City of Royal Oak Retirement System

73rd Actuarial Valuation Report

as of June 30, 2021

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November 23, 2021

Board of Trustees
City of Royal Oak Retirement System
Royal Oak, Michigan

Re: City of Royal Oak Retirement System Actuarial Valuation as of June 30, 2021
Actuarial Disclosures

Dear Board Members:

The results of the June 30, 2021 Annual Actuarial Valuation of the City of Royal Oak 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, and to determine the employer contribution rate for the fiscal year ending June 30, 2023. 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 D-2 and in the Appendix, 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, 2021. 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 Summary of Valuation Methods and Assumptions.

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

This report was prepared during the recent and still-developing COVID-19 pandemic, which is likely to influence demographic and economic experience, at least in the short term. Results in this report are developed based on available data without adjustment. We will continue to monitor these developments and their impact on the Retirement System. Actual experience will be reflected in each subsequent report, as experience emerges.

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 Royal Oak 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.

Mark Buis and Michael D. Kosciuk are Members of the American Academy of Actuaries (MAAA) and 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

Mark Buis, FSA, FCA, EA, MAAA

Michael D. Kosciuk, ASA, ACA, EA, MAAA

MB/MDK:ah

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SECTION A

VALUATION RESULTS

Funding Objective

The funding objective of the Retirement System is to establish and receive contributions, expressed as percents of active member payroll, which will accumulate assets during members' periods of employment that will be sufficient to finance benefits throughout their retirement years.

Contribution Rates

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 reasonable period of future years the actuarial present value of benefits not covered by valuation assets and anticipated future normal costs (the unfunded actuarial accrued liability).

Computed contribution rates for the fiscal year ending June 30, 2023 are shown on page A-2.

Contributions to Provide Benefits
Fiscal Year Ending June 30, 2023

Total Contribution for	Computed Contributions Expressed as Percents of Active Member Payroll & Dollars		
	General & Water	Police Officers*** & Fire Fighters	Total **
Normal Cost			
Age and service benefits	12.09 %	17.71 %	16.20 %
Disability	0.84 %	2.35 %	1.94 %
Death	0.39 %	0.31 %	0.33 %
Deferred service pensions	1.29 %	0.59 %	0.78 %
Future refunds of member contributions	0.28 %	0.35 %	0.33 %
Totals	14.89 %	21.31 %	19.58 %
Member Contributions	5.41 %	5.89 %	5.76 %
Employer Normal Cost	9.48 %	15.42 %	13.82 %
Unfunded Actuarial Accrued Liability*	$462,557	53.15 %	
Computed Employer Rate		**68.57%**	
Projected Payroll	$3,533,095	$11,247,279	
Employer $ Amount (Based on Projected Payroll)	**797,494**	**7,712,259**	**$8,509,753**

* *Amortized as a level dollar amount over 17 years for the General and Water Plan and level percent-of-payroll over 22 years for the Police Officers and Fire Fighters.*

** *Normal cost based on a weighted average of rates from each group.*

*** *Includes Police Service Aides.*

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Determining Employer Dollar Contributions

For any period of time, the percent-of-payroll contribution rate should be converted to dollars -- and then contributed to the Retirement System.

Recommended Procedure: (1) at the end of each payroll period, multiply the active member payroll for the period by the employer contribution percent; and (2) promptly contribute the dollar amount so determined.

Applying the employer normal cost percentage to the General and Water member projected payroll and adding the unfunded actuarial accrued liability produces annual employer contributions of $797,494 for the General and Water group. Applying the employer contribution rate of 68.57% to the Police and Fire member projected payroll produces annual employer contributions of $7,712,259 for the Police and Fire group.

Present Value of Future Benefits and Accrued Liability

	June 30, 2021		
	General	Police/Fire	Total
A. Accrued Liability			
1. For retirees and beneficiaries	$ 59,963,140	$ 128,244,588	$ 188,207,728
2. For vested terminated members	1,547,986	908,322	2,456,308
3. For present active members			
a. Value of expected future benefit payments	27,650,969	61,026,464	88,677,433
b. Value of future normal costs	3,079,637	21,912,406	24,992,043
c. Active member accrued liability: (a) - (b)	24,571,332	39,114,058	63,685,390
4. Total accrued liability	86,082,458	168,266,968	254,349,426
B. Present Assets (Funding Value)	81,484,509	81,157,652	162,642,161
C. Unfunded Accrued Liability: (A.4) - (B)	4,597,949	87,109,316	91,707,265
D. Funding Ratio: (B) / (A.4)	94.7%	48.2%	63.9%
E. Funding Ratio: Market Value Basis	106.1%	54.1%	71.7%

Derivation of Experience Gain (Loss)
Year Ended June 30, 2021

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

		All Groups Combined (Amounts in Thousands)
(1)	UAAL* at start of year	$94,487
(2)	Normal cost from last valuation	2,919
(3)	Actual member and employer contributions	9,299
(4)	Interest accrual	6,619
(5)	Expected UAAL before changes	94,726
(6)	Change in benefit provisions	0
(7)	Change from assumption revision	0
(8)	Expected UAAL after changes	94,726
(9)	Actual UAAL	91,707
(10)	Gain (loss): (8) - (9)	3,019
(11)	% of beginning of year AAL	1.2%

* *Unfunded actuarial accrued liability.*

Valuation Date	Experience Gain (Loss) as % of Beginning of Year Accrued Liability
6/30/2012	(1.9)%
6/30/2013	(1.0)%
6/30/2014	0.6%
6/30/2015	(1.1)%
6/30/2016	(2.1)%
6/30/2017	(1.1)%
6/30/2018	(1.9)%
6/30/2019	(1.6)%
6/30/2020	(1.7)%
6/30/2021	1.2%

Development of Funding Value of Retirement System Assets

Year Ended June 30:	2020	2021	2022	2023	2024
A. Funding Value Beginning of Year	$155,059,101	$156,240,551			
B. Market Value End of Year	149,943,937	182,401,891			
C. Market Value Beginning of Year	154,305,575	149,943,937			
D. Non-Investment Net Cash Flow	(8,770,300)	(10,056,618)			
E. Investment Income					
E1. Market Total: B-C-D	4,408,662	42,514,572			
E2. Amount for Immediate Recognition: (7.25)%	10,923,861	10,962,888			
E3. Amount for Phased-In Recognition: E1-E2	(6,515,199)	31,551,684			
F. Phased-In Recognition of Investment Income					
F1. Current Year: 0.25 x E3	(1,628,800)	7,887,921			
F2. First Prior Year	(646,433)	(1,628,800)	$ 7,887,921		
F3. Second Prior Year	(117,348)	(646,433)	(1,628,800)	$ 7,887,921	
F4. Third Prior Year	1,420,470	(117,348)	(646,434)	(1,628,799)	$7,887,921
F5. Total Recognized Investment Gain (Loss)	(972,111)	5,495,340	5,612,687	6,259,122	7,887,921
G. Funding Value End of Year: A+D+E2+F5	156,240,551	162,642,161			
H. Difference Between Market & Funding Value	(6,296,614)	19,759,730	14,147,043	7,887,921	0
I. Recognized Rate of Return	6.6%	10.9%			
J. Market Value Rate of Return	2.9%	29.3%			
K. Ratio of Funding Value to Market Value	104.2%	89.2 %			

The Funding Value of Assets recognizes assumed investment income (line E2) fully each year. Differences between actual and assumed investment income (line E3) 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 four consecutive years, the Funding Value will become equal to Market Value.

Development of Funding Value of Retirement System Assets

Year Ended June 30:	General	Police/Fire	Total
A. Funding Value Beginning of Year	$78,291,523	$77,949,028	$156,240,551
B. Market Value End of Year	91,355,700	91,046,191	182,401,891
C. Market Value Beginning of Year	75,117,480	74,826,457	149,943,937
D. Non-Investment Net Cash Flow	(5,057,477)	(4,999,141)	(10,056,618)
E. Investment Return			
E1. Market Total: B - C - D	21,295,697	21,218,875	42,514,572
E2. Amt. for Immediate Recognition	5,492,802	5,470,086	10,962,888
E3. Amt. for Phased-In Recognition: E1 - E2	15,802,895	15,748,789	31,551,684
F. Phased-in Recognition of Investment Return			
F1. Current Year: (.25 x E3)	3,950,724	3,937,197	7,887,921
F2. First Prior	(820,683)	(808,117)	(1,628,800)
F3. Second Prior	(323,545)	(322,888)	(646,433)
F4. Third Prior	(48,835)	(68,513)	(117,348)
F5. Total Recognized Investment Gain (Loss)	2,757,661	2,737,679	5,495,340
G. Funding Value End of Year: A+D+E2+F5	81,484,509	81,157,652	162,642,161
H. Difference between Market & Funding Value	9,871,191	9,888,539	19,759,730

Comments and Conclusion

Comment 1: The recommended contribution for the General group decreased from the prior year, due to favorable demographic and economic experience, including pay increases lower than expected. The recommended contribution for the Police/Fire group increased from the prior year, due to unfavorable demographic experience, including greater pay increases than expected.

Comment 2: Investment return of 29.3% was greater than the assumed level (7.25%) on a market value basis. However, under the asset valuation method, investment gains and losses are spread over a four-year period. Partial recognition of this year's gain was combined with the continued phase-in of investment gains and losses from prior years resulting in a net recognized asset gain of 10.9% on a funding value of assets basis. The Market Value exceeds the Funding Value of Assets by approximately $19.8 million (see page A-5), which is the net amount of unrecognized prior year gains/losses to be recognized over the coming three years.

Comment 3: There were no changes in benefit provisions or actuarial assumptions.

Recommendation: The actuarial present value of benefits payable to retirees and beneficiaries on the rolls as of June 30, 2021 exceeded the Reserve for Retired Benefit Payments. In accordance with the Retirement System Ordinance, we recommend the following transfers be made. In accordance with the current administrative procedures, since the reserve for Undistributed Investment Income is less than 10% of the Market Value of the fund, no transfer should be made from the reserve for Undistributed Investment Income to the Reserve for Employer Contributions.

Reserve Account	Recommended Transfer
Employer Contributions - General	($1,205,608)
Retired Benefit Payments - General	$1,205,608
Employer Contributions - Police/Fire	($8,149,329)
Retired Benefit Payments - Police/Fire	$8,149,329
Undistributed Investment Income	N/A

Looking Ahead: Due to the asset smoothing method, only a portion of the current year's asset gain was recognized and portions of prior years' gains and losses remain to be recognized. If the Market Value of Assets were used (instead of smoothed value), the employer contribution would have been approximately $6,800,000 (instead of $8,509,753) and the funded status would have been about 71.7% (instead of 63.9%).

Public Act 202: Under Public Act 202 (PA 202) of the State of Michigan, Michigan municipalities are required to report liabilities under new uniform assumption guidelines. The current guidelines are currently only for reporting purposes (and not funding).

The uniform assumptions include the following:

- Investment return no higher than 7.0%;
- Assumed wage inflation no lower than 3.0%;
- Mortality assumption that uses a version of Pub-2010 with generational mortality improvement using scale MP-2019, or based on an experience study within the last five years; and
- Amortization period no longer than 18 years for Pension Plans.

The information needed to satisfy PA 202 reporting requirements was supplied in the GASB report.

Comments and Conclusion

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 7.25% on the actuarial value of assets), it is expected that:

1) The employer normal cost as a percentage of pay is expected to remain level as a percentage of payroll.
2) The unfunded liability is expected to be paid off in approximately 22 years, which is the number of years remaining in the closed amortization schedule of the unfunded liability for the Police and Fire group.
3) The funded status of the plan is expected to reach a 100% funded ratio in approximately 22 years, which is the number of years remaining in the closed amortization schedule of the unfunded liability for the Police and Fire group.

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 regards 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.
2) The measurement is inappropriate for assessing the need for or the amount of future employer contributions.
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.

The funding level of the plan on a Funding Value Basis is shown on page A-3.

Actuarial Accrued Liabilities & Assets
Comparative Statement

Valuation Date	Actuarial Accrued Liability (AAL) ($1,000s)	Valuation Assets ($1,000s)	Unfunded Actuarial Accrued Liability (UAAL) ($1,000s)	Ratio of Valuation Assets to AAL	Ratio of UAAL to Valuation Payroll
6-30-98	$ 102,995	$ 132,289	$(29,294)	128.4 %	-
6-30-99	107,934	147,433	(39,499)	136.6 %	-
6-30-00	111,515	159,268	(47,753)	142.8 %	-
6-30-00*	113,215	159,268	(46,053)	140.7 %	-
6-30-01*	121,589	162,586	(40,997)	133.7 %	-
6-30-02	128,303	156,403	(28,100)	121.9 %	-
6-30-03*	136,529	146,740	(10,211)	107.5 %	-
6-30-04*	146,386	137,851	8,535	94.2 %	-
6-30-05*	152,016	134,773	17,243	88.7 %	82.7 %
6-30-06	158,239	137,264	20,975	86.7 %	102.7 %
6-30-07	162,782	143,619	19,163	88.2 %	94.3 %
6-30-08	166,957	145,561	21,396	87.2 %	104.6 %
6-30-09*	173,543	138,812	34,731	80.0 %	172.5 %
6-30-10*	178,656	132,168	46,488	74.0 %	253.0 %
6-30-11*	188,717	125,357	63,360	66.4 %	377.0 %
6-30-12*	190,595	124,013	66,582	65.1 %	420.2 %
6-30-13*	199,909	125,709	74,200	62.9 %	485.1 %
6-30-14*	203,770	130,740	73,030	64.2 %	476.2 %
6-30-15*	208,800	133,359	75,441	63.9 %	492.7 %
6-30-16^*	214,522	156,146	58,376	72.8 %	386.7 %
6-30-17	217,993	158,777	59,216	72.8 %	380.7 %
6-30-18*	241,838	157,070	84,768	64.9 %	527.9 %
6-30-19	245,657	155,059	90,598	63.1 %	578.7 %
6-30-20	250,728	156,241	94,487	62.3 %	633.8 %
6-30-21	254,349	162,642	91,707	63.9 %	607.2 %

** After changes in benefit provisions and/or actuarial assumptions and actuarial cost methods.*

^ Reflects Bond Issuance of $21.4 million subsequent to measurement date of June 30, 2016.

The Ratio of Present 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.

Computed Employer Contributions
Comparative Statement

Valuation Date	Active Members				Retirees & Beneficiaries				Calculated Employer Contributions		
		Valuation Payroll					Annual Allowances				
	No.	Total	Average	% Incr.	No.	Active Per Retiree	$	% of Payroll	General & Water	Police & Fire	Wt. Avg.
6-30-97	384	$ 15,949,326	$41,535	6.4 %	430	0.89	$ 5,647,518	35.4 %	0.60 %	0.42 %	0.53 %
6-30-98	392	17,181,869	43,831	7.7 %	426	0.92	5,865,307	34.1 %	0.00 %	0.00 %	0.00 %
6-30-99	385	17,501,352	45,458	1.9 %	429	0.90	6,051,286	34.6 %	0.00 %	0.00 %	0.00 %
6-30-00*	396	18,129,821	45,782	3.6 %	437	0.91	6,346,060	35.0 %	0.00 %	0.00 %	0.00 %
6-30-01*	397	18,962,345	47,764	4.6 %	447	0.89	6,865,032	36.2 %	0.00 %	0.00 %	0.00 %
6-30-02	394	19,368,385	49,158	2.1 %	458	0.86	7,429,422	38.4 %	0.00 %	0.00 %	0.00 %
6-30-03*	391	20,138,113	51,504	4.0 %	456	0.86	7,710,821	38.3 %	3.79 %	10.20 %	6.90 %
6-30-04*	378	20,569,285	54,416	2.1 %	474	0.80	8,575,578	41.7 %	16.27 %	22.87 %	19.55 %
6-30-05*	365	20,839,464	57,094	1.3 %	479	0.76	9,305,818	44.7 %	16.76 %	23.52 %	20.12 %
6-30-06	351	20,431,658	58,210	(2.0)%	479	0.73	9,908,394	48.5 %	18.25 %	24.30 %	21.33 %
6-30-07	346	20,327,590	58,750	(0.5)%	482	0.72	10,342,238	50.9 %	17.57 %	23.49 %	20.60 %
6-30-08	336	20,459,734	60,892	0.7 %	477	0.70	10,386,269	50.8 %	$2,451,876	21.79 %	$4,395,643
6-30-09*	317	20,139,069	63,530	(1.6)%	480	0.66	10,872,875	54.0 %	2,058,401	25.35 %	5,158,959
6-30-10*	287	18,373,382	64,019	(8.8)%	489	0.59	11,320,108	61.6 %	2,658,168	29.89 %	5,739,910
6-30-11*	252	16,804,600	66,685	(8.5)%	518	0.49	12,846,102	76.4 %	2,914,594	37.78 %	6,599,438
6-30-12*	242	15,846,779	65,483	(5.7)%	523	0.46	13,509,275	85.2 %	2,669,308	41.57 %	6,480,707
6-30-13#	244	15,296,167	62,689	(3.5)%	527	0.46	13,833,419	90.4 %	2,835,608	46.72 %	6,891,898
6-30-14*	246	15,336,530	62,344	0.3 %	536	0.46	14,369,883	93.7 %	2,679,570	46.30 %	6,852,495
6-30-15*	240	15,312,473	63,802	(0.2)%	555	0.43	14,983,560	97.9 %	2,406,510	46.52 %	7,009,728
6-30-16*^	231	15,094,284	65,343	(1.4)%	548	0.42	15,482,808	102.6 %	315,659	52.35 %	5,400,763
6-30-17	230	15,552,925	67,621	3.0 %	541	0.43	15,866,119	102.0 %	208,980	46.72 %	5,605,336
6-30-18*#	228	16,056,297	70,422	3.2 %	534	0.43	16,063,314	100.0 %	965,728	61.21 %	7,744,404
6-30-19	215	15,656,680	72,822	(2.5)%	540	0.40	16,636,791	106.3 %	1,014,828	64.30 %	8,259,186
6-30-20	201	14,909,017	74,174	(4.8)%	543	0.37	17,595,034	118.0 %	1,077,067	67.86 %	8,615,365
6-30-21	199	15,103,628	75,898	1.3 %	541	0.37	18,043,896	119.5 %	797,494	68.57 %	8,509,753

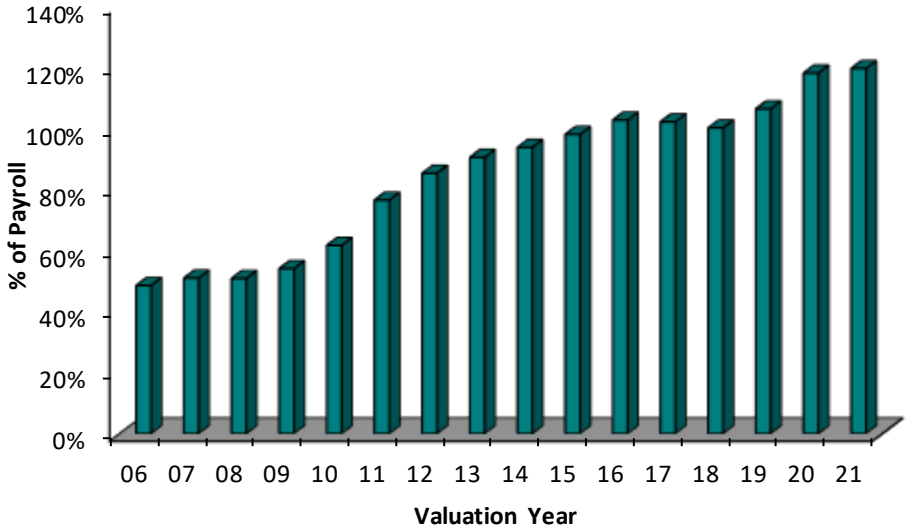
** After changes in benefit provisions.*

 # Actuarial assumptions revised.

^ Reflects Bond Issuance of $21.4 million subsequent to measurement date of June 30, 2016.

Active Members & Benefit Recipients

Benefits as a Percent of Payroll



SECTION B

SUMMARY OF BENEFIT PROVISIONS AND VALUATION DATA

Summary of Benefit Provisions Evaluated
June 30, 2021

Regular Retirement (no reduction factor for age):

The benefit amounts attributable to regular retirements and the conditions under which such benefits may be paid are described in tabular form on page B-4.

Deferred Retirement (vested benefit):

Eligibility:

TPOAM, Executive Department Heads, Department Heads and Deputies, Professional and Technical, 44th District Court, SEIU AFL-CIO Local 517M, Supervisors, Police Service Aides: 5 years of service.
Police Officers, Police Command, Detectives, Fire Fighters: 10 years of service.

Annual Amount:

Same as regular retirement but based upon service and final average compensation at time of termination.

TPOAM, Executive Department Heads, Department Heads and Deputies, Professional & Technical, 44th District Court, Police Service Aides: Payable at age 55 with 25 years of service or age 60 with 5 years of service.

Supervisors, SEIU AFL-CIO Local 517M: Payable at age 50 with 30 years of service or age 60 with 5 years of service.

Police Officers, Police Command, Detectives, Fire Fighters: Payable at age 55 with 10 years of service.

Duty Death Before Retirement:

Eligibility - No age or service requirements.

Annual Amount - Computed as regular retirement but with additional service credit from date of death until date age 60 would have been attained. Spouse is paid 75% of regular retirement benefit; 1 or 2 unmarried children under age 19 are paid 10% of regular retirement benefit per child; 3 or more unmarried children under age 19 are paid an equal share of 25% of regular retirement benefit. Worker's Compensation payments are offset.

Non-Duty Death Before Retirement:

Eligibility - 3 years of service.

Annual Amount - Same as duty death before retirement.

Summary of Benefit Provisions Evaluated
June 30, 2021

Duty Disability Retirement:

Eligibility - No age or service requirements.

Annual Amount:

TPOAM: 66-2/3% of base monthly salary at time of disability, with recomputation to 70% after 5 years of disability and 75% after 10 years. Benefit is payable until attaining minimum retirement requirements.

Executive Department Heads, Department Heads & Deputies: 66% of base monthly salary at time of disability. Benefit is payable until voluntary retirement age.

Professional & Technical, 44th District Court, Supervisors, and SEIU AFL-CIO Local 517M: 66-2/3% of base monthly salary at time of disability. Benefit is payable until voluntary retirement age for Professional & Technical and Supervisors until age 60 for and SEIU AFL-CIO Local 517M.

Police Officers, Police Command, Detectives, Police Service Aides: 66-2/3% of base monthly salary. Workers' compensation is offset. Benefit is payable until age 55 for Police Officers, Police Command, and Detectives and until age 60 for Police Service Aides.

Fire Fighters: 66-2/3% of base monthly salary at time of disability. Worker's compensation is offset. Benefit is payable until voluntary retirement age.

Duty Disability Maximum Monthly Benefit:

Executive Department Heads, Department Heads & Deputies:	$5,000
Professional & Technical, 44th District Court:	$3,500
TPOAM, SEIU AFL-CIO Local 517M, Supervisors, Police Officers, Police Command, Detectives, Police Service Aides, Fire Fighters:	No maximum

Non-Duty Disability Retirement:

Eligibility:

SEIU AFL-CIO Local 517M: 10 years of service.

TPOAM, Executive Department Heads, Department Heads and Deputies, Professional and Technical, 44th District Court, Supervisors, Police Officers, Police Command, Detectives, Police Service Aides, Fire Fighters: 5 years of service.

Annual Amount:

TPOAM: 66-2/3% of base monthly salary at time of disability. Benefit is payable until attaining minimum retirement requirements.

Fire Fighters: 50% of base monthly salary at time of disability. Benefits are payable the same as duty disability.

Executive Department Heads, Department Heads and Deputies, Professional and Technical, Local 270M, Supervisors, Police Officers, Police Command, Police Service Aides, Detectives: Benefits are the same as duty disability.

Automatic Death Benefit After Retirement:

75% of a retiree's straight life pension will be continued to an eligible surviving spouse upon retiree's death with no corresponding reduction in straight life pension.

Lump Sum Death Benefit After Retirement:

$4,000 for all divisions.

Annuity Withdrawal:

Members may withdraw their accumulated member contributions upon retirement with a corresponding reduction in pension amount.

Covered Compensation:

TPOAM, Executive Department Heads, Department Heads and Deputies, Professional and Technical, Local 270M, Supervisors: Covered compensation includes base salary, longevity and up to 96 hours of sick leave incentive pay.

Police Command: Covered compensation includes base salary, longevity, payment in lieu of holidays, sick and personal business (120 hours) and vacation (200 hours).

Fire Fighters: Covered compensation includes base salary, longevity, payment in lieu of holidays, uniform allowance, cleaning allowance, food allowance, sick pay, paramedic premium, personal business (24 hours) and vacation.

Police Officers, Police Service Aides: Covered compensation includes base salary, longevity, payment in lieu of holidays, 120 hours of sick and personal business days, and up to 200 hours from the vacation bank.

Detectives: Covered compensation includes base salary, longevity and payment in lieu of holidays, 24 personal business hours, up to 96 hours sick leave incentive pay and up to 200 hours from the vacation bank.

Summary of Benefit Provisions Evaluated
June 30, 2021

Group	Code	Eligibility	Benefit Multiplier		Maximum FAS	Years in FAS	Member Contribution Rates		Date of Closure to New Hires
			Date of Change	Benefit Formula			To Social Security Wage Base	Over Social Security Wage Base	
Executive Department Heads	10	Age 50 & 25 yrs., or age 55 & 20 yrs., or age 60 & 5 yrs.	Before 7/1/2010 After 6/30/2010	2.5% for 20 yrs., 2.2% after 2.3% for 20 yrs., 2.0% after	80%^	2	5.00%	7.00%	5/1/2008
SEIU AFL-CIO Local 517M	11	Any age & 30 yrs., or age 50 & 25 yrs., or age 55 & 20 yrs., or age 60 & 5 yrs.	Before 7/1/2011 After 6/30/2011	2.5% for 20 yrs., 2.2% after 2.25% for first 10 yrs., 2.5% for next 10 yrs., 2.2% after	75%	2	7.00%	9.00%	7/1/2006
Department Heads and Deputies	12	Age 50 & 25 yrs., or age 55 & 20 yrs., or age 60 & 5 yrs.	Before 9/1/2011 After 8/31/2011	2.5% for 20 yrs., 2.2% after 2.25% for 20 yrs., 2.2% after	80%^	2	5.00%	7.00%	7/1/2008
44th District Court	13	Age 50 & 25 yrs., or age 55 & 20 yrs., or age 60 & 5 yrs.	Before 1/1/2012 After 12/31/2011	2.5% for 20 yrs., 2.2% after 2.25% for 20 yrs., 2.2% after	80%^	2	4.00%	4.00%	7/1/2007
Professional and Technical	33	Age 50 & 25 yrs., or age 55 & 20 yrs., or age 60 & 5 yrs.	Before 7/1/2011 After 6/30/2011	2.5% for 20 yrs., 2.2% after 2.25% for 20 yrs., 2.2% after	80%^	2	5.00%	7.00%	7/1/2007
TPOAM (AFSCME)	14	Age 50 & 25 yrs., or age 55 & 20 yrs., or age 60 & 5 yrs.	Before 9/1/2011 After 8/31/2011	2.5% for 20 yrs., 2.2% after 2.25% for 20 yrs., 2.2% after***	80%^	2	4.50%	6.50%	7/1/2005
Foremen and Supervisors	15	Age 50 & 30 yrs., or age 50 & 25 yrs., or age 55 & 20 yrs., or age 60 & 5 yrs.	Before 9/14/2011 After 9/13/2011	2.5% for 20 yrs., 2.2% after 2.25% for first 10 yrs., 2.5% for next 10 yrs., 2.2% after	80%^	2	7.00%	7.00%	7/1/2006
Police Service Aides	22	Age 55 & 20 yrs., or age 60 & 5 yrs., or age 50 & 25 yrs.		2.5% for 20 yrs., 2.2% after	80%	2	4.00%	6.00%	
Police Officers	92								
Hired before 6/1/2012		Any age & 25 yrs., or age 55 & 10 yrs.		2.8% for all yrs.	80%^	2	6.00%	6.00%	
Hired after 5/30/2012		Any age & 25 yrs.*, or age 55 & 10 yrs.		2.5% for all yrs.	80%^	3	6.00%	6.00%	
Fire Fighters	93								
Hired before 10/1/2009		Any age & 25 yrs., or age 55 & 10 yrs.		2.8% for all yrs.	80%^	2	6.00%	6.00%	
Hired after 9/30/2009		Age 50 & 25 yrs., or age 55 & 10 yrs.**		2.5% for all yrs.	80%^	3	6.00%	6.00%	
Police Command	94	Any age & 25 yrs., or age 55 & 10 yrs.		2.8% for all yrs.	80%^	2	6.00%	6.00%	
Detectives	95	Any age & 25 yrs., or age 55 & 10 yrs.		2.8% for all yrs.	80%^	2	6.00%	6.00%	
Fire Department Heads	96	Any age & 25 yrs., or age 55 & 10 yrs.		2.8% for all yrs.	80%^	2	6.00%	6.00%	
Police Department Heads	97	Any age & 25 yrs., or age 55 & 10 yrs.		2.8% for all yrs.	80%^	2	6.00%	6.00%	

* *For Police Officers hired after 5/30/2012, a member must have at least 25 years of actual service to be eligible to retire and receive a pension. This is actual service and does not include the purchase of service time.*

** *For Fire Fighters hired after 9/30/2009, service for eligibility must be actual service and does not include the purchase of service time.*

*** *Service time previously purchased will be computed utilizing the multiplier in effect at the time of purchase.*

^ *1% multiplier after 75% up to 80%.*

Retirees and Beneficiaries Added to and Removed from Rolls
Comparative Statement

Valuation Date	Added to Rolls*		Removed from Rolls #			Net Increase		Rolls End of Year	
			No.						
	No.	Annual Allowances	A	E	Annual Allowances	No.	Annual Allowances	No.	Annual Allowances
6/30/97	19	$ 349,731	16	9.8	$ 232,065	3	$ 117,666	430	$ 5,647,518
6/30/98	12	300,261	16	6.8	82,472	(4)	217,789	426	5,865,307
6/30/99	24	369,781	21	15.2	183,802	3	185,979	429	6,051,286
6/30/00	25	532,563	17	15.6	237,789	8	294,774	437	6,346,060
6/30/01	18	585,533	8	16.2	66,561	10	518,972	447	6,865,032
6/30/02	27	648,282	16	17.3	83,892	11	564,390	458	7,429,422
6/30/03	24	512,343	26	18.1	230,945	(2)	281,399	456	7,710,821
6/30/04	31	1,003,875	13	18.4	139,118	18	864,757	474	8,575,578
6/30/05	27	953,722	22	19.5	223,481	5	730,240	479	9,305,818
6/30/06	21	824,024	21	16.4	221,448	0	602,576	479	9,908,394
6/30/07	24	631,164	21	17.4	197,320	3	433,844	482	10,342,238
6/30/08	16	402,955	21	18.0	358,924	(5)	44,031	477	10,386,269
6/30/09	23	698,353	20	18.8	211,747	3	486,606	480	10,872,875
6/30/10	24	694,019	15	19.3	246,786	9	447,233	489	11,320,108
6/30/11	48	1,739,131	19	20.1	213,137	29	1,525,994	518	12,846,102
6/30/12	31	995,284	26	20.7	332,111	5	663,173	523	13,509,275
6/30/13	21	546,902	17	20.7	222,758	4	324,144	527	13,833,419
6/30/14	31	958,208	22	20.3	421,744	9	536,464	536	14,369,883
6/30/15	23	696,302	4	21.5	82,625	19	613,677	555	14,983,560
6/30/16	24	927,420	31	23.7	428,172	(7)	499,248	548	15,482,808
6/30/17	21	724,111	28	23.7	340,800	(7)	383,311	541	15,866,119
6/30/18	14	494,955	21	22.3	297,760	(7)	197,195	534	16,063,314
6/30/19	23	849,646	17	21.3	276,169	6	573,477	540	16,636,791
6/30/20	26	1,217,166	23	21.6	258,923	3	958,243	543	17,595,034
6/30/21	19	791,959	21	20.2	343,097	(2)	448,862	541	18,043,896

* *Includes beneficiaries of deceased retirees.*

\# *Includes deceased retirees with beneficiaries.*

A - Represents actual number.

E - Represents expected number based on actuarial assumptions.

Retirees and Beneficiaries June 30, 2021
Tabulated by Type of Allowance Being Paid

	Annual Retirement Allowances					
	General & Water		Police Officers & Fire Fighters		Totals	
Type of Allowances Being Paid	No.	Amount	No.	Amount	No.	Amount
Age and Service Allowances						
Regular allowance						
Terminating at death of retirant	66	$ 1,407,363	28	$ 1,102,254	94	$ 2,509,617
75% of benefit continuing to spouse	139	3,927,276	175	9,137,178	314	13,064,454
100% Joint & Survivor benefit	3	75,594	1	65,446	4	141,040
50% Joint & Survivor benefit	2	47,790			2	47,790
Survivor beneficiary of deceased retirant	39	510,272	50	943,933	89	1,454,205
Domestic Relations Order Recipient	9	99,055	7	114,644	16	213,699
Total Age and Service Allowances	258	6,067,350	261	11,363,455	519	17,430,805
Casualty Allowances						
Duty Disability Allowances						
Terminating at death of retirant			2	88,028	2	88,028
75% of benefit continuing to spouse	1	31,582	1	22,779	2	54,361
Survivor beneficiary of deceased retirant						
Totals	1	31,582	3	110,807	4	142,389
Non-Duty Disability Allowances						
Terminating at death of retirant	1	28,208	1	41,250	2	69,458
75% of benefit continuing to spouse			3	138,432	3	138,432
Survivor beneficiary of deceased retirant						
Totals	1	28,208	4	179,682	5	207,890
Duty Death Allowances						
Survivor beneficiary			1	4,860	1	4,860
Child(ren) beneficiary						
Totals			1	4,860	1	4,860
Non-Duty Death Allowances						
Spouse beneficiary	7	128,964	5	128,988	12	257,952
Child(ren) beneficiary						
Totals	7	128,964	5	128,988	12	257,952
Total Casualty Allowances	9	188,754	13	424,337	22	613,091
Total Allowances Being Paid	**267**	**$6,256,104**	**274**	**$11,787,792**	**541**	**$18,043,896**

Retirees and Beneficiaries June 30, 2021
Tabulated by Nearest Ages

Nearest Ages	Age and Service No.	Age and Service Annual Allowances	Casualty No.	Casualty Annual Allowances	Totals No.	Totals Annual Allowances
Under 45			1	$ 46,186	1	$ 46,186
45-49	4	$ 207,866	3	123,310	7	331,176
50-54	33	1,975,498	2	86,440	35	2,061,938
55-59	48	2,578,982	4	127,108	52	2,706,090
60-64	64	2,809,663	1	20,909	65	2,830,572
65-69	83	2,770,268	1	20,220	84	2,790,488
70-74	96	3,179,187	4	106,728	100	3,285,915
75-79	72	1,776,118	1	4,860	73	1,780,978
80-84	50	1,173,591	3	50,268	53	1,223,859
85-89	34	538,292	1	15,515	35	553,807
90 & Over	35	421,340	1	11,547	36	432,887
Totals	**519**	**$17,430,805**	**22**	**$613,091**	**541**	**$18,043,896**

Inactive Members June 30, 2021
Tabulated by Nearest Ages

Also included in the valuation were 16 General members and 6 Police/Fire members who are eligible for annual deferred allowances with an estimated value of $331,424 upon retirement. Some of these 22 inactive members are presently covered under either a long-term disability insurance policy or worker's compensation.

Nearest Ages	No.	Estimated Deferred Annual Allowances
40	1	$ 22,815
44	2	18,049
48	1	18,744
49	1	14,016
50	2	36,440
51	1	17,606
52	1	19,644
53	1	10,555
54	2	12,227
55	2	23,021
57	1	35,034
58	4	76,267
62	1	5,469
64	1	16,467
65 and Over	1	5,070
Totals	**22**	**$331,424**

Active Members – Comparative Schedule

Valuation Date	Active Members	Valuation Payroll	Average Age	Average Service	Average Pay	% Pay Increase
6-30-02	394	$19,368,385	43.1 yrs.	10.9 yrs.	$49,158	2.9 %
6-30-03	391	20,138,113	43.2	11.1	51,504	4.8 %
6-30-04	378	20,569,285	43.5	10.9	54,416	5.7 %
6-30-05	365	20,839,464	43.7	11.0	57,094	4.9 %
6-30-06	351	20,431,658	43.9	11.4	58,210	2.0 %
6-30-07	346	20,327,590	44.1	11.8	58,750	0.9 %
6-30-08	336	20,459,734	44.9	12.6	60,892	3.6 %
6-30-09	317	20,139,069	45.6	13.5	63,530	4.3 %
6-30-10	287	18,373,382	45.9	14.5	64,019	0.8 %
6-30-11	252	16,804,600	45.8	14.6	66,685	4.2 %
6-30-12	242	15,846,779	46.0	14.7	65,483	(1.8)%
6-30-13	244	15,296,167	46.0	14.8	62,689	(4.3)%
6-30-14	246	15,336,530	45.4	14.4	62,344	(0.6)%
6-30-15	240	15,312,473	45.1	14.5	63,802	2.3 %
6-30-16	231	15,094,284	45.2	14.8	65,343	2.4 %
6-30-17	230	15,552,925	44.7	14.6	67,621	3.5 %
6-30-18	228	16,056,297	44.7	14.7	70,422	4.1 %
6-30-19	215	15,656,680	44.2	14.7	72,822	3.4 %
6-30-20	201	14,909,017	43.7	14.4	74,174	1.9 %
6-30-21	199	15,103,628	43.6	14.4	75,898	2.3 %

Active Members – June 30, 2021

Group	Active Members	Valuation Payroll
Local 270M	23	$ 1,348,447
Department Heads and Deputies	4	379,706
Executive Department Heads	4	438,513
44th District Court	11	683,710
Professional & Technical	7	538,234
TPOAM	11	631,155
Foremen and Supervisors	2	164,175
Police Service Aides	11	561,876
Police	52	3,780,227
Fire	51	4,405,668
Police Command	15	1,422,202
Police Detectives	6	512,089
Fire Department Heads	0	0
Police Department Heads	2	237,626
Total	**199**	**$15,103,628**

Active Members Added to and Removed from Rolls

Year Ended	Number Added During Year		Terminations During Year								Active Members End of Year
			Normal Retirement		Disabled		Death-in-Service		Other Terminations		
	A	E	A	E	A	E	A	E	A	E	
6-30-02	25	28	15	7.4	1	1.3	2	0.9	10	14.6	394
6-30-03	16	19	12	9.8	2	1.3	0	0.8	5	14.1	391
6-30-04	19	32	21	10.8	0	1.3	1	0.9	10	12.5	378
6-30-05	14	27	20	9.5	0	1.3	0	0.9	7	12.1	365
6-30-06	7	21	18	5.9	2	1.4	0	0.7	1	7.7	351
6-30-07	13	18	13	4.8	0	1.5	0	0.7	5	6.5	346
6-30-08	2	12	7	6.9	1	1.5	0	0.6	4	6.0	336
6-30-09	0	9	13	7.9	1	1.6	0	0.7	5	5.1	317
6-30-10	0	7	17	6.6	0	1.6	0	0.7	13	4.1	287
6-30-11	1	16	34	7.2	0	1.5	0	0.6	2	4.1	252
6-30-12	10	13	11	5.3	2	1.4	1	0.5	6	2.5	242
6-30-13	14	8	8	5.5	1	1.3	1	0.5	2	3.0	244
6-30-14	18	7	13	8.9	0	0.8	0	0.4	3	4.2	246
6-30-15	12	8	13	8.4	2	0.7	0	0.4	3	5.1	240
6-30-16	9	14	13	7.5	1	0.7	0	0.4	4	5.0	231
6-30-17	14	8	13	10.7	0	0.6	0	0.4	2	4.6	230
6-30-18	10	8	8	11.9	0	0.6	0	0.4	4	4.8	228
6-30-19	7	8	18	13.0	0	0.6	0	0.4	2	4.3	215
6-30-20	10	15	17	13.2	1	0.5	0	0.4	6	3.9	201
6-30-21	10	11	8	12.1	0	0.5	0	0.3	4	3.7	199
Last 5 Years	51	50	64	60.9	1	2.8	0	1.9	18	21.3	

A - Represents actual number.
E - Represents expected number based on actuarial assumptions.

General and Water Members
by Attained Age and Years of Service

Age Group	Years of Accrued Service								Total Salary
	0-4	5-9	10-14	15-19	20-24	25-29	30 & Up	No.	
35-39				1				1	$ 48,676
40-44			1	4	1			6	426,715
45-49			1	2	3	2		8	589,767
50-54				4	7	1		12	755,550
55-59				5	6	4	1	16	1,128,939
60						1		1	48,377
61				2	1		1	4	230,318
62					1		1	2	116,871
63				1	1	1	2	5	361,978
64				1	1		1	3	247,080
65							1	1	57,671
66					1			1	73,099
69							1	1	46,942
74							1	1	51,957
Totals			**2**	**20**	**22**	**9**	**9**	**62**	**$4,183,940**

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

Group Averages

Age:	55.0 years
Service:	23.6 years
Annual Pay:	$67,483

Police and Fire Members
(Includes Police Service Aides)
by Attained Age and Years of Service

Age Group	Years of Accrued Service								Total Salary
	0-4	5-9	10-14	15-19	20-24	25-29	30 & Up	No.	
20-24	7							7	$ 423,563
25-29	14							14	931,314
30-34	15	15						30	2,233,874
35-39	5	17	1	3				26	2,076,983
40-44	3	10	3	8	2			26	2,139,086
45-49			1	4	6			11	1,007,639
50-54	1	1		3	11	1		17	1,527,223
55-59				2	3	1		6	580,006
Totals	**45**	**43**	**5**	**20**	**22**	**2**		**137**	**$10,919,688**

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

Group Averages

Age:	38.5 years
Service:	10.3 years
Annual Pay:	$79,706

Summary of Reported Asset Information as of June 30, 2021 (Market Value)

Balance Sheet

Reported Assets		Reserves for	
Cash & equivalents	$ 0	Member contributions	$ 10,435,950
Other short-term	0	Employer contributions	23,896,721
Receivables & accruals	65,799	Retired benefit payments	178,852,791
Equities	0	Undistributed investment income	(30,783,571)
Mutual funds	183,749,630		
Other	0		
Accounts payable	(1,413,538)		
Total Current Assets	**$182,401,891**	**Total Reserves**	**$182,401,891**

Revenues and Expenditures

	2020-21	2019-20
Balance - Beginning of year	$149,943,937	$154,305,575
Adjustment to Balance - Beginning of year	0	0
Adjusted Balance - Beginning of year	149,943,937	154,305,575
Revenues		
Member contributions	893,838	1,020,272
Employer contributions	8,404,994	8,575,466
Investment income	43,472,311	5,300,963
Total	52,771,143	14,896,701
Expenditures		
Benefit payments	18,020,680	17,186,476
Health insurance premiums for retired members	0	0
Refund of member contributions	1,334,770	1,179,562
Administrative & investment expenses	957,739	892,301
Total	20,313,189	19,258,339
Balance - End of year	$182,401,891	$149,943,937

SECTION C

SUMMARY OF VALUATION METHODS AND ASSUMPTIONS

Basic Financial Objective and Operation of the Retirement System

Benefit Promises Made Which Must Be Paid For: A retirement program 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 program acquires a unit of service credit they are, in effect, handed an "IOU" which reads: "The 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."

This Retirement System meets this constitutional requirement by having the following **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 member's 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).

If contributions to the retirement program 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

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

Contributions received on behalf of the group.

. . . plus . . .

Investment earnings on contributions received.

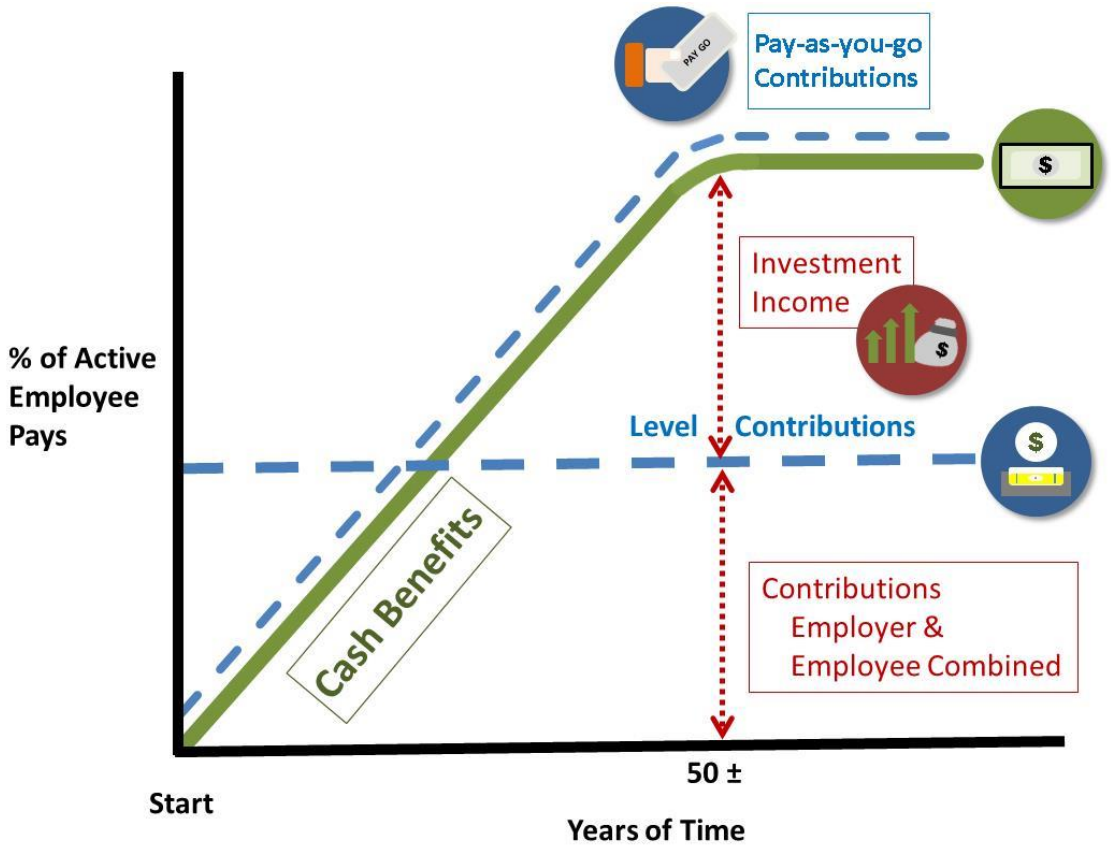
. . . minus . . .

Expenses incurred in operating the program.

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 program, and the amount is directly related to the amount of contributions and investment performance.

There are retirement programs designed to defer the bulk of contributions far into the future. Lured by artificially low present contributions, such programs ignore the inevitable consequence of a relentlessly increasing contribution rate – to a level greatly in excess of the level percent-of-payroll rate. ***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 program.

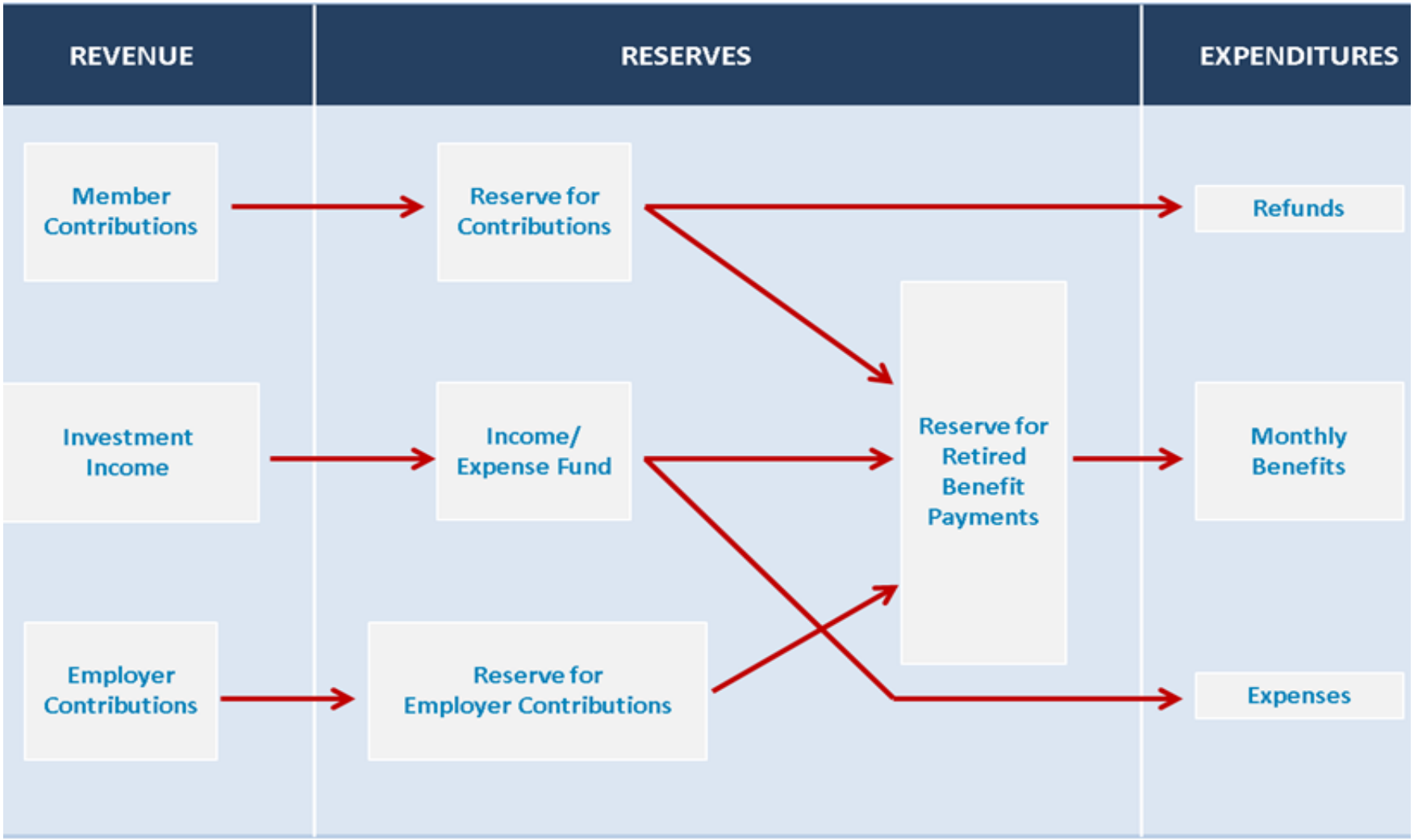


CASH BENEFITS LINE. This relentlessly increasing line is the fundamental reality of retirement plan financing. It happens each time a new benefit is added for future retirements (and happens regardless of the design for contributing for benefits).

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

Flow of Money Through the Retirement System



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.

Financing of Unfunded Actuarial Accrued Liabilities: Unfunded actuarial accrued liabilities were amortized by level (principal & interest combined) percent-of-payroll contributions over a period of 22 years for the Police and Firefighter plans and a 17-year level dollar amount for the General and Water plans.

Actuarial Assumptions Used in the Valuation

The actuarial assumptions used for this report were based upon the results of an experience study for the City of Royal Oak Retirement System covering the period July 1, 2012 through June 30, 2017. A report dated September 28, 2018 presented the results of this experience study. Unless otherwise noted, the assumptions were first used with the actuarial valuation date of June 30, 2018. The actuarial assumptions represent estimates of future experience.

The actuary calculates the contribution requirements and benefit values of the plan by applying actuarial assumptions to the benefit provisions and census data furnished, using the valuation methods described on page C-5.

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

- Long-term rates of investment income;
- Patterns of salary increases;
- Rates of mortality before and after retirement;
- Rates of withdrawal from active membership;
- Rates of disability among members and their subsequent rates of recovery; and
- Probabilities of retirement at various ages after benefit eligibility.

In a valuation the monetary effect of each assumption, for each distinct experience group, is projected 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 skill of the actuary, the completeness of the data and the precision of the many calculations that are made. Each valuation provides a complete recalculation of system obligations based upon assumptions regarding future experience and takes in to account all past differences between assumed and actual experience. The result is a continual series of small adjustments of the computed contribution rate.

From time to time, it is appropriate to 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.

	Annual Rate of Salary Increase for Sample Age		
		Merit & Longevity	
Sample Ages	Base (Economic)	General, Water & Police Service Aides	Police-Fire
20	3.0%	2.2%	1.7%
25	3.0%	1.8%	1.7%
30	3.0%	1.5%	1.7%
35	3.0%	1.3%	1.2%
40	3.0%	1.2%	0.4%
45	3.0%	0.9%	0.1%
50	3.0%	0.6%	0.1%
55	3.0%	0.4%	0.0%
60	3.0%	0.1%	0.0%
65	3.0%	-	-
Ref		760	761

The rate of investment return was 7.25% per year, compounded annually, net after administrative and investment expenses. This assumption is used to make money payable at one point in time equal in value to a different amount of money payable at another point in time.

The assumed real return for funding purposes is the net rate of return in excess of average salary increases. Considering other assumptions used in the valuation, the 7.25% translates to a real return of approximately 4.25%.

		Year Ending June 30					5-Year
		2021	2020	2019	2018	2017	Average
(1)	Nominal rate*	10.9 %	6.6 %	5.5 %	5.5 %	7.6 %	7.2 %
(2)	Increase in CPI	5.4 %	0.6 %	1.6 %	2.9 %	1.6 %	2.4 %
(3)	Average salary increase	2.3 %	1.9 %	3.4 %	4.1 %	3.5 %	3.0 %
(4)	Real return						
	- investment purposes						4.8 %
	- funding purposes						4.2 %

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

The mortality tables used are as follows:

- **Healthy Pre-Retirement:** The RP-2014 Employee Generational Mortality Table, with blue-collar adjustments and extended via cubic spline. This table is adjusted backwards to 2006 with the MP-2014 scale, resulting in a base year of 2006 with future mortality improvements assumed each year using scale MP-2017.

- **Healthy Post-Retirement:** The RP-2014 Healthy Annuitant Generational Mortality Table, with blue-collar adjustments and extended via cubic spline. This table is adjusted backwards to 2006 with the MP-2014 scale, resulting in a base year of 2006 with future mortality improvements assumed each year using scale MP-2017.

- **Disability Retirement:** The RP-2014 Disabled Mortality Table, extended via cubic spline. This table is adjusted backwards to 2006 with the MP-2014 scale, resulting in a base year of 2006 with future mortality improvements assumed each year using scale MP-2017.

Sample Attained Ages	Healthy Pre-Retirement Future Life Expectancy (Years)*		Healthy Post-Retirement Future Life Expectancy (Years)*		Disabled Retirement Future Life Expectancy (Years)*	
	Men	Women	Men	Women	Men	Women
55	29.91	35.09	28.70	31.55	21.47	25.19
60	25.08	30.10	24.14	26.83	18.40	21.63
65	20.58	25.24	19.86	22.33	15.50	18.19
70	16.48	20.52	15.91	18.06	12.74	14.81
75	12.74	15.99	12.31	14.09	10.11	11.64
80	9.37	11.73	9.14	10.56	7.71	8.88

** Based on retirements in 2021. Retirements in future years will reflect improvements in life expectancy.*

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

	Percents of Active Members Retiring within Next Year					
Retirement Ages	General	Police Service Aides	Fire Hired Before 10/1/09 & All Police	Fire Hired After 10/1/09	Retirement Service	All Police, Police and Fire Department Heads, and Fire Hired Before 10/1/09
45-49						
50	20%	22.5%		50%	25	50%
51	15%	17.5%		50%	26	50%
52	15%	17.5%		50%	27	50%
53	15%	17.5%		30%	28	30%
54	15%	17.5%		30%	29	30%
55	15%	17.5%	30%	30%	30	30%
56	15%	17.5%	30%	30%	31	30%
57	15%	17.5%	30%	30%	32	30%
58	15%	17.5%	30%	30%	33	30%
59	15%	17.5%	30%	30%	34	30%
60	15%	17.5%	30%	30%	35	30%
61	15%	17.5%	30%	30%	36	30%
62	35%	37.5%	30%	30%	37	30%
63	20%	22.5%	30%	30%	38	30%
64	20%	22.5%	30%	30%	39	30%
65	55%	100%	100%	100%	40	100%
66	45%					
67	45%					
68	45%					
69	45%					
70	100%					
Ref.	2321	2549	2550	2550		2550

A member was assumed to be eligible for retirement after satisfying the following requirements:

Group	Eligibility Requirements for Retirement
SEIU AFL-CIO Local 517M and Foremen & Supervisors	30 years of service regardless of age (age 50 required for Foremen & Supervisors); or 50 years of age with 25 years of service; or 55 years of age with 20 years of service; or 60 years of age with 5 years of service.
Other General & Water	50 years of age with 25 years of service; or 55 years of age with 20 years of service; or 60 years of age with 5 years of service.
All Police, Fire Hired Before 10/1/2009 and Police & Fire Department Heads	25 years of service regardless of age; or 55 years of age with 10 or more years of service.
Fire Hired After 9/30/2009	50 years of age with 25 years of service; or 55 years of age with 10 years of service.
Police Service Aides	50 years of age with 25 years of service; or 55 years of age with 20 years of service; or 60 years of age with 5 or more years of service.

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

		% of Active Members Separating Within Next Year	
Sample Ages	Years of Service	General & Police Service Aides	Police & Fire
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%	2.50%
30		4.00%	2.00%
35		3.50%	1.25%
40		2.50%	0.75%
45		2.00%	0.50%
50		1.50%	0.25%
55		1.00%	0.25%
60		1.00%	0.25%
65		1.00%	0.25%
Ref.		29 1300	30 1177

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

	% of Active Members Becoming Disabled Within Next Year		
	General, Water & Police Service Aides		
Sample Ages	Male	Female	Police & Fire
20	0.04%	0.02%	0.08%
25	0.05%	0.03%	0.11%
30	0.05%	0.04%	0.19%
35	0.07%	0.07%	0.23%
40	0.11%	0.10%	0.53%
45	0.16%	0.14%	0.60%
50	0.26%	0.23%	0.71%
55	0.46%	0.38%	0.83%
60	0.77%	0.55%	0.90%
Ref.	33	34	45

Loading Factor for Final Average Compensation: In the valuation process, a person's salary is assumed to increase by a certain percentage each year (see page C-7). However, compensation for benefit purposes includes things such as sick leave incentive pay which are not reported for the valuation. In order to more accurately calculate contribution requirements, the General active normal retirement liabilities were increased by 3.0% to account for the items not reported for valuation purposes, and Police/Fire active normal retirement liabilities were increased by 10.0%. As additional experience emerges, the ratios will be periodically adjusted to better estimate the effect of inclusion of additional items in final average compensation.

Final Average Compensation with and without Extra Compensation Items
New General Retirees

Year Ending June 30	Final Average Compensation		Ratio
	With Extras	Without Extras	
2012	$ 399,988	$ 398,597	1.003
2013	166,105	166,105	1.000
2014	555,114	537,827	1.032
2015	672,736	654,355	1.028
2016	306,019	301,092	1.016
2017	553,032	536,505	1.031
2018	331,966	324,453	1.023
2019	674,165	665,633	1.013
2020	747,922	719,174	1.040
2021	61,531	58,832	1.046
Totals	$ 4,468,578	$ 4,362,573	1.024

Final Average Compensation with and without Extra Compensation Items
New Police/Fire Retirees

Year Ending June 30	Final Average Compensation		Ratio
	With Extras	Without Extras	
2012	$ 956,833	$ 840,669	1.138
2013	473,934	418,537	1.132
2014	555,114	537,827	1.032
2015	420,130	378,238	1.111
2016	991,105	873,419	1.135
2017	598,296	526,550	1.136
2018	432,387	382,380	1.131
2019	744,804	663,063	1.123
2020	1,045,354	918,853	1.138
2021	804,293	710,135	1.133
Totals	$ 7,022,250	$ 6,249,671	1.124

Miscellaneous and Technical Assumptions
June 30, 2021

Marriage Assumption:	90% of males and 90% 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.
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.
Pay Annualization:	Reported pay for members with less than 12 contributing months was annualized by the ratio of 12 to the number of contribution months in the year.
Decrement Timing:	Decrements of all types are assumed to occur mid-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.
Decrement Relativity:	Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
Decrement Operation:	All decrements the first 5 years of service. Only mortality operates during retirement eligibility.
Service Credit Accruals:	It is assumed that members accrue one year of service credit per year.
Loads:	Age and Service Retirement Present Values for General and PSA, and Police/Fire members were loaded by 3.0% and 10.0% respectively to account for the additional amount included in the FAC due to unused sick time and unused vacation time. An additional loading factor of 5.0% was applied to each division for Annuity Withdrawal paid at retirement in lump sums.
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.
Normal Form of Benefit:	A 75% automatic joint and survivor payment is the assumed normal form of benefit for married people.
Benefit Service:	Exact fractional service is used to determine the amount of benefit payable.

Glossary

Accrued Service: The service credited under the plan which was rendered before the date of the actuarial valuation.

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."

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.

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 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.

Glossary

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.

Meaning of "Unfunded Actuarial Accrued Liabilities"

"Actuarial accrued liabilities" are ***the portion of the present value of plan promises to pay benefits in the future not covered by future normal cost contributions***. A liability has been established ("accrued") because service has been rendered, but the resulting monthly cash benefit may not be payable until years in the future. Actuarial accrued liabilities are the results of complex mathematical calculations, which are made annually by the plan's actuary.

If "actuarial accrued liabilities" at any time exceed the plan's accrued assets, the difference is ***"unfunded actuarial accrued liabilities."*** This is the common condition. If the plan's assets equaled the plan's "actuarial accrued liabilities," the plan would be termed "fully-funded." This is an unusual condition.

Each time a plan adds a new benefit which applies to service already rendered, an "actuarial accrued liability" is created, which is also an "unfunded actuarial accrued liability" because assets do not immediately increase to cover the value of the new benefit promises. Payment for such unfunded actuarial accrued liabilities is spread over a period of years, commonly in the 20-40-year range.

Unfunded actuarial accrued liabilities can occur in another way: if actual experience is less favorable than assumed experience, the difference is added to unfunded actuarial accrued liabilities. For example, in plans where benefits are directly related to pay near time of retirement, unfunded actuarial accrued liabilities increase when unexpected rates of pay increase create additional actuarial accrued liabilities which are not offset by higher than assumed investment income. Most unexpected pay increases are the direct result of inflation, which is a very destructive force affecting financial stability.

The existence of unfunded actuarial accrued liabilities is not a cause for concern, but the changes from year to year in the amount of unfunded actuarial accrued liabilities are important.

Nor are unfunded actuarial accrued liabilities a bill payable immediately. However, it is important that policy-makers prevent the amount from becoming unreasonably high and ***it is vital for a plan to have a sound method for making payments toward them*** so that they are controlled.

Pensions in an Inflationary Environment

Value of $1,000/Month Retirement Benefit to an Individual Who Retires at Age 55 in an Environment of 3.0% Inflation

	COLA Rate	
Age	2.5%	0%
55	$1,000	$1,000
56	995	971
57	990	943
58	986	915
59	981	888
60	976	863
65	953	744
70	930	642
75	907	554
80	885	478
85	864	412

The life expectancy of a 55-year-old male retiree is to age 84. The life expectancy for a 55-year-old female retiree is to age 87. Half of the people will outlive their life expectancy. The effects of even moderate amounts of inflation can be significant for those who live to an advanced age.

SECTION D

FINANCIAL REPORTING

NOTE: GASB Statements No. 67 and No. 68 are effective for Governmental Retirement Plans for the fiscal year beginning after June 15, 2013 (GASB Statement No. 67) and the fiscal year beginning after June 15, 2014 (GASB Statement No. 68). These statements replace GASB Statements No. 25 and No. 27.

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, 2021
Actuarial cost method:	Entry-Age
Amortization method:	Level percent for Police and Fire Level dollar for General and Water
Remaining amortization period:	22 years closed for Police and Fire 17 years closed for General and Water
Asset valuation method:	4-year smoothed market
Actuarial assumption:	
Investment rate of return	7.25%
Projected salary increases	3.0% - 5.2%
Includes inflation at	2.50%
Cost-of-living adjustments	None

Membership of the plan consisted of the following at June 30, 2021, the date of the latest actuarial valuation.

Retirees and beneficiaries receiving benefits	541
Terminated plan members entitled to but not yet receiving benefits	22
Active plan members	199
Total	762

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

Schedule of Funding Progress and Risk Metrics

Schedule of Funding Progress

Actuarial Valuation Date	Actuarial Value of Assets	Actuarial Accrued Liability (AAL) Entry-Age	Unfunded AAL (UAAL)	Funded Ratio	Covered Payroll	UAAL as a % of Covered Payroll
6-30-12	$124,013,356	$ 190,595,369	$ 66,582,013	65.1 %	$15,846,779	420.2%
6-30-13	125,708,944	199,908,548	74,199,604	62.9 %	15,296,167	485.1%
6-30-14	130,739,595	203,769,951	73,030,356	64.2 %	15,336,530	476.2%
6-30-15	133,358,876	208,799,571	75,440,695	63.9 %	15,312,473	492.7%
6-30-16^	156,145,763	214,521,936	58,376,173	72.8 %	15,094,284	386.7%
6-30-17	158,776,848	217,993,306	59,216,458	72.8 %	15,552,925	380.7%
6-30-18	157,069,962	241,838,143	84,768,181	64.9 %	16,056,297	527.9%
6-30-19	155,059,101	245,656,869	90,597,768	63.1 %	15,656,680	578.7%
6-30-20	156,240,551	250,727,952	94,487,401	62.3 %	14,909,017	633.8%
6-30-21	162,642,161	254,349,426	91,707,265	63.9 %	15,103,628	607.2%

^ *Reflects Bond Issuance of $21.4 million subsequent to measurement date of June 30, 2016.*

Schedule of Employer Contributions

Fiscal Year Beginning	Computed Dollar Contribution Based on Projected Payroll	Actual Annual Contributions
7-1-13	$ 6,480,707	$ 6,503,436
7-1-14	6,891,898	7,098,292
7-1-15	6,852,495	7,034,692
7-1-16	7,009,728	28,605,368
7-1-17	5,400,763	5,878,214
7-1-18	5,605,336	6,125,484
7-1-19	7,744,404	8,575,466
7-1-20	8,259,186	8,404,994
7-1-21	8,615,365	
7-1-22	8,509,753	

APPENDIX

RISK MEASURES

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 amount 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 amounts 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:

	2021	2020	2019	2018
Ratio of the market value of assets to payroll	12.08	10.06	9.86	9.73
Ratio of actuarial accrued liability to payroll	16.84	16.82	15.69	15.06
Ratio of actives to retirees and beneficiaries	0.37	0.37	0.40	0.43
Ratio of net cash flow to market value of assets	-5.5%	-5.8%	-6.7%	-6.5%

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 10.0 times the payroll, a return on assets 5% different than assumed would equal 50% 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 15.0 times the payroll, a change in liability 2% other than assumed would equal 30% 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 actives 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.