

City of Sterling Heights
Police and Fire Retirement System
Annual Actuarial Valuation Report
June 30, 2019



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August 29, 2019

Board of Trustees
City of Sterling Heights
Police and Fire Retirement System
Sterling Heights, Michigan

**Re: City of Sterling Heights Police and Fire Retirement System
Actuarial Valuation as of June 30, 2019
Actuarial Disclosures**

Dear Board Members:

The results of the June 30, 2019 Annual Actuarial Valuation of the City of Sterling 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 the valuation are to measure the System's funding progress to determine the employer contribution rate for the fiscal year ending June 30, 2021. 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 C of this report. This report includes risk metrics on page Appendix 1-1 and Appendix 1-2 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, 2019. The valuation was based upon information furnished by the City, concerning Retirement System 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 by the City.

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. Additional information about the actuarial assumptions is included in the section of this report entitled Methods and Assumptions.

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 Sterling 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, and with the Actuarial Standards of Practice issued by the Actuarial Standards Board.

Francois Pieterse and Mark Buis are Members of the American Academy of Actuaries. These actuaries meet the Academy's Qualification Standards to render the actuarial opinions contained herein.

The signing actuaries are independent of the plan sponsor.

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

Respectfully submitted,

GABRIEL, ROEDER, SMITH & COMPANY



Francois Pieterse, ASA, FCA, MAAA



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SECTION A

VALUATION RESULTS

Funding Objective

The funding objective of the Retirement System is to establish and receive contributions which will remain approximately level from year-to-year and will not have to be increased for future generations of citizens.

The Board of Trustees of the City of Sterling Heights Police and Fire Retirement System confirms that the System provides for payment of the required employer contribution as described in Section 20m of Michigan Public Act No. 728.

Employer Contribution

The Retirement System is supported by member contributions, City contributions and investment income from Retirement System assets.

Contributions which satisfy the funding objective are determined by the annual actuarial valuation and are sufficient to:

- Cover the actuarial present value of benefits allocated to the current year by the actuarial cost method described in Section C (the normal cost); and
- Finance over a period of future years the actuarial present value of benefits not covered by valuation assets and anticipated future normal costs (unfunded actuarial accrued liability).

Computed contributions for the fiscal year ending June 30, 2021 are shown on page A-2.

Contributions to Provide Benefits for the Fiscal Year Ending

Contributions for Fiscal Year Ending	June 30, 2021	June 30, 2020
Normal Cost		
Service pensions	14.40 %	13.97 %
Disability pensions	1.21	1.22
Death-in-service pensions	0.46	0.38
Withdrawal	0.97	0.70
Total Normal Cost	17.04 %	16.27 %
Member Contributions	7.24 %	7.72 %
City Computed Normal Cost	9.80 %	8.55 %
Unfunded Actuarial Accrued Liability*	37.91 %	34.13 %
City's Total Contribution Rate	47.71 %	42.68 %
City's Dollar Contribution[^]	11,969,088	9,813,390

* Actuarial accrued liability in excess of valuation assets was projected to the beginning of the applicable fiscal year and then amortized over a period of 22 years in this year's valuation. A 23 year amortization period was used in the prior valuation by the prior actuary.

[^] Based on projected active member and EROP payroll.

Note: Results shown throughout this report for fiscal years ending prior to June 30, 2021 were prepared by the previous actuarial firm.

Computed Employer Contributions Comparative Schedule

Valuation Date	Active Members				DROP Members			Retirees & Beneficiaries				Employer Contributions		
	Valuation Payroll			%	Annual Pensions		% of Active	Active Per Retired	Annual Pensions		% of Active	Employer		
	No.	Total	Average		No.	Dollars			Dollars	Payroll		Normal Cost	UAAL (Credit)	Total
June 30	No.	Total	Average	Incr.	No.	Dollars	Payroll	No.	Retired	Dollars	Payroll	Normal Cost	UAAL (Credit)	Total
1995#^	256	\$ 15,159,081	\$ 59,215	3.5 %				122	2.1	\$ 4,503,909	29.71 %	23.16 %	2.73 %	25.89 %
1996^	263	15,190,682	57,759	(2.5)%				138	1.9	5,229,252	34.42 %	23.16 %	(1.56)%	21.60 %
1997*^	263	15,251,674	57,991	0.4 %				153	1.7	5,812,977	38.11 %	20.55 %	(5.07)%	15.48 %
1998^	255	15,490,580	60,747	4.8 %				165	1.5	6,410,751	41.38 %	20.94 %	(8.11)%	12.83 %
1999^	263	16,930,450	64,374	6.0 %				178	1.5	7,228,950	42.70 %	20.88 %	(8.64)%	12.24 %
2000*^	261	16,796,531	63,354	0.0 %				184	1.4	7,524,942	44.80 %	33.95 %	(24.77)%	9.18 %
2001^	271	18,504,190	68,281	7.8 %				194	1.4	8,024,912	43.37 %	33.90 %	(19.89)%	14.01 %
2002#^	266	18,595,100	69,906	2.4 %	7	\$ 464,146	2.50%	199	1.3	8,200,739	44.10 %	33.12 %	(15.57)%	17.55 %
2003^	256	18,271,862	71,374	2.1 %	14	964,809	5.28%	213	1.1	8,912,630	48.78 %	34.32 %	(12.61)%	21.71 %
2004*^	256	19,906,323	77,759	8.9 %	15	1,061,982	5.30%	223	1.1	9,508,625	47.77 %	25.71 %	(11.25)%	14.46 %
2005^	251	19,787,496	78,835	1.4 %	18	1,273,334	6.44%	227	1.0	9,674,813	48.89 %	25.68 %	(12.82)%	12.86 %
2006^	244	19,837,496	81,301	3.1 %	17	1,204,824	6.07%	240	0.9	10,555,809	52.00 %	24.57 %	(16.29)%	8.28 %
2007^	253	20,979,120	82,291	2.0 %	18	1,213,292	5.78%	247	1.0	11,073,395	52.78 %	25.94 %	(14.05)%	11.89 %
2008#*^	249	22,064,557	88,613	7.1 %	21	1,524,880	6.91%	260	0.9	11,774,034	53.36 %	16.79 %	3.07 %	19.86 %
2009*^	247	22,510,638	91,136	2.8 %	20	1,458,416	6.48%	264	0.9	12,078,024	53.65 %	14.90 %	9.70 %	24.60 %
2010^	239	22,432,921	93,862	3.0 %	21	1,607,528	7.17%	271	0.8	12,438,018	55.45 %	14.79 %	14.70 %	29.49 %
2011*^	206	19,213,007	93,267	(0.1)%	46	3,408,375	17.74%	284	0.6	13,320,874	69.33 %	11.30 %	25.90 %	37.20 %
2012#^	162	14,671,724	90,566	(0.3)%	71	5,363,537	36.56%	293	0.4	13,875,174	94.57 %	6.92 %	26.77 %	33.69 %
2013#^	159	14,300,045	89,937	(0.3)%	69	5,223,572	36.53%	300	0.4	14,295,306	99.97 %	7.25 %	28.42 %	35.67 %
2014^	169	15,378,745 **	90,998	1.2 %	55	4,111,448	26.73%	318	0.5	15,464,181	100.56 %	7.42 %	28.34 %	35.76 %
2015	186	16,589,288	89,190	(0.2)%	38	2,740,068	16.52%	336	0.5	16,829,526	101.45 %	8.20 %	29.40 %	37.60 %
2016*	210	19,321,315	92,006	3.2 %	18	1,383,481	7.16%	360	0.6	18,188,591	94.10 %	7.34 %	30.26 %	37.60 %
2017*	220	19,788,423	89,947	(2.2)%	5	348,120	1.70%	373	0.6	19,300,281	97.50 %	8.80 %	34.42 %	43.22 %
2018	240	21,549,009	89,788	(0.2)%	8	630,664	2.80%	379	0.6	19,690,970	91.40 %	8.55 %	34.13 %	42.68 %
2019*	232	21,929,903	94,525	5.3 %	16	1,304,434	5.95%	386	0.6	20,016,912	91.28 %	9.80 %	37.91 %	47.71 %

After changes in benefit provisions.

* After changes in actuarial assumptions.

** Adjusted for 27 pay periods.

^ Prior to the June 30, 2015 valuation, the valuation date was December 31st.

Note: Results shown throughout this report for years prior to 2019 were prepared by the previous actuarial firm.

Development of Funding Value of Retirement System Assets

Year Ended June 30:	2016	2017	2018	2019	2020	2021	2022
A. Funding Value Beginning of Year	\$200,823,211	\$206,343,809	\$206,293,124	\$205,007,419			
B. Market Value End of Year	192,115,760	201,782,196	206,639,692	210,069,689			
C. Market Value Beginning of Year	203,358,526	192,115,760	201,782,196	206,639,692			
D. Non-Investment Net Cash Flow	(9,542,748)	(12,813,247)	(14,226,909)	(11,122,721)			
E. Investment Income							
E1. Market Total: B - C - D	(1,700,018)	22,479,683	19,084,405	14,552,718			
E2. Assumed Interest Rate	8.00%	8.00%	7.75%	7.50%			
E3. Amount for Immediate Recognition	15,684,147	15,994,975	15,436,424	14,958,454			
E4. Amount for Phased-In Recognition: E1-E3	(17,384,165)	6,484,708	3,647,981	(405,736)			
F. Phased-In Recognition of Investment Income							
F1. Current Year: 0.25 x E4	(4,346,041)	1,621,177	911,995	(101,434)			
F2. First Prior Year	(682,351)	(4,346,041)	1,621,177	911,995	\$ (101,434)		
F3. Second Prior Year	174,802	(682,351)	(4,346,041)	1,621,177	911,995	\$ (101,434)	
F4. Third Prior Year	4,232,789	174,802	(682,351)	(4,346,042)	1,621,177	911,996	\$ (101,434)
F5. Total Recognized Investment Gain	(620,801)	(3,232,413)	(2,495,220)	(1,914,304)	2,431,738	810,562	(101,434)
G. Funding Value End of Year: A + D + E3 + F5	206,343,809	206,293,124	205,007,419	206,928,848			
H. Difference Between Market & Funding Value	(14,228,049)	(4,510,928)	1,632,273	3,140,841			
I. Recognized Rate of Return - Funding Value Basis	7.68%	6.38%	6.50%	6.54%			
J. Recognized Rate of Return - Market Value Basis	(0.86)%	12.10%	9.80%	7.24%			
K. Ratio of Funding Value to Market Value	107.41%	102.24%	99.21%	98.50%			

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 4-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 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 retirement income are exactly equal for 4 consecutive years, the Funding Value will become equal to Market Value.

Note: Results shown throughout this report for years prior to 2019 were prepared by the previous actuarial firm.

Present Value of Future Benefits and Accrued Liability

Determination of Unfunded Accrued Liability

	<u>June 30,</u> <u>2019</u>
A. Accrued Liability	
1. For retirees and beneficiaries and EROP	\$226,122,975
2. For vested terminated members	2,483,066
3. DROP/EROP Reserve Balance	22,876,225
4. For present active members	
a. Value of expected future benefit payments	119,084,767
b. Value of future normal costs	<u>31,311,774</u>
c. Active member accrued liability: (a) - (b)	<u>87,772,993</u>
5. Total accrued liability	339,255,259
B. Present Assets (Funding Value)	<u>206,928,848</u>
C. Unfunded Accrued Liability: (A.5) - (B)	<u>132,326,411</u>
D. Funding Ratio: (B) / (A.5)	<u>61.0%</u>
E. Funding Ratio: Market Value Basis	<u>61.9%</u>

Unless otherwise indicated, a funded ratio 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. The amount of future contributions will most certainly differ from those assumed in this report due to future actual experience differing from assumed experience based upon actuarial assumptions. A funded ratio measurement in this report of 100% is not synonymous with no required future contributions. If the funded ratio 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.

Actuarial Accrued Liabilities and Valuation Assets - Comparative Schedule

Valuation Date June 30	Actuarial Accrued Liability (AAL)	Valuation Assets	Unfunded Actuarial Accrued Liabilities (UAAL)	Ratio of Valuation Assets to AAL	Ratio of UAAL to Valuation Payroll
1999 [^]	\$ 153,383,231	\$ 174,770,699	\$ (21,387,468)	113.9 %	
2000* [^]	124,915,986	185,771,342	(60,855,356)	148.7 %	
2001 [^]	133,938,061	187,772,035	(53,833,974)	140.2 %	
2002# [^]	141,187,613	184,609,657	(43,422,044)	130.8 %	
2003 [^]	149,968,630	183,664,050	(33,695,420)	122.5 %	
2004* [^]	155,818,664	187,265,961	(31,447,297)	120.2 %	
2005 [^]	158,517,125	194,145,450	(35,628,325)	122.5 %	
2006 [^]	156,707,512	204,756,058	(48,048,546)	130.7 %	
2007 [^]	170,201,230	212,365,515	(42,164,285)	124.8 %	
2008#* [^]	212,914,310	202,192,211	10,722,099	95.0 %	48.6 %
2009* [^]	227,549,069	193,164,045	34,385,024	84.9 %	152.8 %
2010 [^]	237,994,618	185,750,293	52,244,325	78.0 %	232.9 %
2011 [^]	260,283,654	173,001,421	87,282,233	66.5 %	454.3 %
2012# [^]	269,210,724	177,718,953	91,491,771	66.0 %	623.6 %
2013# [^]	276,717,787	186,606,033	90,111,754	67.4 %	630.2 %
2014 [^]	285,081,193	195,103,903	89,977,290	68.4 %	585.1 %
2015	289,714,451	200,823,211	88,891,240	69.3 %	535.8 %
2016*	301,281,758	206,343,809	94,937,950	68.5 %	443.2 %
2017*	309,385,005	206,293,124	103,091,882	66.7 %	504.7 %
2018	314,128,878	205,007,419	109,121,460	65.3 %	488.7 %
2019*	339,255,259	206,928,848	132,326,411	61.0 %	559.6 %

* Actuarial assumptions revised.

Retirement System amended.

[^] Prior to the June 30, 2015 valuation, the valuation date was December 31st.

Note: Results shown throughout this report for years prior to 2019 were prepared by the previous actuarial firm.

The Ratio of Valuation Assets to AAL 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 or decrease gradually toward 100%.

The Ratio of UAAL 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 debt. The lower the ratio, the greater the financial strength - and vice-versa.

Derivation of Experience Gain (Loss) Year Ended June 30, 2019

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

(1) UAAL* at June 30, 2018	\$ 109,121,460
(2) Normal cost from last valuation	3,847,110
(3) Actual contributions	11,961,177
(4) Interest accrual: $[(1) + 1/2 [(2) - (3)]] \times .075$	7,879,832
(5) Expected UAAL before changes: (1) + (2) - (3) + (4)	108,887,225
(6) Change from revised benefit provisions	0
(7) Change from revised actuarial assumptions and methods	18,824,695
(8) Expected UAAL after changes: (5) + (6) + (7)	127,711,920
(9) Actual UAAL at June 30, 2019	132,326,411
(10) Gain (Loss): (8) - (9)	(4,614,491)

* *Unfunded actuarial accrued liabilities.*

Summary Statement of System Resources and Obligations

Present Resources and Expected Future Resources

	<u>June 30, 2019</u>
A. Funding value of System assets	
1. Net assets from Plan financial statements	\$210,069,689
2. Market value adjustment	<u>(3,140,841)</u>
3. Funding value of assets	206,928,848
B. Actuarial present value of expected future employer contributions	
1. For normal costs	17,119,723
2. For unfunded actuarial accrued liability	<u>132,326,411</u>
3. Total	149,446,134
C. Actuarial present value of expected future member contributions	14,192,051
D. Total present and future resources	<u><u>\$370,567,033</u></u>

Actuarial Present Value of Expected Future Benefit Payments

A. To retired members and beneficiaries and EROP	\$226,122,975
B. To vested terminated members	2,483,066
C. DROP/EROP Reserve Balance	22,876,225
D. To present active members	
1. Allocated to service rendered prior to valuation date	87,772,993
2. Allocated to service likely to be rendered after valuation date	<u>31,311,774</u>
3. Total	119,084,767
E. Total actuarial present value of expected future benefit payments	<u><u>\$370,567,033</u></u>

Comments

Recommended Contribution: The recommended employer contribution increased from \$9,813,390 last year to \$11,969,088 this year. The increase is primarily due to unfavorable investment performance, actuarial experience losses, and changes in assumptions and methods as described below.

Actuarial Experience: Overall experience was less favorable than assumed during the year ended June 30, 2019, resulting in a loss of \$4,614,491 (see page A-7). The primary reasons for the loss were due to unfavorable investment performance; fewer deaths among retirees than assumed; higher than expected increases in pay; and more active members retiring/entering the EROP than assumed.

Plan Assumptions and Methods: The following changes in assumptions and methods were made in this valuation.

The following changes in plan assumptions and methods were valued for the first time in this valuation:

- Investment Rate of Return – Decrease the rate from 7.75% to 7.50%.

Actuarial liability loads for the following have been included in this valuation:

- increases in Average Final Compensation due to the inclusion of lump-sum payments; and
- using a subsidized discount rate in the calculation of annuity withdrawal amounts.

Please see page C-6 for additional detail.

Plan Provisions: There were no changes in plan provisions reported since the last valuation.

Reserve Transfers: Retired life liabilities including EROPs as of June 30, 2019 were computed to be \$226,122,975. We recommend that a transfer from the Reserve for Employer Contributions to the Reserve for Retired Benefit Payments be made in an amount that would set the Reserve for Retired Benefit Payments equal to the Retired life liabilities of \$226,122,975. For purposes of this valuation this transfer was assumed to have been made as of June 30, 2019.

Looking Ahead: A four-year smoothing of gains and losses is used to determine the System's Funding Value of Assets. As of June 30, 2019, the Market Value of Assets as a whole exceeds the Funding Value for the System by \$3,140,841. Given investment experience at the assumed rate, this difference will be recognized as actuarial gains over the next 3 years.

Had the June 30, 2019 valuation been computed using the System's Market Value of Assets as of that date in place of the Funding Value, the City's required contribution amount would have been approximately \$11.7 million; instead of \$12.0 million.

The current investment return assumption decreased from 7.75% to 7.50%. New guidance regarding the selection of economic assumptions has been provided by Actuarial Standards of Practice (ASOP) No. 27. The new standards tighten the range of reasonable assumptions that the actuary is allowed to use with regard to the investment return assumption. Based on the investment return expectations of 14 nationally recognized firms, using the Retirement System's current investment target asset allocation, 7.50% is at the near to the upper end of our reasonable assumptions range. Due to more stringent Actuarial Standards of Practice, the investment return assumption is reviewed annually.

Comments

This assumption, as well as all the other assumptions used to calculate liabilities and contribution rates, will be analyzed with an experience study to be completed before the June 30, 2020 actuarial valuation.

Michigan Public Act 202 of 2017 created new reporting and other requirements for local units of government. Please see the June 30, 2019 GASB 67/68 report, dated August 29, 2019, for the necessary Public Act 202 uniform assumption information.

SECTION B

VALUATION DATA

Brief Summary of Benefit Provisions (June 30, 2019)

Regular Retirement (no reduction factor for age)

Eligibility – 25 or more years of service.

Annual Amount –

Police: 2.8% of AFC multiplied by the first 25 years of service, plus 1.0% of AFC multiplied by the excess of 25 years with a maximum benefit of 75%. For employees hired after September 17, 2012, 2.0% of AFC multiplied by the years of service with a maximum benefit of 75%.

Police Command: 2.8% of AFC multiplied by the first 25 years of service, plus 1.0% of AFC multiplied by the excess of 25 years with a maximum benefit of 75%.

Fire: 2.8% of AFC multiplied by the first 25 years of service with a maximum benefit of 70%. For employees hired after January 2, 2013, 2.0% of AFC multiplied by the years of service with a maximum benefit of 70%.

Average Final Compensation (AFC) is based on the highest three of the last ten years of employment prior to retirement.

Normal Form of Payment

Accrued Normal Retirement Benefit payable for life, with 60% continuing to the eligible spouse upon death of participant. Alternatively, member may elect an actuarially equivalent Option 1 - 100% or Option 2- 50% survivor benefit.

Deferred Retirement (vested benefit)

Eligibility - 10 or more years of service. Payments begin on the 25th anniversary of their adjusted date of hire.

Annual Amount - Same as regular retirement but based upon service and AFC at termination.

Duty Disability Retirement

Eligibility - No age or service requirements.

Annual Amount - Computed as regular retirement but with additional service credited from date of disability to age 55 or when they would have completed 25 years of service, whichever comes first. Worker's Compensation payments are offset.

Brief Summary of Benefit Provisions (June 30, 2019)

Non-Duty Disability Retirement

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

Annual Amount –

To Age 55: 1.5% of AFC multiplied by the years of service

At Age 55: Same as regular retirement

Duty Death Before Retirement

Eligibility - No age or service requirements.

Annual Amount –

A member with 25 or more years of service may name a beneficiary to receive the Option 1 - 100% survivor benefit which would have been payable had the member retired the day before death.

A member with less than 25 years of service may name a beneficiary to receive the Option 1 - 100% survivor benefit which would have been payable had the member retired the day before death and shall be computed as if the member had 25 years of service.

An amount equal to that paid under the provisions of the Worker's Compensation Act payable to the spouse, children and/or dependents. This benefit continues during the lifetime of these recipients until the death of the spouse or attainment of age 18 of a child (marriage or death, if earlier).

Non-Duty Death Before Retirement

Eligibility - 10 years of service.

Annual Amount - Same as regular retirement but actuarially reduced in accordance with an Option 1 - 100% survivor benefit.

Annuity Withdrawal

At retirement, members may withdraw their accumulated contributions with interest.

Cost of Living Adjustments

An additional \$800 (\$500 for pre 7/1/93 MAP members) is paid to pre 7/1/94 COA and Fire retirees each January 1st following retirement until death.

Brief Summary of Benefit Provisions (June 30, 2019)

Worker's Compensation Offset

Any benefits payable from the retirement system may be reduced for benefits paid under the Worker's Compensation Act.

Member Contributions

8.0% of pensionable pay.

Early Retirement Option Plan (EROP)

Eligibility – 25 or more years of service.

Annual Amount – 85% of the member's accrued benefit at the date of EROP is deposited into an account that receives 4% compound interest annually while the member remains an active member. No member contributions are made while in the EROP and no additional retirement benefits are earned.

Employer contributions will include payroll of EROP participants and are not credited to members' accounts. Members may remain in the EROP for a maximum of 60 months at which time they begin receiving the benefit accrued to the date of EROP into the program and elect an option of total distribution of the EROP account (full lump sum, partial lump sum, rollover).

Covered Compensation

The following is included in compensation for determining AFC:

- Base pay
- Overtime and compensatory pay
- Longevity
- Unused holiday, vacation and sick time subject to maximums
- Shift premium

The following lump sum payments at the time of retirement are considered compensation for purposes of determining AFC:

- Unused sick leave*
- Unused Vacation Time*

*Fire Maximums			*Police Maximums	
	56 Hrs	40 Hrs		Hrs
Vacation	295	176	Vacation	150
Sick	90	61	Sick/Personal	50
Personal	25	25		

Retirants and Beneficiaries Historical Schedule*

Valuation Date June 30	Rolls End of Year		Average Pension	Present Value of Pensions
	No.	Annual Pensions		
2001^	194	\$ 8,024,912	\$ 41,366	\$ 89,789,658
2002^	199	8,200,739	41,210	90,778,252
2003^	213	8,912,650	41,843	98,996,571
2004^	223	9,508,625	42,640	100,539,756
2005^	227	9,674,813	42,620	99,019,946
2006^	240	10,555,809	43,983	101,679,683
2007^	247	11,073,395	44,701	108,230,658
2008^	281	13,298,914	47,327	141,906,051
2009^	284	13,536,440	47,664	143,970,958
2010^	292	14,045,546	48,101	147,975,238
2011^	330	16,729,248	50,695	177,723,136
2012^	364	19,238,111	52,854	205,949,202
2013^	369	19,518,876	52,897	206,717,743
2014^	373	19,575,629	52,481	205,020,992
2015	374	19,569,594	52,325	203,282,688
2016	378	19,572,072	51,778	205,071,744
2017	378	19,648,401	51,980	208,533,935
2018	387	20,321,634	52,510	212,906,519
2019	402	21,321,346	53,038	226,122,975

* Includes DROP/EROP members and benefits where applicable.

^ Prior to the June 30, 2015 valuation, the valuation date was December 31st.

Note: Results shown throughout this report for years prior to 2019 were prepared by the previous actuarial firm.

Retirants and Beneficiaries June 30, 2019 Tabulated by Attained Age

Attained Age	No.	Annual Pensions
30 - 34	1	\$ 32,925
40 - 44	2	29,885
45 - 49	9	561,347
50 - 54	54	3,477,433
55 - 59	43	2,549,827
60 - 64	78	4,977,218
65 - 69	57	2,854,356
70 - 74	58	2,378,322
75 - 79	58	2,261,574
80 - 84	22	772,814
85 - 89	4	121,211
Totals	386	\$20,016,912

Average Age at Retirement: 49.6 years

Average Age Now: 65.8 years

Inactive Members as of June 30, 2019 Tabulated by Attained Age

Attained Age	No.	Estimated Annual Pensions
40 - 44	1	\$ 53,364
45 - 49	4	152,957
50 - 54	1	35,671
Totals	6	\$241,992

Average Age at Termination: 41.5 years

Average Age Now: 47.4 years

EROP Members as of June 30, 2019 Tabulated by Attained Age

Attained Age	No.	Estimated Annual Pensions
45 - 49	8	\$ 667,457
50 - 54	6	481,143
55 - 59	2	155,834
Totals	16	\$1,304,434

Average Age at Termination: 50.2 years

Average Age Now: 51.0 years

Active Members - Comparative Statement

Valuation Date June 30	Active Members	Valuation Payroll	Average			
			Age	Service	Pay	% Incr.
1999	263	\$ 16,930,450			\$ 64,374	6.0 %
2000	261	16,796,531			63,354	0.0 %
2001	271	18,504,190			68,281	7.8 %
2002	266	18,595,100			69,906	2.4 %
2003	256	18,271,862			71,374	2.1 %
2004	256	19,906,323			77,759	8.9 %
2005	251	19,787,496			78,835	1.4 %
2006	244	19,837,496			81,301	3.1 %
2007	253	20,979,120			82,291	2.0 %
2008	249	22,064,557			88,613	7.1 %
2009	247	22,510,638			91,136	2.8 %
2010	239	22,432,921			93,862	3.0 %
2011	206	19,231,007			93,267	(0.1)%
2012	162	14,671,724			90,566	(0.3)%
2013	159	14,300,045			89,937	(0.3)%
2014	169	15,378,745*			90,998	1.2 %
2015	186	16,589,288	40.0 yrs.	13.5 yrs.	89,190	(0.2)%
2016	210	19,321,315	39.5	12.7	92,006	3.2 %
2017	220	19,788,423	39.8	12.8	89,947	(2.2)%
2018	240	21,549,009	38.6	11.6	89,788	(0.2)%
2019	232	21,929,903	38.5	11.4	94,525	5.3 %

* Adjusted for 27 pay periods.

Note: Results shown throughout this report for years prior to 2019 were prepared by the previous actuarial firm.

Active Members Added to and Removed from Rolls

Year Ended June 30	Number Added		Terminations During Year										Active Members End of Year	
	During Year		Normal Retirement		Disability Retirement		Died-in- Service		Withdrawal					
	A	E	A	E	A	E	A	E	Vested A	Other A	Total A	E		
2018														240
2019	10	18	14	9.7	0	0.7	0	0.2	1	3	4	9.1	232	

A = Actual

E = Expected

Police and Fire as of June 30, 2019 by Attained Age and Years of Service

Attained Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 & Up	No.	Salary
20-24	9							9	\$ 438,160
25-29	35	1						36	2,425,178
30-34	25	2	4					31	2,385,932
35-39	19	7	14	8				48	4,597,087
40-44	7		8	20	2			37	3,813,483
45-49	2	1	2	12	33	2		52	5,980,623
50-54				3	13			16	1,924,999
55-59					3			3	364,441
Totals	97	11	28	43	51	2		232	\$21,929,903

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

Age: 38.5 years

Service: 11.4 years

Annual Pay: \$94,525

Financial Information Furnished for the Actuarial Valuation

Statement of Assets as of June 30, 2019

	<u>Market Value</u>
Assets	
Cash and Deposits	\$ 5,283,079
Receivables	
Accounts Receivable- Sale of Investments	\$ 0
Accrued Interest and Other Dividends	0
Contributions	0
Accounts Receivable - Other	0
Total Receivables	<u>\$ 0</u>
Investments	
Fixed Income	\$ 42,777,618
Domestic Equities	93,311,413
International Equities	60,170,394
Real Estate	824,666
Other - MLP's	9,378,385
Total Investments	<u>\$ 206,462,476</u>
Total Assets	<u>\$ 211,745,555</u>
Liabilities	
Payables	
Accounts Payable - Purchase of Investments	\$ 1,289,151
Accrued Expenses	386,715
Accounts Payable - Other	0
Total Liabilities	<u>\$ 1,675,866</u>
Net Position Restricted for Pensions	<u>\$ 210,069,689</u>

Financial Information Furnished for the Actuarial Valuation

Statement of Revenues and Expenditures for Year Ended June 30, 2019

		<u>Totals</u>
Revenues		
Member Contributions		\$ 1,857,374
Employer Contributions		10,103,803
Investment Income:		
Interest	\$ 65,476	
Dividends	6,163,659	
Amortization of premiums and discounts	0	
Gain (loss) on sales of investments	10,241,043	
Other	0	
Securities lending & misc.	0	
Total investment income	<u> </u>	<u>16,470,178</u>
Total Revenues		\$ 28,431,355
Expenditures		
Retirement Benefits Paid		\$ 22,074,861
Refunds of Member Contributions:		
Refunds	\$ 1,009,037	
Annuity withdrawal	0	
DC transfer	0	
Total Refunds	<u> </u>	1,009,037
Investment Expense:		
Counseling fees		1,856,235
Other (please specify)		0
Administrative Expenses		<u>61,225</u>
Total Expenditures		\$ 25,001,358

SECTION C

METHODS AND ASSUMPTIONS

Valuation Methods

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 valuation method** having the following characteristics:

- 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
- Each annual normal cost is a constant percentage of the member's year-by-year projected covered pay.

The difference between actuarial accrued liabilities and assets were amortized by level (principal & interest combined) percent-of-payroll over a closed period of 22 years beginning June 30, 2019 (23 years for the June 30, 2018 valuation).

Funding value of assets used for funding purposes is derived as follows: prior year valuation assets are increased by contribution and expected investment income and reduced by refunds, benefit payments and expenses. To this amount is added 25% of the difference between expected and actual investment income for each of the previous four years.

Actuarial Assumptions Used in the Valuation

The actuary calculates the contribution requirements and benefit values of the System by applying actuarial assumptions to the benefit provisions and census data furnished, using the valuation method described on page C-1.

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

- long-term rates of investment income likely to be generated by System assets
- patterns of salary increases to members
- rates of mortality among members, retirants and beneficiaries
- rates of withdrawal of active members
- rates of disability among members and their subsequent rates of recovery
- probabilities of retirement at various ages after benefit eligibility

In a valuation, the actuary projects the monetary effect of each assumption, for each distinct experience group, for the next year and for each year over the next half-century or longer.

Actual experience will not coincide exactly with assumed experience, regardless of the wisdom of the assumptions. Each valuation provides a complete recalculation of System costs based upon assumptions regarding future experience and takes into account all past differences between assumed and actual experience. The result is a continual series of small adjustments to the computed contribution rate.

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

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.

Years of Service	Salary Increase Assumptions for a Police Member			Salary Increase Assumptions for a Fire Member		
	Merit & Seniority	Base (Economic)	Increase Next Year	Merit & Seniority	Base (Economic)	Increase Next Year
1	8.50%	2.00%	10.50%	13.80%	2.00%	15.80%
2	7.80	2.00	9.80	6.70	2.00	8.70
3	7.20	2.00	9.20	17.10	2.00	19.10
4	18.10	2.00	20.10	6.30	2.00	8.30
5	16.30	2.00	18.30	5.90	2.00	7.90
6	1.00	2.00	3.00	1.00	2.00	3.00
7	1.00	2.00	3.00	1.00	2.00	3.00
8	1.00	2.00	3.00	1.00	2.00	3.00
9	1.00	2.00	3.00	1.00	2.00	3.00
10 & Over	1.00	2.00	3.00	1.00	2.00	3.00

Active member payroll is assumed to grow at 2.0% per year.

The price inflation component of the investment return rate and the wage inflation rate is assumed to be 2.60%.

The rate of investment return was 7.50% per 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.

Mortality Tables. The mortality rates utilized are based upon the RP-2000 table, projected to 2014.

Sample Attained Ages	Future Life Expectancy (Years)	
	Men	Women
40	41.75	43.99
45	36.95	39.14
50	32.20	34.33
55	27.50	29.59
60	22.97	25.04
65	18.71	20.75
70	14.83	16.82
75	11.28	13.25
80	8.22	10.07

The rates of retirement used to measure the probability of eligible members retiring during the next year were as follows:

Years of Service	% Retiring	
	Police	Fire
25	70%	80%
26	50	70
27	50	60
28	50	50
29	50	50
30	50	100
31	50	100
32 & Over	100	100

Rates of separation from active membership were as shown below (rates do not apply to members eligible to retire and do include separation on account of death or disability). This assumption measures the probabilities of members terminating employment.

Sample Ages	Years of Service	% of Active Members Separating within Next Year
All	0	15.00%
	1	10.00
	2	8.50
	3	6.00
	4	4.00
25	5 & Over	1.25
30		1.25
35		1.20
40		0.30
45		0.25
50		0.25
55		0.25
60	0.25	

Rates of disability were as follows. This assumption measures the probability of members retiring with a disability benefit.

Sample Ages	% of Active Members Becoming Disabled within Next Year
20	0.05%
25	0.07
30	0.09
35	0.13
40	0.20
45	0.30
50	0.50
55	0.85

Miscellaneous and Technical Assumptions

June 30, 2019

<i>Marriage Assumption:</i>	100% of males and 100% of females are assumed to be married for purposes of death-in-service benefits. Male spouses are assumed to be three years older than female spouses.
<i>Salary Increases:</i>	Salary increases are assumed to occur six months after the valuation date.
<i>Decrement Timing:</i>	Decrements of all types are assumed to occur mid-year.
<i>Eligibility Testing:</i>	Eligibility for benefits is determined using the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
<i>Benefit Service:</i>	Exact fractional service is used to determine the amount of benefit payable.
<i>Decrement Relativity:</i>	Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
<i>Decrement Operation:</i>	Disability and mortality decrements operate during the first 5 years of service. Turnover do not operate during retirement eligibility.
<i>Normal Form of Benefit:</i>	A 60% automatic joint and survivor payment is assumed to the normal form.
<i>Loads:</i>	Retirement Present Values were loaded by 4% for Police and Fire to account for the lump sum redemptions at time of retirement and 4% for Police and Fire to account for annuity withdrawal at time of retirement.
<i>Incidence of Contributions:</i>	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.
<i>Financing of Unfunded Actuarial Accrued Liabilities (Money in the Pipes):</i>	The rate-setting valuation projects the unfunded actuarial accrued liability to the beginning of the applicable fiscal year to determine the applicable unfunded amortization rate.

SECTION D

FINANCIAL REPORTING

This information is presented in draft form for review by the System's auditor. Please let us know if there are any items that the auditor changes so that we may maintain consistency with the System's financial statements.

Information to be used for plan reporting is now issued in a separate report in accordance with GASB Statement No. 67.

Information to be used for reporting by the employer is now issued in a separate report in accordance with GASB Statement No. 68.

Required Supplementary Information

Schedule of Funding Progress

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) -- Entry-Age -- (b)	Unfunded AAL (UAAL) (b - a)	Funded Ratio (a / b)	Covered Payroll [@] (c)	UAAL as a % of Covered Payroll ((b - a) / c)
2010 [^]	\$ 185,750,293	\$ 237,994,618	\$52,244,325	78.0 %	\$22,432,921	232.9 %
2011 ^{*^}	173,001,421	260,283,654	87,282,233	66.5 %	19,213,007	454.3 %
2012 ^{#^}	177,718,953	269,210,724	91,491,771	66.0 %	14,671,724	623.6 %
2013 ^{#^}	186,606,033	276,717,787	90,111,754	67.4 %	14,300,045	630.2 %
2014 [^]	195,103,903	285,081,193	89,977,290	68.4 %	15,378,745 ^{**}	585.1 %
2015	200,823,211	289,714,451	88,891,240	69.3 %	16,589,288	535.8 %
2016 [*]	206,343,809	301,281,758	94,937,950	68.5 %	21,422,110	443.2 %
2017 [*]	206,293,124	309,385,005	103,091,882	66.7 %	20,424,418	504.7 %
2018	205,007,419	314,128,878	109,121,460	65.3 %	22,330,307	488.7 %
2019 [*]	206,928,848	339,255,259	132,326,411	61.0 %	23,645,422	559.6 %

Plan amended.

* Revised actuarial assumptions.

** Adjusted for 27 pay periods.

[^] Prior to the June 30, 2015 valuation, the valuation date was December 31st.

[@] Includes EROP payroll.

Note: Results shown throughout this report for years prior to 2019 were prepared by the previous actuarial firm.

Schedule of Employer Contributions

Valuation Date Ended June 30	Computed Dollar Contribution [@]	Actual Contribution	Percentage Contributed
2010 [^]	\$ 7,368,876	\$ 7,368,876	100%
2011 ^{*^}	8,815,031	8,815,031	100%
2012 ^{#^}	8,095,472	8,095,472	100%
2013 ^{#^}	7,953,970	7,953,970	100%
2014 [^]	7,986,312	7,986,312	100%
2015	7,994,747	7,994,747	100%
2016 [*]	8,297,366	8,297,370	100%
2017 [*]	9,091,402	10,103,830	111%
2018	9,813,390		
2019 [*]	11,969,088		

Plan amended.

* Revised actuarial assumptions.

[^] Prior to the June 30, 2015 valuation, the valuation date was December 31st.

[@] Based on projected active member and EROP payroll.

Note: Results shown throughout this report for years prior to 2019 were prepared by the previous actuarial firm.

Required Supplementary Information

The information presented in the required supplementary schedules was determined as part of the actuarial valuations at the dates indicated. Additional information as of the latest actuarial valuation follows:

Valuation date	June 30, 2019
Actuarial cost method	Entry-Age
Amortization method	Level Percent of Payroll
Amortization period	22 years (Closed)
Asset valuation method	4-year smoothed market
Actuarial assumptions:	
Investment rate of return	7.50%
Projected salary increases (includes wage inflation)	3.00% - 20.10%
Wage inflation	2.00%
Cost-of-living adjustments	None

Membership of the plan consisted of the following at June 30, 2019, the date of the latest actuarial valuation:

Retirees and beneficiaries receiving benefits	386
EROP	16
Terminated plan members entitled to but not yet receiving benefits	6
Active plan members	<u>232</u>
Total	640

SECTION E

GLOSSARY

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, turn-over 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.

Decrement - Generic term used to describe various demographic assumptions used in the valuation to model the decreasing likelihood of an active member surviving until retirement. Examples include termination and disability assumptions.

Glossary

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 - The value of assets derived by spreading differences between assumed and actual investment return in dollar installment over four years. The treatment removes the timing of investment activities from the valuation process.

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.

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.

Unfunded Actuarial Accrued Liability - The difference between the actuarial accrued liability and valuation assets. Sometimes referred to as "unfunded accrued liability."

Valuation Assets - The value of current plan assets recognized for valuation purposes. Generally based on book value plus a portion of unrealized appreciation or depreciation.

APPENDIX 1

RISK METRICS

Risk Commentary

The determination of the accrued liability and the actuarially determined contribution requires the use of assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the actuarially determined contribution that result from the differences between actual experience and the actuarial assumptions.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions due to changing conditions; 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. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the plan's future financial condition include:

- **Investment risk** – actual investment returns may differ from the expected returns;
- **Asset/Liability mismatch** – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
- **Contribution risk** – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
- **Salary and Payroll risk** – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
- **Longevity risk** – members may live longer or shorter than expected and receive pensions for a period of time other than assumed; and
- **Other demographic risks** – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

The computed contribution rate shown on page A-2 may be considered as a minimum contribution rate that complies with the Board's funding policy. The timely receipt of the actuarially determined contributions is critical to support the financial health of the plan. Users of this report should be aware that contributions made at the actuarially determined rate do not necessarily guarantee benefit security.

Risk Commentary (Concluded)

Plan Maturity Measures

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Generally accepted plan maturity measures include the following:

	<u>2019</u>	<u>2018</u>
Ratio of the market value of assets to payroll	9.58	9.59
Ratio of actuarial accrued liability to payroll	15.47	14.58
Ratio of actives to retirees and beneficiaries	0.60	0.63
Ratio of net cash flow to market value of assets	-5.3%	-6.9%

Ratio of Market Value of Assets to Payroll

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 5.0 times the payroll, a return on assets 5% different than assumed would equal 25% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.

Ratio of Actuarial Accrued Liability to Payroll

The relationship between actuarial accrued liability and payroll is a useful indicator of the potential volatility of contributions for a fully funded plan. A funding policy that targets a funded ratio of 100% is expected to result in the ratio of assets to payroll and the ratio of liability to payroll converging over time.

The ratio of liability to payroll may also be used as a measure of sensitivity of the liability itself. For example, if the actuarial accrued liability is 2.5 times the payroll, a change in liability 2% other than assumed would equal 5% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

Ratio of Actives to Retirees and Beneficiaries

A young plan with many active members and few retirees will have a high ratio of active to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

Ratio of Net Cash Flow to Market Value of Assets

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means existing funds are being used to make payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

Additional Risk Assessment

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability.



August 29, 2019

Retirement Board
City of Sterling Heights
Police and Fire Retirement System
40555 Utica Road
Sterling Heights, Michigan 48313

Attention: Mr. Ryan Clark, Treasury Services Coordinator

Dear Mr. Clark:

Please find enclosed 14 copies of the report of the Annual Actuarial Valuation for the City of Sterling Heights Police and Fire Retirement System.

Sincerely,

A handwritten signature in black ink, appearing to read "F. Pieterse", is written over a light blue circular background.

Francois Pieterse, ASA, FCA, MAAA

FP:sc
Enclosures