ratio	Unfunded Actuarial Accrued Liabilities & Reserves			City's Contribution Rate			
							Amortiz.	% of Payroll	Percents	Dollars			
					Dollars		Period			Recommended	Actual		
2001	02-03	\$ 48,139,671	\$ 48,997,093	101.8 %	\$ (857,422)	14	- %	13.76 %	\$ 798,609	\$ 951,923			
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				
2020	21-22	91,106,124	43,903,038	48.2	47,203,086	24	796.8	59.10	3,673,090				

* 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 Valuation 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%.

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 more favorable than anticipated as shown on page B-3 primarily due to lower than expected salary increases and more than expected terminations (1 vs 0.2 expected). These gains were partially offset by retirement experience (2 new retirees versus 0.2 expected) and lower than expected return on the actuarial value of assets. Market performance from 2017 to 2020 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 actuarial value of assets is slightly higher than the market value of assets. The contribution rate in this valuation would increase from 59.10% to 60.39% of payroll (excluding expenses) on a market value basis. Unrecognized gains in investment return from 2018 are scheduled to be recognized in the 2021 valuations. However, portions of unfavorable returns from 2019 and 2020 are scheduled to be recognized in 2021, 2022 and 2023 valuations, which will put upward pressure on contribution rates.

Comment B: There were no assumption changes. The assumptions used are discussed in detail in Section D of this report.

Comment C: A 24-year closed amortization period was used for this valuation. Historical funded ratios are shown on page B-5. As of June 30, 2020, the Retirement System's funded ratio was 48.2% compared to 48.0% as of June 30, 2019. On a market value basis, the funded ratio would be 46.9% compared to 48.2% last year.

Comment D: The ratio of the funding value of assets to the market value of assets is 104.1%. 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 67.8% funded. In addition, the amortization period (currently 24 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	Unfunded Remaining	Contribution
Liability	Liability	Rate
10 years	24 years	76.78%
15	24	66.60%
20	24	61.58%
24	24	59.10%

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

Comments, Recommendation and Conclusion

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, 2021, have been computed to be 59.10% of active member payroll for pensions with an additional 6.47% 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 7.69. 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 actuarial value of assets), it is expected that:

- 1) The unfunded actuarial accrued liabilities will be fully amortized after 24 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 actuarial 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 actuarial 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

Valuation Date (6/30)	Accrued Liabilities (AAL)	Market Value			Market Value Funded Ratio (2)/(1)	Retiree Liabilities (RetLiab)	RetLiab / AAL (6)/(1)	AAL / Payroll (1)/(4)	Assets / Payroll (2)/(4)					
		Market Value												
		Market Value of Assets	Unfunded AAL	Valuation Payroll										
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%					

(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

Valuation Date (6/30)	(10)		(11)		(12)		(13)		(14)		(15)		(16)	
	Portfolio	Standard Deviation	Standard Deviation*	as % of Pay	Unfunded AAL/Payroll	Investment	Non-Investment Cash Flow (NICF)	NICF / Assets	Market Rate of Return	Trailing Geometric Average	5-Year			
								(13)/(2)						
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%	3.0%					
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%	4.4%					

* 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, 2020)

Eligibility	Amount
Service Retirement	
Members hired after 7/1/2009 (excluding Dept. Heads) Age 55 with 25 or more years of service or age 60 with 10 years of service.	Straight life pension equals 2.0% (2.5% if member has at least 25 years of service) 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.
Dept. Heads and Members hired before 7/1/2009 25 or more years of service regardless of age or age 60 with 10 years of service.	Straight life pension equals 2.0% (2.8% if member has at least 25 years of service) of 3-year AFC times first 25 years of service plus 1.0% of AFC times years of service in excess of 25 years.
Deferred Retirement	
10 or more years of service.	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.
Death after Retirement Survivor's Pension	
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.	Spouse's pension equals 60% of the straight life pension the deceased retiree was receiving.
Non-Duty Death-in-Service Survivor's Pension	
Payable to a surviving spouse, if any, upon the death of a member with 20 or more years of service.	Accrued straight life pension actuarially reduced in accordance with an Option I election.

Brief Summary of Act 345 Benefit Provisions

(June 30, 2020)

Duty Death-in-Service Survivor's Pension

Payable upon the expiration of Workers' Compensation to the survivors of a member who died in the line of duty.

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

8.90% of pay for Firefighters
8.90% of pay for Fire Command
8.90% for Police
8.90% for Police Command
8.90% for Department Heads

Annuity withdrawal based on Merrill Lynch Bond Index available at retirement with 25 years of service.

Interest earned on Member Contributions is 3.5% annually effective July 1, 2011.

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			
	Annual No.	Pensions	Annual No.	Pensions	Active No.	Per Retired	Annual Pensions Dollars	% of Pay	Annual Pensions	Average Pension	Present Value of Pensions
2001	5	\$ 233,147	1	\$ 34,484	101	0.9	\$ 2,832,787	48.8 %	7.5 %	\$ 28,047	\$ 31,482,029
2002	2	38,323	2	63,872	101	1.0	2,807,238	43.6	(0.9)	27,794	30,706,301
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

Retirees and Beneficiaries as of June 30, 2020

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	18	\$ 627,528
Regular pensions - automatic 60% to spouse	81	4,096,312
Regular pension - survivor	34	618,826
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	134	\$ 5,398,197
Casualty Pensions		
Duty disability pensions	6	\$ 179,614
Non-duty disability pensions	3	89,570
Duty disability pension - survivor	3	26,131
Non-duty disability pension - survivor	0	0
Duty death pension - survivor	1	14,484
Non-duty death pensions - survivor	<u>3</u>	<u>49,708</u>
Total casualty pensions	<u>16</u>	<u>\$ 359,507</u>
Total Pensions Being Paid	150	\$ 5,757,704

Retirees and Beneficiaries as of June 30, 2020

Tabulated by Attained Ages

Attained Ages	No.	Annual Pensions
39	1	\$ 14,484
45	1	59,886
46	1	35,858
49	1	10,989
50	2	120,610
51	1	60,261
52	2	96,118
54	6	372,867
55	6	350,718
56	4	148,770
57	8	344,954
58	5	281,834
59	4	228,663
60	2	138,958
61	4	171,206
62	5	252,079
63	2	81,336
64	4	208,823
65	7	310,922
66	10	432,512
67	1	46,462
68	2	80,491
69	1	44,864
70	3	130,693
71	7	242,128
72	2	106,335
73	2	60,041
74	5	182,851
75	3	79,520
76	1	19,762
77	7	159,350
78	7	190,866
79	3	87,324
80	5	93,156
81	1	33,474
82	4	129,507
83	6	158,370
85	2	42,659
86	2	20,567
87	1	10,819
88	2	33,045
89	2	25,764
90	2	37,053
91	1	8,783
96	1	9,458
97	1	2,514
Totals	150	\$ 5,757,704

Vested Terminated Members as of June 30, 2020*
Tabulated by Attained Ages

Attained Ages	Estimated	
	No.	Annual Pensions
38	1	\$ 30,664
41	1	23,125
45	2	78,344
48	1	23,876
50	1	14,995
51	1	36,997
55	1	36,724
Totals	8	\$ 244,725

* 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	\$1,241,020	\$ 103,418
- Other	34	2,323,460	68,337
Fire - Command	10	916,605	91,661
- Other	21	1,212,197	57,724
Department Heads	2	230,636	115,318
Totals	79	\$5,923,918	\$ 74,986

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	Vested	Other	Total		
2001	4	5	4	0.7	0	0.2	0	0.1	0	1	1	0.9
2002	6	0	0	0.2	0	0.2	0	0.1	0	0	0	1.0
2003	1	2	2	0.6	0	0.2	0	0.1	0	0	0	1.1
2004	1	1	1	1.0	0	0.2	0	0.1	0	0	0	1.1
2005	0	2	0	0.5	0	0.2	0	0.1	0	2	2	1.9
2006	1	3	3	0.4	0	0.3	0	0.1	0	0	0	1.6
2007	1	3	1	0.5	0	0.3	0	0.1	0	2	2	1.4
2008	0	0	0	0.4	0	0.3	0	0.1	0	0	0	1.3
2009	0	2	1	0.6	0	0.3	1	0.1	0	0	0	1.1
2010	0	8	1	0.6	1	0.4	0	0.2	0	6	6	1.0
2011	3	10	10	2.1	0	0.3	0	0.2	0	0	0	0.8
2012	4	9	7	1.5	0	0.3	0	0.2	2	0	2	0.7
2013	5	3	2	1.0	0	0.3	0	0.2	1	0	1	0.8
2014	2	6	4	3.0	0	0.3	0	0.1	0	2	2	1.3
2015	7	9	6	3.6	2	0.2	0	0.1	1	0	1	1.0
2016	13	7	6	2.8	0	0.1	0	0.0	0	1	1	1.4
2017	8	9	5	3.0	0	0.2	0	0.1	1	3	4	2.1
2018	8	8	5	2.3	0	0.2	0	0.1	0	3	3	2.1
2019	6	2	0	0.2	0	0.1	0	0.0	0	2	2	2.2
2020	9	4	2	0.2	0	0.2	0	0.1	1	1	2	2.2
5-Yr. Totals	44	30	18	8.5	0	0.8	0	0.3	2	10	12	10.0
Expected for 2021				0.0		0.3		0.1				2.5

A = actual

E = expected

Active Members in Valuation Comparative Schedule

Valuation		Valuation		Average			
Date	No.	Payroll	Pay	% Incr.	Age	Service	
June 30							
2001	93	\$ 5,799,631	\$ 62,362	4.8 %	37.1 yrs.	9.8 yrs.	
2002	99	6,435,274	65,003	4.2	37.5	10.2	
2003	98	6,307,652	64,364	(1.0)	38.1	10.8	
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	

Active Members as of June 30, 2020

By Near Age and Years of Service

Near Age	Years of Service to Valuation Date							Totals	
								No.	Valuation Payroll
25-29	17	1						18	\$ 972,993
30-34	11	3						14	862,942
35-39	4	5	1	1				11	741,045
40-44	2	1		2	2			7	613,716
45-49	2	1		2	10			15	1,387,391
50-54		1		2	7			10	954,046
55-59				2	2			4	391,785
Totals	36	12	1	9	21			79	\$ 5,923,918

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

Age: 39.1 years
 Service: 10.4 years
 Annual Pay: \$74,986

Summary of Current Asset Information Furnished for the Valuation

Balance Sheet

Current Assets (Market Value)	Reserve for
Cash	\$ 1,590,566
Accrued Interest & Dividends	70,236
Stocks	29,637,826
Stock Mutual Funds	1,391,507
U.S. Government Bonds	3,171,459
Corporate Bonds	4,301,233
Mortgages	445,123
Agency Bonds	1,107,171
Asset Backed Securities	0
Receivables	995,386
Accounts Payable	0
 Total Current Assets	 <u>\$ 42,710,507</u>
	Total Reserves *
	<u>\$ 42,710,507</u>

* As reported.

Receipts and Disbursements

	2019-20	2018-19
Balance - July 1,	\$ 43,440,740	\$ 42,664,542
 Receipts:		
Employees contributions	501,956	509,736
- for EE service purchase	0	0
Employer contributions	3,166,522	3,262,858
- for retiree health insurance	0	0
- for admin. & inv. expenses	383,320	349,433
Investment income	1,387,037	2,616,691
 Disbursements:		
Benefit payments	5,555,009	5,608,206
Refund of member contributions	178,425	13,497
Retiree health insurance	52,317	0
Administrative expenses	192,181	170,409
Investment expenses	191,140	170,408
Other	0	
 Audit Adjustment	4	0
 Balance June 30,	<u>\$ 42,710,507</u>	<u>\$ 43,440,740</u>

Development of Funding Value of Retirement System Assets

Year Ended June 30:	2018	2019	2020	2021	2022	2023
(A) Funding Value Beginning of Year	\$44,678,218	\$42,974,487	\$43,297,793			
(B) Market Value End of Year	42,664,542	43,440,744	42,710,507			
(C) Market Value Beginning of Year	42,364,918	42,664,542	43,440,744			
(D) Non Investment Net Cash Flow	(3,242,803)	(1,849,109)	(2,064,956)			
(EE + ER cont.) - (Ret. Ben. + Refunds)						
(E) Investment Income:						
(E1) Market Total: B-C-D	3,542,428	2,625,311	1,334,719			
(E2) Assumed Rate	7.25%	7.00%	6.75%	6.75%	6.75%	6.75%
(E3) Amount for Immediate Recognition						
E2 * (A + D/2)	3,121,619	2,943,495	2,852,909			
(E4) Amount for Phased-In Recognition: E1-E3	420,809	(318,184)	(1,518,190)			
(F) Phased-In Recognition Investment Income:						
(F1) From Current Year = .25 x (E3)	105,202	(79,546)	(379,548)			
(F2) First Year Prior	171,184	105,202	(79,546)	\$ (379,548)		
(F3) Second Year Prior	(967,920)	171,184	105,202	(79,546)	\$ (379,548)	
(F4) Third Year Prior	(891,013)	(967,920)	171,184	105,203	(79,546)	\$ (379,546)
(F5) Total Recognized Investment Gain	(1,582,547)	(771,080)	(182,708)	(353,891)	(459,094)	(379,546)
(G) Funding Value End of Year						
= (A) + (D) + (E3) + (F5)	\$42,974,487	\$43,297,793	\$43,903,038			
(H) Difference between Market & Funding Value	(309,944)	142,951	(1,192,531)			
(I) Recognized Rate of Return	3.6%	5.2%	6.3%			
(J) Ratio of Funding Value of Assets to Market Value	100.7%	99.7%	102.8%			
(K) Market Rate of Return	8.7%	6.3%	3.1%			

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 24 years for the contribution rate beginning July 1, 2021.

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
	2020	2019	2018	2017	2016	
1) Recognized rate*	6.3 %	5.2 %	3.6 %	5.4 %	4.4 %	5.0 %
2) Increase in CPI	0.6	1.6	2.9	1.6	1.0	1.5
3) Average salary increase	3.5	3.5	1.9	8.3	2.7	4.0
4) Real return						
- investment purposes	5.7	3.6	0.7	3.8	3.4	3.4
- funding purposes	2.8	1.7	1.7	(2.9)	1.7	1.0

* The recognized rate of return was computed using the approximate formula: $i = I \text{ divided by } 1/2 (A+B-I)$, 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.

Sample Ages	Salary Increase Assumptions for an Individual Member		
	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 2020	Single Life Retirement Values			
	Present Value of \$1 Monthly for Life		Future Life Expectancy (Years)	
	Males	Females	Males	Females
45	\$165.76	\$167.67	40.91	42.97
50	159.52	161.89	35.73	37.73
55	151.29	154.39	30.64	32.61
60	140.9	145.13	25.74	27.70
65	128.37	133.84	21.12	23.05
70	113.53	120.05	16.83	18.63
75	96.40	103.81	12.91	14.54
80	77.91	86.06	9.48	10.93

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:

Retirement Ages	Hired Before July 1, 2009		Hired On or After July 1, 2009		
	Percent of Active Members		Percent of Active Members		
	Police	Fire & Dept. Heads	Retirement Ages	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, 2020

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**

Age	Value
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 80% of all future retirees will elect to withdraw their employee contributions at retirement resulting in a corresponding reduction to the monthly annuity. A 3.25% 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, 2019 valuation
Data Adjustments	No additional adjustments were made for this valuation.

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).