

City of Monroe
Employees Retirement System
Seventy-Fourth Annual Actuarial Valuation
December 31, 2018



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May 23, 2019

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

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

Dear Board Members:

The results of the December 31, 2018 Annual Actuarial Valuation of the City of Monroe 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 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.

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 starting on page E-1 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 December 31, 2018. The valuation was based upon information furnished by the City, concerning Retirement System benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal reasonability and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by the City.

This report was prepared using assumptions adopted by the Board. All actuarial assumptions used in this report are reasonable for the purposes of this valuation. Additional information about the actuarial assumptions is included in the section of this report entitled Actuarial Cost Methods and Assumptions.

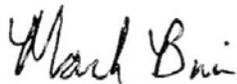
This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. To the best of our knowledge the information contained in this report is accurate and fairly presents the actuarial position of the City of Monroe Employees Retirement System as of the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

Mark Buis and Shana M. Neeson 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,



Mark Buis, FSA, EA, FCA, MAAA



Shana M. Neeson, ASA, FCA, MAAA

MB/SMN:sc



SECTION A

VALUATION RESULTS, COMMENTS, RECOMMENDATIONS AND CONCLUSION

Funding Objective

The funding objective of the Retirement System is to establish and receive contributions, expressed as percents of active member payroll, which will remain approximately level from year to year and will not result in intergenerational cost transfers. This objective is stated in the Retirement System Ordinance and meets the requirements of the Constitution of the State of Michigan.

Contribution Rates

The Retirement System is supported by member contributions, City contributions and investment return 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 costs 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 costs not covered by present assets and anticipated future normal costs (unfunded actuarial accrued liability).

The **Computed Contribution** for the fiscal year beginning July 1, 2020 is shown on page A-2.

City's Computed Contributions Member Portion and Employer Portion

Contributions for Fiscal Year Beginning July 1	% of Active Payroll	
	2020	2019
Normal Cost of Benefits:		
Service Retirement	12.82 %	12.93 %
Disability	0.70 %	0.72 %
Death-in-Service	0.45 %	0.45 %
Refund of Member Contributions	0.33 %	0.33 %
Totals	14.30 %	14.43 %
Member Contributions (Average)	4.42 %	4.46 %
Employer Normal Cost	9.88 %	9.97 %
Unfunded Actuarial Accrued Liabilities*	10.44 %	8.25 %
Computed Employer Rate	20.32 %	18.22 %
Estimated Dollar Contribution	\$2,211,479	\$2,010,912

* The Unfunded Accrued Liability is amortized over a period of 21 years in 2020 and 22 years in 2019.

These amounts are for pension contributions only. Effective 1/1/2000, the Board decided that a minimum contribution rate of 4% would be contributed to the Post-Retirement Health Care Fund.

All members of the Retirement System except police officers and firefighters are covered by Social Security. Social Security taxes are not included in the above amounts.

City's Computed Contributions

Determining Dollar Contributions

For any period of time, the percent-of-payroll contribution rate needs to be converted to dollar amounts. We recommend one of the following procedures.

- (1) Contribute a dollar amount at the end of each payroll period which is equal to the City's percent-of-payroll contribution requirement multiplied by the covered active member payroll for the period. Adjustments should be made as necessary to exclude items of pay that are not covered compensation for Retirement System benefits and to include non-payroll payments that are covered compensation.
- (2) Contribute \$2,211,479.

This dollar amount is derived by multiplying the City's percent-of-payroll contribution requirement by the projected valuation payroll for the fiscal year beginning July 1, 2020. The projected valuation payroll reflects the pay increase assumptions described on page C-7.

The above amounts (Methods 1 and 2) are assumed to be contributed, on average, halfway through the fiscal year. If contributions are made on a later schedule, interest should be added at the rate of 0.61250% ($=0.0735 \div 12$) for each month of delay.

City's Computed Contributions - Comparative Schedule

Fiscal Year	Valuation Date	As Percents of Valuation Payroll						Valuation Payroll	Employer Contribution	
		General	Police and Fire	Water Dept.	Sewage Disposal	Hybrid	Total		Computed	Actual
		Members	Members	Members	Members	Members				
1990-91	1989	4.20 % (1,4)	13.43 % (1,4)	13.00 % (1,4)	9.35 % (1,4)		\$ 7,787,845	\$ 791,566	\$ 791,566	
1991-92	1990 (2)	5.48 % (4)	9.24 %	10.64 %	7.78 % (4)		9,106,876	737,022	737,021	
1992-93	1991	5.00 % (4,5)	5.45 % (4)	11.11 %	6.03 % (4)		8,817,472	551,961	551,961	
1993-94	1992	5.00 % (4,5)	5.00 % (4,5)	10.45 %	6.61 % (4)		9,354,039	565,293	565,293	
1993-94	1992 (2)	5.00 %	5.00 %	9.36 %	5.40 %		9,354,039	536,817	565,293	
1994-95	1993	5.00 %	5.00 %	7.13 %	5.00 %		9,190,716	462,980	520,675	
1994-95	1993 (1)	5.00 % (4,5)	5.00 % (4,5)	7.55 %	5.00 % (4,5)		9,190,716	520,675	520,675	
1995-96	1994	4.00 % (4,5)	4.00 % (4,5)	5.07 %	4.00 % (4,5)		9,651,905	425,850	425,850	
1996-97	1995 (1)	4.00 % (4,5)	4.00 % (4,5)	4.00 % (4,5)	4.00 % (4,5)		9,978,002	417,297	417,297	
1997-98	1996	4.00 % (4,5)	4.00 % (4,5)	4.00 % (4,5)	4.00 % (4,5)		10,172,609	317,709	317,709	
1998-99	1997 (1)	4.00 % (4,5)	4.00 % (4,5)	4.00 % (4,5)	4.00 % (4,5)	4.00 % (4,5)	10,529,011	440,112	547,316	
1999-00	1998 (1)	4.00 % (4,5)	4.00 % (4,5)			4.00 % (4,5)	10,584,002	442,412	426,131	
2000-01	1999 (1)	0.00 % (4,5)	0.00 % (4,5)			0.32 % (4,5)	10,474,156	3,790	11,596	
2001-02	2000 (1)	0.00 % (4,5)	0.00 % (4,5)			3.61 % (4,5)	11,856,866	67,664	0	
2002-03	2001 (1)	0.00 % (4,5)	0.00 % (4,5)			0.00 % (4,5)	11,906,969	0	0	
2003-04	2002 (1,2)	0.00 % (4,5)	0.00 % (4,5)			0.00 % (4,5)	12,514,944	0	0	
2004-05	2003	0.00 % (4,5)	0.00 % (4,5)			0.00 % (4,5)	12,572,732	0	0	
2005-06	2004	0.00 % (4,5)	8.28 % (4,5)			0.00 % (4,5)	13,015,919	479,028	479,028	
2006-07	2004 (1)	0.00 % (4,5)	8.28 % (4,5)			0.00 % (4,5)	13,232,960	487,016	487,368	
2007-08	2005 (1)	0.00 % (4,5)	21.31 % (4,5)			5.21 % (5)	13,232,960	1,444,879	1,444,880	
2008-09	2006	0.00 % (4,5)	20.95 % (5)			5.07 % (5)	13,007,162	1,439,268	1,439,269	
2009-10	2007	0.00 % (4,5)	20.92 % (5)			4.80 % (5)	13,371,922	1,483,539	1,483,539	
2010-11	2008 (2)	0.00 % (4,5)	20.49 % (1,5)			2.74 % (5)	11,289,204	1,191,553	1,191,553	
2011-12	2009 (2)	0.00 % (4,5)	22.67 % (5)			3.48 % (5)	11,061,644	1,274,568	1,274,568	
2012-13	2010	0.00 % (4,5)	25.04 % (5)			3.83 % (5)	10,758,097	1,351,541	1,351,541	
2013-14	2011	0.00 % (4,5)	36.24 % (5)			3.87 % (5)	9,636,542	1,488,154	1,488,054	
2014-15	2012	0.00 % (4,5)	38.86 % (5)			4.12 % (5)	9,543,247	1,622,379	1,622,379	
2015-16	2013	0.00 % (4,5)	40.36 % (5)			4.07 % (5)	9,524,423	1,695,874	1,695,874	
2016-17	2014	0.00 % (4,5)	45.25 % (5)			4.06 % (5)	9,207,491	1,845,799	1,845,799	
2017-18	2015	0.00 % (4,5)	40.87 % (5)			3.50 % (5)	9,469,543	1,830,651	1,830,651	
2018-19	2016 (2,6)						18.09 % (5)	9,204,828	1,803,719	1,803,719 #
2019-20	2017 (2,6)						18.22 % (5)	10,187,413	2,010,912	
2020-21	2018 (1,2,6)						20.32 % (5)	10,045,660	2,211,479	

(1) After Retirement System amendments.

(2) After assumptions revised.

Scheduled contributions for the fiscal year.

(4) Reflects Temporary (Credit)/Charge.

(5) Minimum Contribution Rate per Board Resolution.

(6) Reflects combining divisions per Board Resolution.

Present Value of Future Benefits and Accrued Liabilities

	December 31,	
	2018	2017
A. Accrued Liability		
1. For retirees and beneficiaries	\$120,646,302	\$114,775,602
2. For vested terminated members	1,477,841	1,490,590
3. For present active members		
a. Value of expected future benefit payments	43,747,431	45,703,311
b. Value of future normal costs	11,050,734	11,104,369
c. Active member accrued liability: (a) - (b)	32,696,697	34,598,942
4. Total accrued liability	154,820,840	150,865,134
B. Present Assets (Funding Value)	139,164,142	137,818,983
C. Unfunded Accrued Liability: (A.4) - (B)	15,656,698	13,046,151
D. Funding Ratio: (B) / (A.4)	89.9%	91.4%
E. Funded Ratio - Market Value Basis	83.4%	94.8%

Development of Funding Value of Assets

Year Ended December 31	2016	2017	2018	2019	2020	2021	2022	2023	2024
A. Funding Value Beginning of Year	\$133,736,887	\$135,199,905	\$137,818,983						
B. Market Value End of Year	129,962,228	143,065,771	129,131,976						
C. Market Value Beginning of Year	129,753,467	129,962,228	143,065,771						
D. Non-Investment Net Cash Flow	(7,582,477)	(7,493,745)	(7,870,371)						
E. Investment Income									
E1. Market Total: B-C-D	7,791,238	20,597,288	(6,063,424)						
E2. Assumed Rate of Investment Return	7.50%	7.45%	7.40%						
E3. Amount for Immediate Recognition	9,745,924	9,793,251	9,907,401						
E4. Amount for Phased-In Recognition: E1-E3	(1,954,686)	10,804,037	(15,970,825)						
F. Phased-In Recog. of Investment Return									
F1. Current Year: (1/7) x E4	(279,241)	1,543,434	(2,281,546)						
F2. First Prior Year	(1,275,929)	(279,241)	1,543,434	\$ (2,281,546)					
F3. Second Prior Year	(314,380)	(1,275,929)	(279,241)	1,543,434	\$ (2,281,546)				
F4. Third Prior Year	1,513,456	(314,380)	(1,275,929)	(279,241)	1,543,434	\$ (2,281,546)			
F5. Fourth Prior Year	402,333	1,513,456	(314,380)	(1,275,929)	(279,241)	1,543,434	\$ (2,281,546)		
F6. Fifth Prior Year	(1,270,098)	402,333	1,513,456	(314,380)	(1,275,929)	(279,241)	1,543,434	\$ (2,281,546)	
F7. Sixth Prior Year	523,430	(1,270,101)	402,335	1,513,458	(314,381)	(1,275,932)	(279,240)	1,543,433	\$ (2,281,549)
F8. Total Recognized Investment Gain	(700,429)	319,572	(691,871)	(1,094,204)	(2,607,663)	(2,293,285)	(1,017,352)	(738,113)	(2,281,549)
G. Funding Value End of Year A+D+E3+F8	135,199,905	137,818,983	139,164,142						
H. Difference between Market & Funding Value	(5,237,677)	5,246,788	(10,032,166)	(8,937,962)	(6,330,299)	(4,037,014)	(3,019,662)	(2,281,549)	0
I. Recognized Rate of Return	7.0%	7.7%	6.9%						
J. Market Rate of Return	6.2%	16.3%	(4.4)%						

The Funding Value of Assets recognizes assumed investment return (line E3) fully each year. Differences between actual and assumed investment return (line E4) are phased-in over a closed 7-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 assumed rates are exactly realized for 6 consecutive years, it will become equal to Market Value.

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

The actuarial gains or losses realized in the operation of the Retirement System provide an experience test. Gains and losses are expected to cancel each other over a period of years but sizable year to year fluctuations are common. Detail on the derivation of the actuarial gain (loss) is shown below, along with a year-by-year comparative schedule.

(1)	UAAL* at end of prior year	\$13,046,151
(2)	Total normal cost	1,449,589
(3)	Actual contributions	2,275,067
(4)	Interest accrual	935,418
(5)	Expected UAAL before changes	13,156,091
(6)	Change from Retirement System amendments and/or revised actuarial assumptions/methods	373,511
(7)	Expected UAAL after changes	13,529,602
(8)	Actual UAAL at end of year	15,656,698
(9)	Gain (loss) (7) - (8)	(2,127,096)
(10)	Gain (loss) as percent of actuarial accrued liabilities at start of year (\$150,865,134)	(1.4)%

* *Unfunded Actuarial Accrued Liability.*

Valuation Date December 31	Actuarial Gain (Loss) as % of Beginning Accrued Liability
2009	(2.9)%
2010	(3.0)%
2011	(4.8)%
2012	(2.6)%
2013	(1.6)%
2014	(3.2)%
2015	1.6%
2016	(0.5)%
2017	(0.1)%
2018	(1.4)%

Comments, Recommendations, Conclusions, and Disclosures

December 31, 2018

Comment A: The plan is approximately 89.9% funded on a system-wide basis. Total contribution requirements increased primarily due to the change in investment return assumption (described in Comment D) as well as poor investment performance and fewer retiree deaths than expected. This increase was partially offset by the change in General and Hybrid groups' definition of FAC. Shown below are the contribution requirements from last year's valuation compared to this year's valuation.

Employer Contribution for			
Fiscal Year Beginning			
<u>July 1, 2019</u>		<u>July 1, 2020</u>	
\$	2,010,912	\$	2,211,479

Comment B: On a market value basis, investment results were less favorable than expected, with approximately a negative 4.4% rate of return (see page A-6). However, under the asset valuation method, investment gains and losses are spread over a 7-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 rate of return of 6.9%, leading to an overall asset loss on the actuarial value of assets. The overall experience gain (loss) this year (including liability gains and losses) was \$(2,127,096) (see page A-7).

Comment C: As of this valuation, the Funding Value of assets exceeds the Market Value by \$10.0 million. This means that currently there is \$10.0 million in investment losses yet to be recognized. The deferred losses will be phased-in over the next six years and amortized. If the Market Value had been used this year, the funded status would be about 83.4% instead of 89.9%.

Comment D: The investment return assumption was lowered from 7.40% to 7.35% (this assumption will be lowered by 5 basis points in each of the next two valuations until it reaches 7.25%). This actuarial assumption was updated following the preparation of a review of System experience dated July 26, 2016.

Comment E: Michigan Public Act 202 of 2017 created new reporting and other requirements for local units of government. As such, we will work with the City of Monroe to facilitate compliance. GRS plans to provide the City of Monroe the necessary Public Act 202 uniform assumption information as part of the GASB 67/68 report or as part of a separate supplemental report at a later date.

Comments, Recommendations, Conclusions, and Disclosures

December 31, 2018

Recommendation: The actuary recommends that transfers be made from the reserve for employer contributions to the reserve for retired benefit payments, as shown below:

Reserve for Employer Contributions		
Balance Before Transfer	Amounts Transferred to Reserve for Retired Benefit Payments	Balance After Transfer
\$2,835,842	\$ 3,275,818	(439,976)

The computed employer contribution rate developed in this report assumes that this transfer has been made.

The table above shows the appropriate beginning reserve for employer contributions at 1/1/2019.

Conclusion: The Retirement System continues to operate in accordance with the actuarial principles of level percent of payroll financing.

Disclosure 1: 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 7.35% on the actuarial value of assets), then the following outcomes are expected:

1. The employer normal cost as a percentage of pay is expected to remain level as a percentage of payroll.
2. The unfunded liability is expected to be paid off in approximately 21 years, which is the number of years remaining in the closed amortization schedule of the unfunded liability.
3. The funded status of the Plan is expected to reach a 100% funded ratio in approximately 21 years, which is the number of years remaining in the closed amortization schedule of the unfunded liability.

Disclosure 2: 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.

Actuarial Balance Sheet - December 31, 2018

(\$ amounts in thousands)

Present Resources and Expected Future Resources

	Total
A. Actuarial value of system assets	
1. Net assets from system financial statements	\$129,131,976
2. Market value adjustment	10,032,166
3. Actuarial value of assets	139,164,142
B. Actuarial present value of expected future employer contributions	
1. For normal costs	7,331,408
2. For unfunded actuarial accrued liabilities	15,656,698
3. Total	22,988,106
C. Actuarial present value of expected future member contributions	3,719,326
D. Total Present and Expected Future Resources	\$165,871,574

Actuarial Present Value of Expected Future Benefit Payments and Reserves

A. To retirants and beneficiaries	\$120,646,302
B. To vested terminated members	1,477,841
C. To present active members	
1. Allocated to service rendered prior to valuation date	32,696,697
2. Allocated to service likely to be rendered after valuation date	11,050,734
3. Total	43,747,431
D. Total Actuarial Present Value of Expected Future Benefit payments	165,871,574
E. Total Actuarial Present Value of Expected Future Payments and Reserves	\$165,871,574

20-Year Projection of Benefit Payments

Year	Projected Benefit Payment
2019	\$ 10,497,475
2020	10,810,515
2021	11,089,999
2022	11,322,203
2023	11,558,601
2024	11,834,988
2025	12,151,851
2026	12,485,606
2027	12,796,688
2028	13,060,484
2029	13,285,729
2030	13,481,128
2031	13,667,580
2032	13,800,764
2033	13,922,926
2034	13,998,248
2035	14,035,421
2036	14,043,729
2037	14,025,571
2038	13,995,551

SECTION B

SUMMARY OF BENEFIT PROVISIONS AND VALUATION DATA

Brief Summary* of Non-Hybrid Benefit Provisions December 31, 2018

REGULAR RETIREMENT (no reduction factor for age): The eligibility conditions and benefit factors for regular retirement are shown on page B-5.

EARLY RETIREMENT

Eligibility - Teamsters Local 214 and COMEA Unit I and II: Age 50 with 10 or more years of service.

Annual Amount - Actuarial equivalent of the accrued Regular Retirement benefit.

DEFERRED RETIREMENT (vested benefit):

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

Annual Amount - Computed as a regular benefit 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. If a retirant is paid a worker's compensation benefit which is more than the difference between the retirant's final average compensation and the amount of retirement allowance computed the amount of the retirement allowance shall be reduced to the amount which is the difference between final average compensation and the worker's compensation benefit. The reduction shall continue for the worker's compensation period. Upon termination of worker's compensation or attainment of age 65, whichever occurs first, additional service credit is granted and the benefit is recomputed.

NON-DUTY DISABILITY RETIREMENT:

Eligibility - 10 or more years of service.

Annual Amount - Computed as a regular retirement.

DUTY DEATH BEFORE RETIREMENT:

Eligibility - No age or service requirements.

Annual Amount - Refund of member contributions paid at time of death. A benefit equal to the worker's compensation benefit is paid beginning at the end of the worker's compensation period. Payments to spouse terminate upon remarriage or death.

* In case of disagreement between this summary and either City ordinance or labor agreements, the latter supersedes.

Brief Summary* of Non-Hybrid Benefit Provisions December 31, 2018

NON-DUTY DEATH BEFORE RETIREMENT:

Eligibility - 10 years of service.

Annual Amount - Computed according to the regular retirement formula but actuarially reduced in accordance with Joint and 100% Survivor option.

MEMBER CONTRIBUTIONS: Vary by employment unit as shown on page B-5.

ANNUITY WITHDRAWAL: Annuity withdrawal is not available to persons hired January 1, 1989 and later. Members of the police and fire units of the City may withdraw their accumulated contributions at the time of retirement. The retirement allowances of such members will be reduced in accordance with the interest and mortality assumptions (50% Unisex Mix) used in calculating option factors as of December 31, preceding the date of retirement.

OPTIONAL FORMS OF BENEFIT PAYMENT:

Option A - Straight life retirement allowance

Option B - 100% survivor allowance

Option C - 50% survivor allowance

Option D 120 - 120 months certain and life

Option D 180 - 180 months certain and life

Option E - Members electing early retirement may choose to have the formula amount payable to age 62 (if possible) and a reduced amount thereafter. Option E cannot be elected in conjunction with another option, and does not provide a survivor benefit.

Social Security Coordination - Members covered by Social Security may elect to receive their benefit paid in a form that pays more initially but reduces at age 65 by the amount of the estimated Social Security P.I.A.

Benefit amounts under these optional forms of payment are calculated using a unisex mortality table consisting of 90% male mortality rates and 10% female rates.

** In case of disagreement between this summary and either City ordinance or labor agreements, the latter supersedes.*

Brief Summary* of Hybrid Benefit Provisions (That Became Effective May 1, 1997) December 31, 2018

REGULAR RETIREMENT (no reduction for age):

Eligibility - Age 60 with 10 or more years of service or age 62 with 3 or more years of service.

Benefits -

- (1) *Monthly Benefit Option* equal to the greater of (a) and (b):
 - (a) 1.5% times Final Average Compensation (FAC) times service, plus Cost-of-Living Adjustment (COLA).
 - (b) Annuitized Value of 2.0 times member contributions with interest plus COLA.
- (2) *Lump Sum Option* equal to 1.5 times member contributions with interest.

EARLY RETIREMENT:

Eligibility - Age 55 with 15 or more years of service.

Benefits -

- (1) *Monthly Benefit Option* equal to the annuitized value of 1.5 times member contributions with interest plus COLA.

DEFERRED RETIREMENT (vested benefit):

Eligibility - 3 or more years of service. No age requirement.

Benefits - *Immediate Option* equal to a lump sum distribution in accordance with the following:

Years of Service	Immediate Lump Sum
Less than 3	1.0 times member contributions with interest
At least 3, but less than 7	1.25 times member contributions with interest
7 or more	1.5 times member contributions with interest

OR

Deferred Option: Member can leave own contributions and the credited interest on them in the plan to earn additional interest until retirement, then elect either the Monthly Benefit Option or the Lump Sum Option described under Regular Retirement.

* In case of disagreement between this summary and either City ordinance or labor agreements, the latter supersedes.

Brief Summary* of Hybrid Benefit Provisions (That Became Effective May 1, 1997) December 31, 2018

DISABILITY RETIREMENT (the same provisions apply to duty and non-duty disabilities):

Eligibility - No age or service requirements.

Benefits - Payable in accordance with the following:

Years of Service	Benefit Payable (includes COLA)
Less than 3	1.0% times FAC times Service
At least 3, but less than 7	1.25% times FAC times Service
7 or more	1.5% times FAC times Service

DEATH BEFORE RETIREMENT:

Eligibility - No age or service requirements.

Benefits - 1.0 times member contribution with interest is payable to the deceased member's beneficiary. In addition, if the member had at least 3 years of service at death, the beneficiary will receive the greater of (a) and (b):

- (a) If monthly worker's compensation benefits were being paid prior to the member's death, the Retirement System will continue to pay the same amount to the beneficiary on a monthly basis.
- (b) A life annuity to the beneficiary of 1.5% times the member's FAC (just prior to death) times service.

Note: The monthly amounts from (a) and (b) include COLAs.

RETIREEES' BURIAL BENEFIT:

Eligibility - The death of a member who is receiving monthly retirement benefits.

Benefits - A one-time cash payment of \$2,500.

SPECIAL NOTES:

COLAs - The percent increase in the CPI up to 2%.

Interest on Member Contributions - The annual rate of return on the market value of the Fund-1%.

* In case of disagreement between this summary and either City ordinance or labor agreements, the latter supersedes.

Benefit Provisions by Unit

December 31, 2018

Unit Name	No.	GRS Code	Eligibility	FAC ⁽¹⁾		Retirement Benefit		Employee Contrib.
				Months In	Lump Sums	PCT	COLA ⁽²⁾	
General Unit I	5	11	55 & 25, 60 & 10 or 65 & 5	36	Y ⁽⁵⁾	2.2%	2% Fixed	4%
General Unit II	1	36	55 & 25, 60 & 10, 65 & 5	36	Y ⁽⁵⁾	2.2%	2% CPI	4%
General Teamsters	4	19	60 & 10, 65 & 5, 80 pts	48	Y ⁽⁵⁾	2.2%	2% Fixed	5%
Water Unit I	2	14	55 & 25, 60 & 10 or 65 & 5	36	Y ⁽⁵⁾	2.2%	2% Fixed	4%
Water Unit II	1	37	55 & 25, 60 & 10, 65 & 5	36	Y ⁽⁵⁾	2.2%	2% CPI	4%
Water Teamsters	4	15	60 & 10, 65 & 5, 80 pts	48	Y ⁽⁵⁾	2.2%	2% Fixed	5%
Sewage Unit 1	3	17	55 & 25, 60 & 10 or 65 & 5	36	Y ⁽⁵⁾	2.2%	2% Fixed	4%
Sewage Unit II	1	38	55 & 25, 60 & 10, 65 & 5	36	Y ⁽⁵⁾	2.2%	2% CPI	4%
Sewage Teamsters	2	16	60 & 10, 65 & 5, 80 pts	48	Y ⁽⁵⁾	2.2%	2% Fixed	5%
Police Patrol	10	22	50 & 25, 55 & 10, or 60 & 5	36	Y ⁽⁴⁾	2.65% (80% cap)	3% CPI	5.5%
Police Patrol (Hired on or After 7/1/2008)	22	22	55 & 10, or 60 & 5	36	N	2.0%/2.25% ⁽⁶⁾ (80% cap)	2% CPI	5.5%
Police Command	7	23	50 & 25, 55 & 10, or 60 & 5	36	Y ⁽³⁾	2.65% (80% cap)	3% CPI	5.5%
Police Command (Hired on or After 7/1/2008)	0	23	55 & 10, or 60 & 5	36	N	2.0%/2.25% ⁽⁶⁾ (80% cap)	2% CPI	5.5%
Fire	9	33	50 & 25, 55 & 10, or 60 & 5	36	Y ⁽³⁾	2.65% (80% cap)	3% CPI	5.5%
Fire (Hired on or After 7/1/2008)	8	33	55 & 10, or 60 & 5	36	N	2.0%/2.25% ⁽⁶⁾ (80% cap)	2% CPI	5.5%
Appointed/Confidential	4	35	55 & 15, 60 & 10, 65 & 5	36	Y ⁽⁵⁾	2.2%	2% Fixed	2%
Elected	0	34	55 & 25, 60 & 10, 65 & 5	36	Y ⁽⁵⁾	2.2%	No	2%
Appointed/Elected Hybrid	14	50+	60 & 10 or 62 & 3	36	Y ⁽⁵⁾	1.5%	2% CPI	2%
Hybrid	73	50+	60 & 10 or 62 & 3	36	Y ⁽⁵⁾	1.5%	2% CPI	4%
Total Active Members	170							

⁽¹⁾ Final Average Compensation. The benefit multiplier times FAC times credited service is the amount of retirement allowance payable. For Police and Fire members hired prior to 7/1/2008, FAC is frozen at 30.2 years of service. For Police and Fire members hired on or after 7/1/2008, FAC is frozen at 37.2 years of service.

⁽²⁾ Cost-of-Living Adjustments (COLAs) apply beginning on the anniversary of retirement following 12 months of receiving benefits. COLAs are either fixed at the stated rate or equal to the lesser of the stated rate and the annual increase in the CPI-U for the preceding calendar year. COLAs are not compounded each year.

⁽³⁾ Police Command and Fire receive three years Sick Pay Bonus included in FAC due to an Arbitration Award which was effective 7/1/1998. However, they do not have vacation pay-off included in FAC. Effective 1/1/2012, FAC for Police Command and Fire will not include more than 200 hours per year of overtime.

⁽⁴⁾ Effective 7/1/2009, Police Patrol will receive three years Sick Pay Bonus included in FAC, for members hired prior to 7/1/2008. However, they do not have vacation pay included in FAC. Effective 8/15/2011, FAC for Police will not include more than 200 hours per year of overtime.

⁽⁵⁾ All service on and after 12/31/2014, the computation of FAC shall not include overtime, payoffs for unused vacation benefits in excess of 240 hours or any other payments not expressly referenced in the respective collective bargaining agreements.

⁽⁶⁾ The pension multiplier for employees hired on or after 7/1/2008 will be 2.0% of the employee's FAC for the first 15 years of service, and 2.25% for each year thereafter.

Sample Benefit Computations for *GENERAL* Member Retiring December 31, 2018

Data:

A.	<u>\$45,000</u>	Final Average Compensation
B.	<u>32</u>	Years of Credited Service
C.	<u>60</u>	Age of Retirant
D.	<u>55</u>	Age of Spouse
E.	<u>100%</u>	Percentage of Pension to Continue to Spouse after retirant's death (Retirant makes this choice)

Computations:

	Annual Amount
F. Formula Benefit: $0.022 \times 32 \text{ yrs.} \times \$45,000 =$	\$31,680
G. Reduction for Line E Election $(1-0.84909)^* \times (F) =$	<u>4,781</u>
H. Benefit Payable to Retirant while Spouse is Alive: F-G	\$26,899
I. Benefit Payable to Spouse after Retirant's Death	\$26,899
J. Benefit Payable to Retirant after Spouse's Death	\$26,899

Projected Benefits:

Year Ended December 31	Retirant's Benefit (Retirant & Spouse Alive)	Spouse's Benefit (After Retirant's Death)	Retirant's Benefit (After Spouse's Death)
2019	\$26,899	\$26,899	\$26,899
2020	27,437	27,437	27,437
2021	27,975	27,975	27,975
2022	28,513	28,513	28,513
2023	29,051	29,051	29,051
2024	29,589	29,589	29,589
2025	30,127	30,127	30,127
2026	30,665	30,665	30,665
2027	31,203	31,203	31,203
2028	31,741	31,741	31,741

* Factors effective January 1, 2011.

In each succeeding year the amount increases by \$538 (amount may vary if CPI applies).

The benefits of elected members do not increase.

Sample Benefit Computations for *POLICE* Member Retiring December 31, 2018 (and hired before July 1, 2008)

Data:

A.	<u>\$45,000</u>	Final Average Compensation (FAC)
B.	<u>30.2</u>	Years of Credited Service
C.	<u>55</u>	Age of Retirant
D.	<u>50</u>	Age of Spouse
E.	<u>25,000</u>	Annuity Withdrawal at Retirement (available if hired before 1989)
F.	<u>100%</u>	Percentage of Pension to Continue to Spouse after retirant's death (Retirant makes this choice)

Computations:

	Annual Amount
G. Formula Benefit: $(0.0265 \times 30.2 \text{ yrs.}) \times \$45,000 =$ (Benefit is capped at 80% of FAC)	\$36,000
H. Reduction for Annuity Withdrawal: $0.00736^* \times 12 \times 25,000 =$	2,208
I. Reduction for Line F Election $(1-0.88472)^* \times (G-H)$	<u>3,896</u>
J. Benefit Payable to Retirant while Spouse is Alive: G-H-I	\$29,896
K. Benefit Payable to Spouse after Retirant's Death	\$29,896
L. Benefit Payable to Retirant after Spouse's Death	\$29,896

Projected Benefits:

Year Ended December 31	Retirant's Benefit (Retirant & Spouse Alive)	Spouse's Benefit (After Retirant's Death)	Retirant's Benefit (After Spouse's Death)
2019	\$29,896	\$29,896	\$29,896
2020	30,793	30,793	30,793
2021	31,690	31,690	31,690
2022	32,587	32,587	32,587
2023	33,484	33,484	33,484
2024	34,381	34,381	34,381
2025	35,278	35,278	35,278
2026	36,175	36,175	36,175
2027	37,072	37,072	37,072
2028	37,969	37,969	37,969

* Factors effective January 1, 2011.

In each succeeding year, the amount payable increases by \$897 (amount may vary if CPI applies).

Sample Benefit Computations for *FIRE* Member Retiring December 31, 2018 (and hired before July 1, 2008)

Data:

A.	<u>\$45,000</u>	Final Average Compensation (FAC)
B.	<u>30.2</u>	Years of Credited Service
C.	<u>55</u>	Age of Retirant
D.	<u>50</u>	Age of Spouse
E.	<u>25,000</u>	Annuity Withdrawal at Retirement (available if hired before 1989)
F.	<u>100%</u>	Percentage of Pension to Continue to Spouse after retirant's death (Retirant makes this choice)

Computations:

	Annual Amount
G. Formula Benefit: $(0.0265 \times 30.2 \text{ yrs.}) \times \$45,000 =$ (Benefit is capped at 80% of FAC)	\$36,000
H. Reduction for Annuity Withdrawal: $0.00736^* \times 12 \times 25,000 =$	2,208
I. Reduction for Line F Election $(1-0.88472)^* \times (G-H)$	<u>3,896</u>
J. Benefit Payable to Retirant while Spouse is Alive: G-H-I	\$29,896
K. Benefit Payable to Spouse after Retirant's Death	\$29,896
L. Benefit Payable to Retirant after Spouse's Death	\$29,896

Projected Benefits:

Year Ended December 31	Retirant's Benefit (Retirant & Spouse Alive)	Spouse's Benefit (After Retirant's Death)	Retirant's Benefit (After Spouse's Death)
2019	\$29,896	\$29,896	\$29,896
2020	30,793	30,793	30,793
2021	31,690	31,690	31,690
2022	32,587	32,587	32,587
2023	33,484	33,484	33,484
2024	34,381	34,381	34,381
2025	35,278	35,278	35,278
2026	36,175	36,175	36,175
2027	37,072	37,072	37,072
2028	37,969	37,969	37,969

* Factors effective January 1, 2011.

In each succeeding year, the amount payable increases by \$897 (amount may vary if CPI applies).

Sample Benefit Computations for *HYBRID* Member Terminating December 31, 2018 (Assumes Continuous Hybrid Coverage from Date of Hire)

Data:

A.	\$28,000	Final Average Compensation
B.	10	Years of Credited Service
C.	35	Age of Member; Spouse's Age = 30
D.	\$11,200	Estimated Accumulated 4% Member Contributions

Hybrid Alternatives:

- A. Take a one-time cash distribution of 1.5 times \$11,200 = \$16,800, at age 35. (Plan will not owe Member any other benefits.)
- B. Leave \$11,200 in Plan until age 60:
Assume the Accumulated Member Contributions are credited with 6.35% return each year: the \$11,200 grows to \$52,198.

Choice B1: **Cash option** of 1.5 times \$52,198 = \$78,297
No further benefits are payable

Choice B2: **Annual pension benefit** = the greater of
(a) 1.5% x 10 years x \$28,000 = \$4,200 OR
(b) 2 x \$52,198 / 12.2104# = \$8,550

plus Cost-of-Living Adjustment* (COLA) each July 1 after one year of retirement.

Assume Member elects B2 under the Joint & 100% Survivor form of benefit and COLA rate = 2% each year:

$$\$8,550 \times 0.84909 = \$7,260$$

* COLA rate = lesser of 2% or the rate of change in the CPI in the prior calendar year; COLA rate is applied to benefit paid the prior July 1.

Factors effective January 1, 2011.

Projected Benefits:

Year Ended December 31	Retirant's Benefit (Retirant & Spouse Alive)	Spouse's Benefit (After Retirant's Death)	Retirant's Benefit (After Spouse's Death)
2044	\$7,260	\$7,260	\$7,260
2045	7,405	7,405	7,405
2046	7,550	7,550	7,550
2047	7,695	7,695	7,695
2048	7,840	7,840	7,840

In each succeeding year, the amount payable increases (in this illustration) by \$145 (amount may vary if CPI applies).

Sample Benefit Computations for *HYBRID* Member Retiring December 31, 2018 (Assumes Continuous Hybrid Coverage from Date of Hire)

Data:

- A. \$45,000 Final Average Compensation
- B. 32 Years of Credited Service
- C. 60 Age of Member; Spouse's Age = 55
- D. \$57,600 Estimated Accumulated 4% Member Contributions

Hybrid Alternatives:

- A. Take a one-time **cash distribution** of 1.5 times \$57,600 = \$86,400, at age 60. (Plan will not owe Member any other benefits.)
- B. Elect a **annual pension benefit** = the greater of
 - (a) 1.5% x 32 years x \$45,000 = \$21,600 OR
 - (b) 2 x \$57,600 / 12.2104# = \$9,435
 plus Cost-of-Living Adjustment* (COLA) each July 1 after one year of retirement.

Assume Member elects B under the Joint & 100% Survivor form of benefit and COLA rate = 2% each year:

$$\$21,600 \times .84909 = \$18,340$$

* COLA rate = lesser of 2% or the rate of change in the CPI in the prior calendar year; COLA rate is applied to benefit paid the prior July 1.

Factors effective January 1, 2011.

Projected Benefits:

Year Ended December 31	Retirant's Benefit (Retirant & Spouse Alive)	Spouse's Benefit (After Retirant's Death)	Retirant's Benefit (After Spouse's Death)
2019	\$18,340	\$18,340	\$18,340
2020	18,707	18,707	18,707
2021	19,074	19,074	19,074
2022	19,441	19,441	19,441

In each succeeding year, the amount payable increases (in this illustration) by \$367 (amount may vary if CPI applies).

Summary of Reported Assets as of December 31, 2018

The ledger balances of the Retirement System as of December 31, 2018 were reported to the actuary to total \$129,131,976, as follows:

Accounts	December 31, 2018	December 31, 2017
Reserve for Employees' Contributions	\$ 8,925,650	\$ 8,904,777
Reserve for Employer Contributions	2,835,842	20,976,010
Reserve for Retired Members' Benefits	117,370,484	113,184,984
Reserve for DROP Accounts	0	0
Reserve for Market Value Difference	0	0
Market Value of Assets	\$129,131,976	\$143,065,771

Summary of Financial and Actuarial Information

Revenues and Expenditures

	Year Ended December 31	
	2018	2017
REVENUES:		
a. Member contributions	\$ 457,882	\$ 453,053
b. City contributions	1,817,185	1,838,225
c. Investment income		
1. Interest and dividends	1,902,606	2,116,116
2. Gain or (loss) on sales	(7,132,949)	19,255,871
3. Asset appreciation	(27)	2,817
d. Total revenues	(2,955,303)	23,666,082
EXPENDITURES:		
a. Refunds of member contributions	10,750	50,088
b. Annuity withdrawal	0	0
c. Retirement benefits paid	10,134,688	9,734,935
d. Administrative expense/miscellaneous	132,691	93,275
e. Investment expense	700,363	684,241
f. Total expenditures	10,978,492	10,562,539
RESERVE INCREASE:		
Total revenues minus total expenditures	\$(13,933,795)	\$ 13,103,543

Market Value of Assets

	2018	2017
Cash	\$ 0	\$ 1,829
Receivables/Payables	0	(494,939)
Other short-term	3,330,082	3,774,480
Accrued interest and dividends	262,538	301,597
Bonds - government	22,627,932	15,009,476
- corporate	11,453,947	18,212,938
- mortgages and foreign bonds	4,408,235	7,785,703
- other bonds	6,771,956	6,815,123
Stocks - common	15,005,195	31,420,814
- preferred	0	0
- other stocks	49,795,507	44,338,177
Real estate investments	6,093,891	6,158,809
Other assets	9,382,693	9,741,764
Total Market Value of Assets	\$ 129,131,976	\$ 143,065,771
Increase in Assets		
From reserve increase	\$ (13,933,795)	\$ 13,103,543
Unreconciled difference	0	0

In financing the accrued service costs and reserves, the ledger balances of \$129,131,976 and the funding value adjustment were applied as follows:

	Ledger Balances applied to			Total Assets Applied
	Member Accrued Service Costs	Retirant and Beneficiary Benefits	Funding Value Adjustment	
Employees' Contributions	\$8,925,650	\$ 0	\$ 0	\$ 8,925,650
Employer Contributions	(439,976)	3,275,818	10,032,166	12,868,008
Retired Benefit Payments		117,370,484		117,370,484
Totals	\$8,485,674	\$120,646,302	\$10,032,166	\$139,164,142

Retirant and Beneficiary Comparative Schedule

Valuation Date	Annual Allowances						%	Expected Removals [^]		Ratio of No. Active to No. Retired	Annual Allowances as a % of Payroll
	Added		Removed		End of Year			Annual			
	No.	Amount	No.	Amount	No.	Amount		No.	Amount		
December 31							Incr.				
1987	4	\$ 61,683	2	\$ 4,513	109	\$ 755,565	8.2 %	4.3	\$ 13,750	2.4	10.7 %
1988	10	117,976	7	31,939	112	841,602	11.4 %	4.6	16,668	2.4	10.8 %
1989	10	133,485	7	30,728	115	944,359	12.2 %	4.6	18,465	2.2	12.1 %
1990	3	21,060	4	12,468	114	952,951	0.9 %	4.8	20,352	2.4	10.5 %
1991	19	250,460	8	30,706	125	1,172,705	23.1 %	4.6	21,722	2.1	13.3 %
1992	16	297,352	6	12,939	135	1,457,118	24.3 %	4.8	23,836	1.9	15.6 %
1993	10	308,378	7	42,985	138	1,722,511	18.2 %	4.8	24,445	1.9	18.7 %
1994	8	191,304	2	8,191	144	1,905,624	10.6 %	4.7	30,636	1.8	19.7 %
1995	19	350,373	9	114,849	153	2,141,148	12.4 %	4.4	71,016	1.6	22.1 %
1996	13	213,394	10	95,392	156	2,259,150	5.5 %	4.8	79,164	1.6	22.8 %
1997	13	259,745	4	34,781	165	2,484,114	10.0 %	5.1	55,092	1.5	23.6 %
1998	10	167,935	12	203,731	163	2,448,318	(1.4)%	5.1	48,216	1.6	23.1 %
1999	14	359,489	7	87,216	170	2,720,591	11.1 %	5.9	64,332	1.5	26.0 %
2000	8	161,432	5	35,632	173	2,846,392	16.3 %	6.2	71,448	1.5	24.0 %
2001	12	322,924	7	63,269	178	3,106,047	9.1 %	6.6	76,284	1.5	26.1 %
2002	4	103,833	4	23,884	178	3,185,996	2.6 %	7.0	83,736	1.5	25.5 %
2003	14	363,172	8	163,536	184	3,385,632	6.3 %	6.1	72,516	1.3	26.9 %
2004*	20	600,971	10	115,910	194	3,870,693	14.3 %	6.6	87,156	1.2	29.7 %
2005	15	886,100	7	73,162	202	4,683,631	21.0 %	6.6	115,488	1.2	35.4 %
2006	14	323,353	6	77,574	210	4,929,410	5.2 %	6.9	126,447	1.1	37.9 %
2007	10	397,641	10	123,374	210	5,203,677	5.6 %	7.3	142,544	1.1	38.9 %
2008	34	1,438,533	2	38,940	242	6,603,270	26.9 %	8.0	162,084	0.8	58.5 %
2009	9	351,759	8	142,896	243	6,812,133	3.2 %	8.1	167,980	0.8	61.6 %
2010#	10	321,610	4	69,176	249	7,064,567	3.7 %	8.7	180,172	0.7	65.7 %
2011	16	854,874	2	44,768	263	7,874,673	11.5 %	9.4	201,591	0.6	81.7 %
2012	8	390,843	3	51,290	268	8,214,226	4.3 %	10.2	218,184	0.6	86.1 %
2013	7	274,106	8	131,955	267	8,356,377	1.7 %	10.6	235,203	0.6	87.7 %
2014	14	621,502	7	167,007	274	8,810,872	5.4 %	10.9	246,720	0.5	95.7 %
2015	11	425,743	7	108,366	278	9,128,249	3.6 %	11.0	254,883	0.6	96.4 %
2016	15	715,966	10	239,790	283	9,604,425	5.2 %	9.7	240,076	0.6	104.3 %
2017	10	309,054	5	94,143	288	9,819,336	2.2 %	10.5	261,663	0.6	96.4 %
2018	14	590,472	3	101,420	299	10,308,388	5.0 %	11.3	279,643	0.6	102.6 %

* Annual allowances do not include one-time adjustments made to non-COLA retirees after December 31, 2004.

Annual allowances do not reflect the fixed COLA increase applied to eligible retirees, for valuation purposes.

^ Expected removals in the coming year.

Retirants and Beneficiaries December 31, 2018 Tabulated by Type of Allowances Being Paid

Type of Allowances Being Paid	No.	Annual Allowances
<i>Age and Service Allowances</i>		
Option A allowance - benefit terminating at death of retirant	78	\$ 2,759,900
Option B allowance - 100% joint and survivor benefit	85	3,114,472
Option C allowance - 50% joint and survivor benefit	51	2,365,806
Option D 120 - 120 months certain and life or Option D 180 - 180 months certain and life	16	611,125
Allowance to survivor beneficiary of deceased retirant	37	665,647
Total age and service allowances	267	9,516,950
<i>Casualty Allowances</i>		
Duty disability allowance	4	96,329
Non-duty disability allowance	18	463,068
Total Non-duty disability	22	559,397
Allowance to survivor beneficiary of deceased member		
Duty death	0	0
Non-duty death	10	232,041
Total	10	232,041
Total casualty allowances	32	791,438
<i>Total Allowances Being Paid</i>	299	\$10,308,388

Retirants and Beneficiaries December 31, 2018 Tabulated by Age

Ages	Age & Service		Casualty		Totals	
	No.	Annual Allowances	No.	Annual Allowances	No.	Annual Allowances
Under 40			1	\$ 3,690	1	\$ 3,690
40-44	1	\$ 47,025			1	47,025
45-49						
50-54	13	631,237			13	631,237
55-59	28	1,423,096	5	162,606	33	1,585,702
60	11	421,926	4	162,962	15	584,888
61	16	867,906	1	31,921	17	899,827
62	11	429,128	2	84,111	13	513,239
63	10	337,423	1	19,015	11	356,438
64	5	153,596	1	17,524	6	171,120
65	7	243,960			7	243,960
66	7	293,503	1	17,854	8	311,357
67	10	421,886	1	10,145	11	432,031
68	9	279,236			9	279,236
69	12	514,892	1	31,838	13	546,730
70	17	729,331	1	32,340	18	761,671
71	5	110,485	2	32,387	7	142,872
72	8	383,230	1	6,242	9	389,472
73	3	94,752			3	94,752
74	7	234,258			7	234,258
75	4	157,339			4	157,339
76	4	37,845			4	37,845
77	7	175,941			7	175,941
78	7	175,161			7	175,161
79	9	211,706			9	211,706
80	5	94,333	1	37,352	6	131,685
81	4	92,922	1	22,021	5	114,943
82	3	98,224	1	17,971	4	116,195
83	10	274,994	1	18,435	11	293,429
84	1	36,377			1	36,377
85	1	27,262			1	27,262
86	5	57,376	1	11,647	6	69,023
87	5	73,461			5	73,461
88	5	62,848	2	22,677	7	85,525
89	4	83,865	2	44,749	6	128,614
90 & Over	13	240,426	1	3,951	14	244,377
Totals	267	\$9,516,950	32	\$791,438	299	\$10,308,388

Active Members December 31, 2018

Tabulated by Valuation Divisions

Valuation Divisions	Teamsters		Others		Total	
	Annualized		Annualized		Annualized	
	No.	Payroll	No.	Payroll	No.	Payroll
General members	4	\$ 202,506	10	\$ 722,564	14	\$ 925,070
Police and Fire members	0	0	56	3,975,208	56	3,975,208
Water Department members	4	219,788	3	221,685	7	441,473
Sewage Disposal members	2	104,786	4	301,343	6	406,129
Hybrid members	0	0	87	4,297,780	87	4,297,780
Total Active Members	10	\$ 527,080	160	\$ 9,518,580	170	\$10,045,660

Also included in the valuation were 19 former members eligible for a deferred pension.

Comparative Schedule

Valuation Date	Active Members						Annualized Payroll	Average			% Inc.
	Gen.	P.F.	Water	Sew.	Hybrid	Total		Age	Service	Pay	
December 31											
1987	108	90	29	25		252	\$ 7,082,224	41.1	13.1	\$28,104	5.5 %
1988	108	94	28	28		258	7,827,433	41.1	13.1	30,339	8.0 %
1989	101	94	30	28		253	7,787,845	41.2	13.3	30,782	1.5 %
1990	121	95	28	28		272	9,106,876	41.2	13.1	33,481	8.8 %
1991	108	92	32	29		261	8,817,472	41.1	13.1	33,783	0.9 %
1992	109	87	32	29		257	9,354,039	41.1	12.6	36,397	7.7 %
1993	110	88	30	31		259	9,190,716	41.2	13.0	35,485	(2.5)%
1994	106	87	29	31		253	9,651,905	41.8	13.4	38,150	7.5 %
1995	109	86	27	29		251	9,707,937	41.3	12.9	38,677	1.4 %
1996	106	86	27	31		250	9,923,449	41.4	12.8	39,694	2.6 %
1997	89	87	28	31	17	252	10,529,013	41.5	13.1	41,782	5.3 %
1998	80	88	27	30	29	254	10,584,003	42.2	13.2	41,669	(0.3)%
1999	76	83	25	30	35	249	10,474,154	42.7	13.2	42,065	0.9 %
2000	73	85	23	28	46	255	11,856,866	42.6	13.1	46,498	10.5 %
2001	72	85	23	28	51	259	11,906,969	43.0	13.2	45,973	(1.1)%
2002	71	87	23	27	51	259	12,514,944	43.8	13.9	48,320	5.1 %
2003	66	86	21	26	46	245	12,572,735	44.2	14.5	51,317	6.2 %
2004	60	86	21	23	52	242	13,015,922	43.9	13.9	53,785	6.2 %
2005	59	85	20	21	62	247	13,232,960	43.8	13.3	53,575	(0.4)%
2006	56	85	19	21	60	241	13,007,162	44.2	13.8	53,972	0.7 %
2007	54	82	18	21	57	232	13,371,922	45.1	14.6	57,638	6.8 %
2008	44	71	15	13	49	192	11,289,204	44.6	13.6	58,798	2.0 %
2009	41	67	14	14	53	189	11,061,644	45.2	14.1	58,527	(0.5)%
2010	37	62	13	14	54	180	10,758,097	45.9	14.7	59,767	2.1 %
2011	36	45	13	12	51	157	9,636,542	46.7	15.4	61,379	2.7 %
2012	33	50	11	12	56	162	9,543,247	46.0	14.7	58,909	(4.0)%
2013	30	50	11	12	57	160	9,524,423	46.6	15.2	59,528	1.1 %
2014	26	48	9	10	55	148	9,207,491	46.6	15.1	62,213	4.5 %
2015	23	55	9	8	68	163	9,469,543	45.3	13.2	58,095	(6.6)%
2016	20	54	7	8	75	164	9,204,828	44.6	12.4	56,127	(3.4)%
2017	18	62	7	7	83	177	10,187,413	44.5	11.7	57,556	2.5 %
2018	14	56	7	6	87	170	10,045,660	44.7	11.5	59,092	2.7 %

General Active Members - December 31, 2018 by Age and Years of Service

Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
40-44					1			1	\$ 65,032
45-49						1		1	100,959
50-54					4	1	1	6	349,247
55-59						1	2	3	186,158
60					1			1	82,981
63							1	1	51,619
64						1		1	89,074
Totals					6	4	4	14	\$ 925,070

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

Age: 55.0 years

Service: 26.7 years

Annual Pay: \$66,076

Police Active Members - December 31, 2018 by Age and Years of Service

Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
15-19	1							1	\$ 56,335
20-24	5							5	232,633
25-29	5	2						7	435,179
30-34	2	3						5	292,643
35-39	1	2	1					4	260,889
40-44	1		1	6				8	713,184
45-49			2	1	4			7	643,055
50-54					2			2	148,029
Totals	15	7	4	7	6			39	\$2,781,947

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

Age: 36.1 years

Service: 9.8 years

Annual Pay: \$71,332

Fire Department Active Members - December 31, 2018 by Age and Years of Service

Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
30-34	3							3	\$ 144,798
35-39	5							5	283,038
40-44				2	1			3	256,241
45-49			1	2		1		4	323,458
50-54					1			1	97,617
55-59				1				1	88,109
Totals	8		1	5	2	1		17	\$1,193,261

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

Age: 42.0 years

Service: 11.3 years

Annual Pay: \$70,192

Water Department Active Members - December 31, 2018 by Age and Years of Service

Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
40-44					1			1	\$ 54,634
45-49						1		1	56,409
50-54					3	1		4	255,112
55-59						1		1	75,318
Totals					4	3		7	\$441,473

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

Age: 50.9 years

Service: 24.5 years

Annual Pay: \$63,068

Sewage Disposal Active Members - December 31, 2018 by Age and Years of Service

Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
45-49					1	1		2	\$157,120
50-54							1	1	54,335
55-59					1			1	75,352
60					1			1	68,871
61					1			1	50,451
Totals					4	1	1	6	\$406,129

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

Age: 55.2 years

Service: 24.9 years

Annual Pay: \$67,688

Hybrid Active Members - December 31, 2018 by Age and Years of Service

Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
20-24	2							2	\$ 61,116
25-29	10							10	398,026
30-34	4	1						5	210,212
35-39	3	1						4	182,696
40-44	8	2	3	1	2			16	825,779
45-49	5	4	3	4	1			17	933,692
50-54	7	1	1	4				13	727,146
55-59	2	1	2	1				6	278,447
60	1							1	46,366
61	2			1				3	125,504
62	1							1	36,129
63			1					1	50,245
64	1		2	1		1		5	260,504
65				1				1	63,264
66			1					1	91,194
67	1							1	7,460
Totals	47	10	13	13	3	1		87	\$4,297,780

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

Age: 46.1 years

Service: 7.9 years

Annual Pay: \$49,400

Active Members Added to and Removed from Rolls

Year Ended December 31	Number Added During Year		Terminations During Year								Active Members End of Year
			Retired		Disabled		Died-in-Service		Other		
	A	E	A	E	A	E	A	E	A	E	
2004	16	19	16	7.2	0	0.3	0	0.3	3	7.2	242
2005	21	16	11	7.2	0	0.3	0	0.3	5	7.2	247
2006	8	14	9	7.9	0	0.2	1	0.2	4	2.5	241
2007	2	11	5	9.1	0	0.3	0	0.3	6	7.5	232
2008	3	43	34	8.7	0	0.3	0	0.2	9	5.6	192
2009*	4	7	3	2.6	2	0.3	1	0.2	1	4.1	189
2010	1	10	7	5.1	1	0.4	0	0.2	2	3.9	180
2011	2	25	13	5.7	0	0.4	0	0.2	12	3.1	157
2012	15	10	5	3.8	2	0.4	0	0.2	3	2.5	162
2013	9	11	3	4.1	0	0.4	1	0.2	7	4.0	160
2014	5	17	10	7.0	1	0.4	2	0.2	4	4.2	148
2015	26	11	10	8.7	0	0.3	0	0.2	1	3.7	163
2016*	19	18	10	9.0	0	0.3	0	0.0	8	6.3	164
2017*	24	11	3	9.6	1	0.4	0	0.2	7	7.0	177
2018*	11	18	12	11.4	0	0.3	0	0.3	6	7.6	170
15-Year Total	166	241	151	107.1	7	5.0	5	3.2	78	76.4	

* Change in assumptions.

“A” denotes actual experience.

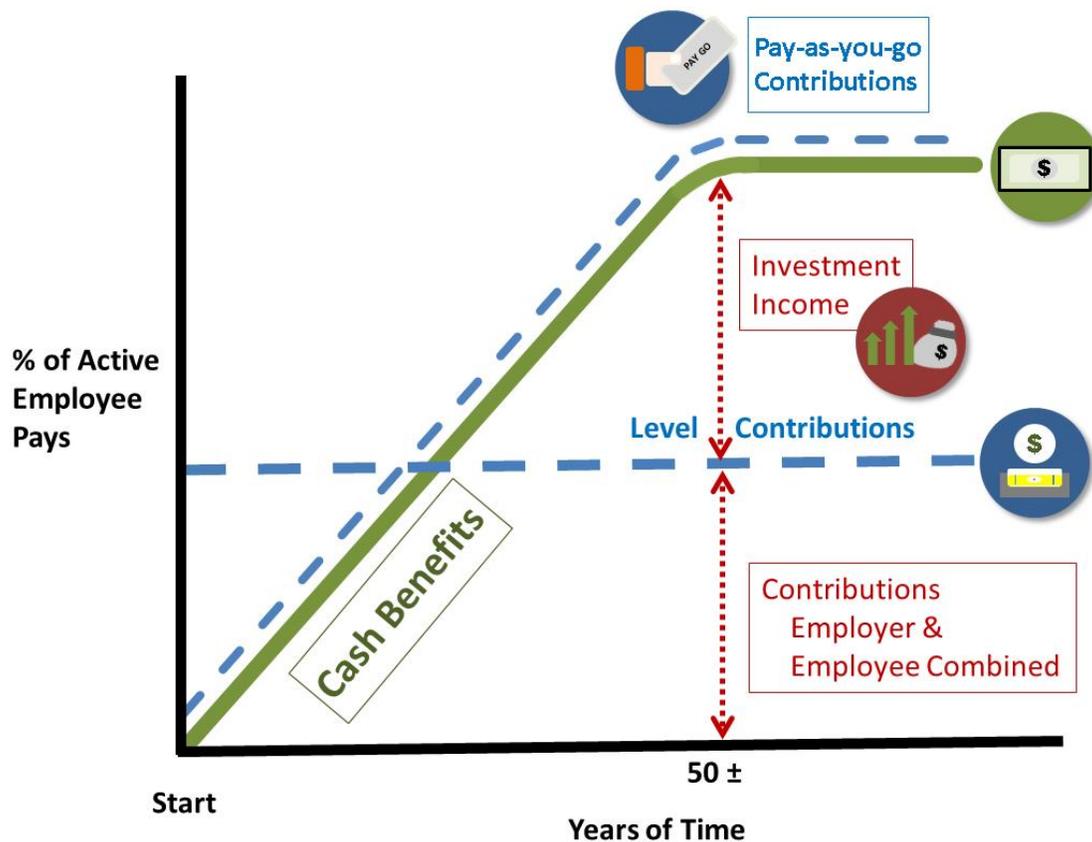
“E” denotes expected experience.

Deferred Members

	Count	Average Benefit
General	1	\$12,390
Police	0	0
Fire	3	30,054
Hybrid	15	4,951
Total	19	\$ 9,306

SECTION C

**ACTUARIAL VALUATION PROCESS, ACTUARIAL COST
METHODS, ACTUARIAL ASSUMPTIONS, AND DEFINITIONS OF
TECHNICAL TERMS**



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

Actuarial Valuation Process

The actuarial valuation is the mathematical process by which the level contribution rate is determined, and the flow of activity constituting the valuation may be summarized as follows:

A. **Covered person data**, furnished by plan administrator.

Retired lives now receiving benefits

Former employees with vested benefits not yet payable

Active employees

B. + **Asset data** (cash & investments), furnished by plan administrator

C. + **Assumptions concerning future financial experience in various risk areas**, which assumptions are established by the Pension Board after consulting with the actuary

D. + **A schedule of benefits** to be provided by the plan

E. + **The funding method** for employer contributions (the long-term, planned pattern for employer contributions)

F. + **Mathematically combining the assumptions, the funding method, the benefits, and the data**

G. = Determination of:

Plan Financial Position

and/or **Employer's New Contribution Rate**

Actuarial Cost Methods Used for the December 31, 2018 Valuation

Normal Costs were calculated as follows:

The series of contributions payable from date of employment to accumulate the reserve of each member's projected allowance at time of retirement, death, or disability was computed using the assumptions summarized on the following pages. Each contribution in the series is a constant percentage of the member's year-by-year projected covered compensation. This method is commonly referred to as the entry-age actuarial cost method.

Actuarial Accrued Liability was computed and financed as follows:

Retirants and Beneficiaries. The actuarial present value of retirement allowances likely to be paid retirants and beneficiaries was computed using the investment return and mortality assumptions. This amount was financed by applicable actuarial assets.

Active and Inactive Members. The portion of the actuarial present value of benefits likely to be paid active and inactive members that is not covered by future normal cost contributions was computed using the assumptions outlined on the following pages. **The computed amount was reduced by applicable assets.**

Amortization Charges and Credits. The unfunded actuarial accrued liability is amortized over a 21-year period.

Assets were valued using a 7-year smoothing method illustrated on page A-6.

Actuarial Assumptions in the Valuation Process

The actuary calculates contribution requirements and actuarial present values for a retirement system by applying actuarial assumptions to the benefit provisions and people information of the system, using the actuarial cost methods described on page C-3.

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

- (i) long-term rates of investment return to be generated by the assets of the system
- (ii) patterns of pay increases to members
- (iii) rates of mortality among members, retirants and beneficiaries
- (iv) rates of withdrawal of active members
- (v) rates of disability among active members
- (vi) the age patterns of actual retirements

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

The employer contribution rate has been computed to remain level from year to year so long as benefits and the basic experience and make-up of members do not change. Examples of favorable experience which would tend to reduce the employer contribution rate are:

- (1) Investment returns in excess of 7.35 % per year.
- (2) Member terminations at a higher rate than outlined on page C-9.
- (3) Mortality among retirants and beneficiaries at a higher rate than indicated by the Mortality Table that is assumed.
- (4) Increases in the number of active members.

Actuarial Assumptions in the Valuation Process

Examples of unfavorable experience which would tend to increase the employer contribution rate are:

- (1) Pay increases in excess of the rates outlined on page C-7.
 - (2) An acceleration in the rate of retirement from the rates outlined on page C-10.
 - (3) A pattern of hiring employees at older ages than in the past.
-

Actual experience of the system will not coincide exactly with assumed experience, regardless of the skill of the actuary and the precision of the calculations. 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 one or more of the assumptions are modified to reflect experience trends (but not random or temporary year-to-year fluctuations). The rationale for the assumptions used in this valuation is included in the 5-year experience study ending December 31, 2015.

Actuarial Assumptions Used for the December 31, 2018 Valuation

Investment Return

The investment return rate assumed in the valuations was 7.35% per year, compounded annually (net after administrative expenses).

The **Wage Inflation Rate** assumed in this valuation was 3.25% per year. The Wage Inflation Rate is defined to be the portion of total pay increases for an individual that are due to macro-economic forces including productivity, price inflation, and labor market conditions. The wage inflation rate does not include pay changes rated to individual merit and seniority effects.

While an exact **Price Inflation** assumption is not required to perform this valuation, we have assumed price inflation of 2.75%.

The assumed **real rate of return** over wage inflation is defined to be the portion of total investment return that is more than the assumed total wage growth rate. Considering other economic assumptions, the 7.35% investment return rate translates to an assumed real rate of return over wage inflation of 4.10%. The assumed real rate of return over price inflation would be higher – on the order of 4.60%, considering both an inflation assumption and an average expense provision.

The Active Member Population is assumed to remain constant. For purposes of financing the unfunded liabilities, total payroll is assumed to grow at the wage inflation rate – 3.25% per year.

Pay increase assumptions for individual active members are shown for sample ages on page C-7. Part of the assumption for each age is for merit and/or seniority increase, and the other 3.25% recognizes wage inflation, including price inflation, productivity increases, and other macro-economic forces. Changes actually experienced in average pay and total payroll have been as follows:

Increase in	Year Ended					3-Year Average	5-Year Average
	2018	2017	2016	2015	2014		
Average pay	2.7 %	2.5 %	(3.4)%	(6.6)%	4.5 %	0.6 %	(0.2)%
Total payroll	(1.4)%	10.7 %	(2.8)%	2.8 %	(3.3)%	2.0 %	1.1 %

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

These rates of return should not be used for measurement of an investment advisor's performance or for comparisons with other systems -- **to do so will mislead.**

Pay Projections. These assumptions are used to project current pays to those upon which benefits will be based. The assumptions were first used for the December 31, 2016 valuation.

Sample Ages	Annual Rate of Pay Increase for Sample Ages					
	General, Water, Sewage, Hybrid			Police - Fire		
	Base (Economic)	Merit & Longevity	Total	Base (Economic)	Merit & Longevity	Total
20	3.25%	2.24%	5.49%	3.25%	1.69%	4.94%
25	3.25%	1.83%	5.08%	3.25%	1.69%	4.94%
30	3.25%	1.57%	4.82%	3.25%	1.46%	4.71%
35	3.25%	1.39%	4.64%	3.25%	0.62%	3.87%
40	3.25%	1.25%	4.50%	3.25%	0.11%	3.36%
45	3.25%	0.98%	4.23%	3.25%	0.11%	3.36%
50	3.25%	0.67%	3.92%	3.25%	0.11%	3.36%
55	3.25%	0.39%	3.64%	3.25%	0.06%	3.31%
60	3.25%	0.09%	3.34%	3.25%	0.00%	3.25%
65	3.25%	0.00%	3.25%	3.25%	0.00%	3.25%
Ref.		354 x 0.75			353 x 0.75	

If the number of active members remains constant, the total active member payroll will increase 3.25% annually, the base portion of the individual pay increase assumptions. This increasing payroll was partially recognized in amortizing unfunded actuarial accrued liabilities.

Mortality Table. The *mortality rates* utilized are based upon the RP-2014 tables, as extended, and include a margin for future mortality improvements projected using a fully generational improvement scale. The tables used were as follows:

- **Healthy Pre-Retirement:** The RP-2014 Employee Generational Mortality Tables, with blue-collar adjustments and extended via cubic spline. This table is adjusted backwards to 2006 with the MP-2014 scale, resulting in a base year of 2006 with future mortality improvements assumed each year using scale MP-2016.
- **Healthy Post-Retirement:** The RP-2014 Healthy Annuitant Generational Mortality Tables, with blue-collar adjustments and extended via cubic spline. This table is adjusted backwards to 2006 with the MP-2014 scale, resulting in a base year of 2006 with future mortality improvements assumed each year using scale MP-2016.
- **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-2016.

These tables were first used for the December 31, 2016 valuation. Sample values are as follows:

Sample Attained Ages	Healthy Pre-Retirement		Healthy Post-Retirement		Disabled Retirement	
	Future Life Expectancy (Years)*		Future Life Expectancy (Years)*		Future Life Expectancy (Years)*	
	Men	Women	Men	Women	Men	Women
55	29.91	35.12	28.69	31.57	21.45	25.22
60	25.07	30.13	24.14	26.85	18.40	21.65
65	20.58	25.26	19.86	22.35	15.51	18.20
70	16.48	20.54	15.91	18.07	12.74	14.81
75	12.73	16.01	12.30	14.10	10.10	11.64
80	9.36	11.76	9.12	10.58	7.70	8.89

* Based on retirements in 2018. Retirements in future years will reflect improvements in life expectancy.

Rates of separation from active membership. The rates apply to members separating from active employment before retirement, death or disability. It was assumed that General, Water and Sewage members belonging to Non-Teamster Unit II and Appointed members who quit prior to age 45 will withdraw their accumulated contributions. For Police and Fire, age 40 was assumed.

Sample Ages	Years of Service	% of Active Members Separating within Next Year			
		General, Water, and Sewage	Hybrid	Police	Fire
ALL	0	24.00%	24.00%	9.60%	9.60%
	1	16.00%	16.00%	7.20%	7.20%
	2	12.00%	12.00%	5.60%	5.60%
	3	8.00%	8.00%	4.00%	4.00%
	4	5.60%	5.60%	3.60%	3.60%
20	5 & Over	3.00%	7.20%	2.70%	2.70%
25		3.00%	7.20%	2.70%	2.70%
30		2.75%	6.60%	2.34%	2.34%
35		2.20%	5.28%	1.38%	1.38%
40		0.93%	2.22%	0.54%	0.54%
45		0.63%	1.50%	0.30%	0.30%
50		0.63%	1.50%	0.30%	0.30%
55		0.63%	1.50%	0.30%	0.30%
60		0.63%	1.50%	0.30%	0.30%
65		0.63%	1.50%	0.30%	0.30%
Ref.		11 x 0.8	11 x 0.8	29 x 0.8	29 x 0.8
		59 x 0.5	59 x 1.2	53 x 0.6	53 x 0.6

The rates in this table were first used in the December 31, 2016 valuation.

Rates of Disability. These assumptions represent the probabilities of active members becoming disabled.

Sample Ages	Percent Becoming Disabled within Next Year		
	General, Water, and Sewage	Hybrid	Police and Fire
20	0.08%	0.04%	0.12%
25	0.08%	0.04%	0.12%
30	0.08%	0.04%	0.12%
35	0.08%	0.04%	0.12%
40	0.20%	0.10%	0.30%
45	0.27%	0.13%	0.40%
50	0.49%	0.25%	0.74%
55	0.89%	0.45%	1.34%
60	1.41%	0.71%	2.12%
65	1.66%	0.83%	2.49%
Ref.	9 x 1	9 x 0.5	9 x 1.5

The rates in this table were first used in the December 31, 2016 valuation.

Rates of Retirement. These rates are used to measure the probabilities of an eligible member retiring during the next year.

Retirement Ages	Percent of Active Members Retiring within Next Year*					Rule of 80
	General, Water, and Sewage	Appointed	Hybrid	Police	Fire	General, Water, and Sewage
50				45.0%	45.0%	30.0%
51				35.0%	35.0%	30.0%
52				30.0%	30.0%	30.0%
53				30.0%	30.0%	30.0%
54				30.0%	30.0%	30.0%
55	35.0%	32.5%	15.0%	30.0%	30.0%	35.0%
56	35.0%	25.0%	15.0%	30.0%	30.0%	35.0%
57	35.0%	25.0%	15.0%	30.0%	30.0%	35.0%
58	35.0%	25.0%	15.0%	30.0%	30.0%	35.0%
59	35.0%	25.0%	15.0%	30.0%	30.0%	35.0%
60	35.0%	32.5%	35.0%	100.0%	100.0%	40.0%
61	35.0%	22.0%	35.0%			40.0%
62	35.0%	32.5%	35.0%			40.0%
63	35.0%	23.5%	35.0%			40.0%
64	35.0%	32.5%	35.0%			40.0%
65	60.0%	80.0%	35.0%			60.0%
66	60.0%	40.0%	35.0%			60.0%
67	60.0%	50.0%	35.0%			60.0%
68	60.0%	60.0%	35.0%			60.0%
69	60.0%	70.0%	35.0%			60.0%
70	100.0%	100.0%	100.0%			100.0%
Ref.	2622	2627	2625	1350	1350	2624

* Fire members and Police members hired prior to 7/1/2008, retirement rates were changed to 80% once members reach 30.2 years of service. For Police members hired on or after 7/1/2008, retirement rates were changed to 80% once members reach 37.2 years of service.

The rates in this table were first used in the December 31, 2016 valuation.

The above probabilities apply to members satisfying the conditions described on page B-5.

Miscellaneous and Technical Assumptions

December 31, 2018

Marriage Assumption:	100% of males and 100% of females are assumed to be married for purposes of death-in-service benefits for General and Police/Fire members. 80% of males and 70% of females are assumed to be married for purposes of death-in-service benefits for Hybrid members. Male spouses are assumed to be three years older than female spouses for active member valuation purposes. In retired or inactive cases where spouse information is needed, but not available, the three-year age difference is also assumed.
Pay Increase Timing:	Beginning of (Fiscal) year for all groups. This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date.
Decrement Timing:	Decrements are assumed to occur mid-year.
Eligibility Testing:	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
Decrement Relativity:	Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
Decrement Operation:	Disability and mortality decrements do not operate during the first 10 years of service.
Incidence of Contributions:	Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made.
Benefit Service:	Exact fractional service is used to determine the amount of benefit payable.
Normal Form of Benefit:	The assumed normal form of benefit is a straight life benefit, except where otherwise noted.
Final Average Compensation (FAC) Adjustment:	The normal cost and actuarial accrued liability, for age and service benefits were increased by 3.0% for the General members, 2.25% for the Hybrid members, 3.5% for the Police members hired before 7/1/2008, and 4.5% for the Fire members hired before 7/1/2008 to account for inclusion of longevity, overtime pay, vacation pay, etc. in the FAC used to calculate retirement benefits.

Miscellaneous and Technical Assumptions

December 31, 2018

Hybrid Benefit Election:

Upon normal retirement eligibility, Hybrid members can choose the Monthly Benefit Option or the Lump Sum Option. For valuation purposes, it was assumed that 85% of members would elect the Monthly Benefit Option and 15% would elect the Lump Sum Option.

Upon deferred retirement eligibility, Hybrid members can choose the Immediate Option or the Deferred Option. For valuation purposes, it was assumed that 30% would elect the Immediate Option and 70% would elect the Deferred Option.

Option Factors:

Option factors are based upon 7.5% interest and the RP-2000 Mortality table with a 90% Unisex Blend. The Annuity Withdrawal reduction factor is based upon 7.50% interest and the RP-2000 Mortality table with a 50% Unisex Blend.

Definitions of Technical Terms

Accrued Service. Service credited under the system which was rendered before the date of the actuarial valuation.

Actuarial Accrued Liability. The difference between the actuarial present value of system benefits and the actuarial present value of future normal costs. Also referred to as “past service liability.”

Actuarial Assumptions. Estimates of future 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 benefits” between future normal costs and actuarial accrued liability. Sometimes referred to as the “actuarial funding method.”

Actuarial Equivalent. One series of payments is said to be actuarially equivalent to another series of payments if the two series have the same actuarial present value.

Actuarial Gain (Loss). The difference between actual unfunded actuarial accrued liabilities and anticipated unfunded actuarial accrued liabilities -- during the period between two valuation dates. It is a measurement of the difference between actual and expected experience.

Actuarial Present Value. The amount of funds currently required to provide a payment or series of payments in the future. It is determined by discounting future payments at predetermined rates of interest, and by probabilities of payments.

Amortization. Paying off an interest-discounted amount with periodic payments of interest and (generally) principal -- as opposed to paying off with a lump sum payment.

Credited Projected Benefit. The portion of a member’s projected benefit attributable to service before the valuation date - allocated based on the ratio of accrued service to projected total service and based on anticipated future compensation.

Normal Cost. The portion of the actuarial present value of future benefits that is assigned to the current year by the actuarial cost method. Sometimes referred to as “current service cost.”

Definitions of Technical Terms

Unfunded Actuarial Accrued Liabilities. The difference between actuarial accrued liabilities and valuation assets. Sometimes referred to as “unfunded past service liability” or “unfunded supplemental present value.”

Most retirement systems have unfunded actuarial accrued liabilities. They arise each time new benefits are added and each time an actuarial loss occurs.

The existence of unfunded actuarial accrued liabilities is not in itself bad, any more than a mortgage on a house is bad. Unfunded actuarial accrued liabilities do not represent a debt that is payable today. What is important is the ability to amortize the unfunded actuarial accrued liabilities and the trend in its amount (after due allowance for devaluation of the dollar).

Valuation Assets. The value of cash, investments and other property belonging to a pension plan, as used for the purpose of an actuarial valuation.

SECTION D

ADDITIONAL SCHEDULES OF INTEREST

Schedule of Funding Progress (Dollar amounts in thousands)

Actuarial Valuation Date December 31	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) Entry Age (b)	Unfunded (Overfunded) AAL (b)-(a)	Funded Ratio (a)/(b)	Covered Payroll (c)	UAAL as a Percent of Covered Payroll [(b)-(a)]/(c)
2006	\$ 124,033	\$ 105,394	\$ (18,639)	117.7 %	\$ 13,007	-
2007	130,366	110,753	(19,613)	117.7 %	13,372	-
2008	130,512	117,030	(13,482)	111.5 %	11,289	-
2009	131,184	120,828	(10,356)	108.6 %	11,062	-
2010	132,119	124,415	(7,704)	106.2 %	10,758	-
2011	131,234	128,991	(2,243)	101.7 %	9,637	-
2012	130,063	130,741	678	99.5 %	9,543	7.1 %
2013	130,300	132,708	2,408	98.2 %	9,524	25.3 %
2014	130,057	136,238	6,181	95.5 %	9,207	67.1 %
2015	133,737	137,412	3,675	97.3 %	9,470	38.8 %
2016	135,200	147,210	12,010	91.8 %	9,205	130.5 %
2017	137,819	150,865	13,046	91.4 %	10,187	128.1 %
2018	139,164	154,821	15,657	89.9 %	10,046	155.9 %

Schedule of Employer Contributions

Fiscal Year July-June	Annual Required Contribution
2006-2007	\$ 487,016
2007-2008	1,444,879
2008-2009	1,439,268
2009-2010	1,483,539
2010-2011	1,191,553
2011-2012	1,274,568
2012-2013	1,351,541
2013-2014	1,488,154
2014-2015	1,622,379
2015-2016	1,695,874
2016-2017	1,845,799
2017-2018	1,830,651
2018-2019	1,803,719
2019-2020	2,010,912
2020-2021	2,211,479

Summary of Actuarial Methods and Assumptions

The information presented on the prior two pages was determined as part of the actuarial valuations at the dates indicated. Additional information as of the latest actuarial valuation follows:

Valuation date	December 31, 2018
Actuarial cost method	Entry age actuarial cost method
Amortization method	Level percent-of-pay
Amortization period	21 years, closed
Asset valuation method	7-year smoothed market
Actuarial assumptions	
Investment rate of return (includes wage inflation at 3.25%)	7.35%
Cost-of-living adjustments [^]	3% simple for Police Unit 2% simple for Police Unit after 7/1/2008 3% simple for Fire Unit 2% simple for Fire Unit after 7/1/2008 2% simple for Hybrid members 2% simple for General

[^] COLAs are either fixed at the stated rate or equal to the lesser of the stated rate and the annual increase in the CPI-U for the preceding calendar year, varies by group.

SECTION E

RISK DISCLOSURES

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

Determination of the accrued liability, the employer contribution, and the funded rate 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** – 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; and
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-2 may be considered as a minimum contribution rate that complies with the Board's funding policy. The timely receipt of the actuarially determined contributions is critical to support the financial health of the plan. Users of this report should be aware that contributions made at the actuarially determined rate do not necessarily guarantee benefit security.

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

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>2018</u>	<u>2017</u>
Ratio of the market value of assets to total payroll	12.9	14.0
Ratio of actuarial accrued liability to payroll	15.4	14.8
Ratio of actives to retirees and beneficiaries	0.6	0.6
Ratio of net cash flow to market value of assets	-6.1%	-5.2%

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.