

City of Owosso Employees Retirement System

Seventy-Fourth Annual Actuarial Valuation
December 31, 2018



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May 23, 2019

Board of Trustees
City of Owosso Employees Retirement System
Owosso, Michigan

**Re: City of Owosso Employees Retirement System
Actuarial Valuation as of December 31, 2018**

Dear Board Members:

The results of the December 31, 2018 Annual Actuarial Valuation of the City of Owosso Employees 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:

- 1) measure the System's funding progress;
- 2) determine the employer contribution rate for the fiscal year beginning July 1, 2019 in accordance with Board policy. A separate report will be issued that contains information needed for reporting under GASB Statements No. 67 and No. 68;
- 3) provide additional information to assist the City with reporting under P.A. 202 of 2017; and
- 4) provide the Board with additional information related to transferring Police members and Police retirees to another retirement system.

This report should not be relied on for any purpose other than the purposes described. Determinations of the financial results associated with the benefits described in this report in a manner other than the intended purpose may produce significantly different results.

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 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.

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; increases or decreases expected as part of the natural operation of the methodology used for these

measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of the actuary's assignment, the actuary did not perform an analysis of the potential range of such future measurements.

The contribution rate in this report is determined using the actuarial assumptions and methods disclosed in Section A of this report. This report includes risk metrics on page A-14 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 report has been prepared by individuals 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 Owosso Employees Retirement System as of the valuation date. All calculations have been made in conformity with generally accepted actuarial principles and practices, with the Actuarial Standards of Practice issued by the Actuarial Standards Board and with applicable statutes.

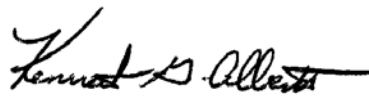
Laura Frankowiak is a Member of the American Academy of Actuaries (MAAA) and meets the Academy's Qualification Standards to render the actuarial opinions contained herein.

The signing individuals are independent of the plan sponsor.

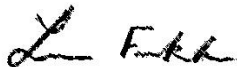
Gabriel, Roeder, Smith & Company believes that the actuarial assumptions used in this valuation are reasonable. Furthermore, we believe the funding policy is reasonable and is expected to fund the System benefits expected to be paid to members (based on the current assumptions). However, reasonable assumptions and funding policies do not guarantee benefit security. We recommend the Board consider benefit security whenever adopting contributions. We remind the Board that they are free to adopt larger contributions if they believe such larger contributions are warranted.

This report replaces our draft report dated April 17, 2019. None of the valuation results have changed from the draft report. However, Section E has been added at the Board's request. This section contains additional information relative to 1) The City's reporting requirements under P.A. 202 of 2017 and 2) transferring the Police members and retirees to another system.

Respectfully submitted,



Kenneth G. Alberts



Laura Frankowiak, ASA, FCA, MAAA

KGA/LF:ah



SECTION A

VALUATION RESULTS

Computed Contributions Expressed as Percents of Annual Pay for the Fiscal Year Beginning July 1, 2019 Using Entry Age Funding Method

Contributions for	General [#]	Police	Fire Dept.	Total (All Groups)	Total (Excluding Police Patrol)
Number of Active Members	16	11	16	43	32
Actuarial Accrued Liabilities	\$23,164,343	\$5,644,291	\$10,073,643	\$38,882,277	\$33,237,986
Assets	19,118,803	5,207,040	9,097,143	33,422,986	28,215,946
Unfunded Actuarial Accrued Liabilities	4,045,540	437,251	976,500	5,459,291	5,022,040
Total Normal Cost - %	13.85%	16.30%	16.93%		
Members' Contributions - %	6.00	10.00	8.00		
City's Normal Cost - %	7.85	6.30	8.93		
Unfunded Actuarial Accrued Liabilities - %	63.71	9.26	10.89		
UAL Payment	\$ 518,982	\$ 47,771	\$ 110,725	\$ 677,478	\$ 629,707
City's Normal Cost - \$	61,382	46,659	90,829	198,870	152,211
TOTAL CITY CONTRIBUTIONS					
Effective 7/1/2019 - %	71.56%	15.56%	19.82%		
Effective 7/1/2019 (Mid of FY contribution) - \$	\$ 580,364	\$ 94,430	\$ 201,554	\$ 876,348	\$ 781,918
Effective 7/1/2019 (End of FY contribution) - \$	\$ 601,366	\$ 97,835	\$ 208,815	\$ 908,016	\$ 810,181
Amortization Period (in years)	10	10	10		
For every \$1,000 of Contingency Reserve Released, the Employer Contribution Decreases*:	\$ 0	\$ 128	\$ 128	\$ 128	\$ 128

[#] Includes two retired command officers previously included with the Police Division.

* The change in contingency reserve is dependent on the timing of the City's contributions.

Contributions shown above are based on the Board's current funding policy. The Board should regularly review/re-evaluate the funding policy. The Board is free to adopt higher employer contributions if it believes higher contributions are warranted.

Timing of Contribution Payments

The contribution requirements in this report anticipate regular payments throughout the year. Examples would be at each payroll date or in 12 monthly installments. If the employer contribution pattern is significantly different, an adjustment to the costs may be appropriate. For example, a lump sum contribution at the beginning of the year is available for investment throughout the year and, therefore, ought to be somewhat smaller than 12 monthly payments. Similarly, a lump sum contribution at the end of the year will not generate any investment income that year and so must be greater than 12 monthly payments. Examples of this are shown below using an interest rate equal to the valuation rate of investment return to adjust for timing differences:

	<u>Each Payment</u>	<u>Total for Year</u>	<u>Total Prior Year</u>
Lump Sum at Beginning of Fiscal Year (7/1/2019):	\$845,752	\$845,752	\$687,787
Lump Sum at Middle of Fiscal Year (12/31/2019):	876,348	876,348	712,708
Lump Sum at End of Fiscal Year (6/30/2020):	908,016	908,016	738,656
Twelve Monthly Installments (starting July 2019):	73,029	876,348	712,708

Illustration is based on the calculated mid-year contributions adjusted to the beginning of year or end of year based on simple interest, by division.

The table below shows the same timing illustration, excluding Police Patrol members.

	<u>Each Payment</u>	<u>Total for Year</u>
Lump Sum at Beginning of Fiscal Year (7/1/2019):	\$754,657	\$754,657
Lump Sum at Middle of Fiscal Year (12/31/2019):	781,918	781,918
Lump Sum at End of Fiscal Year (6/30/2020):	810,181	810,181
Twelve Monthly Installments (starting July 2019):	65,160	781,918

Valuation Assets and Actuarial Accrued Liability

In financing the actuarial accrued liabilities, the valuation assets of \$33,422,986 were distributed as shown below.

<u>Reserves for</u>	<u>Present Valuation Assets Applied to</u>			<u>Totals</u>
	<u>Member Actuarial Accrued Liabilities</u>	<u>Retired Life Actuarial Liabilities</u>	<u>Contingency Reserve</u>	
Employees' Contributions	\$ 3,263,668			\$ 3,263,668
Employer Contributions	(2,540,438)	\$ 1,847,128		(693,310)
Retired Benefit Payments		27,446,902	\$765,419	28,212,321
Undistributed Investment Income	<u>2,640,307</u>			<u>2,640,307</u>
Totals	\$ 3,363,537	\$29,294,030	\$765,419	\$33,422,986

Historical Comparison of Contingency Reserve by Division

Contingency Reserve				
Valuation				
Year	General	Police	Fire	Total
2003*	\$ 332,125	\$ 174,762	\$ 660,099	\$ 1,166,986
2004*	149,603	234,935	329,028	713,566
2005	379,612	242,833	630,448	1,252,893
2006	374,388	209,771	629,568	1,213,727
2007	403,449	344,481	616,305	1,364,235
2008	366,855	351,453	707,770	1,426,078
2009	297,674	468,166	697,978	1,463,818
2010	505,101	480,114	689,335	1,674,550
2011	566,173	524,232	650,227	1,740,632
2011#	424,630	393,174	487,670	1,305,474
2012#@	366,148	481,920	425,067	1,273,135
2013^	379,078	669,336	381,914	1,430,328
2013^!	118,258	575,524	178,077	871,859
2014	-	583,098	271,295	854,393
2015	-	602,246	211,785	814,031
2016	-	616,498	222,431	838,929
2017	-	628,230	161,059	789,289
2018**	-	636,654	128,765	765,419

* Prior to 2005, General Union and General Non-Union were summarized as General for purposes of the actuarial valuation. Prior to 2005, Police Command and Police Patrol were summarized as Police for purposes of the actuarial valuation. For the purpose of this exhibit, the combined General and Police groups pre-2005 have been summarized with General Union and Police Patrol respectively.

After the release of ¼ of the contingency reserve as approved by the Board as of 12/31/2011.

@ After transfer of \$74,000 from WWTP to Sewage.

^ Beginning in 2013, the WWTP, Sewage, General Union, General Non-Union, and Water groups are combined into one General Group. The Police Command and Police Patrol were also combined into one Police group for purposes of the actuarial valuation.

! After actuarial assumptions and/or methods revised.

** The Police Command group is now included in the General division.

Development of Unfunded Accrued Liability Using Entry Age Funding Method

	General [#]	Police	Fire	Total	Total Excluding Police Patrol
A. Accrued Liability					
1. For retirees and beneficiaries					
a. Retiree Liability	\$ 18,383,703	\$ 3,344,980	\$ 7,565,347	\$ 29,294,030	\$ 25,949,050
b. Contingency Reserve	0	636,654	128,765	765,419	128,765
2. For vested terminated members					
	1,016,020	0	56,674	1,072,694	1,072,694
3. For pending MERS transfer					
	0	0	0	0	
4. For present active members					
a. Value of expected benefit payments	4,385,284	2,927,275	3,910,541	11,223,100	8,295,825
b. Value of future normal costs	620,664	1,264,618	1,587,684	3,472,966	2,208,348
c. Active member liability: (a) - (b)	3,764,620	1,662,657	2,322,857	7,750,134	6,087,477
5. Total					
	23,164,343	5,644,291	10,073,643	38,882,277	33,237,986
B. Present Assets (valuation basis)					
	19,118,803	5,207,040	9,097,143	33,422,986	28,215,946
C. Unfunded Accrued Liability (Excess Assets) as of 12/31/2018: (A.5) - (B)					
	4,045,540	437,251	976,500	5,459,291	5,022,040
D. Employer Normal Cost (for period 1/1/19 to 6/30/19)					
	30,840	22,985	44,743	98,568	75,583
E. Expected Employer Contribution Payable 6/30/2019					
	490,575	88,864	159,127	738,566	649,702
F. Interest Adjustment to 6/30/2019					
	146,651	15,850	35,398	197,899	182,049
G. Projected Unfunded Accrued Liability (Excess Assets) as of 6/30/2019: (C) + (D) - (E) + (F)					
	3,732,456	387,222	897,514	5,017,192	4,629,970

[#] Includes two retired command officers previously included with the Police Division.

Employer Contribution History

Valuation Date December 31	City's Computed Contributions for		Policemen [^] and Firemen	
	General Members			
2004#(a)	0.00	%	0.00	%
2005#(a)(b)	2.67		1.30	
2006(a)(b)	4.28		1.54	
2007(b)	2.53		3.88	
2008(b)	10.19		4.77	
2009#(b)	10.90		5.48	
2010(b)	18.43		9.21	
2011(a)(b)	25.99		15.83	
2012#	28.60		11.09	
2013(a)	29.27		9.63	
2014	33.57		10.74	
2015#	31.28		11.95	
2016	44.27		14.48	
2017	49.85		13.14	
2018!	71.56		16.84	

After benefit provisions changed.

(a) After actuarial assumptions and/or methods revised.

(b) Closed groups financed using the Aggregate method.

[^] The City's Contribution for Police Patrol has a maximum of 4% until the 2015 valuation. However, the contribution percentage on this page includes the additional contribution for the Police Command group, since the Policemen group includes both divisions.

! The General division now includes the additional contribution for Police Command, as of December 31, 2018.

Development of Experience Gain (Loss) Year Ended December 31, 2018

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

	General	Police	Fire	Total
(1) UAAL* at start of year	\$ 3,388,824	\$ 376,981	\$ 614,983	\$ 4,380,788
(2) NC from last val: (Total)	107,841	116,181	162,864	386,886
(3) Actual contributions: (Total)	575,848	152,823	247,941	976,612
(4) Interest Accrual: $[(1) + 1/2 [(2) - (3)]] \times 0.0725$	228,724	26,003	41,502	296,229
(5) Expected UAAL before changes: (1) + (2) - (3) + (4)	3,149,541	366,342	571,408	4,087,291
(6) Change from benefit improvements	0	0	0	0
(7) Change from revised actuarial methods [@]	144,400	(144,400)	0	0
(8) Change from revised actuarial assum.	0	0	0	0
(9) Expected UAAL after changes: (5) + (6) + (7) + (8)	\$ 3,293,941	\$ 221,942	\$ 571,408	\$ 4,087,291
(10) Actual UAAL at end of year	4,045,540	437,251	976,500	5,459,291
(11) Gain (Loss): (9) - (10)	(751,599)	(215,309)	(405,092)	(1,372,000)
(11a) AAL at start of year	22,601,614	6,016,512	9,926,548	38,544,674
(12) Gain (Loss) as percent of AAL [#] at start of year	(3.33%)	(3.58%)	(4.08%)	(3.56%)

* *Unfunded Actuarial Accrued Liability.*

[@] As a result of moving the two retired command officers from the Police Division to the General Division.

[#] *Actuarial Accrued Liabilities.*

	General	Police	Fire	Total
(13) Total Gain (Loss)	(751,599)	(215,309)	(405,092)	(1,372,000)
(14) Investment Gain(Loss)	(609,761)	(164,058)	(289,662)	(1,063,481)
(15) Liability Gain(Loss)	(141,838)	(51,251)	(115,430)	(308,519)

Historical Comparative Schedules

Schedule of Funding Progress

Actuarial Valuation Date	Actuarial Value of Assets (a)	Entry Age Actuarial Accrued Liability (AAL) (b)	Unfunded AAL (b)-(a)	Funded Ratio (a)/(b)	Covered Payroll (c)	UAAL as a % of Covered Payroll ((b-a)/c)
2009#	\$32,187,590	\$30,042,649	\$(2,144,941)	107.1 %	\$3,952,336	-
2010	31,529,473	31,251,375	(278,098)	100.9	3,672,267	-
2011*	29,624,891	33,523,677	3,898,786	88.4	3,746,852	104%
2012#	30,611,263	34,120,683	3,509,420	89.7	3,333,049	105%
2013*	31,913,449	35,821,262	3,907,813	89.1	3,108,992	126%
2014	32,558,582	36,714,271	4,155,689	88.7	2,938,821	141%
2015#	33,296,146	36,885,534	3,589,388	90.3	2,891,530	124%
2016	33,555,552	38,079,080	4,523,528	88.1	2,786,412	162%
2017	34,163,886	38,544,674	4,380,788	88.6	2,701,419	162%
2018	33,422,986	38,882,277	5,459,291	86.0	2,459,389	222%

* Revised actuarial assumptions and/or methods.

After benefit provisions changed.

Schedule of Employer Contributions

Fiscal Year Ending June 30	Valuation Year Ended December 31	Contribution Rates as Percents of Valuation Payroll	Computed Dollar Contribution Based on Projected Valuation Payroll*	Actual Contribution	Percentage Contributed
2010	2008	7.90 %	\$ 328,824	\$ 328,824	100%
2011	2009	8.50	350,599	350,599	100
2012	2010	14.31	550,684	550,684	100
2013	2011	21.29	829,038	829,038	100
2014	2012	20.24	701,388	701,388	100
2015	2013	19.06	600,769	600,769	100
2016	2014	21.28	629,143	629,143	100
2017	2015	20.23	614,448	958,312	156
2018	2016	25.64	757,712	766,089	125
2019	2017	25.72	738,565		
2020	2018	34.51	908,016		

* End of year dollar amount is shown beginning fiscal year ending June 30, 2017.

The funded status shown above is not a measure of the plan's settlement costs. A funded status of 100% or above is not an indication of the need for future contributions. A funded status below 100% is an indication that future contributions are needed.

Actuarial Balance Sheet as of 12/31/2018

A. Accrued value of System assets:	
1. Net assets from System financial statements	\$31,523,256
2. Funding value adjustment	1,899,730
3. Valuation assets	33,422,986
B. Present value of expected future employer contributions:	
1. For normal costs	1,641,122
2. For unfunded actuarial accrued liabilities	5,459,291
3. Total	7,100,413
C. Present value of expected future member contributions	1,831,844
D. Total Present and Expected Future Resources	\$42,355,243

A. To retirees and beneficiaries	\$30,059,449
B. To vested terminated members	1,072,694
C. To present active members:	
1. Allocated to service rendered prior to valuation date	7,750,134
2. Allocated to service likely to be rendered after valuation date	3,472,966
3. Total	11,223,100
D. Total Actuarial Present Value of Expected Future Benefit Payments	\$42,355,243

Comments

Comment A: The System was closed to General Union and Police Command Officers new entrants effective January 1, 2005 and General Non-Union new entrants effective January 1, 2006. The plan is open for Police Patrol and Fire groups.

Comment B: Experience during the year was less favorable than assumed. The primary sources of unfavorable experience were:

- Losses related to investment activity (the recognized rate of investment return was 4.04% compared with the assumed rate of investment return of 7.25%);
- Losses related to retiree mortality (2 deaths compared with 3.3 expected);
- Losses related to retirements (3 members actually retired compared with 0.7 expected); and
- Losses related to active death-in-service (1 active member died while 0.1 deaths were expected).

The funded status decreased to 86.0% on an actuarial value of assets basis and 81.1% on a market value of assets basis.

Comment C: The Retirement System currently has a contingency reserve of approximately \$765 thousand. This reserve is the excess of the Reserve for Retired Benefit Payments over the accrued liabilities for retirees and beneficiaries.

See page A-4 for additional details regarding the contingency reserve amounts by group.

Comment D: The computed Employer contribution effective July 1, 2019 is \$876,348, assuming periodic payments throughout the fiscal year or a lump sum payment in the middle of the fiscal year.

Comment E: The actuarial value of assets recognized a 4.04% rate of return, despite the market rate of return of (6.20)%. This difference is due to the 4-year smoothing. The portion of this year's loss recognized in the actuarial value of assets was offset by the gains from prior years continuing to be recognized this year. As recognition of those prior gains is completed, there will be upward pressure on contributions as the remainder of this year's loss is recognized over the next 3 years.

Comment F: The last experience review was completed in 2013. We suggest that a formal experience study be done prior to the December 31, 2019 valuation for the System to ensure that assumptions going forward are consistent with long term expectations with regard to both economic and demographic trends. New state laws passed in late 2017 now require an experience study every 5 years and an actuarial audit every 8 years (P.A. 202 of 2017).

Comment G: We understand the City and the Retirement System are in the process of moving the Police Division (not including retired Command Officers) to MERS (the Municipal Employees Retirement System of Michigan). If the assets transferred are based on the Police Division assets as of December 31, 2019, adjusted for cash flow between December 31, 2018 and the transfer date, valuation results for remaining divisions will not be directly affected.

Comments (Continued)

Comment H: Observations for next experience review:

- All assumptions continue to be reasonable.
- The industry trend on the mortality assumption is to update the mortality assumption to a version of the 2014 table.
- The industry trend has been to lower assumed price inflation, which may result in the lowering of the assumed rate of return.

Comment I: The System has tracked assets by division for many years. However, we understand that the Board has previously been given a legal opinion that correct separation of assets was done for administrative reasons and the Board is not bound by that separation. Because the Police Division was open and one of the two remaining divisions is closed, the transfer of the Police Division could result in a different risk assessment of the System leading to an asset allocation to the Police Division that differs from the historical allocation. There are many different ways to allocate assets within a plan for purposes of this kind of transfer. If the Board would like GRS to explore alternate allocations, please let us know.

Comment J: The status of the Plan (open or closed to new members) can have implications on the economic assumptions due to changes in asset allocations that may be necessary to cover cash flows. We understand the City is considering transferring the Fire group to MERS. If that happens, the remaining plan would be completely closed and could possibly have an unfunded retiree liability. The Board may want to consider this possibility when evaluating the implications of the Police Division transfer to MERS.

Comments (Concluded)

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) employer normal cost amounts as a percentage of payroll will remain approximately level year-to-year;
- 2) the unfunded actuarial accrued liability will be fully amortized after 10 years; and
- 3) the funded status of the plan will increase gradually towards a 100% funded ratio.

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.

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

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:

1. **Investment Risk** – actual investment returns may differ from the expected returns;
2. **Asset/Liability Mismatch Risk** – 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;
3. **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;
4. **Salary and Payroll Risk** – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. **Longevity Risk** – members may live longer or shorter than expected and receive pensions for a period of time other than assumed;
6. **Other demographic Risks** – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

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

The computed contribution rate shown on page A-1 may be considered as a minimum contribution rate that complies with the Board's funding policy. The timely receipt of the actuarially determined contributions is critical to support the financial health of the plan. Users of this report should be aware that contributions made at the actuarially determined rate do not necessarily guarantee benefit security.

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:

	2018	2017
Ratio of the market value of assets to total payroll	12.82	13.23
Ratio of actuarial accrued liability to payroll	15.81	14.27
Ratio of actives to retirees and beneficiaries	0.47	0.54
Ratio of net cash flow to market value of assets	-6.6%	-4.8%

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 2.0 times the payroll, a return on assets 5% different than assumed would equal 10% 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.

SECTION B

VALUATION DATA

Brief Summary of Benefit Provisions (12/31/2018)

Regular Retirement (no reduction factor for age)

Eligibility - General* Non-Union: Age 60 with 10 or more years of service.

General* Union: Age 55 with 25 or more years of service or age 60 with 10 or more years of service.

Police: Age 50 with 25 or more years of service or age 55 with 10 or more years of service.

Fire: Any age with 25 or more years of service or age 55 with 10 or more years of service if hired prior to 6/30/93. Age 50 with 25 or more years of service or age 55 with 10 or more years of service if hired after 6/30/93.

Annual Amount - General* Non-Union: Final Average Compensation (FAC) times 2.5% for all years of service to a maximum 80% of FAC, effective 7/1/2010.

Fire: FAC times the sum of a) 2.80% for the first 25 years of service plus b) 1.0% for years of service in excess of 25 years to a maximum of 80% FAC.

Police: FAC times 2.80% for all years of service to a maximum 80% of FAC.

General* Union: FAC times 2.50% for all years of service to a maximum of 80% FAC.

Type of Final Average Compensation - Highest 3 consecutive years out of last 10. Some lump sums included.

* Includes WWTP, Water, and Sewage.

Deferred Retirement (vested benefit)

Eligibility - 10 or more years of service. Benefit begins at age 60.

Annual Amount - Computed as a regular retirement but based upon service and final average compensation at time of termination.

Duty Disability Retirement

Eligibility - No age or service requirements. Must be in receipt of worker's compensation.

Annual Amount - Computed as a regular retirement. Minimum benefit to age 65 is 20% of final average compensation. Upon termination of worker's compensation, additional service credit is granted and benefit is recomputed.

Non-Duty Disability Retirement

Eligibility - 10 or more years of service.

Annual Amount - Computed as a regular retirement. Minimum benefit to age 65 is 20% of final average compensation.

Duty Death Before Retirement

Eligibility - No age or service requirements. Must be in receipt of worker's compensation.

Annual Amount - Refund of accumulated contributions or, upon termination of worker's compensation, a benefit to the spouse, unmarried children under 18 and dependent parents equal to the worker's compensation payment.

Non-Duty Death Before Retirement

Eligibility - 10 or more years of service.

Annual Amount - Computed as a regular retirement but actuarially reduced in accordance with a 100% joint and survivor election.

Post-Retirement Increases

Annual increase - 1.4% of the base pension for the first 10 years of retirement.

Member Contributions

General, Police Non-Union	6.0% of annual compensation
Fire	8.0% effective 7/1/2017
Police Union	10.0% effective 7/1/2017

Membership

General City Union (including WWTP, Water, and Sewage) employees hired on or after January 1, 2005, and General City Non-Union (including WWTP, Water, and Sewage) employees and Police Command Officers hired on or after January 1, 2006 are not covered by this Retirement System.

Retirants and Beneficiaries Comparative Statement

Valuation Date	Added to Rolls		Removed from Rolls		Rolls End of Year		% Incr. in Annual Pensions	Average Pension	Present Value of Pensions	Active Per Retiree	Pensions as a % of Pay
	No.	Annual Pensions [#]	No.	Annual Pensions	No.	Annual Pensions					
1994	5	\$ 29,230	3	\$ 4,664	86	\$ 662,647	3.8%	\$ 7,705	\$ 6,486,947	1.2	1972.00%
1995	2	46,143	3	7,064	85	701,726	5.9	8,256	6,918,988	0.8	28.87
1996	2	11,415	7	12,934	80	700,207	(0.2)	8,753	6,743,764	0.8	31.74
1997	2	47,931	2	25,613	80	722,975	3.3	9,037	6,856,333	0.8	29.57
1998	4	22,510	6	60,410	78	685,075	(5.2)	8,783	6,431,181	0.9	27.60
1999	3	96,306	2	2,583	79	778,798	7.7	9,858	7,416,876	0.8	29.81
2000	2	54,935	3	18,350	78	815,383	4.7	10,454	7,807,925	1.3	21.52
2001	8	171,244	4	42,562	82	944,065	15.8	11,513	9,172,050	1.2	24.78
2002	7	119,045	4	32,234	85	1,030,876	9.2	12,128	10,126,061	1.2	26.84
2003	1	17,294	10	31,998	76	1,016,172	(1.4)	13,371	9,841,684	1.3	25.45
2004	4	115,408	6	33,752	74	1,097,828	8.0	14,836	10,609,898	1.3	27.47
2005	3	62,062	3	22,700	74	1,137,190	3.6	15,367	10,861,853	1.3	27.32
2006	5	207,589	2	2,865	77	1,341,914	18.0	17,427	13,043,591	1.2	34.12
2007	3	125,438	7	37,612	73	1,429,740	6.5	19,585	13,864,399	1.2	35.28
2008	1	63,419	4	33,043	70	1,460,116	2.1	20,859	14,063,424	1.3	36.12
2009	4	95,927	2	29,187	72	1,526,856	4.6	21,206	14,688,020	1.2	38.63
2010	4	252,797	1	22,320	75	1,757,333	15.1	23,431	16,795,936	1.0	47.85
2011	4	133,694	3	26,612	76	1,864,415	6.1	24,532	17,718,104	1.0	49.76
2012	6	247,091	4	57,258	78	2,054,248	10.2	26,337	19,536,094	0.9	61.63
2013	10	312,029	5	57,844	83	2,308,433	12.4	27,812	23,305,303 @	0.8	74.25
2014	5	163,556	4	41,881	84	2,430,108	5.3	28,930	24,627,565	0.7	82.69
2015	5	135,504	6	78,885	83	2,486,727	2.3	29,961	24,926,664	0.7	86.00
2016	6	282,359	1	22,219	88	2,746,867	10.5	31,214	27,609,693	0.6	98.58
2017	4*	152,265	2	7,680	90	2,891,452	5.3	32,127	28,574,768	0.5	107.03
2018	3	120,055	2	8,924	91	3,002,582	3.8	32,995	29,294,030	0.5	122.09

Includes post retirement increases.

@ After changes in actuarial assumptions/methods.

* One retired member previously reported as deceased was re-added to the database.

Retirants and Beneficiaries as of 12/31/2018 Tabulated by Type of Pensions Being Paid

Type of Pensions Being Paid	No.	Annual Pension
Age and Service Pensions		
Regular pension - benefit terminating at death	40	\$1,504,964
Option A pension - 10-year certain and life thereafter	1	35,028
Option B pension - joint and last survivor benefit	22	589,228
Option C pension - modified joint and last survivor	15	606,912
Pension to survivor beneficiary of deceased retirant	8	137,878
Total age and service pensions	86	\$2,874,010
Casualty Pensions		
Duty disability Regular Pension		
Non-Duty disability Regular Pension	3	\$ 95,353
Pension to survivor beneficiary of deceased retirant Non-Duty disability	1	13,850
Pension to survivor beneficiary of deceased member Non-Duty death	1	19,369
Total casualty pensions	5	\$ 128,572
Total Pensions Being Paid	91	\$3,002,582

Retirants and Beneficiaries as of 12/31/2018 Tabulated by Attained Ages

Attained Age	Age and Service		Casualty		Totals	
	Number	Annual Pensions	Number	Annual Pensions	Number	Annual Pensions
50-54	1	\$ 49,510			1	\$ 49,510
55-59	8	298,352	1	\$ 13,851	9	312,203
60-64	20	706,318	1	21,446	21	727,764
65-69	15	617,572	2	81,664	17	699,236
70-74	10	471,283	1	11,612	11	482,895
75-79	8	284,850			8	284,850
80-84	14	324,509			14	324,509
85-89	5	60,900			5	60,900
90-94	4	49,696			4	49,696
95-100	1	11,019			1	11,019
Totals	86	\$ 2,874,009	5	\$ 128,573	91	\$ 3,002,582

Average Age at Retirement: 58.3 years
Average Age Now: 71.3 years

Inactive Members as of 12/31/2018 Tabulated by Attained Ages

Attained Ages	No.	Annual Deferred Pension
39	1	\$ 13,550
51	1	12,128
53*	2	37,433
56	1	15,427
58	1	13,257
59	1	17,192
Totals	7	\$108,987

Average Age Now: 53.3 years

**Includes one Death-in-Service survivor beneficiary who has yet to begin receiving benefits.*

Comparative Statement

Valuation Date Dec. 31	Active Members				Vested Term. Member	Valuation Payroll	Average			
	General*	P-F	Water	Total			Age	Service	Pay	% Change
1999	30	34	3	67	4	\$ 2,612,348	43.6	13.1	\$ 38,990	510.00%
2000	51	32	15	98	6	3,788,920	44.3	13.7	38,662	(0.8)
2001	48	34	15	97	6	3,809,203	43.2	12.8	39,270	1.6
2002	52	33	15	100	4	3,840,501	43.6	12.7	38,405	(2.2)
2003	50	34	14	98	3	3,993,163	44.8	13.6	40,747	6.1
2004	49	33	15	97	3	3,996,822	44.7	13.3	41,204	1.1
2005	49	34	15	98	3	4,162,066	45.1	13.6	42,470	3.1
2006	45	29	15	89	3	3,933,310	44.9	13.7	44,194	4.1
2007	43	33	14	90	4	4,052,300	47.0	14.9	45,026	1.9
2008	43	32	13	88	4	4,042,417	46.5	14.8	45,937	2.0
2009	40	32	11	83	3	3,952,336	46.4	15.4	47,619	3.7
2010	37	29	10	76	3	3,672,267	47.4	15.9	48,319	1.5
2011	36	31	10	77	3	3,746,852	47.2	15.5	48,660	0.7
2012	33	29	7	69	6	3,333,049	47.0	15.5	48,305	(0.7)
2013	29	30	5	64	6	3,108,992	45.6	14.1	48,578	0.6
2014	26	28	4	58	6	2,938,821	46.0	14.3	50,669	4.3
2015	27	29	*	56	6	2,891,530	45.6	13.8	51,634	1.9
2016	23	29	*	52	5	2,786,412	44.8	12.9	53,585	3.8
2017	20	29	*	49	6	2,701,419	44.5	13.1	55,131	2.9
2018	16	27	*	43	7	2,459,389	44.3	12.9	57,195	3.7

* Beginning with the December 31, 2015 valuation, General members includes all non-police/fire divisions.

Valuation payroll in 2009 was adjusted to account for 27 pay periods during the year.

Valuation payroll in 2012 was adjusted to remove the one-time payout of unused sick leave for Firefighters.

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		Died-in-Service		Other Withdrawal		
		A	E	A	E	A	E	A	E	
2009		4	3.2	0.2		0.2	1	2.4	83	
2010		4	1.2	0.2		0.2	3	2.1	76	
2011	7	3	1.3	0.2		1	0.2	1.7	77	
2012	3	5	1.9	0.2		0.2	6	2.2	69	
2013	5	7	1.6	1	0.2	0.2	2	2.0	64	
2014	2	4	1.5	0.2		0.1	4	1.8	58	
2015	3	3	2.6	0.2		0.1	2	1.5	56	
2016	3	5	1.6	0.2		0.1	2	1.5	52	
2017	3	2	0.5	0.2		0.1	3	1.5	49	
2018	2	3	0.7	0.1	1	0.1	4	1.4	43	
2009-2018	28	40	16.1	1	1.9	3	1.5	29	18.1	

A represents actual number.
E represents expected number.

General Members as of 12/31/2018 By Age and Years of Service

Attained Age	Years of Service on Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
40-44				2				2	\$ 88,325
45-49						1		1	72,330
50-54				1				1	45,307
55-59			2	5	2			9	419,798
60-64					2	1		3	152,310
Totals	0	0	2	8	4	2	0	16	\$778,070

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: 19.7 years
Annual Pay: \$48,629

Police Members as of 12/31/2018 By Age and Years of Service

Attained Age	Years of Service on Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
25-29	1							1	\$ 43,134
30-34	1	3						4	269,590
35-39		1	1	1				3	193,970
40-44				2				3	201,724
	1								
Totals	3	4	1	3	0	0	0	11	\$ 708,418

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

Group Averages:

Age: 35.3 years
Service: 8.7 years
Annual Pay: \$60,480

Fire Department Members as of 12/31/2018 By Age and Years of Service

Attained Age	Years of Service on Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
20-24	3							3	\$ 150,350
25-29	1							1	59,801
30-34	1							1	54,190
35-39		1						1	65,748
40-44		2	1					3	197,495
45-49	1	1			1			3	190,150
50-54			1	3				4	255,167
Totals	6	4	2	3	1	0	0	16	\$ 972,901

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

Group Averages:

Age: 39.6 years
Service: 9.0 years
Annual Pay: \$60,806

Development of Funding Value of Retirement System Assets

Year Ended December 31:	2017	2018	2019	2020	2021
A. Funding Value Beginning of Year	\$33,555,552	\$34,163,887			
B. Market Value End of Year	35,752,993	31,523,256			
C. Market Value Beginning of Year	31,715,358	35,752,993			
D. Non-Investment Net Cash Flow	(1,727,571)	(2,078,940)			
Investment Income %	7.25%	7.25%			
E. Investment Income					
E1. Market Total: B-C-D	5,765,206	(2,150,797)			
E2. Amount for Immediate Recognition	2,370,153	2,401,520			
E3. Amount for Phased-In Recognition: E1-E2	3,395,053	(4,552,317)			
F. Phased-In Recognition of Investment Income					
F1. Current Year: 0.25 x E3	848,763	(1,138,079)			
F2. First Prior Year	(183,018)	848,763	\$ (1,138,079)		
F3. Second Prior Year	(591,147)	(183,018)	848,763	\$ (1,138,079)	
F4. Third Prior Year	(108,845)	(591,147)	(183,019)	848,764	\$ (1,138,080)
F5. Total Recognized Investment Gain	(34,247)	(1,063,481)	(472,335)	(289,315)	(1,138,080)
G. Funding Value End of Year: A+D+E2+F5	\$34,163,887	\$33,422,986			
H. Difference between Market & Funding Value	\$ 1,589,106	\$ (1,899,730)			
I. Funding Value Recognized Rate of Return	7.15%	4.04%			
J. Market Value Recognized Rate of Return	18.69%	(6.20)%			

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 4-year period. During periods when investment performance exceeds the assumed rate, Funding Value of Assets will tend to be less than Market Value. During periods when investment performance is less than the assumed rate, Funding Value 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 retirement are exactly equal for 3 consecutive years, the Funding Value will become equal to Market Value.

Summary of Asset Information as of 12/31/2018 Furnished for Valuation

Balance Sheet

Valuation Assets (Funding Value)		Reserves	
Cash & Equivalents	\$ 345,408	Employees' Contributions	\$ 3,263,668
U.S. Notes & Bills	0	Employer Contributions	(2,593,040)
Short-term Investment Funds	947,874	Retired Benefit Payments	28,212,321
Common Stocks	20,826,180	Unallocated Reserves	2,640,307
Preferred Stocks	79,144		
Stock Mutual Funds	1,528,651		
Other: ETF's	949,262		
Bonds	6,851,601		
Accounts Receivable	229		
Accounts Payable	(5,093)		
Net System Assets (market value)	\$31,523,256	Total Reserves	\$31,523,256

Revenues and Expenditures

	2018	2017
Valuation Assets - January 1	\$34,163,887	\$33,555,552
Revenues		
Employees' contributions	210,523	214,940
Employer contributions	766,089	958,312
Net Investment income	1,338,039	2,335,906
Expenditures		
Benefit payments	2,950,784	2,851,171
Refund of member contributions	104,768	49,652
Valuation Assets - December 31	\$33,422,986	\$34,163,887

SECTION C

OPERATION OF THE SYSTEM

Financial Objective

Benefit Promises Made Which Must Be Paid For. A retirement system is an orderly means of handing out, keeping track of, and financing contingent pension promises to a group of employees. As each member of the retirement program acquires a unit of service credit they are, in effect, handed an "IOU" which reads: *"The Employees Retirement System promises to pay you one unit of retirement benefits, payments in cash commencing when you retire."*

The principal related financial question is: **When shall the money required to cover the "IOU" be contributed?** This year, when the benefit of the member's service is received? Or, some future year when the "IOU" becomes a cash demand?

The Constitution of the State of Michigan is directed to the question:

"Financial benefits arising on account of service rendered in each fiscal year shall be funded during that year and such funding shall not be used for financing unfunded accrued liabilities."

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 present 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 system are less than the preceding amount, the difference, plus investment earnings not realized thereon, will have to be contributed at some later time, or, benefits will have to be reduced, to satisfy the fundamental fiscal equation under which all retirement systems 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 and not required for immediate payment of benefits

... minus ...

Expenses incurred in operating the program.

There are retirement systems designed to defer the bulk of contributions far into the future. The present contribution rate for such systems is artificially low. The fact that the contribution rate is destined to increase relentlessly to a much higher level is often ignored. ***This method of financing is prohibited in Michigan by the state constitution.***

A by-product of the level percent-of-payroll contributions objective is the accumulation of invested assets. Investment income on accumulated assets becomes a major contributor to the retirement system, 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, the actuary calculated the contribution rate ***by means of an actuarial valuation*** - the technique of assigning monetary values to the risks assumed in operating a retirement system.

SECTION D

VALUATION METHODS AND ASSUMPTIONS

Actuarial Cost Method

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

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

UAAL (as well as Assets in excess of Actuarial Accrued Liabilities) were amortized over a 10-year closed period (from July 1, 2019). The amortization method was level percent-of-payroll for the open groups and level dollar for the closed groups.

Unless otherwise noted, the rationale for all assumptions and methods was the 2013 method and assumption review. Assumptions are forward looking.

Asset Valuation Method

An essential step in the valuation process is comparing valuation assets with computed liabilities. Valuation assets are those assets that are recognized for funding purposes.

Asset valuation methods are distinguished by the timing of the recognition of investment income. Total investment income is the sum of ordinary income and capital value changes. Under a pure market value approach, ordinary investment income and all capital value changes would be recognized immediately. Because of market volatility, use of pure market values in retirement funding can result in volatile contribution rates and unstable financial ratios, contrary to management objectives.

Under the current asset valuation method (see page B-11), assumed investment return is recognized fully each year. Differences between actual and assumed investment return are phased-in over a closed 4-year period. During periods when investment performance exceeds the assumed rate, the funding value will tend to be less than the market value. Conversely, during periods when investment performance is less than the assumed rate, funding value will tend to be greater than market value.

Member Data

Member Data was submitted by the Treasurer and was found to be reasonable and complete. After review and reconciliation, we submitted some minor questions. The result was clarification and annualized pays for new hires. No other changes were made to the data submitted by the Treasurer.

Actuarial Assumptions Used for the Valuations

The contribution requirements and benefit values of the System are calculated by applying actuarial assumptions to the benefit provisions and people information furnished, using the actuarial cost method 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 the assets of the Fund;
- Patterns of pay increases to members;
- Rates of mortality among members, retirants and beneficiaries;
- Rates of withdrawal of active members (without entitlement to a retirement benefit);
- Rates of disability among members; and
- The age patterns of actual retirements.

The monetary effect of each assumption is calculated for as long as a present covered person survives - - - a period of time which can be as long as a century.

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

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

The assumed rate of investment return was 7.25% (net of expenses) a year, compounded annually. This assumption is used to make money payable at one point in time equal in value to an amount of money payable at another point in time. The assumed real rate of return (the net return in excess of the wage inflation rate) was 4.25%. Economic experience during the last 5 years has been as follows:

	Year Ending December 31					5-Year Average
	2018	2017	2016	2015	2014	
1) Nominal rate of return*	4.0%	7.2%	6.5%	7.6%	7.0%	6.4%
2) Increase in CPI	1.9	2.1	2.1	0.7	0.8	1.5%
3) Average salary increase	3.7	2.9	3.8	1.9	4.3	3.3%
4) Real return						
- investment purposes						4.9%
- funding purposes						3.1%
- assumption						4.25%

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

The rates of salary increase used for individual members are in accordance with the following table. This assumption is used to project a member's current salary to the salaries upon which benefit amounts will be based.

Salary Increase Assumptions for an Individual Member			Salary Increase Assumptions for an Individual Member			
Years of Service	Base (Economic)	Merit & Seniority	Years of Service	Base (Economic)	Merit & Seniority	
		General			Police	Fire
1	3.0%	0.0%	1	3.0%	10.0%	5.0%
2	3.0%	0.0%	2	3.0%	5.0%	4.5%
3	3.0%	0.0%	3	3.0%	1.5%	4.0%
4	3.0%	0.0%	4	3.0%	1.0%	3.5%
5	3.0%	0.0%	5	3.0%	0.8%	3.0%
6	3.0%	0.0%	6	3.0%	0.5%	2.5%
7 & Up	3.0%	0.0%	7 & Up	3.0%	0.0%	0.0%

If the number of active members remains constant, then the total active member payroll will increase 3.0% annually, the base portion of the individual salary increase assumptions.

The rate of price inflation was assumed to be 2.5%. Although this assumption is not directly used in the valuation, it was used to determine the reasonable range for the investment return assumption.

The real wage growth was assumed to be 0.5%, resulting in a total wage inflation assumption of 3.0%, as shown in the salary increase tables.

The rate of payroll growth was assumed to be 3.0% for the open groups. This assumption was used to finance UAAL for the open groups (level dollar financing was used for the closed groups).

These economic assumptions were first used for the December 31, 2013 valuation.

The mortality table used was the RP-2000 Combined Healthy Mortality Table projected to 2020 using Projection Scale AA. A margin for future mortality improvements is contained in the projection.

Sample Attained Ages	Present Value of \$1 Monthly for Life		Future Life Expectancy (years)	
	Men	Women	Men	Women
45	\$154.72	\$156.27	37.54	39.46
50	148.84	150.73	32.77	34.63
55	140.89	143.37	28.04	29.88
60	130.74	134.14	23.47	25.31
65	118.50	123.10	19.17	21.02
70	104.41	110.47	15.22	17.06
75	88.00	96.22	11.58	13.47
80	70.35	80.35	8.42	10.23

This assumption is used to measure the probabilities of members dying before retirement and the probabilities of each benefit payment being made after retirement. For valuation purposes, pre-retirement deaths are assumed to be non-duty. For disability purposes, the mortality is set forward ten years.

This assumption was first used for the December 31, 2013 valuation.

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

Retirement Ages	Percent of Eligible Active Members Retiring within Next Year			
	General, Sewage, Water, and WWTP		Police	Fire
	Non-Union	Union		
45-49			20%	20%
50			20%	20%
51			20%	15%
52			20%	10%
53			20%	10%
54			20%	10%
55	20%	20%	20%	10%
56	15%	15%	20%	10%
57	10%	10%	20%	10%
58	10%	10%	20%	10%
59	10%	10%	20%	20%
60	10%	10%	100%	100%
61	10%	10%		
62	15%	15%		
63	25%	25%		
64	30%	30%		
65	100%	100%		

This assumption was first used for the December 31, 2013 valuation.

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 One Year		
		General	Fire	Police
ALL	0	20.00%	12.00%	20.00%
	1	15.00%	9.00%	15.00%
	2	10.00%	7.00%	10.00%
	3	8.00%	5.00%	8.00%
	4	7.00%	4.50%	7.00%
25	5 & Over	4.50%	4.50%	6.75%
30		3.90%	4.35%	5.85%
35		2.30%	3.50%	3.45%
40		0.90%	2.10%	1.35%
45		0.50%	1.00%	0.75%
50		0.50%	0.62%	0.75%
55		0.50%	0.50%	0.75%
60		0.50%	0.50%	0.75%

This assumption was first used for the December 31, 2013 valuation.

Rates of disability were as follows:

Sample Ages	% of Active Members Becoming Disabled within Next Year	
	General, Water, WWTP & Sewage	Police and Fire
20	0.02%	0.05%
25	0.02%	0.08%
30	0.02%	0.12%
35	0.03%	0.21%
40	0.07%	0.31%
45	0.13%	0.46%
50	0.27%	0.73%
55	0.44%	1.23%
60	0.67%	1.77%
65	1.00%	1.58%

For valuation purposes, pre-retirement disabilities are assumed to be non-duty.

This assumption was first used for the December 31, 2013 valuation.

Summary of Assumptions

Marriage Assumption:	100% of males and 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.
Decrement Timing:	Normal Retirement is assumed to occur at the beginning of the year and all other decrements are assumed to occur at the end of the year.
Eligibility Testing:	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
Benefit Service:	Exact fractional service is used to determine the amount of benefit payable.
Decrement Relativity:	Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
Decrement Operation:	Disability and mortality decrements do not operate during the first 5 years of service. Disability and turnover do not operate during retirement eligibility.
Normal Form of Benefit:	The assumed normal form of benefit is the straight life form.
Liability Adjustments:	Active member liabilities and normal costs were increased by 10% for Police, 7% for Fire hired before 6/30/1993, 4% for Fire hired after 6/30/1993, and 8% for all others to model end of career payments that are included in final average compensation (such as sick leave payouts).
Incidence of Contributions:	Contributions are assumed to be received continuously throughout the year.
Police Patrol Refund Cost:	Normal cost and accrued liabilities for Police Patrol refunds were based on an estimated long-term member contribution rate of 10%.
Fire Refund Cost:	Normal cost and accrued liabilities for Fire refunds were based on an estimated long-term member contribution rate of 8.0%.
Data Adjustments:	One survivor beneficiary of a deceased active member was added to the inactive benefit recipient rolls for the December 31, 2018 valuation because of a dispute between which beneficiary is eligible as of the valuation date. We valued the younger beneficiary.

Glossary

Actuarial Accrued Liability. The difference between (i) the actuarial present value of future plan benefits, and (ii) the actuarial present value of future normal cost. Sometimes referred to as "accrued liability" or "past service liability."

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

Actuarial Assumptions. Estimates of future plan experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and salary increases. Decrement assumptions (rates of mortality, disability, turn-over and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.

Actuarial Cost Method. A mathematical budgeting procedure for allocating the dollar amount of the "actuarial present value of future plan benefits" between the actuarial present value of future normal cost and the actuarial accrued liability. Sometimes referred to as the "actuarial funding method."

Actuarial Equivalent. A single amount or series of amounts of equal value to another single amount or series of amounts, computed on the basis of the rate(s) of interest and mortality tables used by the plan.

Actuarial Present Value. The amount of funds presently required to provide a payment or series of payments in the future. It is determined by discounting the future payments at a predetermined rate of interest, taking into account the probability of payment.

Amortization. Paying off an interest-bearing liability by means of periodic payments of interest and principal, as opposed to paying it off with a lump sum payment.

Experience Gain (Loss). A measure of the difference between actual experience and that expected based upon a set of actuarial assumptions during the period between two actuarial valuation dates, in accordance with the actuarial cost method being used.

Funding Value of Assets. The value of assets derived by spreading the difference between actual investment return and expected investment return in equal dollar installments over four years. This treatment removes the timing of investment activities from the valuation process.

Normal Cost. The annual cost assigned, under the actuarial funding method, to current and subsequent plan years. Sometimes referred to as "current service cost." Any payment toward the unfunded actuarial accrued liability is not part of the normal cost.

Reserve Account. An account used to indicate that funds have been set aside for a specific purpose and are not generally available for other uses.

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

SECTION E

ADDITIONAL INFORMATION

Additional Information – PA 202

Information for PA 202 Disclosures													
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">Membership</th> </tr> </thead> <tbody> <tr> <td>Active</td> <td style="text-align: right;">43</td> </tr> <tr> <td>Inactive¹</td> <td style="text-align: right;">7</td> </tr> <tr> <td>Retirees and Beneficiaries</td> <td style="text-align: right;">91</td> </tr> <tr> <td>Total</td> <td style="text-align: right;">141</td> </tr> </tbody> </table>		Membership		Active	43	Inactive ¹	7	Retirees and Beneficiaries	91	Total	141		
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<p>¹ Includes one Death-in-Service survivor beneficiary who has yet to begin receiving benefits.</p>													
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The information above is provided to assist the City in filling out Michigan form 5572. The items shown are a portion of the items on that form.

Additional Information – PA 202

When “spinning off” or transferring liabilities and assets from a plan, the general industry standard is that the remaining participants in the plan should not be any worse if after the transfer than they were before the transfer. This is often tested by comparing the funded status of the plan before and after the transfer. However, the manner in which the funded status is computed can vary greatly. At the heart of maintaining a similar funded status before and after the transfer is the 1) computation of the accrued liabilities, 2) the computation of the assets to be transferred, and 3) the computation of the funded status.

Computation of Accrued Liabilities

Decisions around the computation of the liabilities generally revolve around two (2) areas:

- The discount rate (interest rate); and
- The method (such as entry age accrued liability or present value of accrued benefits).

Often times the assumed investment return from the annual actuarial valuation is used as the discount rate. However, certain circumstances could justify the use of a different rate, such as a “risk free” rate or short term investment rate (currently in the 3% - 4% range).

Circumstances that would justify this lower rate include:

- 1) The size of the transfer causing the asset allocation to change (post-transfer).
- 2) Money being transferred going to individuals (or a participant directed DC plan) if not able to be invested in a balanced portfolio.
- 3) A change in plan sponsor obligations (for either the transferring group or the remaining group).

Circumstances 2 and 3 do not apply to the Owosso Employees Retirement System.

Circumstance 1 may or may not apply. While it is not currently believed that the transfer will mandate a change to the asset allocation, the group transferring is one of the two open groups. We understand the other open group (Fire) is also under consideration to be transferred. When a plan is completely closed to new members, its cash flow needs change as it moves toward an all retiree group. At some point, the asset allocation for a closed group has to change as the covered population moves to retiree status and the cash flow needs change. Whether or not this situation and the potential movement of the Fire group justifies using a lower rate if returned as the discount rate is a matter of Board Policy. We are, therefore, showing liabilities under two different discount rates.

The argument relative to the method for determining the accrued liabilities generally focus on the plan’s or the plan sponsor’s obligations. In cases where there may be a change in plan sponsor obligation or a freezing of benefits, the present value of accrued benefit method (or unit credit method) is generally the preferred method. However, in this situation there is no change in benefit accruals or plan sponsor. Essentially, this is just a change in the trust from which benefits will be paid. As such, it makes sense to determine the liabilities using the method upon which funding was based. The actuarial valuation that develops the employer contributions has used the entry-age actuarial cost method for the past several years. We have, therefore, showed liabilities under this method (for each of the two interest rates).

Additional Information – PA 202

Computation of Asset Transfer

We have seen different approaches to determining the value of the asset transfer. Generally, the method chosen attempts to allocate assets to the transferring group that is representative of the funding for that group and leaves the remaining members' plan in a funded position after the transfer that is at least as good as it was before the transfer. Frequently, this is accomplished by determining the funded status immediately before the transfer for the plan as a whole, when transferring assets equal to the funded status multiplied by the liabilities for the transferring group (as discussed in the next section, the funded status could be a single number or multiple numbers). The following sample example illustrates this method:

1) Accrued Liability for Transferring Group	\$ 500,000
2) Accrued Liability for Remaining Group	\$2,000,000
3) Total Liability (1)+(2)	\$2,500,000
4) Market Value of Assets	\$2,000,000
5) Plan Funded Status (4) / (3)	80%
6) Assets Allocated to Transferring Group (5)-(6)	\$ 400,000
7) Funded Status after Transfer [(4)-(6)] / (2)	80%

There are frequently variations on this method such as capping the transfer at 100% of the transferring group's accrued liability or looking at funded status categorically (see next section).

Historically, the Owosso Employees Retirement System has tracked assets by group. We understand from the Board's legal counsel that this is an administrative decision and not a legal decision. In other words, the assets allocated to any group can be changed at any time. However, the current asset allocation has been used for many years to develop the employer contribution in the annual actuarial valuation. This tracking could be used through the transfer date to determine the value of the assets to be transferred. We believe either method is reasonable. There may be other reasonable methods as well. By using the assets that have been administratively allocated to the transferring group, the funded status of the remaining groups (based on the assets administratively allocated to them) should be relatively unaffected.

Computation of Funded Status

If the amount of the asset transfer is based on the administratively allocated assets, the determination of the funded status becomes less important. However, if the amount of the asset transfer is based on the funded status, then how it is calculated is critical. There are two main approaches that we have seen (both are based on the market value of assets):

- 1) Determine overall plan funded status.
- 2) Determine the categorized funded status.

The overall funded status is the total market value of assets divided by the total plan liabilities. When using the method to determine the asset transfer, the total plan funded status is generally maintained. However, if the ratio of actives to retirees of the transferring group differs from the remaining group, the categorized funded status could change.

Additional Information – PA 202

To determine the categorized funded status, liabilities are ordered and assets are applied to that order. The first assets generally go to member contributions. Next, assets are allocated to liabilities for participants in pay status. Finally, assets are allocated to actives and inactive. The concept is that members fund their contributions and the funding for participants in pay status should have occurred in the past, leaving any unfunded amounts to be associated with current active members. Using this approach, a funded status for each category is determined and an asset transfer for each category is determined. This method then preserves the categorized funded status after the transfer.

To assist the Board with their evaluation, we have projected plan liabilities to May 31, 2019 and June 30, 2019 using roll-forward techniques. The projections are performed on the valuation assumed discount rate and a “risk free” rate. In addition, we have also added a chart showing the categorized funded status.

Additional Information

Actuarial Accrued Liabilities** (7.25% Assumed Rate of Return)

Roll-Forward Date	General	Fire	Police	Total
12/31/2018	\$23,164,343	\$10,073,643	\$5,644,291	\$38,882,277
5/31/2019	\$23,113,499	\$10,098,912	\$5,710,076	\$38,922,487
6/30/2019	\$23,100,650	\$10,102,969	\$5,722,859	\$38,926,478

Actuarial Accrued Liabilities** (3.71% Assumed Rate of Return*)

Roll-Forward Date	General	Fire	Police	Total
12/31/2018	\$32,360,365	\$14,393,519	\$8,110,502	\$54,864,386
5/31/2019	\$32,173,337	\$14,426,795	\$8,201,077	\$54,801,209
6/30/2019	\$32,134,667	\$14,433,102	\$8,219,127	\$54,786,896

* Fixed-income municipal bonds with 20 years to maturity that include only federally tax-exempt municipal bonds as reported in Fidelity Index's "20-Year Municipal GO AA Index" as of December 31, 2018. In describing this index, Fidelity notes that the municipal curves are constructed using option-adjusted analytics of a diverse population of over 10,000 tax-exempt securities.

** Includes contingency reserve.

Additional Information – Categorical Funded Status

By ordering the liabilities and then applying the assets in that order, any unfunded amounts are attributable to the final category (or final two categories). For Owosso, we have set the order as follows:

- Category 1: Member contributions
- Category 2: Liability for participants in pay status
- Category 3: All other liabilities

Because we are evaluating a spin-off termination, we are showing this schedule using the Market Value of Assets. If we were using this analysis to trend funding progress, use of the Actuarial Value of Assets would be appropriate.

As of December 31, 2018 (Excluding Contingency Reserve)

Assumed Rate of Investment Return	(1) Member Contributions	(2)	(3)	Present Market Value of Valuation Assets	(1)	Portion of Present Values Covered by Present Assets		Total
		Accrued Liability for Current Retirees and Beneficiaries*	Accrued Liability for Current Active and Inactive Members			(2)	(3)	
-----\$ Thousands-----								
7.25%	\$ 2,338	\$ 29,294	\$ 6,485	\$ 31,523	100.0%	99.6%	0.0%	82.7%
3.71%	2,338	39,478	13,048	31,523	100.0%	73.9%	0.0%	57.5%

* Excludes contingency reserves