

Midland County Act 345 Retirement System

Actuarial Valuation

December 31, 2018



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July 23, 2019

Retirement Board
Midland County
Act 345 Retirement System
Midland, Michigan

Dear Board Members:

The results of the December 31, 2018 annual actuarial valuation of the Midland County Act 345 Retirement System are presented in this report. The purpose of the valuation is to measure the System's funding progress and determine the employer contribution for the 2020 fiscal year. This report should not be relied on for any purpose other than the purpose described herein. Determinations of financial results, associated with the benefits described in this report, for purposes other than those identified above may be significantly different.

This 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 findings in this report are based on data and other information through December 31, 2018. The valuation was based upon information furnished by the County, 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. As a result, we are unable to assume responsibility for the accuracy or completeness of the data provided.

The computed contribution shown on page B-2 may be considered as a minimum contribution which complies with the Board's funding policy. Users of this report should be aware that contributions made at this level do not guarantee benefit security. Given the importance of benefit security to any retirement system, we suggest that contributions to the System in excess of those presented in this report be considered.

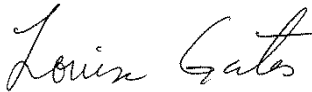
This report was prepared using assumptions adopted by the Board. The fiscal 2020 contribution amount shown in this report was determined using the actuarial assumptions and methods shown in Section D of this report. This report includes risk metrics on pages B-4 and E-1, but does not include additional risk metrics such as those that assess the risk of future experience not meeting the actuarial assumptions. These additional risk assessments were beyond the scope of this assignment. We encourage a review and assessment of investment and other significant risks that may have a material impact on the plan's financial condition.

Future actuarial measurements may differ significantly from those presented in this report due to such factors as experience differing from that anticipated by actuarial assumptions, changes in plan provisions, actuarial assumptions/methods or applicable law. Due to the limited scope of this assignment, we did not perform an analysis of the potential range of future measurements. In addition, 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.

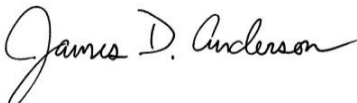
This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. To the best of our knowledge the information contained in this report is accurate and fairly presents the actuarial position of the Midland County Act 345 Retirement System as of the 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.

Louise M. Gates and James D. Anderson are independent of the plan sponsor and are Members of the American Academy of Actuaries (MAAA) who meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. It is our opinion that the actuarial assumptions used for the valuation produce results which are reasonable.

Respectfully submitted,



Louise Gates, ASA, FCA, MAAA



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

LMG/JDA



SECTION A

EXECUTIVE SUMMARY

1. Required Employer Contributions - Fiscal Year Beginning January 1, 2020

Computed County contributions for fiscal years 2020 and 2019 are shown below:

Contributions for the Indicated Fiscal Year	\$ Amount
All divisions (2020)	\$893,715
All divisions (2019)	\$814,861

2. Reasons for Change

The actuarial cost method has been chosen with the intent of producing employer contributions that are fairly level. In a closed plan, the normal cost dollar amount is expected to trend downward as active members retire and terminate employment for other reasons. A major factor affecting the stability of the contributions is how well actual plan experience compares to actuarial assumptions. The value of this difference is called an actuarial gain or loss. Gains tend to lower the contributions and losses tend to increase them. In addition to actuarial gains and losses, changes in the benefits (or benefit eligibility) and changes in actuarial assumptions/methods also affect employer contributions. No changes in System benefits or assumptions/methods were reflected in this valuation of the System.

3. 2018 Plan Year Experience

The experience of the System during calendar year 2018 was overall, unfavorable. The investment return on System assets was lower than long term expectations. The market smoothing techniques used in this valuation of the System recognize a portion of the current and prior year's investment experience. As a result, the recognized rate of return on System assets was 4.8%. In addition, no retiree deaths were reported among current benefit recipients. As a result, retiree liabilities were slightly higher than anticipated by actuarial assumptions, which contributed to the experience loss during the year.

4. System Funded Percent

The System's funded percent based on the total actuarial value of assets is 87.93% as of December 31, 2018. Last year the funding percent was 88.73%. If the market value of assets was used to determine the System's funding percent as of December 31, 2018 the result would be a funded percent of 82.69%. Unless otherwise indicated, a funded status measurement presented in this report is based upon the actuarial accrued liability and the total actuarial value of assets. Unless otherwise indicated, with regards to any funded status measurements presented in this report:

- The measurement is inappropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations.
- The measurement is inappropriate for assessing the need for or the amount of future employer contributions.
- The measurement would produce a different result if the market value of assets were used instead of the total actuarial value of assets

5. UIR

As of the valuation date, the System has an Unallocated Income Reserve (UIR) balance of \$1.5 million. Assets held in the UIR were not used in the development of the fiscal year 2020 County pension contribution shown above. These assets will be used in the development of County Contributions in future years to help maintain contribution stability.

6. Other

Michigan Public Act 202 of 2017 has created new reporting and other requirements for local units of government. The Retirement Board may be asked to assist the County in its efforts to comply with these new requirements. We recommend that the Board develop a policy to document any System responsibilities to facilitate compliance.

7. Reserve Transfers

As of the valuation date the value of retiree liabilities exceed the market value of assets held in the Retired Benefit Payment Reserve. As a result, a transfer from the Employer Contribution Reserve to the Retired Benefit Payment Reserve is required. This is summarized below:

Results as of December 31, 2018

Retiree Liabilities	\$18,106,163
Retired Benefit Payment Reserve	<u>15,055,344</u>
Transfer Amount	\$3,050,819

8. Expectations

Given the System's contribution allocation procedure, if all actuarial assumptions are met (including the investment return assumption) then the following outcomes are expected:

- The employer normal cost dollar contribution is expected to decrease over time, given the closed nature of the System.
- The unfunded accrued liability is expected to be paid off in approximately 11 years (from FY 2020).
- The funded status of the System is expected to reach 100% in approximately 11 years (the number of years remaining in the amortization schedule).

SECTION B

VALUATION RESULTS

Financial Objective

The financial objective of the Retirement System is to establish and receive contributions that will accumulate reserves over members' working years that are sufficient to finance benefits expected to be paid after retirement.

Annual actuarial valuations measure how well the objective is being met.

Contributions

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

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

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

Computed contributions for the fiscal year beginning January 1, 2020 are shown on page B-2.

Contributions to Provide Benefits Member Portion and Employer Portion

Contributions	Percent of Active Payroll for Fiscal Year Ending December 31,	
	2020	2019
Normal Cost of Benefits:		
Age & service	16.23 %	16.27 %
Disability	0.98 %	0.97 %
Death-in-service	0.39 %	0.38 %
Total	17.60 %	17.62 %
Member Contributions:		
Total	6.71 %	6.72 %
Future refunds	0.75 %	0.75 %
Usable for pensions	5.96 %	5.97 %
Employer Normal Cost	11.64 %	11.65 %
Amortization Payment*	\$ 633,184	\$ 549,628
Projected Payroll	\$2,238,241	\$2,276,678
Recommended Dollar Contribution	\$ 893,715	\$ 814,861

* Amortized as a level dollar amount over 11 years in Fiscal Year 2020 and level dollar amount over 12 years in Fiscal Year 2019.

Information shown on page B-3 was used in the determination of the contributions shown above.

Determination of Unfunded Accrued Liability

	December 31,	
	2018	2017
A. Accrued Liability:		
1. For retirees and beneficiaries:		
a. Benefit payments	\$18,106,163	\$17,632,203
b. Reserves	0	0
c. Total	18,106,163	17,632,203
2. For vested terminated members	513,395	479,017
3. For present active members:		
a. Value of expected future benefit payments	14,677,173	14,466,918
b. Value of future normal costs	3,286,634	3,483,853
c. Active member liability: (a) - (b)	11,390,539	10,983,065
4. Total Accrued Liability	30,010,097	29,094,285
B. Valuation Assets*	24,887,467	24,314,751
C. Unfunded Accrued Liability: (A4) - (B)	\$ 5,122,630	\$ 4,779,534

* The amount shown excludes Unallocated Income Reserve (UIR) assets

Development of Funding Value of Assets

Year Ended December 31:	2017	2018	2019	2020	2021	2022
A. Funding Value Beginning of Year	\$22,965,653	\$24,314,751				
B. Market Value End of Year	26,283,288	24,814,858				
C. Market Value Beginning of Year	24,027,528	26,283,288				
D. Non-Investment Net Cash Flow	(453,505)	(589,008)				
E. Investment Income						
E1. Market Total: B - C - D	2,709,265	(879,422)				
E2. Amount for Immediate Recognition (7.0%)	1,591,723	1,681,417				
E3. Amount for Phased-In Recognition: E1-E2	1,117,542	(2,560,839)				
F. Phased-In Recognition of Investment Income						
F1. Current Year: 0.20 x E3	223,508	(512,168)				
F2. First Prior Year	(2,790)	223,508	\$ (512,168)			
F3. Second Prior Year	(188,884)	(2,790)	223,508	\$ (512,168)		
F4. Third Prior Year	(39,359)	(188,884)	(2,790)	223,508	\$ (512,168)	
F5. Fourth Prior Year	218,405	(39,359)	(188,886)	(2,788)	223,510	\$(512,167)
F6. Total Recognized Investment Gain/(loss)	210,880	(519,693)	(480,336)	(291,448)	(288,658)	(512,167)
G. Preliminary Funding Value End of Year	24,314,751	24,887,467				
H. Transfer to Unallocated Income Reserve	0	0				
I. Final Funding Value End of Year: G - H	24,314,751	24,887,467				
J. Difference between Market & Preliminary Funding Value*	1,968,537	(1,572,609)				
K. Recognized Rate of Return	7.9%	4.8%				
L. Market Value Rate of Return	11.4%	(3.4)%				

* Total market value - UI Reserve

In addition to the funding value of assets shown above (\$24,887,467) as of December 31, 2018, \$1.5 million in assets were held in a reserve account within the pension trust.

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

The determination of the actuarial 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 actuarial 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 System'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 actuarial 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 actuarial 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 actuarial 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.

Derivation of Experience Gain (Loss)

Actual experience will never (except by coincidence) exactly match assumed experience. It is anticipated that gains and losses will cancel each other over a period of years, but sizable year-to-year fluctuations are common. Detail on the derivation of the experience gain (loss) for 2018 is shown below:

		December 31, 2018
(1)	UAAL* at start of year^	\$ 4,779,534
(2)	Normal cost from last valuation	418,226
(3)	Actual contributions	1,017,353
(4)	Interest accrual	313,598
(5)	Expected UAAL before changes: (1) + (2) - (3) + (4)	4,494,005
(6)	Change from benefit increases	0
(7)	Change from revised actuarial assumptions	0
(8)	Expected UAAL after changes: (5) + (6) + (7)	4,494,005
(9)	Actual UAAL at end of year^	5,122,630
(10)	Gain (loss): (8) - (9)	(628,625)
(11)	Beginning accrued liability	29,094,285
(12)	Experience Gain (Loss) as % of beginning accrued liability	(2.16)%

*Unfunded Actuarial Accrued Liabilities

^ Not Including Unallocated Income Reserve

Comparative Schedule

Valuation Date December 31,	Accrued Liability	Valuation Accrued Assets	% Funded	Unfunded Actuarial Accrued Liabilities & Reserves			County's Contribution Amount		
				Dollars	Amortization Period	% of Payroll	% of Payroll	Dollars Recommended	Actual
1989	\$ 6,427,948	\$ 7,023,585	109.3 %	\$ (595,637)	21 years	(109)%	16.88 %	\$ 278,668	\$ 278,668
1990	7,421,103	7,906,519	106.5 %	(485,416)	20	(107)%	17.35 %	308,538	308,538
1991	7,681,601	8,844,143	115.1 %	(1,162,542)	19	(115)%	14.79 %	267,157	275,770
1992	8,643,955	9,819,468	113.6 %	(1,175,513)	18	(114)%	14.91 %	294,214	300,213
1993	9,604,344	10,987,010	114.4 %	(1,382,666)	17	-	8.89 % #	175,756	289,645
1994	10,525,713	12,098,606	114.9 %	(1,572,893)	16	-	8.38 % *	175,482	190,580
1995	11,272,278	13,496,466	119.7 %	(2,224,188)	15	-	5.18 % *	103,869	106,053
1996	11,882,083	14,994,833	126.2 %	(3,112,750)	14	-	0.30 %	5,930	5,930
1997	13,213,248	16,617,963	125.8 %	(3,404,715)	14	-	0.00 %	0	0
1998	13,405,094	18,671,578	139.3 %	(5,266,484)	24	-	0.00 % *	0	0
1999	14,950,711	20,904,976	139.8 %	(5,954,265)	30	-	0.00 % *	0	0
2000	16,273,458	22,738,569	139.7 %	(6,465,111)	28	-	0.00 %	0	0
2001	17,199,214	23,946,278	139.2 %	(6,747,064)	33	-	0.00 %	0	0
2002	18,230,800	24,009,724	131.7 %	(5,778,924)	22	-	0.00 %	0	0
2003	19,430,425	23,753,515	122.2 %	(4,323,090)	13	-	0.00 %	0	0
2004	19,985,876	23,349,975	116.8 %	(3,364,099)	10	-	0.00 %	0	0
2005	20,309,350	22,941,716	113.0 %	(2,632,366)	10	-	2.94 %	74,995	74,995
2006	21,233,451	22,933,679	108.0 %	(1,700,228)	10	-	7.67 %	200,291	200,291
2007	21,837,360	23,667,032	108.4 %	(1,829,672)	10	-	5.54 % *#	155,073	155,073
2008	22,798,452	22,975,033	100.8 %	(176,581)	10	-	12.93 %	395,849	395,849
2009	23,310,822	22,457,053	96.3 %	853,769	20	30 %	16.36 % #	445,066	445,066
2010	24,735,517	22,224,143	89.8 %	2,511,374	19	86 %	22.08 % *	657,441	657,441
2011	25,436,050	21,509,017	84.6 %	3,927,033	18	135 %	26.93 %	798,874	798,874
2012	26,655,688	20,868,056	78.3 %	5,787,632	17	207 %	34.04 %	984,068	984,068
2013	27,177,338	21,798,640	80.2 %	5,378,698	16	198 %	33.86 %	946,923	946,928
2014	27,664,507	22,684,376	82.0 %	4,980,131	15	186 %	33.03 % *	918,782	918,782
2015	29,128,985	23,288,983	80.0 %	5,840,002	14	232 %	36.24 % #	937,074	937,075
2016^	28,240,476	24,465,653	86.6 %	3,774,823	13	157 %	35.37 %	865,969	865,969
2017^	29,094,285	25,814,751	88.7 %	3,279,534	12	149 %	35.79 %	814,861	
2018^	30,010,097	26,387,467	87.9 %	3,622,630	11	166 %	39.93 %	893,715	

* Retirement System amended, # Revised actuarial assumptions, ^ Includes assets held in the Unallocated Income Reserve

The Ratio of Valuation Assets to AAL is a traditional measure of a system's funding progress. Except in years when the system is amended or actuarial assumptions are revised, this ratio can be expected to increase gradually toward 100%.

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

SECTION C

SUMMARY OF BENEFIT PROVISIONS AND VALUATION DATA

Brief Summary of Benefit Provisions (December 31, 2018)

ELIGIBILITY	AMOUNT
SERVICE RETIREMENT	
Age 50 with 25 or more years of service or age 60 regardless of service.	Straight life pension equals: 2.7% (Road Patrol and Command) or 2.6% (MSEA – Corrections and Court Security) or 2.5% for 25 years and 1% thereafter (Sheriff) of 3-year Average Final Compensation (AFC) times service (maximum 80% of AFC).
DEFERRED RETIREMENT	
10 or more years of service.	Computed as service retirement but based upon service, AFC and benefit in effect at termination. Benefit begins at date retirement would have occurred had member remained in employment.
DEATH AFTER RETIREMENT SURVIVOR'S PENSION	
Payable to a surviving spouse, if any, upon the death of a retired member who was receiving a straight life pension which was effective July 1, 1975 or later.	Spouse's pension equals 60% of the straight life pension the deceased retiree was receiving.
NON-DUTY DEATH-IN-SERVICE SURVIVOR'S PENSION	
Payable to a surviving spouse, if any, upon the death of a member with 20 or more years of service.	Accrued straight life pension actuarially reduced in accordance with an Option I election.
DUTY DEATH-IN-SERVICE SURVIVOR'S PENSION	
Payable upon the expiration of worker's compensation to the survivors of a member who died in the line of duty.	Same amount that was paid by worker's compensation.
NON-DUTY DISABILITY	
Payable upon the total and permanent disability of a member with 5 or more years of service.	To Age 55: 1.5% of AFC times years of service. At Age 55: 2.0% of AFC times years of service at date of disability.
DUTY DISABILITY	
Payable upon the total and permanent disability of a member in the line of duty.	To Age 55: 50% of AFC. At Age 55: Same as Service Retirement Pension with service credit from date of disability to age 55.
MEMBER CONTRIBUTIONS	
	7.00% of pay for Road Patrol and Command 5.00% of pay for Sheriff 6.27% of pay for MSEA
COVERED COMPENSATION	
Covered compensation includes base salary and longevity pay (and a maximum of 120 hours annual leave for Command Officers).	
NEW HIRES	
The Plan is closed to new hires as of May 4, 2010.	

Sample Benefit Computation

Retiring December 31, 2018

Assumed data in connection with this sample retiree is shown below:

	Data	Description	
A.	\$40,000	Final Average Compensation	
B.	27	Years of Credited Service	
C.	50	Age of Retiree	
D.	60%	Percentage to continue to spouse after retiree's death (this is automatic)	
Sample Computation Steps			Annual Amount
E.	Benefit Formula: $.0270^* \times 27 \times \$40,000 =$		\$29,160
	<u>Benefit payable to:</u>		
F.	Retiree while spouse is alive		\$29,160
G.	Spouse after retiree's death (D x F)		\$17,496
H.	Retiree after spouse's death		\$29,160

* Multiplier for Road Patrol and Command. MSEA and Sheriff, please see page C-1 for multiplier.

Retirees and Beneficiaries Added to and Removed from Rolls Comparative Statement

Year Ended Dec. 31	Added to Rolls		Removed from Rolls		Rolls End of Year				Average Pension
	No.	Annual Pensions*	No.	Annual Pensions*	No.	Active Per Retired	Annual Pensions		
							Dollars	% of Pay	
1984	1	\$ 13,975			5	10.4	\$ 41,250	3.1 %	\$ 8,250
1985	2	17,113			7	7.3	58,363	4.2 %	8,338
1986	1	17,983			8	6.2	76,346	5.4 %	9,543
1987	1	5,000	1	\$ 4,598	8	6.2	76,748	5.1 %	9,594
1988					8	6.2	76,748	5.3 %	9,594
1989	1	18,089			9	5.4	94,837	6.1 %	10,537
1990	2	31,792			11	4.5	126,629	7.5 %	11,512
1991	1	21,571			12	4.3	148,200	8.7 %	12,350
1992		1,249			12	4.4	149,449	8.0 %	12,454
1993	2	33,436	1	9,512	13	3.9	173,373	9.2 %	13,336
1995	6	141,525			19	2.7	314,898	16.5 %	16,574
1996	3	77,573			22	2.3	392,471	20.8 %	17,840
1997	2	42,623			24	2.1	435,094	20.1 %	18,129
1998	1	16,637	2	30,485	23	2.2	421,246	19.8 %	18,315
1999	4	126,856			27	1.8	548,102	27.6 %	20,300
2000					27	1.9	548,102	24.1 %	20,300
2001	6	237,393			33	1.5	785,495	37.0 %	23,803
2002	2	75,760			35	1.6	861,257	37.1 %	24,607
2003	2	71,578			37	1.6	932,835	36.2 %	25,212
2004	1	32,892			38	1.6	965,727	36.6 %	25,414
2005	4	189,430	1	28,225	41 #	1.3	1,126,932	46.4 %	27,486
2006	4	131,590			45 #	1.2	1,258,522	49.4 %	27,967
2007	7	193,662	4	82,120	48 #	1.1	1,370,064	53.5 %	28,543
2008	1	42,748			49 #	1.1	1,412,812	50.4 %	28,833
2009	1	13,617	3	23,433	47 #	1.1	1,402,997	49.7 %	29,851
2010	1	52,177			48 #	1.0	1,455,174	50.0 %	30,316
2011	2	43,616	1	13,617	49 #	1.0	1,485,172	51.2 %	30,310
2012	1	85,795 @			50	0.9	1,570,967	56.1 %	31,419
2013					50	0.9	1,570,967	57.9 %	31,419
2014	1	10,978	1	10,136	50	0.8	1,571,809	58.8 %	31,436
2015	1	13,266			51	0.7	1,585,075	63.1 %	31,080
2016	3	90,481	5	177,235	49	0.8	1,498,321	62.5 %	30,578
2017	2	113,414			51	0.7	1,611,735	73.2 %	31,603
2018	1	57,164			52	0.6	1,668,899	76.4 %	32,094

* Includes adjustments to pensions and beneficiaries of deceased retirees.

Includes newly elected sheriff who is currently active.

@ Includes adjustment for retired sheriff who is no longer also active.

Retirees and Beneficiaries Tabulated by Attained Ages

Attained Ages	No.	Annual Pensions
49	1	\$ 13,266
50	1	57,164
51	2	113,414
52	1	52,728
60	2	69,905
61	3	74,914
62	2	111,003
63	5	199,190
64	1	7,581
65	1	10,978
66	6	218,276
67	3	117,270
68	1	32,779
69	3	144,722
70	1	19,214
71	1	34,181
72	4	134,658
74	1	8,170
76	2	49,556
77	2	33,364
79	2	37,499
80	2	38,283
81	1	27,693
82	1	25,488
83	2	19,620
84	1	17,983
Totals	52	\$1,668,899

Inactive Members

Number: 3
Average Age: 47.7
Average Benefit: \$19,234

Active Members Comparative Schedule

Valuation Date December 31	Members	Active Payroll	Valuation Age	Average		
				Service	Pay	% Inc.
1994	51	\$ 1,994,337	42.3 yrs.	15.6 yrs.	\$ 39,105	5.9 %
1995	51	1,909,710	40.0	13.8	37,445	(4.2)%
1996	50	1,882,428	39.0	13.2	37,649	0.5 %
1997	51	2,160,463	38.8	13.3	42,362	12.5 %
1998	51	2,122,375	39.9	14.3	41,615	(1.8)%
1999	49	1,987,965	39.9	13.6	40,571	(2.5)%
2000	52	2,272,790	40.1	13.9	43,708	7.7 %
2001	51	2,125,397	38.3	11.2	41,674	(4.7)%
2002	55	2,320,797	38.1	10.3	42,196	1.3 %
2003	58	2,574,805	37.3	9.8	44,393	5.2 %
2004	59	2,640,677	36.7	9.8	44,757	0.8 %
2005	54	2,429,380	36.7	9.1	44,989	0.5 %
2006	56	2,547,031	36.1	8.1	45,483	1.1 %
2007	53	2,561,782	36.1	7.8	48,336	6.3 %
2008	55	2,804,077	36.8	8.5	50,983	5.8 %
2009	50	2,825,077	37.8	10.0	56,502	10.8 %
2010	49	2,908,006	38.5	10.6	59,347	5.0 %
2011	48	2,900,866	39.6	11.6	60,435	1.8 %
2012	44	2,802,259	39.9	12.6	63,688	5.4 %
2013	43	2,714,705	41.0	13.7	63,133	(0.9)%
2014	42	2,673,953	41.5	14.8	63,666	0.8 %
2015	38	2,512,598	42.3	15.9	66,121	3.9 %
2016	37	2,397,304	42.9	17.0	64,792	(2.0)%
2017	34	2,202,322	43.1	17.5	64,774	(0.0)%
2018	33	2,183,593	43.9	18.3	66,169	2.2 %

Active Members Added to and Removed from Rolls

Year Ended Dec. 31	Number Added During Year	Terminations During Year										Active Members End of Year
		Normal Retirement		Disability Retirement		Died-in-Service		Vested Term.		Other		
		A	E	A	E	A	E	A	E	A	E	
2009		1	2.15		0.10		0.01		0.23	4	1.78	50
2010		1	1.15		0.10		0.01		0.28		1.13	49
2011			1.00		0.12		0.01	1	0.36		0.82	48
2012		2	1.15		0.14		0.01		0.37	2	0.61	44
2013			1.00		0.14		0.01	1	0.49		0.32	43
2014		1	1.00		0.14		0.01		0.54		0.17	42
2015				1	0.14		0.02	1	0.47	2	0.16	38
2016				1	0.14		0.02		0.41		0.10	37
2017		2	0.60		0.14		0.02	1	0.38		0.06	34
2018		1	0.30		0.12		0.02		0.32		0.05	33

A: Actual
E: Expected

Summary of Reported Asset Information

Balance Sheet as of December 31, 2018

Assets		Reserve for	
Cash & Equivalents	\$ 4,227,484	Employees' Contributions	\$ 2,601,668
Accruals & Receivables#	44,872	Employer Contributions	5,657,846
Common Stock/International Equity	15,072,076	Retired Benefit Payments	15,055,344
U.S. Securities	980,798	Unallocated Income Reserve	1,500,000
Bonds	1,355,425		
Other Debt Securities	2,323,430		
Real Estate	810,773		
Total Current Assets*	\$ 24,814,858	Total Reserves	\$24,814,858

Net of payables

* Includes unallocated income reserve

Receipts and Disbursements for the Indicated Year (Market Value)

	2018	2017
Receipts		
Employees' Contributions	\$151,384	\$154,565
Employer's Contributions	865,969	937,075
Net Investment Return *	(841,051)	2,750,750
Total	176,302	3,842,390
Disbursements		
Benefit Payments	1,606,361	1,545,145
Refund of Member Contributions	0	0
Administrative Expenses	38,371	41,485
Total	1,644,732	1,586,630

* net of investment expenses (\$45,252 in 2018)

SECTION D

**THE VALUATION PROCESS, ACTUARIAL METHODS,
ASSUMPTIONS AND DEFINITION OF TECHNICAL TERMS**

The 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. **Census 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 are established by the Board of Trustees after consulting with the actuary

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

- E. + **Mathematically combining the assumptions, the funding method, and the data**

- F. = Determination of:
 - Plan financial position, and/or
 - New Employer Contribution Rate

Actuarial Methods

Actuarial Cost Method

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

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

Financing of Unfunded Actuarial Accrued Liabilities. The UAAL was amortized by level (principal and interest combined) dollar contributions over 11 years. The UAAL payment reflects any payments expected to be made between the valuation date and the date contributions determined by this report are scheduled to begin.

Assets

The Funding Value of Assets recognizes assumed investment income fully each year. Differences between actual and assumed investment income are phased-in over a closed 5-year period. During periods when investment performance exceeds the assumed rate, funding value of assets will tend to be less than market value. During periods when investment performance is less than the assumed rate, Funding Value of Assets will tend to be greater than market value. The funding value of assets is unbiased with respect to market value. At any time it may be either greater or lesser than Market Value. If actual and assumed rates of investment income are exactly equal for 4 consecutive years, the Funding Value will become equal to market value.

Actuarial Assumptions

The investment return assumption used in the valuation was 7.0% per year, compounded annually net of investment and administrative expenses. The assumed real rate of investment return is the return in excess of pay or price inflation. Considering the pay inflation assumption of 3.5%, this implies a 3.5% real rate of return over wage inflation.

This assumption is used to equate the value of payments due at different points in time and was first used for the December 31, 1995 valuation. Approximate rates of investment return, for the purpose of comparisons with assumed rates, are shown below. Increases in average active member pay are also shown for comparative purposes.

	Year Ended December 31					5-Year Average*
	2018	2017	2016	2015	2014	
Rate of Investment Return	4.8 %	7.9 %	7.0 %	4.9 %	6.0 %	6.1 %
Increase in Average Pay	2.2 %	0.0 %	(2.0)%	3.9 %	0.8 %	1.0 %
Real Rate of Return	2.6 %	7.9 %	9.0 %	1.0 %	5.2 %	5.1 %

* Compound rate of increase.

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 asset value, and B is the end of year asset value.

These rates of return should not be used for measurement of an investment advisor's performance or for comparisons with other systems.

Individual pay increase assumptions are used to project current pays to those upon which benefits will be based. The Base (Economic) assumption was first used for the December 31, 2015 valuation. The Merit and Longevity assumptions were first used for the December 31, 2007 valuation.

Sample Ages	Annual Rate of Pay Increase for Sample Ages		
	Base (Economic)	Merit and Longevity	Total
20	3.5%	3.0%	6.5%
25	3.5%	3.0%	6.5%
30	3.5%	2.6%	6.1%
35	3.5%	1.1%	4.6%
40	3.5%	0.2%	3.7%
45	3.5%	0.2%	3.7%
50	3.5%	0.2%	3.7%
55	3.5%	0.1%	3.6%
60	3.5%	0.0%	3.5%
Ref		170	

The mortality table used to measure post-retirement mortality was the RP-2014 Healthy Annuitant Mortality Table projected to 2025 using a static projection based on the 2-dimensional MP-2014 improvement scales. The assumptions were first used for the December 31, 2015 valuation.

Sample Attained Ages	Single Life Retirement Values			
	Present Value of \$1 Monthly for Life		Future Life Expectancy (years)	
	Men	Women	Men	Women
50	\$151.72	\$156.06	33.92	36.62
55	144.85	149.93	29.56	32.08
60	136.50	142.08	25.34	27.64
65	126.18	132.26	21.26	23.33
70	113.72	120.30	17.37	19.22
75	99.12	106.20	13.73	15.36
80	82.71	90.22	10.42	11.85
Ref:	1220 x 1.00	1221 x 1.00		

For disabled retirements, the healthy retirement rates were set forward 10 years.

Probabilities of retirement for members eligible to retire were:

Retirement Ages	Percent of Active Members Retiring Within Next Year
50	30%
51	20%
52	15%
53	15%
54	15%
55	15%
56	15%
57	15%
58	15%
59	30%
60	100%
Ref	1500

Members are eligible to retire at age 50 with 25 years of service or at age 60 regardless of service. Members were assumed to have rates of retirement that are 50% higher once 30 years of service is reached.

Sample rates of separation from active employment before retirement, death or disability are shown below:

Sample Ages	Years of Service	% Active Members Separating Within Next Year
ALL	0	15.00%
	1	11.25%
	2	8.75%
	3	6.25%
	4	5.63%
25	5 & Over	5.63%
30		4.88%
35		2.88%
40		1.13%
45		0.63%
50		0.63%
55		0.63%
60		0.63%
Ref		29
		1.25
		53

Sample Ages	Probability of Becoming Disabled Within Next Year	
	Men	Women
20	0.07%	0.03%
25	0.09%	0.05%
30	0.10%	0.07%
35	0.14%	0.13%
40	0.21%	0.19%
45	0.32%	0.28%
50	0.52%	0.45%
55	0.92%	0.76%
60	1.53%	1.10%
Ref	33	34

Sample rates of disability are shown above.
50% of disabilities are assumed to be duty-related.

Miscellaneous and Technical Assumptions

December 31, 2018

Marriage Assumption:	80% of males and 80% of females are assumed to be married for purposes of death-in-service benefits. Male spouses are assumed to be three years older than female spouses.
Pay Increase Timing:	Beginning of (Fiscal) year. This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date.
Decrement Timing:	Decrements of all types are assumed to occur mid-year.
Eligibility Testing:	Eligibility for benefits is determined based upon the age nearest birthday and exact fractional service.
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. They also do not operate during retirement eligibility.
Loads:	Age and Service Retirement Present Values were loaded by 4% to account for the additional amount included in the FAC due to military service purchases and lump sum payments at retirement.
Benefit Option Factors:	Benefit option factors are based upon 7.0% interest and the 1971 GA Mortality Table 100% Unisex Blend.
Incidence of Contributions:	Contributions are assumed to be received continuously throughout the year.
Data Adjustments	<ul style="list-style-type: none">• Pays were adjusted for active members on Worker's Compensation or Leave of Absence for part of the valuation year.• Benefits for new terminated vested members were established based on reported Final Average Compensation (FAC), reported service, and reported benefit group.• For new terminated vested members, unless spouse information is reported, male spouses are assumed to be three years older than female spouses.

Glossary

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

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

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

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

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

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

Actuary. A person who is trained in the applications of probability and compound interest to problems in business and finance that involve payment of money in the future, contingent upon the occurrence of future events. Most actuaries in the United States are Members of the American Academy of Actuaries. The Society of Actuaries is an international research, education and membership organization for actuaries in the life and health insurance, employee benefits, and pension fields. It administers a series of examinations leading initially to Associateship and the designation ASA and ultimately to Fellowship with the designation FSA.

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 differences between assumed and actual investment return in dollar installments over five years. The treatment removes the timing of investment activities from the valuation process.

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

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

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

SECTION E

SUPPLEMENTAL INFORMATION

Supplementary Information Schedule of Funding Progress (Dollar Amounts in Millions)

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) Entry Age (b)	Unfunded AAL (UAAL) (b)-(a)	Funded Ratio (a)/(b)	Covered Payroll (c)	UAAL as a Percent of Covered Payroll [(b)-(a)]/(c)
12/31/04	\$23.3	\$20.0	\$(3.4)	116.8%	\$2.6	-
12/31/05	22.9	20.3	(2.6)	113.0%	2.4	-
12/31/06	22.9	21.2	(1.7)	108.0%	2.5	-
12/31/07*#	23.7	21.8	(1.8)	108.4%	2.6	-
12/31/08	23.0	22.8	(0.2)	100.8%	2.8	-
12/31/09#	22.5	23.3	0.9	96.3%	2.8	30.2%
12/31/10*	22.2	24.7	2.5	89.8%	2.9	86.4%
12/31/11	21.5	25.4	3.9	84.6%	2.9	135.4%
12/31/12	20.9	26.7	5.8	78.3%	2.8	206.5%
12/31/13	21.8	27.2	5.4	80.2%	2.7	198.1%
12/31/14	22.7	27.7	5.0	82.0%	2.7	186.2%
12/31/15#	23.3	29.1	5.8	80.0%	2.5	232.4%
12/31/16^	24.5	28.2	3.8	86.6%	2.4	157.5%
12/31/17^	25.8	29.1	3.3	88.7%	2.2	148.9%
12/31/18^	26.4	30.0	3.6	87.9%	2.2	165.9%

* Benefit provisions changed.

Revised actuarial assumptions.

^ Actuarial value of assets includes assets held in the Unallocated Income Reserve.

Schedule of Employer Contributions

Fiscal Year Beginning January 1	Annual Calculated Contribution	Actual Contributions	Percent Contributed
2007	\$ 74,995	\$ 74,995	100 %
2008	200,291	200,291	100 %
2009	155,073	155,073	100 %
2010	395,849	395,849	100 %
2011	445,066	445,066	100 %
2012	657,441	657,441	100 %
2013	798,874	798,874	100 %
2014	984,068	984,068	100 %
2015	946,923	946,928	100 %
2016	918,782	918,782	100 %
2017	937,074	937,075	100 %
2018	865,969	865,969	100 %
2019	814,861	N/A	N/A
2020	893,715	N/A	N/A

Summary of Actuarial Methods and Assumptions

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

Valuation date	December 31, 2018
Actuarial cost method	Entry age actuarial cost method
Amortization method	Level dollar
Remaining amortization period	11 years, closed
Asset valuation method	5-year smoothed market
Actuarial assumptions:	
Investment rate of return	7.0%
Projected salary increases*	3.5% - 6.5%
Cost-of-living adjustments	N/A
<hr/>	
*Includes wage inflation at	3.5%