City of Madison Heights
Police and Fire Retirement System
Actuarial Valuation Report
June 30, 2018

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December 31, 2018

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

Dear Board Members:

Submitted in this report are the results of the Sixty-Second Annual Actuarial Valuation of the City of Madison Heights Police and Fire Retirement System, based upon Act No. 345 of the Public Acts of 1937, as amended. The purpose of the June 30, 2018 valuation and gain/loss analysis is to measure funding progress in relation to the actuarial cost method and to determine employer contribution rates for the fiscal year ending June 30, 2020. The results of the valuation are not applicable for other purposes. No adjustments have been made for events after June 30, 2018.

The computed contribution rate shown on page B-1 may be considered as a minimum contribution rate that complies with the Board's funding policy. Users of this report should be aware that contributions made at that rate do not guarantee benefit security. Given the importance of benefit security to any retirement system, we suggest that contributions to the System in excess of those presented in this report be considered.

While this report includes status measures of the Retirement System, it does not include a more robust assessment of the risks of future experiences not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment. We encourage a review and assessment of investment and other significant risks that may have a material effect on the plan's financial condition.

Calculations required for compliance with the Governmental Accounting Standards Board (GASB) Statement Nos. 67 and 68 were issued in a separate report dated August 30, 2018.

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. This report should not be relied on for any purpose other than the purpose described. GRS is not responsible for unauthorized use of this report.

The valuation was based upon information, furnished by the Assistant City Manager, concerning the Retirement System's benefits, financial transactions, and active members, terminated members, retirees and beneficiaries. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the data provided.

The valuation results summarized in this report involve actuarial calculations that require assumptions about future events. We believe that the assumptions and methods used in this report are reasonable and appropriate for the purpose for which they have been used. However, other assumptions and methods could also be reasonable and could result in materially different results. In addition, because it is not possible or practical to consider every possible contingency, we may use summary information, estimates or simplifications of calculations to facilitate the modeling of future events. We may also exclude factors or data that are deemed to be immaterial. The actuarial method and assumptions used in the actuarial valuation are summarized in Section D of this report. The assumptions are established by the Board after consulting with the actuary.

The findings in this report are based on data and other information through June 30, 2018. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as: plan experience differing from that anticipated by the economic and demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of the actuary's assignment, the actuary did not perform an analysis of the potential range of such future measurements.

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.

Brad Lee Armstrong and Heidi G. Barry are independent of the plan sponsor, are Members of the American Academy of Actuaries (MAAA), and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

Respectfully submitted,

Brad Lee Armstrong, ASA, EA, FCA, MAAA

Heidi G. Barry, ASA, FCA, MAAA

BLA/HGB:ah

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 of 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 ...

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

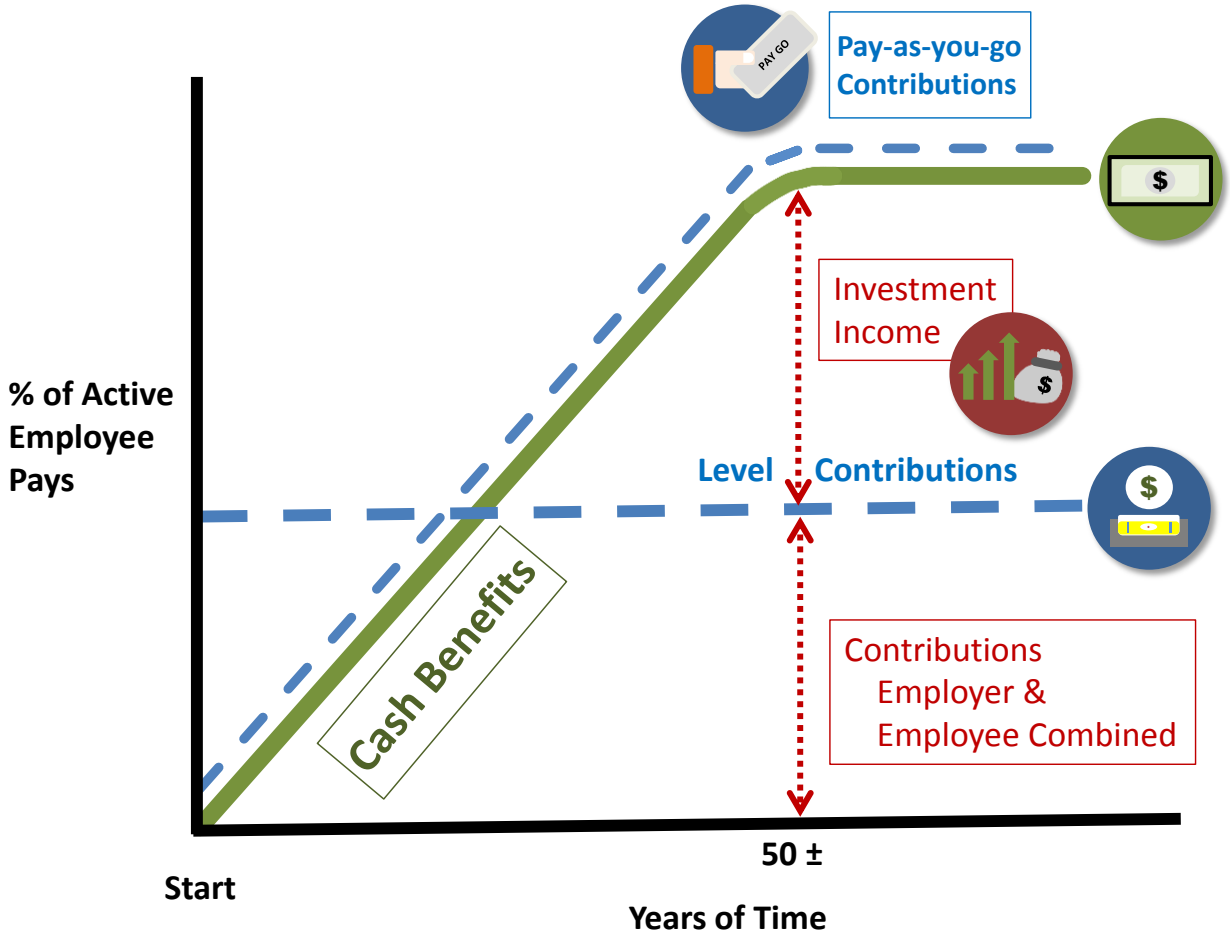
... minus ...

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, 2019

Contributions for	Contributions Expressed as Percents of Annual Pay					
	Department Heads	Police		Fire		Totals
		Command	Other	Command	Other	
NORMAL COST						
Age and service pensions	20.40 %	18.70 %	16.73 %	17.64 %	14.91 %	17.14 %
Disability pensions	0.76	1.04	1.22	1.23	1.40	1.19
Death pensions	0.29	0.27	0.24	0.32	0.30	0.27
Totals	21.45	20.01	18.19	19.19	16.61	18.60
MEMBERS' CONTRIBUTIONS						
Gross contributions	8.90	8.90	8.90	8.90	8.90	8.90
Less prospective refunds	0.60	0.70	0.70	0.46	0.49	0.62
Available for pensions	8.30	8.20	8.20	8.44	8.41	8.28
CITY'S NORMAL COST	13.15	11.81	9.99	10.75	8.20	10.32
UNFUNDED ACTUARIAL ACCRUED LIABILITIES						
Retirees and beneficiaries						18.36
Active members*						25.72
Totals						44.08
CITY'S TOTAL CONTRIBUTION (PENSIONS)						54.40 %
Administrative and Investment Expenses						7.02 %
CITY'S TOTAL CONTRIBUTION (PENSIONS & EXPENSES)						61.42 %

Retiree health insurance costs are not included in this report.

* *Financed as a level percent-of-payroll over a closed period of 26 years.*

In financing the actuarial accrued liabilities, the funding value of assets, $42,974,487 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 derivation of the funding value of assets.

	Present Reserves Reported for		
Market Value	Member Actuarial Accrued Liabilities	Retired Life Actuarial Liabilities	Totals
Employees Contributions	$ 6,820,538		$ 6,820,538
Employer Contributions	(25,878,137)	$ 33,429,603	7,551,466
Retired Benefit Payments		28,292,538	28,292,538
Totals *	$ (19,057,599)	$ 61,722,141	$ 42,664,542

** As reported.*

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

	Retired Lives	Active Members	Totals
Computed Actuarial Accrued Liabilities	$ 61,722,141	$ 22,254,347	$ 83,976,488
Applied Assets (4-yr. smoothed market value)	42,974,487	0	42,974,487
Unfunded Actuarial Accrued Liabilities	$ 18,747,654	$ 22,254,347	$ 41,002,001

Derivation of Experience Gain (Loss)
Year Ended June 30, 2018

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	$ 37,267,330
(2) Employer normal cost from the last valuation	556,102
(3) Actual employer contributions	2,698,592
(4) Interest accrual: [(1) + 1/2 [(2) - (3)]] x .075	2,624,216
(5) Expected UAAL before changes: (1) + (2) - (3) + (4)	$ 37,749,056
(6) Change from the benefit provision application	-
(7) Change from the revised actuarial assumptions and methods	1,865,188
(8) Expected UAAL after changes: (5) + (6) + (7)	$ 39,614,244
(9) Actual UAAL at end of year	41,002,001
(10) Gain (loss): (8) - (9)	(1,387,757)
(11) Actuarial accrued liability at the start of the year	81,945,548
(12) Gain (loss) as a percent of actuarial accrued liabilities at start of year	**(1.7)%**

** Unfunded Actuarial Accrued Liabilities.*

Valuation Date June 30,	Experience Gain (Loss) as % of Beginning Accrued Liability Total
2009	(5.2) %
2010	(2.1)
2011	(9.0)
2012	(8.5)
2013	(1.5)
2014	(2.3)
2015	(4.6)
2016	(2.3)
2017	(3.8)
2018	(1.7)

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	$ 42,664,542
2. Market value adjustment	309,944
3. Valuation assets	42,974,487
B. Actuarial present value of expected future employer contributions:	
1. For normal costs	5,075,749
2. For unfunded actuarial accrued liability	41,002,001
3. Total of (1) + (2)	46,077,750
C. Actuarial present value of expected future member contributions	4,691,220
D. Total present and expected future resources	$ 93,743,457

Actuarial Present Value of Expected Future Benefit Payments

A. To retirees and beneficiaries	$ 61,722,141
B. To vested terminated members	1,528,414
C. To present active members:	
1. Allocated to service rendered prior to valuation date - actuarial accrued liability	20,725,933
2. Allocated to service likely to be rendered after valuation date	9,766,969
3. Total	30,492,902
D. Total actuarial present value of expected future benefit payments	$ 93,743,457

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		Dollars	
					Dollars	Period	Payroll	Percents	Recommended	Actual
1999 #	00-01	$ 44,416,775	$ 45,285,637	102.0 %	$ (868,862)	16	-	14.44 %	$ 802,364	$ 850,457
2000	01-02	46,244,023	47,689,403	103.1	(1,445,380)	15	-	13.45	727,203	845,881
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	
2018	**19-20**	**82,111,300**	**42,974,487**	**52.3**	**39,136,813**	**26**	**731.2**	**51.01**	**2,885,123**	
2018 *	**19-20**	**83,976,488**	**42,974,487**	**51.2**	**41,002,001**	**26**	**766.1**	**54.40**	**3,065,746**	

** Revised actuarial assumptions and methods.* *# Retirement System was amended.*
*** Changes in the application of the benefit provisions.* *@ 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 less favorable than anticipated as shown on page B-3 primarily due to more retirements than expected (5 new retirees versus 2.3 expected) and a recognized investment return rate of 3.6% compared to last year's assumed rate of 7.25%. These losses were partially offset by salary increases that were lower than expected. Market performance from 2015 to 2018 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. Unrecognized losses in investment return from 2016 will continue to put upward pressure on the City's contribution rate in the 2019 report. As an indication of the magnitude, the contribution rate in this valuation would increase from 54.40% to 56.51% of payroll (excluding expenses) on a market value basis. However, portions of favorable returns from 2017 and 2018 are scheduled to be recognized in 2020 and 2021 valuations.

COMMENT B: The assumed rate of investment return was reduced from 7.25% to 7.00% which resulted in an increase of approximately $1.9 million in liabilities and increased the employer contribution rate by 3.39% of payroll. Also, both the wage inflation assumption and the annuity withdrawal interest assumption were reduced from 3.75% to 3.50%.

COMMENT C: A 26-year closed amortization period was used for this valuation. Historical funded ratios are shown on page B-5. As of June 30, 2018, the Retirement System's funded ratio was 51.2% compared to 54.5% as of June 30, 2017. On a market value basis, the funded ratio would be 50.8% compared to 51.7% last year. These are both indications of a negative trend.

COMMENT D: The ratio of the funding value of assets to the market value of assets is 100.7%. 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.

COMMENT E: The retiree liability is only 69.6% funded. In addition, the amortization period (currently 26 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	26 years	73.61%
15	26	63.10%
20	26	57.92%
26	26	54.40%

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

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, 2019, have been computed to be 54.40% of active member payroll for pensions with an additional 7.02% 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. 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 7.5. 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.

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 7% on the actuarial value of assets), it is expected that:

1) The unfunded actuarial accrued liabilities will be fully amortized after 26 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)	(1) Accrued Liabilities (AAL)	(2) Market Value of Assets	(3) Market Value Unfunded AAL	(4) Valuation Payroll	(5) Market Value Funded Ratio (2)/(1)	(6) Retiree Liabilities (RetLiab)	(7) RetLiab / AAL (6)/(1)	(8) AAL / Payroll (1)/(4)	(9) Assets / Payroll (2)/(4)
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%

(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) 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%	$ (3,326)	-7.3%	-3.2%	-0.8%
2013			380.0%	(2,227)	-4.9%	5.4%	1.1%
2014			374.1%	(2,266)	-4.6%	14.7%	8.2%
2015	14.7%	127.8%	615.4%	(3,757)	-8.2%	0.0%	6.4%
2016	12.6%	95.5%	658.1%	(3,853)	-9.3%	-1.1%	3.0%
2017	14.1%	108.0%	715.4%	(3,221)	-7.6%	10.0%	5.6%
2018	13.8%	110.0%	771.9%	(3,243)	-7.6%	8.7%	6.3%

** 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, 2018)

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.

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.	Same amount that was paid by Workers' Compensation.

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 No.	Added to Rolls Annual Pensions	Removed from Rolls No.	Removed from Rolls Annual Pensions	Rolls End of Year No.	Rolls End of Year Active Per Retired	Rolls End of Year Annual Pensions Dollars	Rolls End of Year Annual Pensions % of Pay	% Incr. in Annual Pensions	Average Pension	Present Value of Pensions
1999	11	$ 350,221	4	$ 71,463	87	1.1	$ 2,178,218	37.5 %	14.7 %	$ 25,037	$ 24,146,654
2000	13	515,306	3	59,400	97	1.0	2,634,124	47.1	20.9	27,156	29,462,600
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**

Retirees and Beneficiaries as of June 30, 2018
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	17	$ 616,539
Regular pensions - automatic 60% to spouse	82	4,080,050
Regular pension - survivor	30	545,516
Option 1 pension	1	55,531
Option 2 pension - modified joint and survivor benefit	0	0
Total age and service pensions	130	$ 5,297,636
Casualty Pensions		
Duty disability pensions	7	$ 196,134
Non-duty disability pensions	3	89,570
Duty disability pension - survivor	2	16,218
Non-duty disability pension - survivor	0	0
Duty death pension - survivor	1	14,484
Non-duty death pensions - survivor	3	49,708
Total casualty pensions	16	$ 366,114
Total Pensions Being Paid	**146**	**$ 5,663,750**

Retirees and Beneficiaries as of June 30, 2018
Tabulated by Attained Ages

Attained Ages	No.	Annual Pensions
37	1	$ 14,484
44	1	35,858
48	1	42,050
49	1	60,261
50	2	96,118
52	6	372,867
53	6	350,718
54	4	148,770
55	7	344,952
56	5	281,834
57	4	228,663
58	2	138,958
59	4	171,206
60	5	252,079
61	2	81,336
62	4	208,823
63	7	310,924
64	10	432,511
65	1	46,462
66	2	80,491
67	1	44,864
68	3	130,693
69	7	242,128
70	2	106,335
71	2	60,041
72	4	172,939
73	3	79,520
75	6	143,694
76	9	240,323
77	3	103,183
78	5	93,156
79	1	33,474
80	5	155,600
81	6	158,370
83	2	42,659
84	2	20,567
85	1	10,819
86	1	18,941
87	3	49,271
88	2	37,053
89	1	8,783
94	1	9,458
95	1	2,514
Totals	**146**	**$ 5,663,750**

Vested Terminated Members as of June 30, 2018*
Tabulated by Attained Ages

Attained Ages	No.	Estimated Annual Pensions
36	1	$ 30,664
39	1	23,125
43	1	23,998
46	1	23,876
49	1	36,997
53	1	36,724
Totals	**6**	**$ 175,384**

* *Includes members currently on leave of absence from service.*

Active Members Included in Valuation by Division

Division	No.	Valuation Payroll	Average Pay
Police - Command	11	$1,085,683	$ 98,698
- Other	32	2,231,679	69,740
Fire - Command	7	701,070	100,153
- Other	17	991,236	58,308
Department Heads	3	342,464	114,155
Totals	**70**	**$5,352,132**	**$ 76,459**

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				
									Vested	Other	Total		
	A	E	A	E	A	E	A	E	A	A	A	E	
1999	7	8	7	2.4	0	0.2	0	0.2	0	1	1	1.2	97
2000	8	11	11	1.0	0	0.2	0	0.1	0	0	0	1.0	94
2001	4	5	4	0.7	0	0.2	0	0.1	0	1	1	0.9	93
2002	6	0	0	0.2	0	0.2	0	0.1	0	0	0	1.0	99
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
5-Yr. Totals	38	39	26	14.7	2	1.0	0	0.4	2	9	11	7.9	
Expected for 2019				0.2		0.2		0.1				2.2	

A = actual
E = expected

Active Members in Valuation
Comparative Schedule

Valuation Date June 30	No.	Valuation Payroll	Average Pay	% Incr.	Age	Service
1999	97	$ 5,801,619	$ 59,811	11.3 %	38.5 yrs.	11.5 yrs.
2000	94	5,593,871	59,509	(0.5)	36.9	9.9
2001	93	5,799,631	62,362	4.8	37.1	9.8
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

Active Members as of June 30, 2018
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
20-24	3							3	$ 155,535
25-29	9	1						10	512,472
30-34	9	2	1					12	700,867
35-39	5	1		1				7	474,053
40-44	3	1		4	2			10	854,951
45-49	1	1		12	6	1		21	1,951,094
50-54				2	3			5	509,625
55-59				1	1			2	193,535
Totals	**30**	**6**	**1**	**20**	**12**	**1**		**70**	**$ 5,352,132**

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

Age:	39.3 years
Service:	10.8 years
Annual Pay:	$76,459

Summary of
Current Asset Information
Furnished for Valuation

Balance Sheet

Current Assets (Market Value)		Reserve for	
Cash	$ 1,469,477	Employees Contributions	$ 6,820,538
Accrued Interest & Dividends	106,576	Employer Contributions	7,551,466
Stocks	28,094,739	Retired Benefit Payments	28,292,538
Stock Mutual Funds	3,379,836		
U.S. Government Bonds	3,323,425		
Corporate Bonds	3,894,340		
Mortgages	1,157,323		
Agency Bonds	636,220		
Asset Backed Securities	0		
Receivables	602,606		
Accounts Payable	0		
Total Current Assets	$ 42,664,542	Total Reserves *	$ 42,664,542

* *As reported.*

Receipts and Disbursements

		2017-18	2016-17
Balance - July 1,		$ 42,364,918	$ 41,606,219
Receipts:			
Employees contributions		500,066	510,712
	- for EE service purchase	0	0
Employer contributions		2,698,592	2,473,172
	- for retiree health insurance	0	0
	- for admin. & inv. expenses	375,854	357,593
Investment income		3,542,427	3,979,960
Disbursements:			
Benefit payments		5,456,962	5,281,950
Refund of member contributions		984,499	923,195
Retiree health insurance		0	0
Administrative expenses		168,621	197,525
Investment expenses		207,233	160,068
Audit Adjustment		0	0
Balance June 30,		$ 42,664,542	$ 42,364,918

Development of Funding Value of Retirement System Assets

Year Ended June 30:	2016	2017	2018	2019	2020	2021
(A) Funding Value Beginning of Year	$47,383,538	$45,546,957	$44,678,218			
(B) Market Value End of Year	41,606,219	42,364,918	42,664,542			
(C) Market Value Beginning of Year	45,922,041	41,606,219	42,364,918			
(D) Non Investment Net Cash Flow (EE + ER cont.) - (Ret. Ben. + Refunds)	(3,853,406)	(3,221,261)	(3,242,803)			
(E) Investment Income:						
(E1) Market Total: B-C-D	(462,416)	3,979,960	3,542,428			
(E2) Assumed Rate	7.50%	7.50%	7.25%	7.00%	7.00%	7.00%
(E3) Amount for Immediate Recognition E2 * (A + D/2)	3,409,263	3,295,224	3,121,619			
(E4) Amount for Phased-In Recognition: E1-E3	(3,871,679)	684,736	420,809			
(F) Phased-In Recognition Investment Income:						
(F1) From Current Year = .25 x (E3)	(967,920)	171,184	105,202			
(F2) First Year Prior	(891,014)	(967,920)	171,184	$ 105,202		
(F3) Second Year Prior	745,049	(891,014)	(967,920)	171,184	$ 105,202	
(F4) Third Year Prior	(278,553)	745,048	(891,013)	(967,919)	171,184	$105,203
(F5) Total Recognized Investment Gain	(1,392,438)	(942,702)	(1,582,547)	(691,533)	276,386	105,203
(G) Funding Value End of Year = (A) + (D) + (E3) + (F5)	**$45,546,957**	**$44,678,218**	**$42,974,487**			
(H) Difference between Market & Funding Value	(3,940,738)	(2,313,300)	(309,944)			
(I) Recognized Rate of Return	4.4%	5.4%	3.6%			
(J) Ratio of Funding Value of Assets to Market Value	109.5%	105.5%	100.7%			
(K) Market Rate of Return	(1.1)%	10.0%	8.7%			

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 26 years for the contribution rate beginning July 1, 2019.

Actuarial Assumptions Used for the Valuations

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).

Valuation Assumptions

The rate of investment return was 7.00% a year, compounded annually. 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 rate is not the assumed real return which, for funding purposes, is the rate of return in excess of average salary increases. Considering other assumptions used in the valuation, the 7.00% translates to a real return of approximately 3.50%. Experience over the last five years has been as illustrated below:

		Year Ending June 30,					5-Year
		2018	2017	2016	2015	2014	Average
1)	Recognized rate*	3.6 %	5.4 %	4.4 %	3.8 %	7.5 %	4.9 %
2)	Increase in CPI	2.9	1.6	1.0	0.1	2.1	1.5
3)	Average salary increase	1.9	8.3	2.7	3.6	1.1	3.5
4)	Real return						
	- investment purposes	0.7	3.8	3.4	3.7	5.4	3.4
	- funding purposes	1.7	(2.9)	1.7	0.2	6.4	1.4

* *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 %	3.50 %	6.50 %
25	3.00	3.50	6.50
30	2.60	3.50	6.10
35	1.10	3.50	4.60
40	0.20	3.50	3.70
45	0.20	3.50	3.70
50	0.20	3.50	3.70
55	0.10	3.50	3.60
60	0.00	3.50	3.50

If the number of active members remains constant, then the total active member payroll will increase 3.50% annually, the base portion of the individual salary increase assumptions. This increasing payroll was recognized in amortizing unfunded actuarial accrued liabilities.

The mortality table used to measure post-retirement mortality is the RP-2014 Healthy Annuitant Mortality for males and females projected forward, to 2018 with the MP-2018 Mortality Improvement Scales. The corresponding Disability and Employee tables were used to measure Disabled mortality and Pre-Retirement mortality, respectively. Mortality rates include some margin for future mortality improvements. The mortality table was last updated for the June 30, 2018 actuarial valuation.

	Single Life Retirement Values			
	Present Value of $1 Monthly for Life		Future Life Expectancy (Years)	
Sample Ages	Males	Females	Males	Females
45	$154.78	$158.68	36.41	39.09
50	148.69	153.36	31.99	34.53
55	141.26	146.46	27.71	30.04
60	132.18	137.88	23.58	25.69
65	121.18	127.34	19.61	21.49
70	107.96	114.47	15.84	17.49
75	92.60	99.36	12.34	13.75
80	75.78	82.52	9.20	10.38

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		
	Percent of Active Members Retiring within Next Year			Percent of Active Members Retiring within Next Year	
Retirement Ages	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, 2018

Pensions in an Inflationary Environment

Value of $1,000/month Retirement Benefit
To an Individual Who Retires at Age 50
In an Environment of 3.50% Wage Inflation

Age	Value
50	$ 1,000
51	966
52	934
53	902
54	871
55	842
60	709
65	597
70	503
75	423
80	356
85	300

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.
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 3.50% interest rate assumption was used to determine the annuity equivalent of the member contribution balance at retirement.
Data Adjustments	Prior year salary was used for one member on medical leave and one member on workers compensation.

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.

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).