

City of Ann Arbor Employees' Retirement System

Annual Actuarial Valuation
as of June 30, 2019



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December 18, 2019

Retirement Board
City of Ann Arbor Employees' Retirement System
Ann Arbor, Michigan

Dear Board Members:

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, 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. This valuation updates the report originally delivered October 11, 2019 to incorporate information provided by the City in accordance with its Funding Policy.

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 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, 2019. The valuation was based upon information furnished by the Plan Administrator, 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. Refer to the Miscellaneous and Technical Assumptions section of the report for additional disclosures regarding the data that was used in the valuation. We are not responsible for the accuracy or completeness of the information provided by the Plan Administrator.

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 Section C of this report.

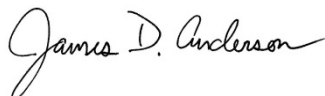
This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. To the best of our knowledge the information contained in this report is accurate and fairly presents the actuarial position of the City of Ann Arbor Employees' Retirement System as 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.

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

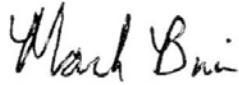
The signing actuaries are independent of the plan sponsor.

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.

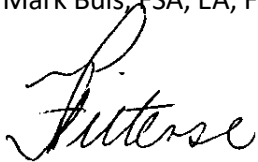
Respectfully submitted,



James D. Anderson, FSA, EA, FCA, MAAA



Mark Buis, FSA, EA, FCA, MAAA



Francois Pieterse, ASA, MAAA

JDA/MB:bd

SECTION A

VALUATION RESULTS

Summary of Key Actuarial Valuation Results

Valuation Date	June 30, 2019	June 30, 2018*
Summary of Member Data		
Number of Members Included in Valuation		
Active Members	711	695
Inactive Members (Deferred and Retirees & Beneficiaries)	1,230	1,217
Total	1,941	1,912
Annual Payroll (Average)	\$77,735	\$76,592
Annual Benefit Payments (Average)		
Inactive Members	\$14,319	\$14,199
Retirees and Beneficiaries	\$34,939	\$34,403
Summary of Assets		
Market Value	\$512,898,230	\$503,705,603
Market Value Rate of Return	6.21%	6.98%
Funding Value	\$513,611,366	\$505,014,630
Funding Value Rate of Return	6.07%	7.33%
Summary of Liabilities		
Total Actuarial Accrued Liability	\$601,108,981	\$583,600,733
Unfunded Actuarial Liability (UAL)	\$87,497,615	\$78,586,103
Funded Ratio	85.44%	86.53%
Employer Actuarially Determined Contribution (ADC)		
Total Normal Cost Rate	18.24%	
Employee Contribution Rate (weighted avg.)	5.39%	
Employer Normal Cost Rate	12.85%	13.22%
Amortization of UAL Rate	12.91%	12.27%
Total Employer ADC	25.76%	25.70%
Actual/Statutory Contribution Rate	31.15%	31.31%
Amortization Period (years)	22	23

* Prior year results were calculated by the City's prior actuary.

Funding Objective

The funding objective of the Retirement System is to establish and receive contributions that will accumulate assets during each member's working years which, together with regular interest, will be sufficient to pay promised benefits after retirement.

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:

- (1) Cover the actuarial present value of benefits allocated to the current year by the actuarial cost methods described in Section C (the normal cost); and
- (2) Finance over a 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, 2021 are shown on page A-3.

Contributions to Provide Benefits Computed June 30, 2019 for Fiscal Year Ending June 30, 2021

Contributions for	General	General Hybrid	Police	Police Hybrid	Fire	Fire Hybrid	Total [#]
Normal Cost of Benefits:							
1. Age & service	15.59 %	7.50 %	24.74 %	12.70 %	24.48 %	10.73 %	17.01 %
2. Disability	0.65 %	0.36 %	0.88 %	0.38 %	0.22 %	0.12 %	0.58 %
3. Death-in-service	0.38 %	0.15 %	0.34 %	0.09 %	0.46 %	0.00 %	0.33 %
4. Refunds of member contributions	0.42 %	0.37 %	0.16 %	0.19 %	0.12 %	0.24 %	0.32 %
5. Total normal cost	17.04 %	8.38 %	26.12 %	13.36 %	25.28 %	11.09 %	18.24 %
6. Member contributions (average)	6.00 %	3.00 %	6.00 %	3.00 %	6.00 %	3.00 %	5.39 %
7. Employer Normal Cost (5. - 6.)	11.04 %	5.38 %	20.12 %	10.36 %	19.28 %	8.09 %	12.85 %
8. Payment for Unfunded Actuarial Liabilities (UAL)*	\$ 3,948,687	\$ 11,004	\$ 2,206,623	\$ 236	\$ 1,478,793	\$ 362	\$ 7,645,705
9. Payment for UAL as a Percentage of Projected Payroll	14.58 %	0.09 %	18.23 %	0.17 %	18.81 %	0.27 %	12.91 %
10. Projected Fiscal Year Payroll	\$ 27,086,342	\$ 11,881,070	\$ 12,101,292	\$ 141,837	\$ 7,863,144	\$ 132,597	\$ 59,206,282
11. Preliminary Actuarially Determined Contribution (ADC) (7. * 10. + 8.)	\$ 6,939,019	\$ 650,206	\$ 4,641,403	\$ 14,930	\$ 2,994,807	\$ 11,089	\$ 15,251,454
12. Preliminary ADC as a Percent of Projected Payroll	25.62 %	5.47 %	38.35 %	10.53 %	38.09 %	8.36 %	25.76 %
13. Prior Fiscal Year Budgeted Contribution[^]							\$ 14,092,966
14. Prior Fiscal Year Budgeted Contribution with 2% Increase							\$ 14,374,825
15. Estimated City Contribution (Greater of 11. & 14.)							\$ 15,251,454

* Amortized as a level dollar amount over a closed period of 22 years.

[^] Provided by the City.

[#] Total Employer Normal Cost is a weighted average and applying this percentage to projected fiscal year payroll may not match the preliminary ADC due to rounding.

All percents in the table above are expressed as a percent of active member payroll.

Determining Employer Dollar Contributions

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

The recommended procedure is: (1) **at the end of each payroll period, multiply the active member payroll for the period by the employer normal cost percent;** (2) **add the payment for unfunded actuarial liabilities divided by the number of payroll periods from (1);** and (3) **promptly contribute the dollar amount so determined.**

Present Value of Future Benefits and Accrued Liabilities

	June 30, 2019							June 30, 2018 [^]
	General	General Hybrid	Police	Police Hybrid	Fire	Fire Hybrid	Total	Total
A. Accrued Liability								
1. For retirees and beneficiaries	\$ 207,025,747	\$ 0	\$ 121,524,097	\$ 0	\$ 80,187,555	\$ 0	\$ 408,737,399	\$ 398,830,028
2. For vested terminated members	13,321,541	0	1,080,572	0	\$ 261,671	0	14,663,784	14,289,172
3. For present active members								
a. Value of expected future benefit payments	126,381,734	7,737,420	75,896,924	167,661	51,328,749	127,202	261,639,690	254,222,569
b. Value of future normal costs	36,281,426	6,872,245	25,015,868	149,070	15,514,575	98,708	83,931,892	83,741,035
c. Active member accrued liability: (a) - (b)	90,100,308	865,175	50,881,056	18,591	35,814,174	28,494	177,707,798	170,481,534
4. Total accrued liability	310,447,596	865,175	173,485,725	18,591	116,263,400	28,494	601,108,981	583,600,734
B. Present Assets (Funding Value)*	265,258,746	739,240	148,233,087	15,885	99,340,062	24,346	513,611,366	505,014,630
C. Unfunded Accrued Liability: (A.4) - (B)	45,188,850	125,935	25,252,638	2,706	16,923,338	4,148	87,497,615	78,586,104
D. Funding Ratio: (B) / (A.4)	85.4%	85.4%	85.4%	85.4%	85.4%	85.4%	85.4%	86.5%

* Funding Value of Assets was allocated to each group based on total accrued liability.

[^] As shown in the prior actuary's report.

Development of Funding Value of Retirement System Assets June 30, 2019

Valuation Date June 30:	2019	2020	2021	2022	2023
A. Funding Value Beginning of Year (BOY)	\$505,014,630				
B. Market Value End of Year (EOY)	512,898,230				
C. Market Value BOY	503,705,603				
D. Non-Investment Net Cash Flow	(21,406,724)				
E. Investment Income					
1) Market Total: B-C-D	30,599,351				
2) Amount for Immediate Recognition (7.0% x (A + 0.5 x D))	34,601,789				
3) Amount for Phased-In Recognition E1 - E2	(4,002,438)				
F. Phased-In Recognition of Investment Income					
1) Current Year: 0.20 x E3	(800,488)				
2) First Prior Year	(14,929)	\$ (800,488)			
3) Second Prior Year	4,250,545	(14,929)	\$ (800,488)		
4) Third Prior Year	(5,967,488)	4,250,545	(14,929)	\$ (800,488)	
5) Fourth Prior Year	(2,065,969)	(5,967,488)	4,250,545	(14,930)	\$ (800,486)
6) Total Recognized Investment Gain	(4,598,329)	(2,532,360)	3,435,128	(815,418)	(800,486)
G. Funding Value EOY: A + D + E2 + F6	513,611,366				
H. Difference Between Market Value and Funding Value	(713,136)				
I. Net Funding Value Rate of Return	6.07%				
J. Net Market Value Rate of Return	6.21%				
K. Funding Value / Market Value	100.1%				

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 5-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.

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

Actual experience will never (except by coincidence) coincide exactly with assumed experience. Gains and losses often offset one another 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:

	2018-2019
(1) UAAL* at start of year	\$ 78,586,104
(2) Normal cost from last valuation	9,784,176
(3) Actual contributions	16,886,516
(4) Interest	7.00%
(5) Interest accrual: $(1) \times (4) + ((2) - (3)) \times (4) / 2$	5,252,445
(6) Expected UAAL before changes: $(1) + (2) - (3) + (5)$	76,736,209
(7) Change from benefit improvements and revised actuarial assumptions	847,765
(8) Expected UAAL after changes: $(6) + (7)$	77,583,974
(9) Actual UAAL at end of year	87,497,615
(10) Gain (loss): $(8) - (9)$	\$(9,913,641)
(11) Gain (loss) as percent of actuarial accrued liabilities at start of year $\$(583,600,734)$	(1.7%)

* *Unfunded Actuarial Accrued Liability.*

Actuarial Accrued Liabilities and Valuation Assets Comparative Statement

Valuation Date	Actuarial Accrued Liability (AAL)	Funding Value of Assets	Unfunded Actuarial Accrued Liability (UAAL)	Ratio of Present Assets to AAL	Ratio of UAAL to Valuation Payroll
2010	\$ 466,883,000	\$ 421,387,000	\$ 45,496,000	90.3 %	93.4 %
2011	481,330,000	423,734,000	57,596,000	88.0 %	125.4 %
2012	496,770,000	410,709,000	86,061,000	82.7 %	195.6 %
2013	507,435,000	407,170,000	100,265,000	80.2 %	222.5 %
2014	523,461,000	433,854,000	89,607,000	82.9 %	186.8 %
2015	533,198,000	459,480,000	73,718,000	86.2 %	151.2 %
2016	548,201,000	470,029,000	78,172,000	85.7 %	156.2 %
2017	571,074,000	489,943,000	81,131,000	85.8 %	151.4 %
2018*^	583,601,000	505,015,000	78,586,000	86.5 %	147.6 %
2019	601,108,981	513,611,366	87,497,615	85.4 %	158.3 %

* Actuarial assumptions revised.

^ Valuation results for 2018 and prior years were calculated by the City's prior actuary.

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 move gradually toward 100%.

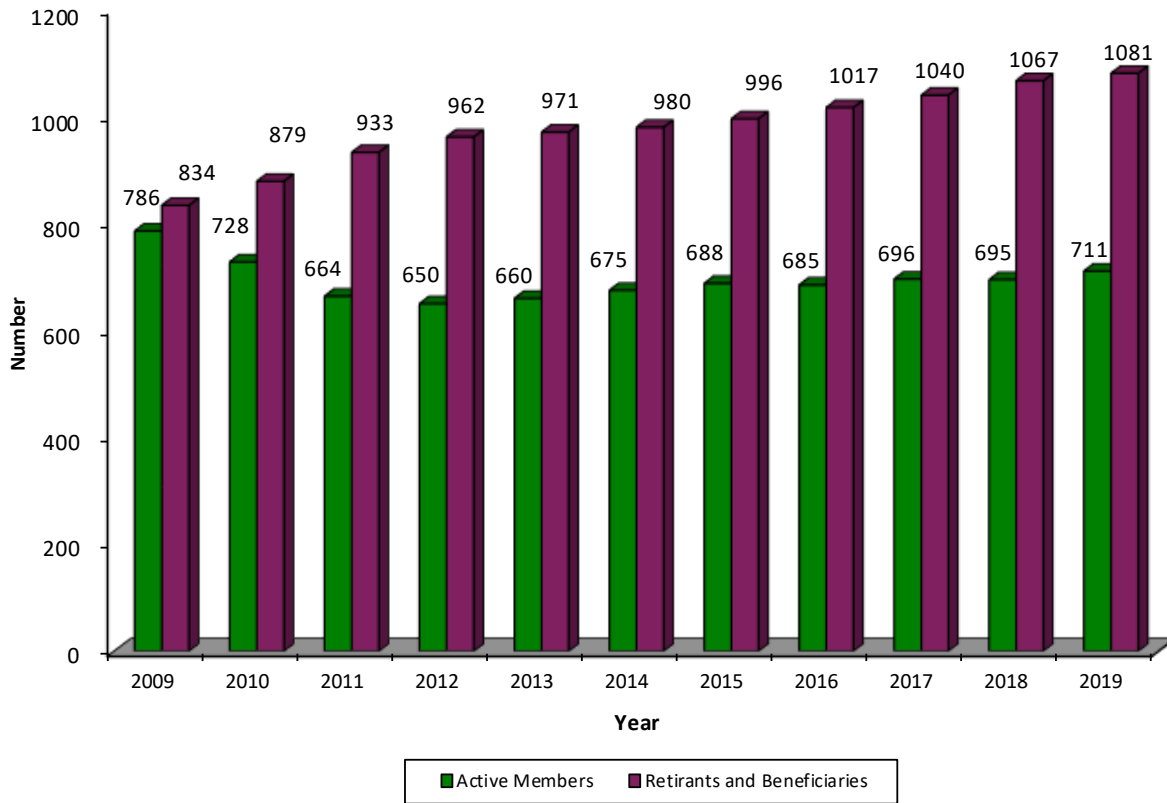
The Ratio of UAAL to Valuation Payroll is another relative index of condition. Actuarial unfunded liabilities represent debt, while active member payroll represents the system's capacity to collect contributions to pay toward debt. The lower the ratio, the greater the financial strength – and vice-versa.

Solvency Test

Valuation Date	Actuarial Liabilities (in thousands)			Valuation Assets (in thousands)	Portion of Accrued Liabilities Covered by Assets		
	(1) Active Member Contributions	(2) Inactive Members	(3) Active Members (Employer-Financed Portion)		(1)	(2)	(3)
2010	\$ 3,148	\$ 306,296	\$ 157,439	\$ 421,387	100.00%	100.00%	71.10%
2011	2,790	327,964	150,576	423,734	100.00%	100.00%	61.75%
2012	2,797	348,249	145,724	410,709	100.00%	100.00%	40.94%
2013	2,858	353,683	150,895	407,170	100.00%	100.00%	33.55%
2014	2,948	356,397	164,116	433,854	100.00%	100.00%	45.40%
2015	3,013	361,314	168,871	459,480	100.00%	100.00%	56.35%
2016	3,139	374,798	170,264	470,029	100.00%	100.00%	54.09%
2017	3,325	389,354	178,395	489,943	100.00%	100.00%	54.52%
2018*	3,185	413,119	170,478	505,015	100.00%	100.00%	52.04%
2019	3,085	423,401	174,623	513,611	100.00%	100.00%	49.89%

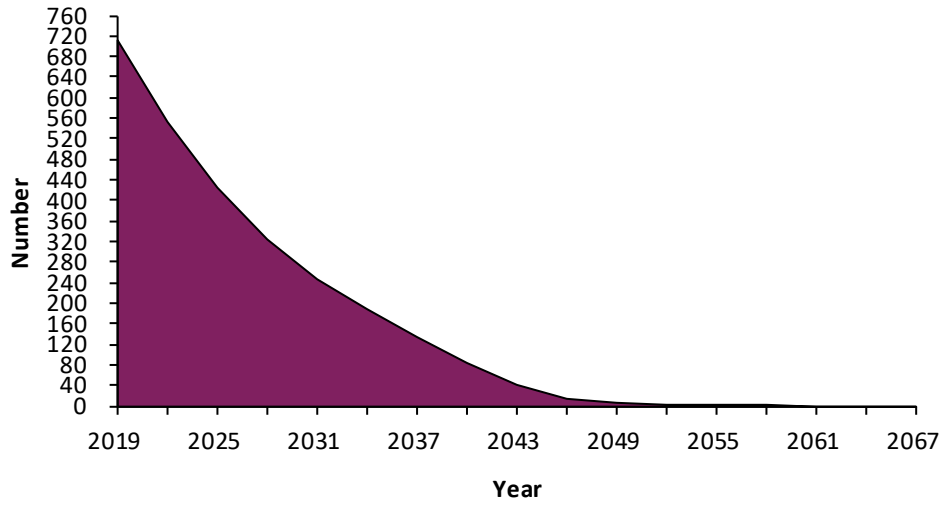
* Valuation results for 2018 and prior years were calculated by the City's prior actuary.

Active and Retired Members

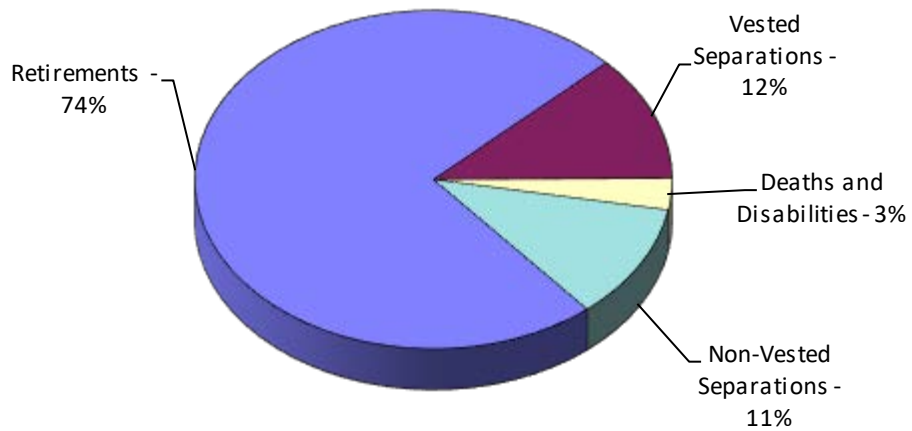


Expected Development of Present Population

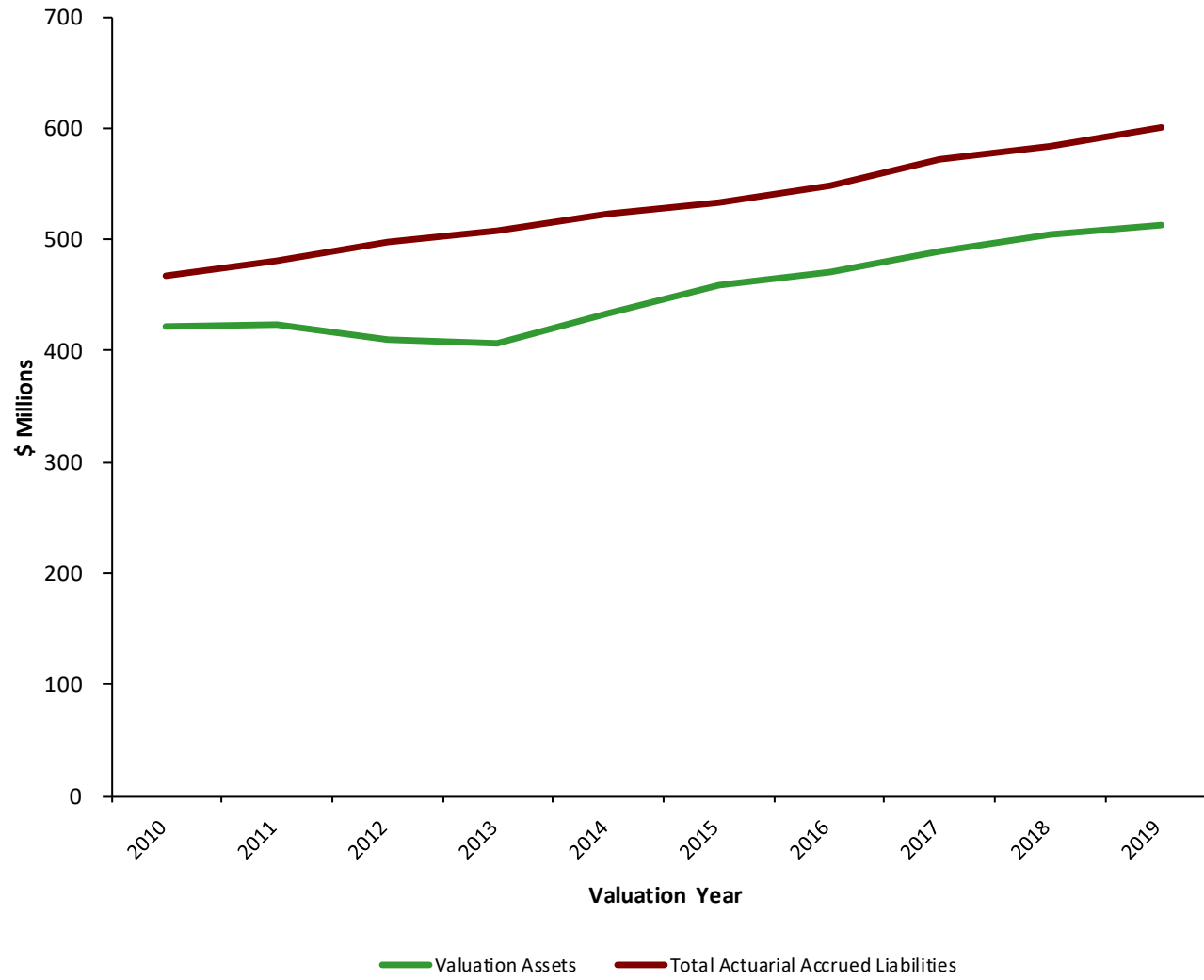
Closed Group Active Population Projection



Expected Terminations from Active Employment for Current Active Members



Assets and Accrued Liabilities



Comments and Recommendation

Comment 1: Aggregate experience during the year ending June 30, 2019 was less favorable than assumed, generating an overall experience loss of approximately \$9.9 million as indicated on page A-6. The actuarial loss was approximately 1.7% of the beginning of year Actuarial Accrued Liabilities, arising from lower than assumed recognized investment return with respect to the funding value of assets, a loss on retiree liabilities and changes in actuarial system software. Note that each of these changes individually is less than 1% of beginning of year actuarial liabilities. Computed contribution requirements increased from the prior year from \$14.1 million to \$15.3 million. In addition, valuation assets represent 85.4% of accrued liabilities; last year the ratio was 86.5%. If the valuation results were based on market value of assets instead of smoothed funding value, the funded percent of the plan would be 85.3%.

Comment 2: Investment return of 6.2% was lower than the assumed level of 7.0% on a market value basis. However, under the asset valuation method, investment gains and losses are spread over a 5-year period. Partial recognition of this year's loss was combined with the continued phase-in of investment gains and losses from prior years resulting in a net recognized asset loss for 2019. The Funding Value of Assets now exceeds the Market Value by approximately \$713,000 (see page A-4), which is the net amount of unrecognized prior year gains and losses to be recognized over the coming four years.

Comment 3: Reserve transfers between the active and retired life accounts are required whenever retired life liabilities differ from the Reserve for Retired Benefit Payments. If a reserve is maintained for the City of Ann Arbor, the Reserve for Retired Benefit Payments should be equal to \$408,737,399 (the actuarial accrued liability for retired lives).

Comment 4: Under Public Act 202 of the State of Michigan, Michigan municipalities are required to report liabilities under new uniform assumption guidelines. While the current guidelines are only for reporting purposes (and not funding), governments may be encouraged to use these new assumptions for funding.

The uniform assumptions include the following:

- Investment return no higher than 7.0%;
- Assumed wage inflation no lower than 3.5%;
- Mortality assumption that uses a version of the RP-2014 table (with possible update to PUB-2010, developed for the public sector); and
- Amortization period no longer than 20 years for Pension Plans and 30 years for Retiree Health Plans.

The information needed to satisfy PA 202 reporting requirements will be provided in December.

Comment 5: Assumptions were last updated for the June 30, 2018 valuation after a review was performed by the prior actuary. The State of Michigan now requires experience studies once every 5 years, consistent with guidelines set by the Government Finance Officers Association (GFOA).

Comment 6: Please see the Appendix to this valuation for presentation of information related to Actuarial Standard of Practice ("ASOP") No. 51 entitled "Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions."

SECTION B

SUMMARY OF BENEFIT PROVISIONS AND VALUATION DATA

City of Ann Arbor Employees' Retirement System

Brief Summary of Benefit Provisions Evaluated

June 30, 2019

Regular Retirement (no reduction factor for age):

Eligibility – AFSCME: Age 50 with 25 years of service or age 60 with 5 years of service (10 years of service for members hired on/after 8/29/2011).

Police Service Specialists: Age 50 with 25 years of service or age 60 with 5 years of service (10 years of service for members hired on/after 1/1/2012).

Police Professional Assistants: Age 50 with 25 years of service or age 60 with 5 years of service (10 years of service for members hired on/after 7/2/2012).

Non-Union: Age 50 with 25 years of service or age 60 with 5 years of service (10 years of service for members hired on/after 7/1/2011).

Teamsters: Age 50 with 25 years of service or age 60 with 5 years of service (10 years of service for members hired on/after 7/2/2012).

Police: 25 years of service or age 55 with 5 years of service (10 years of service for members hired on/after 1/1/2012).

Deputy Police Chiefs and Assistant Fire Chiefs: 25 years of service or age 55 with 5 years of service (10 years of service for members hired on/after 7/2/2012).

Fire: 25 years of service or age 55 with 5 years of service (10 years of service for members hired on/after 7/1/2012).

Type of Final Average Compensation (FAC) - Highest 3 consecutive years out of last 10 or the last 36 months for members with 5 year vesting. Highest 5 consecutive years out of last 10 or the last 60 months for members with 10 year vesting.

Annual Amount – AFSCME hired before 1/1/2017, Police Service Specialists, Police Professional Assistants, Non-Union hired before 1/1/2017, and Teamsters hired before 1/1/2017: 2.5% of FAC times total years of service.

AFSCME, Non-Union, and Teamsters hired on/after 1/1/2017: 1.25% of FAC times total years of service.

Police, Deputy Police Chiefs hired before 6/5/2017, Assistant Fire Chiefs hired before 7/1/2017, and Fire: 2.75% of FAC times total years of service.

Deputy Police Chiefs hired on/after 6/5/2017 and Assistant Fire Chiefs hired on/after 7/1/2017: 1.375% of FAC times total years of service.

Annuity Withdrawal - Upon regular retirement, a member may elect to withdraw accumulated contributions. If this lump sum election is made, the retirement allowance is reduced by the actuarial equivalent of the amount withdrawn.

City of Ann Arbor Employees' Retirement System

Brief Summary of Benefit Provisions Evaluated

June 30, 2019

Early Retirement (reduction factor for age):

Eligibility – All Members: Age 50 with 20 or more years of service.

Benefit – Computed as a regular retirement but the pension portion of the allowance is reduced by 0.33% for each month by which retirement precedes normal retirement eligibility.

For General: Earlier of a) age 60 or b) the age the member would have had 25 years of service.

For Police/Fire: Earlier of a) age 55 or b) the age the member would have had 25 years of service.

Deferred Retirement (vested benefit):

Eligibility – AFSCME hired before 8/29/2011, Police Service Specialists hired before 1/1/2012, Police Professional Assistants hired before 7/2/2012, Non-Union hired before 7/1/2011, Teamsters hired before 7/2/2012, Police hired before 1/1/2012, Deputy Police Chiefs hired before 7/2/2012, and Fire hired before 7/1/2012: 5 years of service.

AFSCME hired on/after 8/29/2011, Police Service Specialists hired on/after 1/1/2012, Police Professional Assistants hired on/after 7/2/2012, Non-Union hired on/after 7/1/2011, Teamsters hired on/after 7/2/2012, Police hired on/after 1/1/2012, Deputy Police Chiefs hired on/after 7/2/2012, and Fire hired on/after 7/1/2012: 10 years of service.

Annual Amount – Computed as regular retirement but based upon service and final average compensation at time of termination. Benefit begins at age 60. A member may elect to receive all or a portion of his/her accumulated contributions at termination if the member's age plus service total at least 50 and receive a lesser benefit at age 60.

Duty Disability Retirement:

Eligibility - No age or service requirement.

Annual Amount – *Police/Fire:* Computed as a regular retirement. Minimum benefit is 25% of FAC. Upon termination of worker's compensation, additional service credit is granted for period in receipt of worker's compensation and benefit is recomputed.

All Others: Computed as a regular retirement. Minimum to age 60 is 18% of FAC. Minimum after age 60 is the sum of a) 12% of the portion of FAC not in excess of Social Security base plus b) 18% of FAC in excess of Social Security base. Upon termination of worker's compensation, additional service credit is granted for period in receipt of worker's compensation and benefit is recomputed.

City of Ann Arbor Employees' Retirement System

Brief Summary of Benefit Provisions Evaluated

June 30, 2019

Non-Duty Disability Retirement:

Eligibility - AFSCME hired before 8/29/2011, Police Service Specialists hired before 1/1/2012, Police Professional Assistants hired before 7/2/2012, Non-Union hired before 7/1/2011, Teamsters hired before 7/2/2012, Police hired before 1/1/2012, Deputy Police Chiefs hired before 7/2/2012, and Fire hired before 7/1/2012: 5 years of service.

AFSCME hired on/after 8/29/2011, Police Service Specialists hired on/after 1/1/2012, Police Professional Assistants hired on/after 7/2/2012, Non-Union hired on/after 7/1/2011, Teamsters hired on/after 7/2/2012, Police hired on/after 1/1/2012, Deputy Police Chiefs hired on/after 7/2/2012, and Fire hired on/after 7/1/2012: 10 years of service.

Annual Amount – Police/Fire: Computed as a regular retirement. Minimum benefit is 25% of FAC.

All Others: Computed as a regular retirement. Minimum to age 60 is 18% of FAC. Minimum after age 60 is the sum of a) 12% of the portion of FAC not in excess of Social Security base plus b) 18% of FAC in excess of Social Security base.

Duty Death Before Retirement:

Eligibility - No age or service requirements.

Annual Amount – Computed as regular retirement but actuarially reduced in accordance with a 100% joint and survivor election. If the member had less than 25 years of service at time of death, a minimum of 25 years of service will be used to compute the benefits. Worker's compensation payments made to the member's beneficiary will offset the benefits paid by the Retirement System. Upon termination of worker's compensation payments the amount paid to the beneficiary will be the greater of the annual worker's compensation payment and the computed 100% joint and survivor retirement benefit.

Non-Duty Death Before Retirement:

Eligibility - AFSCME hired before 8/29/2011, Police Service Specialists hired before 1/1/2012, Police Professional Assistants hired before 7/2/2012, Non-Union hired before 7/1/2011, Teamsters hired before 7/2/2012, Police hired before 1/1/2012, Deputy Police Chiefs hired before 7/2/2012, and Fire hired before 7/1/2012: 5 years of service.

AFSCME hired on/after 8/29/2011, Police Service Specialists hired on/after 1/1/2012, Police Professional Assistants hired on/after 7/2/2012, Non-Union hired on/after 7/1/2011, Teamsters hired on/after 7/2/2012, Police hired on/after 1/1/2012, Deputy Police Chiefs hired on/after 7/2/2012, and Fire hired on/after 7/1/2012: 10 years of service.

Annual Amount - Computed as regular retirement but actuarially reduced in accordance with a 100% joint and survivor election. If there is no named beneficiary, a lump sum will be payable to the estate.

City of Ann Arbor Employees' Retirement System

Brief Summary of Benefit Provisions Evaluated

June 30, 2019

Post-Retirement Increases:

Subject to Ordinance provisions, adjustments may be made every July 1 to retirees and beneficiaries on the rolls at least 12 months. Adjustments are funded by financial gains and are not guaranteed.

Member Contributions:

AFSCME hired on/after 1/1/2017, Non-Union hired on/after 1/1/2017, Teamsters hired on/after 1/1/2017, Assistant Fire Chiefs hired on/after 7/1/2017, and Police Deputy Chiefs hired on/after 6/5/2017: 3.0% of annual compensation.

All Others: 6.0% of annual compensation.

Retirees and Beneficiaries Added to and Removed from Rolls Comparative Schedule

Year Ended June 30	No. Added to Rolls	No. Removed from Rolls	Rolls End of Year	
			No.	Annual Allowances
2010	64	19	879	\$ 27,174,651
2011	70	16	933	29,163,874
2012	52	23	962	30,539,094
2013	39	30	971	31,056,330
2014	34	25	980	31,734,475
2015	36	20	996	32,249,188
2016	45	24	1,017	33,495,093
2017	53	30	1,040	34,825,341
2018	63	33	1,067	36,707,905
2019	49	35	1,081	37,768,548

Retirees and Beneficiaries as of June 30, 2019 Tabulated by Attained Ages

Attained Ages	Age and Service		Disability			Total
	No.	Annual Allowances	No.	Annual Allowances	No.	Annual Allowances
Under 50	20	\$ 1,034,207			20	\$ 1,034,207
50-54	59	3,038,716	1	\$ 6,655	60	3,045,371
55-59	124	5,423,596	1	31,635	125	5,455,231
60-64	196	7,191,825	2	43,384	198	7,235,209
65-69	210	7,927,974	1	37,905	211	7,965,879
70-74	194	6,252,324	2	29,922	196	6,282,246
75-79	119	3,368,051			119	3,368,051
80-84	72	1,793,674			72	1,793,674
85-89	47	1,024,325			47	1,024,325
90 & Over	33	564,355			33	564,355
Totals	1,074	\$ 37,619,047	7	\$ 149,501	1,081	\$ 37,768,548

Inactive Members Eligible for Deferred Benefits as of June 30, 2019 Tabulated by Attained Ages

Attained Ages	No.	Annual Allowances
38	2	\$ 27,513
39	3	46,798
40	4	68,903
41	1	9,059
42	5	104,929
43	9	114,464
44	7	73,035
45	2	29,341
46	2	7,057
47	7	106,639
48	6	62,730
49	8	140,604
50	8	192,867
51	10	198,251
52	9	120,728
53	5	60,077
54	13	165,921
55	4	53,209
56	3	27,605
57	8	109,100
58	12	195,504
59	5	80,245
60	6	32,825
61	2	6,301
62	2	18,796
63	2	45,844
64	1	14,842
65	2	19,171
66	1	1,173
Totals	149	\$2,133,531

Retirees and Beneficiaries as of June 30, 2019 Tabulated by Valuation Divisions

Valuation Divisions	No.	Annual Allowances
General	695	\$19,517,836
Police	220	10,678,478
Fire	166	7,572,234
Total	1081	\$37,768,548

Inactive Members Eligible for Deferred Benefits as of June 30, 2019 Tabulated by Valuation Divisions

Valuation Divisions	No.	Estimated Annual Allowances
General	139	\$1,923,019
Police	8	164,090
Fire	2	46,422
Total	149	\$2,133,531

Active Members as of June 30, 2019 Tabulated by Valuation Divisions

Valuation Divisions	No.	Annual Payroll
General	382	\$ 28,940,639
General Hybrid	131	7,435,857
Police	117	11,296,685
Police Hybrid	1	132,406
Fire	79	7,340,329
Fire Hybrid	1	123,781
Total Active Members	711	\$ 55,269,697

General Members as of June 30, 2019 by Age and Years of Service

Age	Years of Service to Valuation Date								Totals	
	0-4	5-9	10-14	15-19	20-24	25-30	30 Plus	No.	Valuation Payroll	
20-24	8							8	\$ 388,138	
25-29	23	1						24	1,158,519	
30-34	37	14	1					52	3,110,657	
35-39	44	14	7					65	4,215,731	
40-44	36	20	20	12	3			91	6,451,427	
45-49	27	14	21	9	11	4		86	6,471,671	
50-54	12	6	14	16	14	10	1	73	5,803,650	
55-59	18	9	12	11	6	8	3	67	5,047,471	
60	1	2	3	2	1	2		11	1,000,986	
61	2	4		1		2	2	11	923,373	
62		1	2	1	3			7	544,681	
63	2	2	2					6	401,836	
64				1				1	72,861	
65	1			1			2	4	343,735	
66		1	2					3	230,741	
67	2					1		3	128,194	
68		1						1	82,825	
Totals	213	89	84	54	38	27	8	513	\$ 36,376,496	

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

Age: 45.40 years
Service: 9.61 years
Annual Pay: \$70,909

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

Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-30	30 Plus	No.	Valuation Payroll
20-24	3							3	\$ 171,646
25-29	8							8	517,858
30-34	17	11						28	2,276,273
35-39	5	4	1					10	910,157
40-44	6	1	1	5	5			18	1,822,182
45-49	1			5	23			29	3,155,918
50-54	1		1	2	10	2		16	1,824,092
55-59					2	2	2	6	750,966
Totals	41	16	3	12	40	4	2	118	\$ 11,429,092

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

Age: 41.08 years
Service: 12.96 years
Annual Pay: \$96,857

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

Age	Years of Service to Valuation Date							No.	Totals
	0-4	5-9	10-14	15-19	20-24	25-30	30 Plus		Valuation Payroll
25-29	9							9	\$ 470,866
30-34	6	1						7	516,925
35-39	3	3	1	1				8	669,998
40-44		1	2	5	2			10	1,012,993
45-49		2	7	4	13			26	2,588,576
50-54	1		1		7	6		15	1,667,915
55-59				1	1	3		5	536,837
Totals	19	7	11	11	23	9		80	\$ 7,464,110

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

Age: 43.38 years
Service: 14.91 years
Annual Pay: \$93,301

Active Members Added to and Removed from Rolls

General Members

Year	No. Added During Year	Terminations During the Year										Active Members End of Year
		Normal Retirement		Disabled		Died-in-Service		Withdrawals				
		A	E	A	E	A	E	Vested	Other	Total		
2015	48	23	24	1	1	0	1	8	9	17	18	483
2016	46	23	27	1	1	0	1	9	8	17	18	488
2017	51	19	27	0	1	0	1	11	14	25	18	495
2018*	59	23	26	0	1	0	1	13	21	34	20	499
2019	56	16	19		1	0	1	0	26	26	21	513
5-Year Total		104	123	2	5	0	5	41	78	119	95	

Police Members

Year	No. Added During Year	Terminations During the Year										Active Members End of Year
		Normal Retirement		Disabled		Died-in-Service		Withdrawals				
		A	E	A	E	A	E	Vested	Other	Total		
2015	10	1	5	0	0	0	0	1	2	3	1	121
2016	7	7	7	0	0	0	0	0	1	1	2	120
2017	10	9	7	0	0	0	0	0	0	0	2	121
2018*	6	5	12	0	0	0	0	2	2	4	3	118
2019	11	8	8		0	1	0	1	1	2	3	118
5-Year Total		30	39	0	0	1	0	4	6	10	11	

Fire Members

Year	No. Added During Year	Terminations During the Year										Active Members End of Year
		Normal Retirement		Disabled		Died-in-Service		Withdrawals				
		A	E	A	E	A	E	Vested	Other	Total		
2015	1	1	4	0	0	0	0	0	0	0	1	84
2016	-2	5	4	0	0	0	0	0	0	0	1	77
2017	9	6	4	0	0	0	0	0	0	0	1	80
2018*	4	5	7	0	0	0	0	1	0	1	1	78
2019	5	3	4	0	0	0	0	0	0	0	1	80
5-Year Total		20	23	0	0	0	0	1	0	1	5	

A = Actual

E = Expected

* Revised actuarial assumptions.

Summary of Current Asset Information

Balance Sheet

Valuation Assets

Cash, receivables, accruals and other short-term		\$ 18,166,768
Equity securities		295,151,633
Debit securities		159,994,569
Real Estate		42,429,907
Other - Sundry, Notes, and Mortgages		556,947
Accounts payable		(3,401,594)
Funding value adjustment		713,136
Total Current Assets		\$513,611,366

Revenues and Expenditures

	2018-2019	2017-2018
Balance - July 1	\$503,705,603	\$490,961,867
Revenues		
Member contributions	3,264,590	3,185,449
Employer contributions	13,621,926	13,445,765
Recognized investment income	30,599,351	33,550,876
Total	47,485,867	50,182,090
Expenditures		
Benefit payments	37,258,219	36,715,168
Refund of member contributions	363,827	0
Administrative expenses	671,194	723,186
Total	38,293,240	37,438,354
Balance - June 30	\$512,898,230	\$503,705,603
Net investment income/mean assets	6.2%	7.0%

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: "Your 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 members' service being rendered in the current year)

. . . plus . . .

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

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 . . .

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

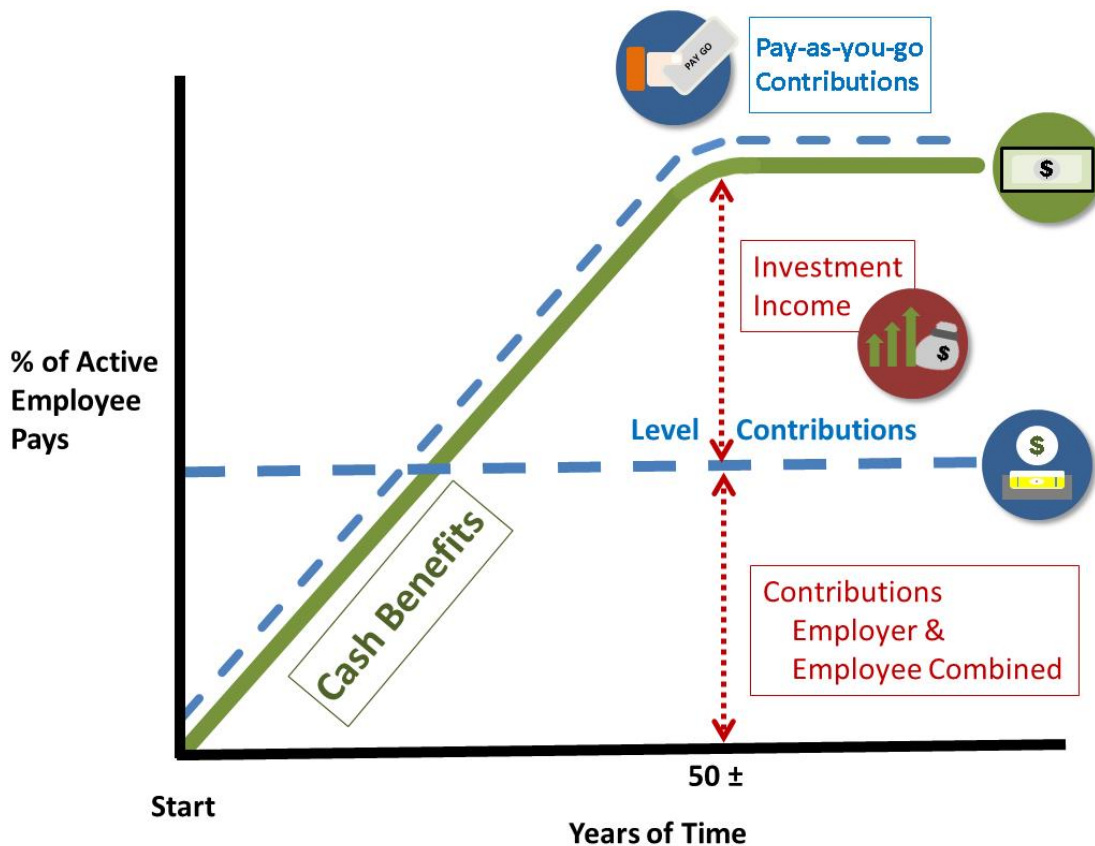
. . . minus . . .

Expenses incurred in operating the program.

There are retirement programs designed to defer the bulk of contributions far into the future. Lured by artificially low present contributions, the inevitable consequence is 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.***

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 the major contributor*** to the retirement program, and the amount is directly related to the amount of contributions and investment performance.

Computed Contribution Rate Needed to Finance Benefits. From a given schedule of benefits and from the data furnished him, 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.

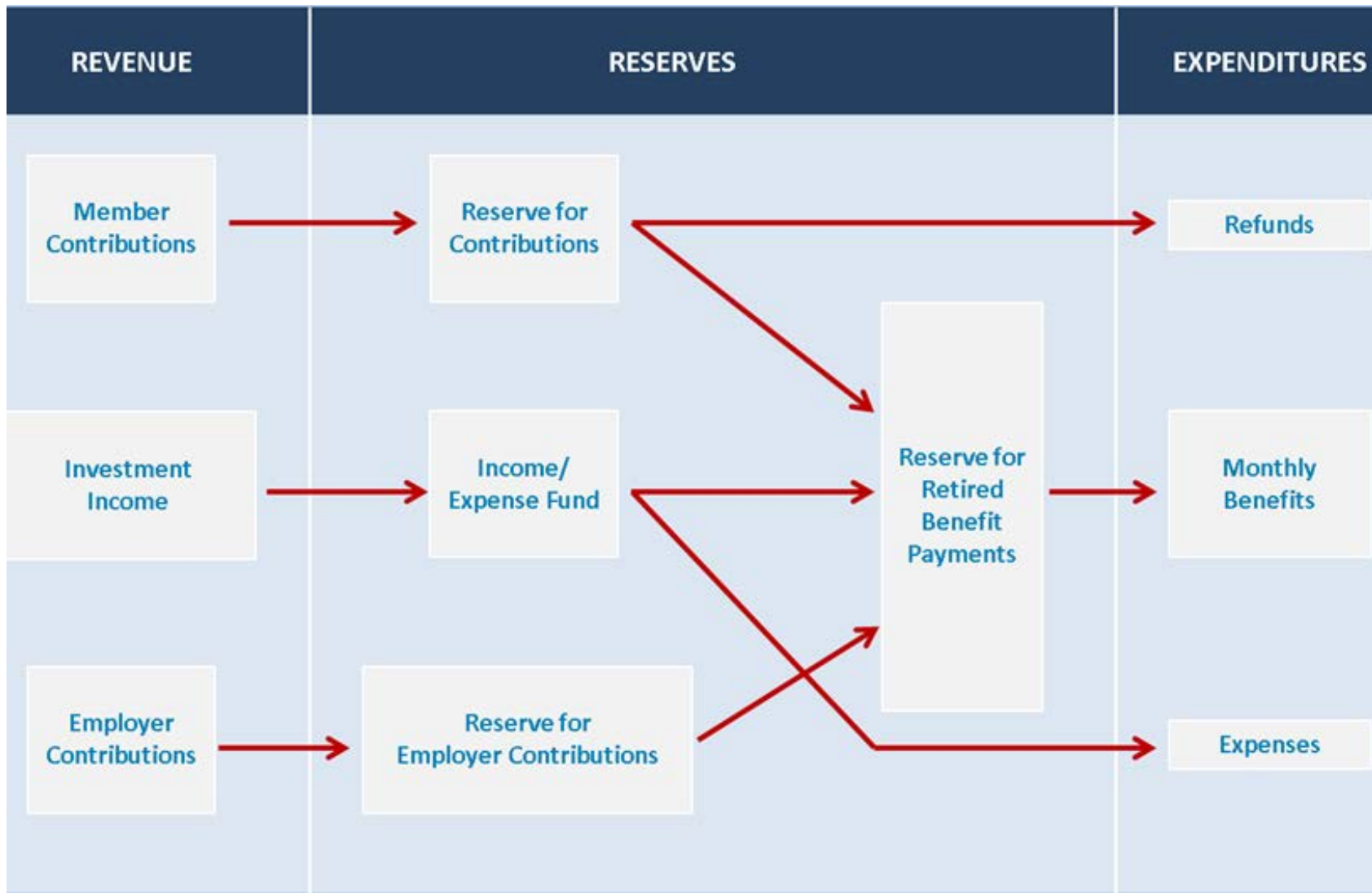


CASH BENEFITS LINE. This relentlessly increasing line is the fundamental reality of retirement plan financing. It happens each time a new benefit is added for future retirements (and happens regardless of the design for contributing for benefits).

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



Actuarial Cost Methods

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

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

Financing of Unfunded Actuarial Accrued Liabilities. Unfunded actuarial accrued liabilities (full funding credit if assets exceed liabilities) are amortized by level dollar contributions.

The City of Ann Arbor Employees' Retirement System is funded by Employer and Member Contributions in accordance with the funding policy adopted by the Retirement Board, based on actuarially determined contributions (ADC), which require contributions be sufficient to pay the Normal Costs of active plan members, Plan expenses, and amortize the Unfunded Actuarial Accrued Liability over a declining period. Effective with the 2017 valuation, the Board approved a change to a level dollar amortization that decreases by one year in each year until a 15-year open amortization period is obtained.

Additionally, Section 1.3 of the City of Ann Arbor General Pension Policy allows for more than the Minimum Required policy as follows:

"The City of Ann Arbor will strive to achieve 100% funding of the City of Ann Arbor Employees' Retirement Plan. To the extent that 100% funding has been achieved, the City will continue to fund at a minimum the Normal Cost as defined by an outside actuary. To the extent that 100% funding had not been achieved, the City shall budget each fiscal year the higher of the ADC or the existing level of funding in the current budget year adjusted annually for the change in general fund budgeted revenues. In some years this may result in an excess contribution to the Pension Fund, which will serve to pay down the unfunded actuarial accrued liability and reduce future city cost increases."

Actuarial Assumptions Used for the Valuation

The actuary calculates the contribution requirements and benefit values by applying actuarial assumptions to the benefit provisions and census data furnished, using the actuarial cost methods described on the previous page.

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

- long-term rates of investment return to be generated by system assets;
- patterns of pay increases to members;
- rates of mortality among members, retirees and beneficiaries;
- rates of separation (withdrawal) from active membership;
- rates of disability among active members; and
- the age patterns of actual retirement.

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

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

From time to time it is appropriate to modify one or more of the assumptions to reflect experience trends (but not random year-to-year fluctuations). Actuarial assumptions were last revised for the June 30, 2018 valuation. These assumptions were based on an experience study performed by the City's prior actuary.

The rate of net investment return was 7.00% a year, compounded annually net of 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 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 benefits will be based.

Sample Ages	% Increase in Salary at Sample Ages						
	Merit and Seniority			Base (Economic)	Increase Next Year		
	General	Police	Fire		General	Police	Fire
20	4.00%	7.50%	7.29%	3.50%	7.50%	11.00%	10.79%
25	3.58%	6.60%	6.52%	3.50%	7.08%	10.10%	10.02%
30	2.82%	4.74%	4.86%	3.50%	6.32%	8.24%	8.36%
35	2.14%	3.36%	3.44%	3.50%	5.64%	6.86%	6.94%
40	1.84%	2.70%	2.70%	3.50%	5.34%	6.20%	6.20%
45	1.47%	2.38%	2.38%	3.50%	4.97%	5.88%	5.88%
50	0.98%	2.18%	2.18%	3.50%	4.48%	5.68%	5.68%
55	0.68%	2.04%	2.04%	3.50%	4.18%	5.54%	5.54%
60	0.50%	1.80%	1.90%	3.50%	4.00%	5.30%	5.40%

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 remaining in employment.

Sample Ages	Years of Service	% of Active Members Separating within Next Year			
		General		Police	Fire
		Males	Females		
	1	6.00%	16.00%	6.00%	4.50%
	2	4.80%	13.00%	6.00%	4.00%
	3	4.00%	11.00%	4.00%	3.60%
	4	3.20%	8.00%	3.00%	3.60%
	5	2.50%	6.00%	2.50%	3.60%
25	6 & Over	3.20%	4.50%	2.40%	1.40%
30		3.20%	4.50%	2.40%	1.10%
35		3.25%	3.50%	1.75%	0.90%
40		3.25%	3.50%	0.74%	1.00%
45		3.25%	3.50%	0.48%	0.90%
50		3.25%	3.50%	0.48%	0.50%
55		3.25%	3.50%	0.48%	0.50%
60		3.25%	3.50%	0.48%	0.50%
65		3.25%	3.50%	0.48%	0.50%

The mortality tables used are as follows:

- **Healthy Pre-Retirement:** The RP-2014 Employee Generational Mortality Tables, 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 Tables, 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		Healthy Post-Retirement		Disabled Retirement	
	Future Life		Future Life		Future Life	
	Expectancy (Years)*		Expectancy (Years)*		Expectancy (Years)*	
	Men	Women	Men	Women	Men	Women
55	31.16	35.41	29.64	32.04	21.23	24.97
60	26.24	30.40	25.09	27.29	18.21	21.44
65	21.61	25.51	20.78	22.75	15.35	18.04
70	17.32	20.75	16.72	18.44	12.62	14.67
75	13.36	16.18	12.95	14.40	9.99	11.51
80	9.80	11.87	9.60	10.78	7.61	8.77

* Based on retirements in 2019. 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:

Retirement Ages	General		Police		Fire		Retirement Service	Police	Fire
	Normal	Early	Normal	Early	Normal	Early			
50	25%	10%		10%		10%	25	50%	25%
51	25%	10%		10%		10%	26	50%	25%
52	25%	10%		10%		10%	27	50%	25%
53	25%	10%		10%		10%	28	50%	25%
54	25%	10%		10%		10%	29	50%	25%
55	25%	10%	50%		25%		30	50%	25%
56	25%	10%	50%		25%		31	50%	25%
57	25%	10%	50%		25%		32	50%	25%
58	25%	10%	50%		25%		33	50%	25%
59	25%	10%	50%		25%		34	50%	25%
60	30%		100%		100%		35	100%	100%
61	30%								
62	30%								
63	30%								
64	30%								
65	60%								
66	40%								
67	40%								
68	40%								
69	40%								
70	100%								

Rates of disability among active members.

Sample Ages	% Becoming Disabled within Next Year		
	General	Police	Fire
20	0.06%	0.08%	0.02%
25	0.06%	0.08%	0.02%
30	0.06%	0.08%	0.02%
35	0.06%	0.08%	0.02%
40	0.11%	0.14%	0.03%
45	0.24%	0.32%	0.08%
50	0.42%	0.56%	0.14%
55	0.65%	0.86%	0.22%
60	0.86%	1.14%	0.29%
65	0.99%	1.32%	0.33%

For General members, 75% of the disabilities are assumed to be non-duty and 25% of the disabilities are assumed to be duty related. For Police/Fire members, 50% of the disabilities are assumed to be non-duty and 50% of the disabilities are assumed to be duty related.

Miscellaneous and Technical Assumptions

June 30, 2019

Benefit Service:	Exact Fractional service is used to determine the amount of benefit payable.
Decrement Operation:	Disability and mortality decrements do not operate during the first five years of service. Disability also does not operate during normal retirement eligibility.
Decrement Relativity:	Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
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.
Incidence of Contributions:	Contributions are assumed to be received continuously throughout the year based upon the computed dollar amount shown in this report.
Liability Adjustments:	None.
Missing Data:	For any participant data (i.e., beneficiary information, pop-up benefit amount, etc.) that was not provided for the current valuation, the information from the prior year data was used if it was available. For instances where beneficiary information was not available, males were assumed to be 3 years older than females.
Normal Form of Benefit:	A straight life benefit is the normal form of benefit.
Pay Increase Timing:	Middle of (Fiscal) year. Reported pays for Fire members were adjusted for purposes of this valuation.
Service Credit Accruals:	It is assumed that members accrue one year of service credit per year.

Glossary

Actuarial Accrued Liability	The difference between (i) the actuarial present value of future plan benefits, and (ii) the actuarial present value of future normal cost. Sometimes referred to as “accrued liability” or “past service liability.”
Accrued Service	The service credited under the plan which was rendered before the date of the actuarial valuation.
Actuarial Assumptions	Estimates of future plan experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and salary increases. Decrement assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.
Actuarial Cost Method	A mathematical budgeting procedure for allocating the dollar amount of the “actuarial present value of future plan benefits” between the actuarial present value of future normal cost and the actuarial accrued liability. Sometimes referred to as the “actuarial funding method.”
Actuarial Equivalent	A single amount or series of amounts of equal value to another single amount or series of amounts, computed on the basis of the rate(s) of interest and mortality tables used by the plan.
Actuarial Present Value	The amount of funds presently required to provide a payment or series of payments in the future. It is determined by discounting the future payments at a predetermined rate of interest, taking into account the probability of payment.
Amortization	Paying off an interest-bearing liability by means of periodic payments of interest and principal, as opposed to paying it off with a lump sum payment.
Experience Gain (Loss)	A measure of the difference between actual experience and that expected based upon a set of actuarial assumptions during the period between two actuarial valuation dates, in accordance with the actuarial cost method being used.

Glossary

Normal Cost	The annual cost assigned, under the actuarial funding method, to current and subsequent plan years. Sometimes referred to as “current service cost.” Any payment toward the unfunded actuarial accrued liability is not part of the normal cost.
Plan Termination Liability	The actuarial present value of future plan benefits based on the assumption that there will be no further accruals for the future service and salary. The termination liability will generally be less than the liabilities computed on a “going-concern” basis and is not normally determined in a routine actuarial valuation.
Reserve Account	An account used to indicate that funds have been set aside for a specific purpose and are not generally available for other uses.
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 related to market value in a manner which spreads unexpected gains or losses over a period of future years.

SECTION D

PROJECTIONS

Projection Assumptions and Methods

For purposes of the 5-year funding projection, the following assumptions were used:

- 7.0% investment return on the Fair Value of Assets in all future years.
- 7.0% discount rate for determining liability.
- The Actuarial Value of Assets reflects the deferred gains and losses generated by the smoothing method. The current deferred amounts are recognized in the first four years of the projections.
- Actuarial assumptions and methods as described in Section C. All future demographic experience is assumed to be exactly realized.
- The actuarially calculated contribution rate is determined as a percent of total payroll and contributed each year.
- Projections assume a 0% increase in the total active member population. All new future members are expected to enter the plan upon date of hire, under applicable plan provisions.
- The projections are based on the combined impact of the Minimum Required Policy and the Funding Plan.
- For the Sensitivity Analysis, all assumptions and methods are the same except investment returns on the Fair Value of Assets are assumed as follows:

Base:	7.00% for all future years
Optimistic:	8.00% for all future years
Pessimistic:	6.00% for all future years

Projected Actuarial Results – Base Assumes 7.0% Returns in Future Years

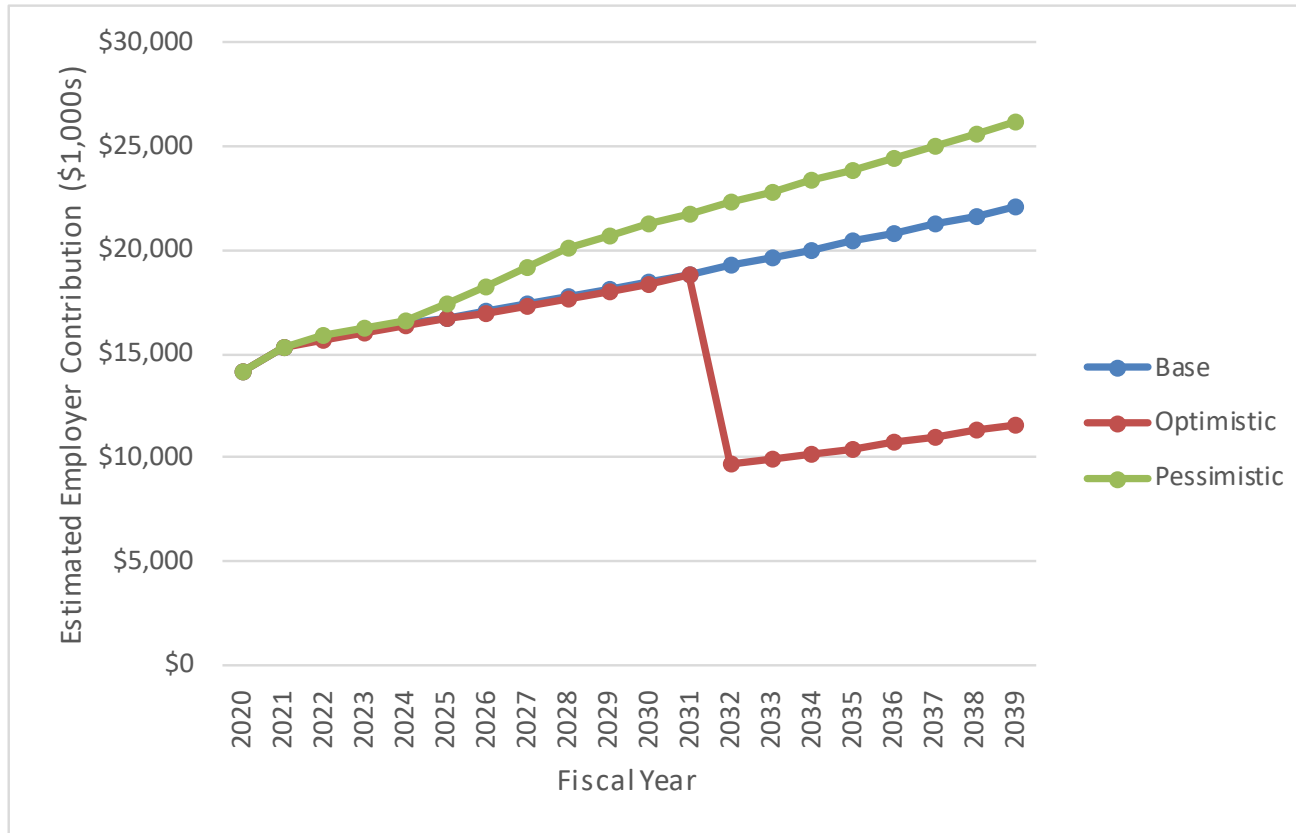
Year Ending June 30,	Employee Contributions	Employer Contributions	Total Contributions	Benefit Payments	Actuarial Value of Assets	Actuarial Accrued Liability	Funded Ratio	Unfunded Actuarial Accrued Liability	Actuarially Determined Contribution	Estimated Funding Plan Contribution
(a)	(b)	(c)=(a) + (b)	(d)	(e)	(f)	(g) = (e) / (f)	(h) = (f) - (e)	(i)	(j)	
2020	\$ 3,144,761	\$ 14,092,966	\$ 17,237,727	\$ 38,879,662	\$ 523,927,729	\$ 613,933,361	85.3%	\$ 90,005,632	\$ 15,775,168	\$ 15,775,168
2021	3,187,712	15,251,454	18,439,166	40,496,054	540,529,159	626,166,513	86.3%	85,637,354	15,705,943	16,090,671
2022	3,232,775	15,775,168	19,007,943	42,207,164	552,838,182	637,677,278	86.7%	84,839,096	15,981,353	16,412,484
2023	3,279,753	16,090,671	19,370,424	43,816,533	564,721,587	648,528,128	87.1%	83,806,541	16,263,965	16,740,734
2024	3,330,125	16,412,484	19,742,609	45,375,352	577,008,147	658,737,418	87.6%	81,729,271	16,473,017	17,075,549
2025	3,384,175	16,740,734	20,124,909	46,852,677	589,030,596	668,357,736	88.1%	79,327,140	16,678,140	17,417,060
2026	3,440,754	17,075,549	20,516,303	48,203,134	600,876,359	677,488,959	88.7%	76,612,600	16,884,240	17,765,401
2027	3,500,962	17,417,060	20,918,022	49,346,246	612,805,364	686,324,603	89.3%	73,519,239	16,758,104	18,120,709
2028	3,566,598	17,765,401	21,331,999	50,252,937	625,071,012	695,107,293	89.9%	70,036,281	16,603,549	18,483,123
2029	3,636,173	18,120,709	21,756,882	51,046,262	637,814,875	703,964,903	90.6%	66,150,028	16,418,585	18,852,785
2030	3,711,284	18,483,123	22,194,407	51,654,412	651,274,993	713,113,442	91.3%	61,838,449	16,196,508	19,229,841
2031	3,791,602	18,852,785	22,644,387	52,083,479	665,699,670	722,776,838	92.1%	57,077,168	15,935,310	19,614,438
2032	3,874,764	19,229,841	23,104,605	52,560,094	681,117,367	732,953,167	92.9%	51,835,800	15,633,297	20,006,727
2033	3,961,027	19,614,438	23,575,465	52,892,569	697,757,609	743,839,632	93.8%	46,082,023	15,290,332	20,406,862
2034	4,051,153	20,006,727	24,057,880	53,093,967	715,853,565	755,636,094	94.7%	39,782,529	14,903,976	20,814,999
2035	4,146,833	20,406,862	24,553,695	53,331,805	735,483,267	768,388,181	95.7%	32,904,914	14,470,351	21,231,299
2036	4,248,594	20,814,999	25,063,593	53,565,553	756,772,874	782,188,342	96.8%	25,415,468	13,985,320	21,655,925
2037	4,356,146	21,231,299	25,587,445	53,919,388	779,728,725	797,006,223	97.8%	17,277,498	13,444,522	22,089,044
2038	4,469,136	21,655,925	26,125,061	54,455,585	804,292,957	812,743,943	99.0%	8,450,986	12,844,680	22,530,825
2039	4,587,252	22,089,044	26,676,296	54,985,742	830,598,500	829,490,961	100.1%	(1,107,539)	12,301,505	12,301,505

Section 1.3 of the City of Ann Arbor General Pension Policy states:

“The City of Ann Arbor will strive to achieve 100% funding of the City of Ann Arbor Employees’ Retirement Plan. To the extent that 100% funding has been achieved, the City will continue to fund at a minimum the Normal Cost as defined by an outside actuary. To the extent that 100% funding had not been achieved, the City shall budget each fiscal year the higher of the ADC or the existing level of funding in the current budget year adjusted annually for the change in general fund budgeted revenues. In some years this may result in an excess contribution to the Pension Fund, which will serve to pay down the unfunded actuarial accrued liability and reduce future city cost increases.”

For purposes of the projection, the increase in General Fund revenues is assumed to be 2% per year. Based on the City’s funding policy and given that all actuarial assumptions are exactly realized, after reaching full-funding status all future actuarially determined contributions are projected to equal the normal cost contribution.

Projected Actuarial Results – Sensitivity Analysis Impact That Various Investment Rates of Return Have on the Employer Contribution Amount



APPENDIX

RISK MEASURES

Risk Measures

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Actuarial Valuation Date	Actuarial Value of Assets	Actuarial Accrued Liability (AAL) Entry Age	Unfunded AAL (UAAL) (2) - (1)	Covered Payroll	Funded Ratio (1) / (2)	Assets / Payroll (1) / (4)	Liability / Payroll (2) / (4)	Unfunded / Payroll (3) / (4)
6/30/2010	\$421,387,000	\$466,883,000	\$45,496,000	\$48,688,316	90.3 %	865.5 %	958.9 %	93.4 %
6/30/2011	423,734,000	481,330,000	57,596,000	45,921,381	88.0	922.7	1048.2	125.4
6/30/2012	410,709,000	496,770,000	86,061,000	44,003,987	82.7	933.3	1128.9	195.6
6/30/2013	407,170,000	507,435,000	100,265,000	45,063,112	80.2	903.6	1126.1	222.5
6/30/2014	433,854,000	523,461,000	89,607,000	47,956,745	82.9	904.7	1091.5	186.8
6/30/2015	459,480,000	533,198,000	73,718,000	48,759,189	86.2	942.3	1093.5	151.2
6/30/2016	470,029,000	548,201,000	78,172,000	50,057,471	85.7	939.0	1095.1	156.2
6/30/2017	489,943,000	571,074,000	81,131,000	53,583,277	85.8	914.4	1065.8	151.4
6/30/2018 ^{*^}	505,015,000	583,601,000	78,586,000	53,231,121	86.5	948.7	1096.4	147.6
6/30/2019	513,611,366	601,108,981	87,497,615	55,269,697	85.4	929.3	1087.6	158.3

* Revised actuarial assumptions.

^ Valuation results for 2018 and prior years were calculated by the City's prior actuary.

(5) The Funded Ratio is the most widely known measure of a plan's financial strength, but the trend in the funded ratio is much more important than the absolute ratio. The funded ratio should trend to 100%. As it approaches 100%, it is important to re-evaluate the level of investment risk in the portfolio and potentially to re-evaluate the assumed rate of return.

(6) and (7) The ratios of assets and liabilities to payroll gives an indication of both maturity and volatility. Many systems have ratios between 5 and 7. Ratios significantly above that range may indicate difficulty in supporting the benefit level as a level % of pay. For systems that are closed to new hires, it is expected that these ratios will grow as payroll declines.

(8) The ratio of the unfunded liability to payroll gives an indication of the plan sponsor's ability to actually pay off the unfunded liability. A ratio above approximately 3 or 4 may indicate difficulty in discharging the unfunded liability within a reasonable time frame.

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-3 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:

	<u>2019</u>	<u>2018</u>
Ratio of the market value of assets to payroll	9.28	9.17
Ratio of actuarial accrued liability to payroll	10.88	10.63
Ratio of actives to retirees and beneficiaries	0.66	0.65
Ratio of net cash flow to market value of assets	-4.2%	-4.3%

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 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.