Charter Township of Ypsilanti
Police and Firefighter's Retirement System
Fifty-Fourth Annual Actuarial Valuation Report
December 31, 2017

Outline of Contents

GRS Retirement Consulting

800.521.0498 | P: 248.799.9000 | F: 248.799.9020 | www.grsconsulting.com

August 24, 2018

Retirement Board
Charter Township of Ypsilanti
Police and Firefighter's Retirement System
7200 South Huron River Drive
Ypsilanti, Michigan 48197

Dear Board Members:

Submitted in this report are the results of the Fifty-Fourth Annual Actuarial Valuation of the assets, actuarial values and contribution requirements associated with benefits provided by the Charter Township of Ypsilanti Police and Firefighter's Retirement System (the Retirement System), which is based on Act No. 345 of the Public Acts of 1937, as amended. This report replaces our original report dated July 2, 2018 to reflect a 6.50% assumed investment return and a closed 20-year amortization of the unfunded actuarial accrued liability.

The date of the valuation was December 31, 2017.

Valuation results and conclusions are contained in Section A.

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

This report was prepared at the request of the Retirement System and is intended for use by the Retirement System and those designated or approved by the Retirement System. This report may be provided to parties other than the Retirement System only in its entirety and only with the permission of the Retirement System. GRS is not responsible for unauthorized use of this report.

The purpose of the valuation is to measure the System's funding progress and to determine the employer contribution rate for the fiscal year beginning January 1, 2019. A separate report will be issued for this plan for GASB Statement Nos. 67 and 68.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law.

The valuation was based upon information, furnished by the Township Treasurer, concerning Retirement System benefits, financial transactions, and individual members, terminated members, retirees and beneficiaries. Data was checked for year-to-year consistency, but was not audited by us. We are not responsible for the accuracy or completeness of the information provided by the Township. This information is summarized in Section B.

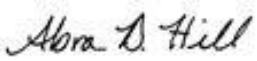
The contribution rate in this report is determined using the actuarial assumptions and methods disclosed in Section C of this report. This report does not include a robust assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of the risks was outside the scope of this assignment. We encourage a review and assessment of investment and other significant risks that may have a material effect on the plan's financial condition.

The individuals preparing this report have substantial experience valuing public employee retirement systems. To the best of our knowledge, this report is complete and accurate and was made in accordance with standards of practice promulgated by the Actuarial Standards Board of the American Academy of Actuaries. The actuarial assumptions used for the valuation are reasonable individually and in the aggregate.

The signing individuals are independent of the plan sponsor.

Abra D. Hill and Derek Henning are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

Respectfully submitted,



Abra D. Hill, ASA, MAAA

Derek Henning, ASA, MAAA

David L. Hoffman

ADH/DH/DLH:ah

SECTION A

PENSION VALUATION RESULTS, COMMENTS, AND CONCLUSION

Financial Objective

The financial 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 have to be increased for future generations of citizens. This objective meets the requirements of Act No. 345 of the Public Acts of 1937, as amended, and the Michigan Constitution.

Contribution Rates

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

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

(1) cover the actuarial present value of benefits assigned to the current year by the actuarial cost methods described in Section C (the normal cost); and

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

Contribution requirements for the fiscal year beginning January 1, 2019 are shown on page A-2 for pensions.

Contributions Computed to Meet the Financial Objective of the Retirement System for the Fiscal Year Beginning January 1, 2019

Contributions for	Contributions for Pensions Expressed as Percents of Payroll			
	Base	Demographic Assumption Change	Demographic & Interest Rate Assumption Change	Demographic, Interest Rate & Amortization Policy Change (FINAL)
Interest Rate Assumption	7.25 %	7.25 %	6.50 %	6.50 %
Wage Inflation Assumption	3.50 %	3.50 %	3.00 %	3.00 %
Price Inflation Assumption	3.00 %	3.00 %	2.50 %	2.50 %
Amortization Period	Layered (12-15 yrs)	Layered (12-15 yrs)	Layered (12-15 yrs)	20 yrs
Normal Cost				
Age & service benefits	19.64 %	20.77 %	23.37 %	23.37 %
Death and disability benefits	1.84	1.85	2.06	2.06
Termination benefits				
Deferred age & service benefits	0.67	0.68	0.79	0.79
Refunds of member contributions	0.37	0.37	0.37	0.37
Administrative Expense	1.02	1.02	1.03	1.03
Total Normal Cost	23.54	24.69	27.62	29.21
Total Unfunded Actuarial Accrued Liability[(1)]	23.24	24.28	35.18	26.20
Total Contribution Requirement	46.78 %	48.97 %	62.80 %	53.82 %
Member portion	6.00 %	6.00 %	6.00 %	6.00 %
Township's Required Employer Contribution	40.78 %	42.97 %	56.80 %	47.82 %
Township's Required Employer Contribution Expressed as Dollar Amount	**$ 859,971**	**$ 906,153**	**$ 1,186,256**	**$ 998,711**
Funded Ratio	**85.20 %**	**84.60 %**	**78.60 %**	**78.60 %**

(1) Unfunded Actuarial Accrued Liability was financed as level percents of member payroll.

The characteristics of this method of amortizing unfunded actuarial accrued liabilities are illustrated on page C-3.

Procedures for determining dollar contribution amounts are described on page A-3.

Comparative contribution amounts for prior fiscal years are shown on page A-7.

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 (based on a 6.50% assumed rate of investment return):

(1) Contribute dollar amounts at the end of each payroll period which are equal to the Township's percent-of-payroll contribution requirement, 47.82%, 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 special payments that are covered compensation.

(2) Contribute $998,711 in approximately equal installments during the fiscal year beginning January 1, 2019. This dollar amount was derived by multiplying the percent-of-payroll contribution requirement, 47.82%, by the December 31, 2017 valuation payroll including payroll for DROP members, $1,968,592, projected to the fiscal year beginning January 1, 2019. The projection factor is equal to 1.0609 (1.030^2).

Financial Objective Achievement Tests

The Retirement System's financial objective is to meet long-term benefit promises through contributions that remain approximately level from year to year as a percent of active member payroll. If the contributions to the System are level in concept and soundly executed, the System will ***pay all promised benefits when due -- the ultimate test of financial soundness***. Testing for level contribution rates is ***the long-term solvency test***. Year-by-year computed contribution rates are displayed on page A-7.

There is no single all-encompassing test to measure a retirement system's funding progress and current funded status. Measures based on the actuarial accrued liability are shown on page A-5, and are described below.

The ratio of valuation assets to the actuarial accrued liability - The ratio is expected to gradually move toward 100% in the absence of benefit changes and changes in actuarial assumptions. This ratio is appropriate for assessing the need for future contributions but it is not appropriate for assessing the sufficiency of plan assets to cover the cost of settling the plan's benefit obligation.

The ratio of the unfunded actuarial accrued liability to member payroll. In a soundly financed retirement system, the amount of the unfunded actuarial accrued liability will be controlled and prevented from increasing in the absence of benefit changes or strengthening of actuarial assumptions. However, in an inflationary environment it is seldom practical to impose this control on dollar amounts which are depreciating in value. The ratio is a relative index of condition where inflation is present in both items. The ratio is expected to gradually decrease in the absence of benefit changes and changes in actuarial assumptions.

Financial Objective Achievement Tests and Risk Measures - Comparative Statement

Valuation Date December 31,	(1) Valuation Assets	(2) Member Payroll		(3) Actuarial Accrued Liability**	Unfunded Accrued Liability** Funded Ratio (1) / (3)	(4) Dollars (3) - (1)	% of Payroll (4) / (2)	Amortization Period Years	Assets / Payroll (1) / (2)	AAL / Payroll (3) / (2)
1990	$ 9,989,626	$ 1,289,090		$ 9,748,955	102	$ (240,671)	- %	N/A	7.7	7.6
1995	14,957,910	1,463,341		10,935,241	137	(4,022,669)	-	N/A	10.2	7.5
2000	22,122,513	1,850,554		15,010,643	147	(7,111,870)	-	N/A	12.0	8.1
2005 @#	24,105,951	2,449,553		20,780,318	116	(3,325,633)	-	N/A	9.8	8.5
2006	25,338,997	2,422,211		21,766,018	116	(3,572,979)	-	N/A	10.5	9.0
2007	27,173,331	2,752,251		23,911,443	114	(3,261,888)	-	N/A	9.9	8.7
2008	27,097,583	2,641,821		24,935,159	109	(2,162,424)	-	N/A	10.3	9.4
2009 @	27,211,032	2,669,178		26,117,456	104	(1,093,576)	-	N/A	10.2	9.8
2010 #	27,042,094	1,879,944	*	28,278,783	96	1,236,689	66	15	14.4	15.0
2011	26,161,102	2,046,691	*	29,478,634	89	3,317,532	162	15	12.8	14.4
2012	25,629,166	1,967,312	*	29,842,164	86	4,212,998	214	15	13.0	15.2
2013 @	27,178,122	1,768,793	*	31,850,507	85	4,672,385	264	15	15.4	18.0
2014	27,335,154	2,016,307	*	32,058,665	85	4,723,511	234	15	13.6	15.9
2015	27,526,195	1,934,576	*	31,803,061	87	4,276,866	221	14-15	14.2	16.4
2016	28,170,351	1,826,564	*	32,684,010	86	4,513,659	247	13-15	15.4	17.9
2017	**28,429,784**	**1,968,592**	*	**33,365,407**	**85**	**4,935,623**	**251**	**12-15**	**14.4**	**16.9**
2017 @	**28,429,784**	**1,968,592**	*	**36,152,816**	**79**	**7,723,032**	**392**	**20**	**14.4**	**18.4**

@ After changes in actuarial assumptions or methods.
 # After changes in benefit provisions.
*** Prior to the 1998 valuation, the present value of credited projected benefits, and the unfunded present value, are reported.*
** Includes DROP payroll.*

The Short Condition Test is another way of looking at a system's progress under its funding program - based on the actuarial accrued liability. In a short condition test, the plan's valuation assets are compared with: 1) active member contributions on deposit; 2) the liabilities for future benefits to present retired lives; and 3) the liabilities allocated to service already rendered by active members. In a system that has been following the discipline of level percent-of-payroll financing, the liabilities for active member contributions on deposit (liability 1) and the liabilities for future benefits to present retired lives (liability 2) will be fully covered by valuation assets (except in rare circumstances). In addition, the liabilities assigned to service already rendered by active members (liability 3) will be partially covered by the remainder of valuation assets. The larger the funded portion of liability 3, the stronger the condition of the system. Liability 3 being fully funded is not necessarily the by-product of level percent-of-payroll funding methods.

The schedule below illustrates the history of liabilities 1, 2 and 3.

Short Condition Test
Comparative Statement

Val. Date Dec. 31,	Actuarial Accrued Liability** (1) Active Member Contr.	(2) Retirants and Beneficiaries	(3) Active Members (Employer Financed Portion)	Valuation Assets	Portion of Accrued Liability Covered by Assets (1)	(2)	(3)
1990	$ 461,893	$ 6,261,508	$ 3,025,554	$ 9,989,626	100 %	100 %	108 %
1995	559,516	7,435,931	2,939,794	14,957,910	100	100	237
2000	922,965	7,633,537	6,454,141	22,122,513	100	100	210
2005 @#	1,272,365	10,771,503	8,736,450	24,105,951	100	100	138
2006	1,377,974	11,278,705	9,109,339	25,338,997	100	100	139
2007	1,568,703	10,959,266	11,383,474	27,173,331	100	100	129
2008	1,680,491	11,332,133	11,922,535	27,097,583	100	100	118
2009 @	1,641,145	13,081,874	11,394,437	27,211,032	100	100	110
2010 #	1,175,561	20,118,278	6,984,944	27,042,094	100	100	82
2011	1,284,439	19,841,003	8,353,192	26,161,102	100	100	60
2012	1,233,553	21,009,022	7,599,589	25,629,166	100	100	45
2013 @	1,326,944	21,925,774	8,597,789	27,178,122	100	100	46
2014	1,332,517	22,514,850	8,211,298	27,335,154	100	100	42
2015	1,435,090	21,828,833	8,539,138	27,526,195	100	100	50
2016	1,289,997	23,350,789	8,043,224	28,170,351	100	100	44
2017	**1,022,496**	**26,400,921**	**5,941,990**	**28,429,784**	**100**	**100**	**17**
2017 @	**1,022,496**	**28,148,714**	**6,981,606**	**28,429,784**	**100**	**97**	**0**

@ After changes in actuarial assumptions or methods.
 # After changes in benefit provisions.
*** Prior to the 1998 valuation, the present value of credited projected benefits is shown.*

Computed and Actual Township Contributions
Comparative Statement

Fiscal Year Beg. January 1,	Valuation Date December 31,	Valuation Payroll	Fiscal Year Contributions		
			Computed % of Pay Contrib.	Computed Dollar Contrib. **	Actual Dollar Contrib. &
1992	1990	$ 1,289,090	21.69 %	$ 298,957	$ 378,366
1997	1995	1,463,341	3.01	47,095	49,162
2002	2000	1,850,554	0	0	0
2007	2005 @#	2,449,553	5.79	149,851	149,851
2008	2006	2,422,211	4.85	124,122	136,559
2009	2007	2,752,251	7.97	231,762	231,762
2010	2008	2,641,821	10.91	304,525	304,525
2011	2009 @	2,669,178	14.96	421,895	421,895
2012	2010 #	1,879,944 *	23.78	472,337	472,337
2013	2011	2,046,691 *	31.81	687,878	687,878
2014	2012	1,967,312 *	36.09	750,163	759,462
2015	2013 @	1,768,793 *	39.96	737,867	737,867
2016	2014	2,016,307 *	36.53	789,018	789,018
2017	2015	1,934,576 *	36.86	763,874	763,874
2018	2016	1,826,564 *	40.20	786,578	
2019	**2017**	**1,968,592 ***	**40.78**	**859,971**	
2019	**2017 @**	**1,968,592 ***	**47.82**	**998,711**	

@ After changes in actuarial assumptions or methods.
 # After changes in benefit provisions.
** Includes DROP payroll.*
*** Includes payroll projection factor beginning with the 1981 valuation. The current projection factor is 1.0609.*
& Prior to 1994 fiscal year actual contribution equals total Township contribution less amounts paid for post-retirement health insurance benefits.

Comments and Conclusion

Comment A: Overall actuarial experience for the year ended December 31, 2017 was less favorable than anticipated, as shown in the gain (loss) derivation on page A-15. The System experienced an actuarial loss of $543,841.

The loss is primarily attributed to higher than expected average final compensation for retirement occurring during the year, lower than expected retiree mortality and other active decrement experience deviating from expectations.

Comment B: Subsequent to the December 31, 2016 actuarial valuation, the Board of Trustees elected to review the actuarial assumptions in conjunction with the December 31, 2017 actuarial valuation. This valuation reflects our recommend assumption changes, with the assumed rate of investment return assumption having the largest impact.

Based on our analysis that follows, the rate of return assumption of 7.25% is now outside the reasonable range. Column 5 of Exhibit 2 shows the estimated probability of achieving the 7.25% assumed rate of return over a 10-year period with the current asset mix. The average probability of achieving 7.25% over 10 years is 34%.

We recommended lowering the assumed rate of return assumption. At the August 8, 2018 Retirement Board meeting the Board adopted a 6.50% interest rate assumption. We believe a 6.50% assumed rate of return is within the bounds of what is considered reasonable. Our analysis performed during the assumption review is below.

The determination of the assumed rate of interest that the actuary uses is governed by the Actuarial Standards of Practice (ASOP), which were most recently revised for valuation dates on or after September 30, 2014. While GRS is not an investment consultant, nor do we provide investment advice, we seek out the advice of investment professionals when developing the assumed rate of return. GRS does this through our Capital Market Assumption Modeler (CMAM), which investigates the investment return assumption for our clients in conjunction with the ASOP. Using a system's asset allocation, future expectations of various investment consultants are analyzed and summarized.

CMAM developed projected real returns based on the asset allocation as of December 31, 2017 for the Charter Township of Ypsilanti Police and Firefighter's Retirement System and 2018 capital market return assumptions from twelve investment consulting firms. Many in the actuarial community interpret ASOP No. 27 by developing a range between the expected geometric return (see 50th percentile shown in column (3) of Exhibit 2) and the expected arithmetic return (see column (6) of Exhibit 1). Based on a long-term inflation expectation of 2.50%, and the average of the twelve investment consultants' expectations measured by CMAM, this would result in a range of 5.79% to 6.36%.

Comments and Conclusion

Nothing in this report should be construed as GRS giving investment advice.

To the best of our ability, we have adapted the System's investment policy to fit with the twelve consultants' assumptions adjusting for these known differences in assumptions and methodology. In the following charts, all returns are net of investment expenses and have no assumption for excess manager performance.

For purposes of this analysis, we have reviewed the following investment allocation based on the asset allocation as of December 31, 2017:

Asset Class	Current Allocation
Cash	2.1%
Stocks	54.3%
Bonds	34.3%
Real Estate	9.3%
Total	100.0%

Investment Return Expectations of Various Investment Consultants

Exhibit 1: Arithmetic Return

Investment Consultant	Investment Consultant Expected Nominal Return	Investment Consultant Inflation Assumption	Expected Real Return (2)–(3)	Actuary Inflation Assumption	Expected Nominal Return (4)+(5)	Investment Expenses	Expected Nominal Return Net of Expenses (6)-(7)	Standard Deviation of Expected Return (1-Year)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	5.46%	2.20%	3.26%	2.50%	5.76%	0.00%	5.76%	12.38%
2	5.66%	2.21%	3.44%	2.50%	5.94%	0.00%	5.94%	11.56%
3	6.03%	2.50%	3.53%	2.50%	6.03%	0.00%	6.03%	11.15%
4	5.87%	2.25%	3.62%	2.50%	6.12%	0.00%	6.12%	10.59%
5	5.88%	2.26%	3.62%	2.50%	6.12%	0.00%	6.12%	9.66%
6	6.16%	2.50%	3.66%	2.50%	6.16%	0.00%	6.16%	11.53%
7	5.87%	2.00%	3.87%	2.50%	6.37%	0.00%	6.37%	10.50%
8	6.18%	2.31%	3.87%	2.50%	6.37%	0.00%	6.37%	11.08%
9	5.94%	2.00%	3.94%	2.50%	6.44%	0.00%	6.44%	9.69%
10	6.48%	2.26%	4.22%	2.50%	6.72%	0.00%	6.72%	12.04%
11	6.21%	1.95%	4.26%	2.50%	6.76%	0.00%	6.76%	11.03%
12	6.98%	2.00%	4.98%	2.50%	7.48%	0.00%	7.48%	10.44%
Average	**6.06%**	**2.20%**	**3.86%**	**2.50%**	**6.36%**	**0.00%**	**6.36%**	**10.97%**

Comments and Conclusion

Exhibit 2: Geometric Return

Investment Consultant	Distribution of 10-Year Average Geometric Net Nominal Return			Probability of Exceeding	Probability of Exceeding	Probability of Exceeding	Probability of Exceeding
	40th	50th	60th	7.25%	6.50%	6.25%	6.00%
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	4.06%	5.04%	6.03%	28.64%	35.43%	37.82%	40.27%
2	4.41%	5.32%	6.24%	29.87%	37.29%	39.90%	42.57%
3	4.57%	5.45%	6.34%	30.48%	38.24%	40.97%	43.76%
4	4.76%	5.59%	6.44%	31.06%	39.31%	42.21%	45.16%
5	4.92%	5.69%	6.46%	30.47%	39.48%	42.66%	45.90%
6	4.63%	5.54%	6.46%	31.92%	39.55%	42.21%	44.92%
7	5.02%	5.85%	6.69%	33.68%	42.23%	45.20%	48.21%
8	4.93%	5.80%	6.69%	33.96%	42.07%	44.89%	47.73%
9	5.23%	6.00%	6.78%	34.19%	43.52%	46.75%	50.02%
10	5.10%	6.05%	7.01%	37.55%	45.23%	47.85%	50.49%
11	5.32%	6.19%	7.07%	38.06%	46.48%	49.35%	52.23%
12	6.15%	6.98%	7.81%	46.73%	55.84%	58.84%	61.80%
Average	**4.92%**	**5.79%**	**6.67%**	**33.88%**	**42.06%**	**44.89%**	**47.76%**

Comment C: The assumption & method changes incorporated into this valuation are summarized as follows:

- Lower the Assumed Rate of Investment Return from 7.25% to 6.50%.
- Lower the Price Inflation Assumption from 3.00% to 2.50%.
- Lower the Wage Inflation Assumption from 3.50% to 3.00%.
- Increase the Average Final Compensation load of 5% to 10% when projecting future normal retirement benefits.
- Update the mortality improvement scale from MP-2014 to MP-2017 and incorporate fully-generational improvements.
- Finance the Unfunded Actuarial Accrued Liabilities over a closed 20-year period.

The change in actuarial assumptions increased the unfunded actuarial liability by $2,787,409 increased the employer contribution rate from $859,971 (40.78% of active payroll) to $998,711 (47.82% of active payroll) and decreased the funded ratio from 85.2% to 78.6%.

Comments and Conclusion (concluded)

Comment D: Market experience in 2017 was favorable and the rate of return on the Market Value of Assets was 9.36%. However, due to the 5-year asset smoothing, the recognized rate of return was 7.13%, slightly lower than the assumed rate of return of 7.25%. As of December 31, 2017, the funding value of assets exceeds the market value of assets. For reference, the employer contribution rate would have been 49.22% of payroll, if valuation assets were set to market value for this valuation. This means we expect the contribution rate to approach 49.22% of payroll in the next few years. Note the long-term employer expected contribution rate is 21.62%, the employer normal cost. The funded ratio on the basis of the market value of assets is 77.5%.

Comment E: On May 26, 2015, the Board adopted an Actuarial Funding Policy to establish funding objectives and policy ensuring systematic funding of future benefit payments for members of the Retirement System. The amortization method changed from amortizing the Unfunded Actuarial Accrued Liability (UAAL) as level percent of payroll over an open 15-year period to a level percent of payroll fixed period layered amortization by source of UAAL. The initial UAAL as of December 31, 2014 was financed over a closed period of 15 years.

Unfunded liabilities associated with experience deviations, benefit changes, or assumption changes may be amortized over a closed period not exceeding 15 years beginning with the valuation year in which they arise. Unfunded liabilities arising from benefit increases provided to retirees or in conjunction with early retirement incentive programs may be amortized over a period of not exceeding 5 years.

On August 8, 2018, the Board adopted to finance the UAAL as of the December 31, 2017 valuation over a closed period of 20-years. The Actuarial Funding Policy in Section D has been updated to reflect the adopted amortization period and method.

***Comment F*:** As a result of the 2010 Early Retirement Incentive, the ratio of active to retired members decreased from 0.7 in 2009 to 0.4 in 2010. This is an indication of a super mature plan and is expected to persist for several years. Super mature plans may have large changes in contribution rates from year to year because payroll is small relative to the actuarial accrued liability. For reference, the ratio of actuarial accrued liability to payroll is now approximately 19 to 1. The ratio of assets to payroll is approximately 14 to 1. This means that a 10% change in assets is roughly 140% of payroll. This year's loss on the market value of assets of $0.4 million was 23% of payroll. This volatility is managed through the 5-year asset smoothing and the System's amortization policy of the unfunded actuarial accrued liability.

Conclusion: The Township's contribution (member contributions are additional) to the Retirement System, for the fiscal year beginning January 1, 2019, has been computed to be 47.82% of active member payroll or $998,711. Contributing this amount conforms to the requirements of PA 728 of 2003.

Other Observations

General Implications of Contribution Allocation Procedure or Funding Policy on Future Expected Contributions and Funded Status

Given the System's contribution allocation procedure, if all actuarial assumptions are met (including the assumption of the Retirement System earning 6.50% on the Market Value of Assets), it is expected that:

1. The employer normal cost is sufficient to cover the cost of benefits accruing each year;
2. The Unfunded Actuarial Accrued Liabilities (UAAL) will be fully amortized after 20 years; and
3. The funded status of the Retirement System will continue to increase gradually towards a 100% funded ratio.

Limitations of Funded Status Measurements

Unless otherwise indicated, a funded status measurement presented in this report is based upon the Actuarial Accrued Liability (AAL) and the Funding Value of Assets (FVA). Unless otherwise indicated, with regard to any funded status measurements presented in this report:

1. The measurement is inappropriate for assessing the sufficiency of Retirement System assets to cover the estimated cost of settling the Retirement and Benefit System's benefit obligations, for example: transferring the liability to an unrelated third party in a market value type transaction.
2. The measurement is dependent upon the Actuarial Cost Method which, in combination with the Retirement System's amortization policy, affects the timing and amounts of future contributions. The amounts of future contributions will most certainly differ from those assumed in this report due to future actual experience differing from assumed experience based upon the actuarial assumptions. A funded status measurement in this report of 100% is not synonymous with no required future contributions. Even though the funded status is over 100%, the Retirement System would still require future normal cost contributions (i.e., contributions to cover the cost of active membership accruing an additional year of service credit).
3. The measurement would produce a different result if the Market Value of Assets (MVA) were used instead of the FVA, unless the MVA is used in the measurement.

Other Observations

Limitations of Project Scope

Actuarial standards do not require the actuary to evaluate the ability of the plan sponsor or other contributing entities to make required contributions to the plan when due. Such an evaluation was not within the scope of this project and is not within the actuary's domain of expertise. Consequently, the actuary performed no such evaluation.

Risks to Future Employer Contribution Requirements

There are ongoing risks to future employer contribution requirements to which the Retirement System is exposed, such as:

- Actual and Assumed Investment Rate of Return
- Actual and Assumed Mortality Rates
- Amortization Policy

Actuarial Balance Sheet - December 31, 2017

Present Resources and Expected Future Resources

A. Valuation assets:	
1. Net assets (market value)	$28,029,742
2. Valuation adjustment	400,042
3. Valuation assets	28,429,784
B. Actuarial present value of expected future employer contributions:	
1. For normal costs	2,742,942
2. For unfunded actuarial accrued liabilities	7,723,032
3. Total	10,465,974
C. Actuarial present value of expected future member contributions	851,498
D. Total Actuarial Present Value of Present and Expected Future Resources	$39,747,256

Actuarial Present Value of Expected Future Benefit Payments and Reserves

A. To retirants and beneficiaries	$28,148,714
B. To vested terminated members	0
C. To present active members:	
1. Allocated to service rendered prior to valuation date	8,004,102
2. Allocated to service likely to be rendered after valuation date	3,594,440
3. Total	11,598,542
D. Total Actuarial Present Value of Expected Future Benefit Payments	$39,747,256

Derivation of Actuarial Gain (Loss)
Year Ended December 31, 2017

The actuarial gains or losses realized in the operation of the Retirement System provide an experience test. Actual experience will never (except by coincidence) coincide exactly with assumed experience. It is expected that gains and losses will cancel each other over a period of years, but sizeable 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.

	(A) Actuarial Accrued Liability	(B) Valuation Assets	(C) = (A) - (B) UAAL*
(1) Value at start of year	$ 32,684,010	$28,170,351	$ 4,513,659
(2) Total normal cost from last valuation	436,506	0	436,506
(3) Actual Township and member contributions for pensions	0	869,912	(869,912)
(4) Benefit payments & administrative expenses	(2,559,613)	(2,559,613)	0
(5) Interest accrual: (1) x .0725 + [(2) + (3) +(4)] x .03625	2,292,628	1,981,099	311,529
(6) Expected value before changes: (1) + (2) + (3) + (4) +(5)	$ 32,853,531	$ 28,461,749	$ 4,391,782
(7) Change from benefit changes	none	none	none
(8) Change from revised actuarial assumptions/methods	2,787,409	none	2,787,409
(9) Expected value after changes: (6) + (7) + (8)	$ 35,640,940	$ 28,461,749	$ 7,179,191
(10) Actual value at end of year	36,152,816	28,429,784	7,723,032
(11) Gain (loss): (9) - (10)	$ (511,876)	$ 31,965	$ (543,841)
(12) Gain (loss) as percent of actuarial accrued liabilities at start of year ($32,684,010)	Loss (1.57%)	Loss 0.10%	Loss (1.66%)

* *Unfunded Actuarial Accrued Liability.*

Year Ended December 31,	Actuarial Gain (Loss) As % of Beginning Accrued Liabilities
2008	(4.1) %
2009	(1.6)
2010	(0.9)
2011	(7.3)
2012	(2.4)
2013	4.0
2014	(0.4)
2015	1.1
2016	(1.3)
2017	**(1.7)**

Schedule of Funding Progress

Actuarial Valuation Date December 31,	(a) Actuarial Value of Assets	(b) Entry Age Actuarial Accrued Liability	(b-a) Unfunded Accrued Liability (UAL)	(a/b) Funded Ratio	(c) Annual Covered Payroll	[(b-a)/c] UAL as a Percentage of Covered Payroll
1995	$ 14,957,910	$ 11,098,119	$ (3,859,791)	135 %	$ 1,463,341	- %
1996	15,848,190	11,672,783	(4,175,407)	136	1,637,213	-
1997	17,102,734	12,005,001	(5,097,733)	142	1,660,635	-
1998	18,868,177	12,486,609	(6,381,568)	151	1,658,459	-
1999 #	20,704,196	14,433,723	(6,270,473)	143	1,862,245	-
2000	22,122,513	15,010,643	(7,111,870)	147	1,850,554	-
2001	23,036,055	15,848,237	(7,187,818)	145	1,972,538	-
2002	23,738,457	16,957,687	(6,780,770)	140	1,977,181	-
2003	23,632,588	18,055,207	(5,577,381)	131	2,143,204	-
2004	23,815,715	19,060,810	(4,754,905)	125	2,274,281	-
2005 #	24,105,951	20,780,318	(3,325,633)	116	2,449,553	-
2006	25,338,997	21,766,018	(3,572,979)	116	2,422,211	-
2007	27,173,331	23,911,443	(3,261,888)	114	2,752,251	-
2008	27,097,583	24,935,159	(2,162,424)	109	2,641,821	-
2009	27,211,032	26,117,456	(1,093,576)	104	2,669,178	-
2010 #	27,042,094	28,278,783	1,236,689	96	1,879,944	66
2011	26,161,102	29,478,634	3,317,532	89	2,046,691	162
2012	25,629,166	29,842,164	4,212,998	86	1,967,312	214
2013 @	27,178,122	31,850,507	4,672,385	85	1,768,793	264
2014	27,335,154	32,058,665	4,723,511	85	2,016,307	234
2015	27,526,195	31,803,061	4,276,866	87	1,934,576	221
2016	28,170,351	32,684,010	4,513,659	86	1,826,564	247
2017 @	**28,429,784**	**36,152,816**	**7,723,032**	**79**	**1,968,592**	**392**

 # After changes in benefit provisions.
@ After changes in actuarial assumptions.

Schedule of Employer Contributions

Year Ending December 31,	Annual Required Contribution	Percent Contributed
1995	$147,354	102.3 %
1996	124,167	104.4
1997	47,095	104.4
1998	40,787	116.7
1999	0	100.0
2000	0	100.0
2001	0	100.0
2002	0	100.0
2003	0	100.0
2004	0	100.0
2005	0	100.0
2006	72,708	100.0
2007	149,851	100.0
2008	124,122	110.0
2009	231,762	100.0
2010	304,525	100.0
2011	421,895	100.0
2012	472,337	100.0
2013	687,878	100.0
2014	750,163	101.2
2015	737,867	100.0
2016	789,018	100.0
2017	763,874	100.0

SECTION B

SUMMARY OF BENEFIT PROVISIONS AND VALUATION DATA

Brief Summary of Act 345 Benefit Conditions Evaluated (December 31, 2017)

Eligibility	Amount
SERVICE RETIREMENT	
25 or more years of service regardless of age or age 60 regardless of service. Military service prior to employment may be purchased.	**Employees hired before 1/1/2014:** Straight life pension equals 3.0% of 3-year average final compensation (AFC) times first 25 years of service plus 1% of AFC times years of service in excess of 25 years. **Employees hired on or after 1/1/2014:** Straight life pension equals 2.35% of 3-year average final compensation (AFC) times first 25 years of service plus 1% of AFC times years of service in excess of 25 years.
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.
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.

Brief Summary of Act 345 Benefit Conditions Evaluated (December 31, 2017)

Eligibility	Amount
NON-DUTY DISABILITY	
Payable upon the total and permanent disability of a member with 5 or more years of service.	Medical Disability Retirement as described in Act 345 of Public Act of 1937, as amended below: Upon application a member with 5 or more years of service and who becomes totally and permanently incapacitated for duty by reason of a personal injury or illness occurring as a result of causes outside the course of the member's employment by the municipality may be retired by the retirement board. The member shall receive a disability retirement pension of 1.5% of the member's average final compensation multiplied by the number of years of service credit to the member. Effective January 1, 2016 once a member reaches 60 days prior to the anniversary of what would have been their 25th year of service they should notify, in writing, the Human Resource Department. At that time, the pension will be recalculated based on the multiplier rate that was in effect at the time the said member was deemed medically retired. It may take up to 60 days from the time of the notification for the recalculated change to be enacted.
DEFERRED RETIREMENT OPTION PLAN (DROP)	
Employees hired before 1/1/2014: Same as Normal Retirement **Employees hired on or after 1/1/2014:** The DROP Program will not be available for any employee hired after 1/1/2014.	Member's accrued benefit at the date of election to participate in the DROP. Maximum DROP period is 5 years. Member contributions cease upon entering the DROP. DROP account balances earn interest at 5% per year. Employees shall continue to contribute toward retiree health care expenses at a the rate of Non-DROP active employees.
MEMBER CONTRIBUTIONS	
	Employees hired before 1/1/2014: 10% of pay (6% directed to the Pension Fund and 4% to the Health Care Fund). **Employees hired on or after 1/1/2014:** 6% of pay to the Pension Fund.

Fund Balance (Market Value)

Reserves	Fund Balance Dec. 31, #	
	2017	2016
Reserve for Employees' Contributions	$ 1,022,496	$ 1,289,997
Reserve for Employer Contributions	(1,141,468)	2,607,594
Reserve for Retired Benefit Payments	28,148,714	23,350,789
Reserve for Health Benefits	-	-
Reserve for Undistributed Investment Income	none	none
Total Fund Balance	**$28,029,742**	**$27,248,380**

 # Allocated by the actuary.

Beginning with the December 31, 1998 actuarial valuation, the asset valuation method reflects the projected investment income and spread over 5 years any differences between actual and projected investment income. See pages B-4 to B-6 for details on the asset valuation method.

In financing actuarial accrued liabilities, valuation assets of $28,429,784 were distributed as follows:

Reserves for	Valuation Assets Applied to Actuarial Accrued Liabilities for #			
	Active Members	Retirants & Beneficiaries	Contingency Reserve	Totals
Employees' Contributions	$ 1,022,496			$ 1,022,496
Employer Contributions	(1,141,468)			(1,141,468)
Retired Benefit Payments		$ 28,148,714		28,148,714
Undistributed Investment Income				-
Valuation Asset Adjustment	400,042			400,042
Total	**$ 281,070**	**$ 28,148,714**	**$ -**	**$ 28,429,784**

 # Allocated by the actuary.

Derivation of Valuation Assets
Market Value with 20% Recognition of Capital Value Changes

	Year Ended December 31,								
	2013	2014	2015	2016	2017	2018	2019	2020	2021
A. Funding Value Beginning of Year	$25,629,166	$27,178,122	$27,335,154	$27,526,195	$28,170,351				
B. Market Value End of Year	27,896,362	27,574,797	26,978,205	27,248,380	28,029,742				
C. Market Value Beginning of Year	25,472,853	27,896,362	27,574,797	26,978,205	27,248,380				
D. Non-Investment Net Cash Flow	(813,676)	(1,778,461)	(1,399,913)	(1,261,235)	(1,689,701)				
E. Investment Return									
E1. Market Total: B-C-D	3,237,185	1,456,896	803,321	1,531,410	2,471,063				
E2. Assumed Rate	7.50%	7.25%	7.25%	7.25%	7.25%	6.50%			
E3. Amount for Immediate Recognition	1,891,675	1,905,945	1,931,052	1,949,929	1,981,099				
E4. Amount for Phased-In Recognition	1,345,510	(449,049)	(1,127,731)	(418,519)	489,964				
F. Phased-In Recognition of Investment Return									
F1. Current Year: 0.2 x E4	269,102	(89,810)	(225,546)	(83,704)	97,993				
F2. First Prior Year	85,421	269,102	(89,810)	(225,546)	(83,704)	$ 97,993			
F3. Second Prior Year	(379,266)	85,421	269,102	(89,810)	(225,546)	(83,704)	$ 97,993		
F4. Third Prior Year	144,102	(379,266)	85,421	269,102	(89,810)	(225,546)	(83,704)	$ 97,993	
F5. Fourth Prior Year	351,598	144,101	(379,265)	85,420	269,102	(89,809)	(225,547)	(83,703)	$ 97,992
F6. Total Recognized Investment Gain	470,957	29,548	(340,098)	(44,538)	(31,965)	(301,066)	(211,258)	14,290	97,992
G. Funding Value End of Year: A+D+E3+F6	**27,178,122**	**27,335,154**	**27,526,195**	**28,170,351**	**28,429,784**				
H. Difference Between Market & Funding Value	718,240	239,643	(547,990)	(921,971)	(400,042)				
I. Recognized Rate of Return	9.37%	7.36%	5.97%	7.08%	7.13%				
J. Ratio of Funding Value to Market Value	97.4%	99.1%	102.0%	103.4%	101.4%				
K. Market Rate of Return	12.91%	5.39%	2.99%	5.81%	9.36%				

Summary of
Current Asset Information
Market Value Reported for Valuation

Assets

	December 31,	
	2017	2016
Cash & equivalents	$ 808,082	$ 423,076
Receivables & accruals	(165,658)	(164,891)
Stocks	15,210,523	14,054,573
Bonds and notes	9,603,348	9,845,860
Real estate	2,600,874	3,112,547
Other	-	-
Total assets	28,057,169	27,271,165
Less accounts payable	27,427	22,785
Net Assets Available for Benefits*	**$28,029,742**	**$27,248,380**

* *Includes DROP accounts.*

Revenues and Expenses

	2017	2016
Balance - January 1, 2017	$27,248,380	$26,978,205
Revenues		
Employees' contributions	106,038	101,436
Township contributions	763,874	789,018
Investment income	2,600,897	1,661,187
Miscellaneous income	0	0
Expenses		
Benefit payments	2,080,369	1,996,661
Retirement DROP Benefits Paid	461,940	137,865
Health insurance premiums for retired members	0	0
Refunds of member contributions	0	0
Investment expenses	129,834	129,777
Administrative expenses*	17,304	17,163
Balance - December 31, 2017	$28,029,742	$27,248,380
Approximate Market Value Rate of Investment Return (net of expenses)	9.4%	5.8%

* *For this purpose, administrative expenses include actuarial fees, attorney fees and MAPERS fees.*

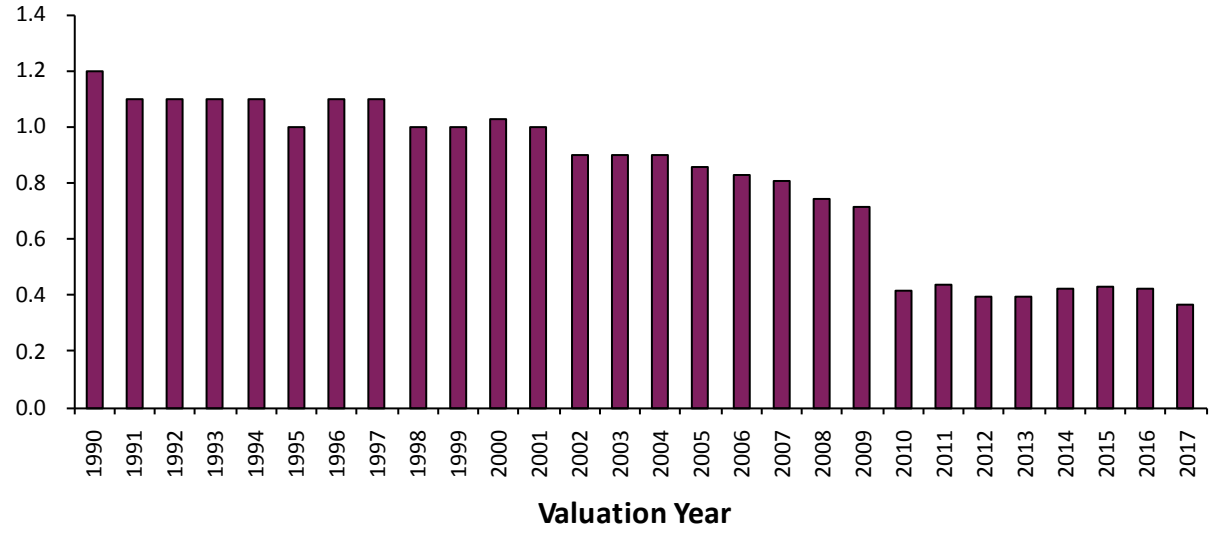
Asset Information Reported for Valuation
Comparative Statement

Year Ended Dec. 31,	Assets Beginning of Year	Revenues				Expenses				Assets Year-End
		Employee Contrib.	Employer Contrib.	Investment Income	Misc. Income	Retirement Benefits	Health Insur.	Contrib. Refunds	Inv./Admin. Expenses	
1990	$ 9,643,810	$ 68,764	$ 497,909	$ 885,128	$ 0	$ 471,270	$ 76,406	$ 0	$ 52,412	$ 10,495,523
1995	13,997,325	79,421	379,629	1,358,601	0	707,812	152,876	0	75,763	14,878,525
2000	22,521,436	137,371	354,234	1,009,594	0	771,895	223,945	0	0	23,026,795
2005	23,934,778	0	0	2,243,672	0	1,033,232	0	0	96,882	25,048,335
2006	25,048,335	177,572	72,708	3,447,409	(206,029)	1,030,039	0	0	108,021	27,401,935
2007	27,401,935	165,132	149,851	647,571	22,320	1,016,607	0	0	48,595	27,321,607
2008	27,321,607	165,588	136,559	(5,943,486)	(1,014)	1,022,600	0	0	153,940	20,502,714
2009	20,502,714	179,048	231,762	3,866,041	0	1,155,077	0	0	103,302	23,521,186
2010	23,521,186	179,706	304,525	2,833,755	0	1,548,550	0	0	111,850	25,178,772
2011	25,178,772	112,804	421,895	198,611	0	1,646,515	0	0	107,974	24,157,593
2012	24,157,593	102,673	472,337	2,477,062	0	1,610,571	0	0	126,240	25,472,853
2013	25,472,853	97,293	687,878	3,335,452	0	1,598,847	0	0	98,266	27,896,362
2014	27,896,362	102,044	759,462	1,542,486	0	2,630,932	0	0	94,625	27,574,797
2015	27,574,797	99,333	737,867	927,479	0	2,222,807	0	0	138,464	26,978,205
2016	26,978,205	101,436	789,018	1,661,187	0	2,134,526	0	0	146,940	27,248,380
2017	**27,248,380**	**106,038**	**763,874**	**2,600,897**	**0**	**2,542,309**	**0**	**0**	**147,138**	**28,029,742**

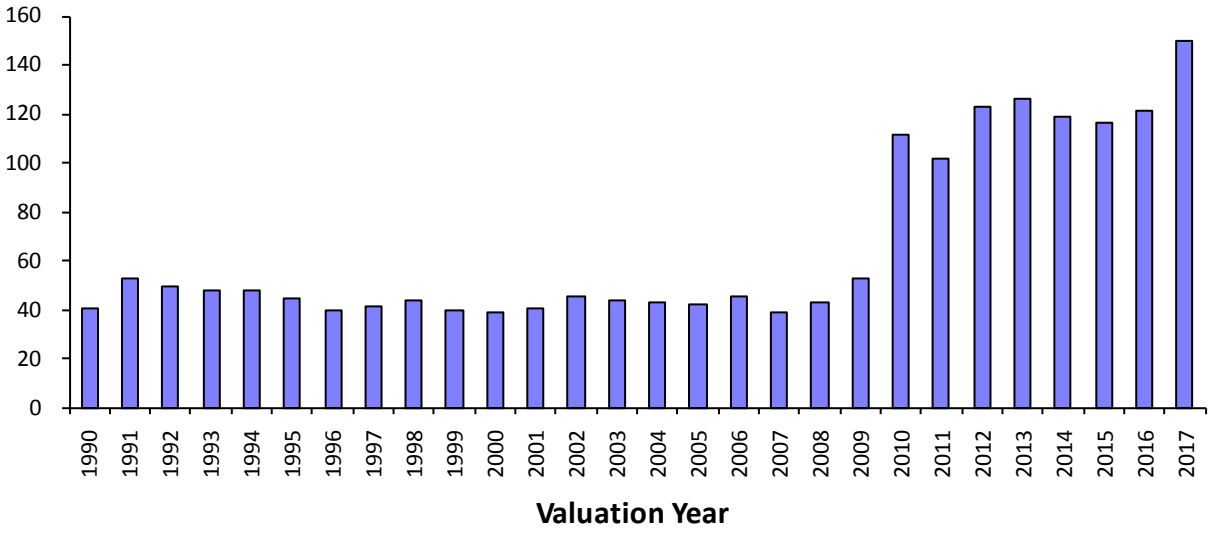
Comparative Statement
Retirees and Beneficiaries Added to and Removed from Rolls
Including DROP Members

Year Ended Dec. 31,	Added to Rolls			Removed from Rolls		Rolls End of Year		Active Per Retired	Benefit As % of Non-DROP Pay	% Incr. Annual Benefits	Present Value of Pension Benefits
	No.	Annual Benefits	Post-Ret. Increases	No.	Annual Benefits	No.	Annual Benefits				
1990	2	$ 64,898				27	$ 523,018	1.2	40.6	14.2	$ 6,261,508
1995				1	$ 28,045	32	652,353	1.0	44.6	(4.1)	7,435,931
2000				1	9,696	34	723,133	1.0	39.1	(1.3)	7,633,537
2005	2	67,964				41	1,033,992	0.9	42.2	7.0	10,771,503
2006	1	58,240	$ 3,823	1	8,356	41	1,087,699	0.8	44.9	5.2	11,278,705
2007	3	45,611	(29,677)	2	28,231	42	1,075,402	0.8	39.1	(1.1)	10,959,266
2008	2	69,130	1,080	1	23,011	43	1,122,601	0.7	42.5	4.4	11,332,133
2009	3	178,703		1	25,411	45	1,275,893	0.7	52.3	13.7	13,081,874
2010	11	600,500		1	21,964	55	1,854,429	0.4	111.5	45.3	20,118,278
2011						55	1,854,429	0.4	101.9	0.0	19,841,003
2012	3	145,937		2	36,142	56	1,964,224	0.4	122.5	5.9	21,009,022
2013	1	10,543		1	17,572	56	1,957,195	0.4	125.7	(0.4)	21,925,774
2014	1	69,811				57	2,027,006	0.4	118.8	3.6	22,514,850
2015	2	32,539		3	71,607	56	1,987,938	0.4	116.3	(1.9)	21,828,833
2016	4	162,151		1	18,717	59	2,131,372	0.4	121.2	7.2	23,350,789
2017	**4**	**270,136**		**0**	**0**	**63**	**2,401,508**	**0.4**	**149.6**	**12.7**	**28,828,180**

Actives Per Retired



Benefits as Percent of Pay



Retirees and Beneficiaries
December 31, 2017
Tabulated by Type of Benefits Being Paid

Type of Benefits Being Paid	Number*	Annual Benefits
Age and Service Benefit		
Regular benefit - benefit terminating upon death of retirant	19	$ 488,861
Regular benefit - automatic 60% joint and survivor benefit	32	1,675,775
Benefit being paid survivor beneficiary of deceased age and service retirant	8	114,290
DROP benefits	1	58,911
Total age and service benefits	60	2,337,837
Casualty Benefits		
Duty disability benefit	2	42,256
Non-duty disability benefit	1	21,415
Total casualty benefits	3	63,671
Total Benefits Being Paid	**63**	**$2,401,508**

* *Including one member in DROP and two alternate payees. Benefits for non-DROP members are $2,131,372 per year.*

Retirees and Beneficiaries
December 31, 2017
Tabulated by Attained Ages

Attained Ages	No.	Annual Benefits
48	1	$ 21,416
50	2	137,138
54	1	12,573
55	5	321,385
56	3	189,393
57	3	223,183
58	3	197,022
59	3	203,452
60	2	73,611
61	1	61,743
63	1	50,462
64	3	117,204
65	1	31,802
66	1	42,642
67	2	55,682
68	1	61,981
69	1	15,191
70	1	17,348
71	1	14,973
72	3	101,930
75	3	44,797
76	2	48,104
77	3	63,339
78	1	5,982
79	3	59,765
80	3	75,999
81	1	34,953
83	4	69,609
84	1	8,977
85	2	26,046
89	1	13,806
Totals	**63**	**$ 2,401,508**

Retirees and Beneficiaries
December 31, 2017

Average Final Compensation with and without Vacation and Compensatory Time Lump Sums for New Retirees

Year Ending June 30,	Final Average Salary		Ratio
	With Lump Sum	Without Lump Sum	
2013	N/A	N/A	
2014	88,232	85,996	1.02600
2015	N/A	N/A	
2016	251,313	206,952	1.21435
2017	358,996	328,519	1.09277
Totals	**$ 1,908,680**	**$ 1,792,528**	**1.06480**

In the valuation process a person's salary is assumed to increase by a certain percentage each year (see page C-7). However, there are often lump sum payments upon retirement for things such as unused sick leave, vacation pay, etc. which increase a person's retirement benefit but that are not included in the assumptions. The valuation assumption in use is 1.10 beginning with the December 31, 2017 valuation.

Inactive Vested Members
December 31, 2017
Tabulated by Attained Age

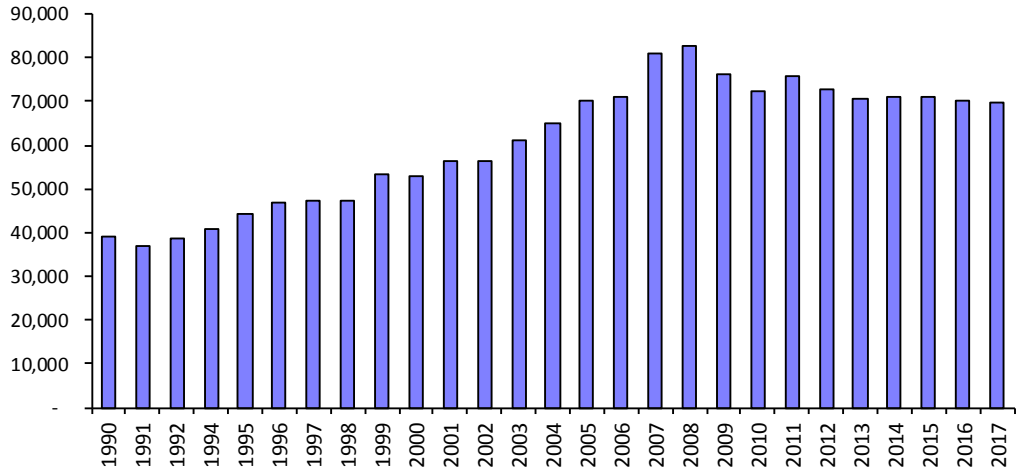
Attained Ages	No.	Annual Benefits
	None	
Totals	**0**	**$0**

Active Members Included in Valuation
Comparative Schedule

Valuation Date Dec. 31,	Active Members*	Valuation Payroll	Average			% Inc. Avg. Pay
			Age	Service	Pay	
1990	33	$1,289,090	37.1	10.4	$39,063	2.3 %
1995	33	1,463,341	37.4	9.5	44,344	8.4
2000	35	1,850,554	40.5	12.5	52,873	(0.6)
2001	35	1,972,538	40.4	12.0	56,358	6.6
2002	35	1,977,181	40.0	11.6	56,491	0.2
2003	35	2,143,204	40.3	11.9	61,234	8.4
2004	35	2,274,281	41.3	12.9	64,979	6.1
2005	35	2,449,553	42.2	13.2	69,987	7.7
2006	34	2,422,211	42.9	14.3	71,242	1.8
2007	34	2,752,251	43.9	15.3	80,949	13.6
2008	32	2,641,821	44.4	16.4	82,557	2.0
2009	32	2,440,391	44.5	15.3	76,262	(7.6)
2010	23	1,663,027	44.9	14.6	72,306	(5.2)
2011	24	1,819,281	45.3	15.0	75,803	4.8
2012	22	1,602,995	45.7	15.1	72,863	(3.9)
2013	22	1,556,538	46.7	16.1	70,752	(2.9)
2014	24	1,706,096	45.1	14.5	71,087	0.5
2015	24	1,709,517	46.1	15.5	71,230	0.2
2016	25	1,758,735	43.0	13.1	70,349	(1.2)
2017	**23**	**1,605,017**	**41.2**	**11.1**	**69,783**	**(0.8)**

**Does not include DROP members.*

Valuation Year
Average Pay

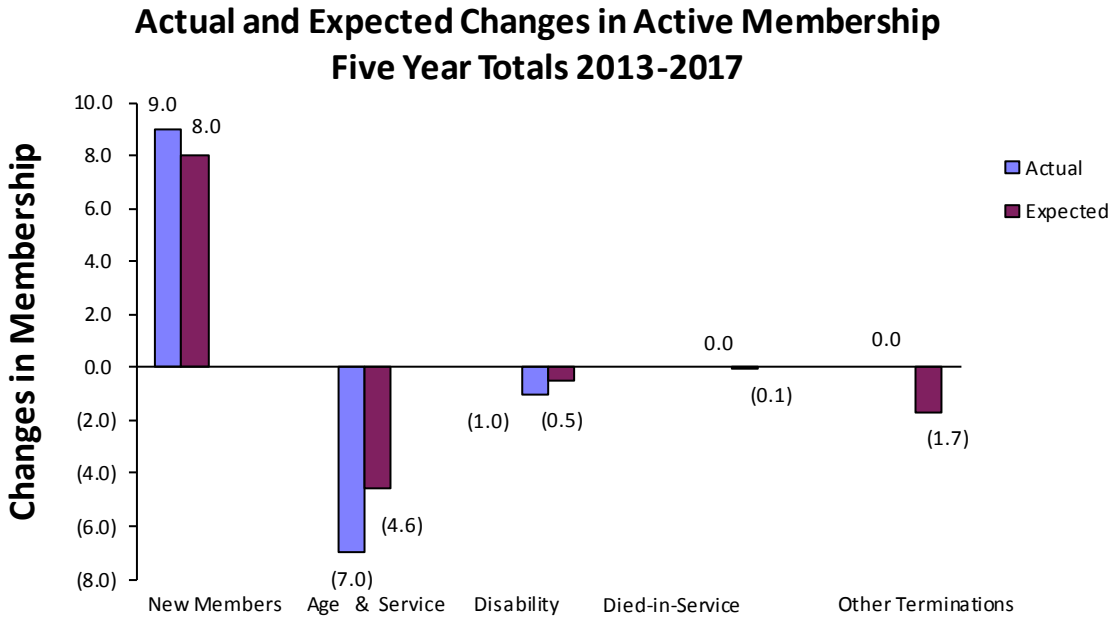


Additions to and Removals from Active Membership
Actual and Expected Numbers

Year Ended Dec. 31,	Number Added During Year		Terminations During Year								Active Members End of Year
			Normal Retirement		Disability Retirement		Died-In-Service		Other Terminations		
	A	E	A	E	A	E	A	E	A	E	
2008	0	2	1	0.3	0	0.1	0	0.0	1	0.3	32
2009	3	3	2	0.6	0	0.1	0	0.0	1	0.2	32
2010	0	9	8	0.6	0	0.1	0	0.0	1	0.5	23
2011	1	0	0	0.3	0	0.1	0	0.0	0	0.3	24
2012	0	2	2	0.9	0	0.1	0	0.0	0	0.3	22
2013	0	0	0	0.5	0	0.1	0	0.0	0	0.2	22
2014	3	1	1	0.6	0	0.1	0	0.0	0	0.2	24
2015	0	0	0	0.0	0	0.1	0	0.0	0	0.4	24
2016	4	3	2	2.0	1	0.1	0	0.0	0	0.3	25
2017	**2**	**4**	**4**	**1.5**	**0**	**0.1**	**0**	**0.0**	**0**	**0.6**	**23**
5-Year Totals	9	8	7	4.6	1	0.5	0	0.1	0	1.7	

A represents actual number.

E represents expected number based on assumptions outlined in Section C.



Active Members
December 31, 2017*
By Attained Age and Years of Service

Attained 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
25-29	3							3	$ 159,724
30-34	5							5	259,569
35-39		1		1				2	173,406
40-44	1		1	1				3	194,697
45-49		1		3	1			5	415,128
50-54					2			2	158,707
55-59		1			2			3	243,786
Totals	**9**	**3**	**1**	**5**	**5**			**23**	**$1,605,017**

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

Age: 41.2 years

Service: 11.1 years

Annual Pay: $69,783

** Excluding four members in DROP. The four DROP members have an aggregate salary of $363,575.*

SECTION C

ACTUARIAL VALUATION PROCESS, ACTUARIAL COST METHODS, ACTUARIAL ASSUMPTIONS AND DEFINITIONS 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. ***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 Retirement Board after consulting with the actuary

D. + ***The funding method*** for employer contributions (the long-term, planned pattern for employer contributions) including the asset smoothing method and amortization policy

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

F. = Determination of:

Plan financial position

and/or New Employer Contribution Rate

Actuarial Cost Methods Used for the Valuation

Age and Service and Casualty Benefits. Normal cost and the allocation of actuarial present 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 employment ceases, are sufficient to accumulate the actuarial present value of the member's or survivor's benefit at the time benefits commence; and

(ii) each annual normal cost is a constant percentage of the member's year by year projected covered pay.

Valuation Asset Method. Valuation assets recognize assumed investment return fully each year. Differences between actual and assumed investment return are phased-in over a closed 5-year period. During periods when investment performance exceeds the assumed rate, valuation assets will tend to be less than market value. During periods when investment performance is less than the assumed rate, valuation assets will tend to be greater than market value. If assumed rates are exactly realized for 4 consecutive years, funding value will become equal to market value.

Amortization of Unfunded Actuarial Accrued Liabilities. Unfunded actuarial accrued liabilities were projected to the next fiscal year then amortized by level percent-of-payroll contributions (principal and interest combined). Please refer to page A-4 for a schedule of amortization periods.

Active member payroll was assumed to increase 3.0% a year for the purpose of determining the level percent contributions. Characteristics of this method of amortization for pensions are illustrated on page C-3.

Level Percent of Active Member Payroll Amortization of Unfunded Actuarial Accrued Liability*

Year	Active Employee Payroll	Unfunded Actuarial Accrued Liability	Annual Contributions		UAAL as % of Payroll
			Dollars	% of Payroll	
	(- - - - - - - $ in Thousands - - - - -)				
0	$ 1,969	$ 7,723	$ 348	17.17 %	392 %
1	2,028	7,866	547	26.20	388
2	2,088	7,812	564	26.20	374
3	2,151	7,738	581	26.20	360
4	2,216	7,642	598	26.20	345
5	2,282	7,522	616	26.20	330
6	2,351	7,375	634	26.20	314
7	2,421	7,199	653	26.20	297
8	2,494	6,993	673	26.20	280
9	2,569	6,753	693	26.20	263
10	2,646	6,476	714	26.20	245
11	2,725	6,160	735	26.20	226
12	2,807	5,802	757	26.20	207
13	2,891	5,397	780	26.20	187
14	2,978	4,943	804	26.20	166
15	3,067	4,434	828	26.20	145
16	3,159	3,868	853	26.20	122
17	3,254	3,240	878	26.20	100
18	3,351	2,544	904	26.20	76
19	3,452	1,776	932	26.20	51
20	3,555	930	960	26.20	26
21	3,662	0	0	0.00	0

The Unfunded Actuarial Accrued Liability (UAAL) amortization rate for year zero (0) was the Township's total dollar contribution determined by the prior valuation reduced by the employer normal cost determined as of the current valuation and expressed as a percentage of the projected payroll. The UAAL amortization rate for year one (1) is determined by this valuation and may be found on page A-2. This rate takes into account expected contributions received during the year following the valuation date.

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-2.

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, retirees, and beneficiaries
(iv) rates of withdrawal of active members
(v) rates of disability among active members
(vi) the age patterns of actual retirements
(vii) rates of health insurance premium increase

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 6.50 % per year.

(2) Member non-vested terminations at a higher rate than outlined on page C-9.

(3) Mortality among retirees and beneficiaries at a higher rate than indicated by the RP-2014 Mortality Tables with fully-generational mortality improvements using projection scale MP-2017.

(4) Increases in the number of active members.

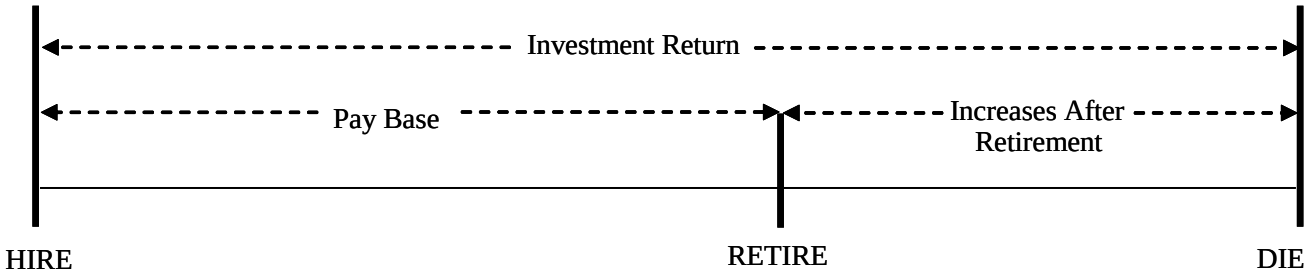
Examples of unfavorable experience which would tend to increase the employer contribution rate are:

(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 choice of the assumptions, or the skill of the actuary or 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 is modified to reflect experience trends (but not random or temporary year-to-year fluctuations).

Relationship of Economic Assumptions in Computing Contributions to a Retirement System



Investment Return

An increase in this assumption reduces computed contributions. The assumption operates over all parts of an employee's lifetime.

Pay Base

An increase in this assumption increases computed contributions. However, a 1% increase in this assumption, coupled with a 1% increase in Investment Return reduces computed contributions. This is because the Pay Base assumption operates only over an employee's working lifetime, while the Investment Return assumption operates over the employee's entire lifetime, and therefore has a greater effect.

Increases After Retirement

An increase in this element increases computed contributions.

If Investment Return, Pay Base, and Increases After Retirement are each increased by equal amounts, computed contributions remain the same (except in plans using Final Average Pay as a factor in computing benefits; the multi-year average used for Final Average Pay causes computed contributions to decrease slightly).

If Investment Return and Pay Base are increased by equal amounts, with no change in Increases After Retirement, computed contributions decrease – sometimes significantly. The decreases represent the projected devaluation of an employee's benefits following retirement.

Actuarial Assumptions Used for the Valuation

All actuarial assumptions are expectations of future experience, not market measures. The rationale for the actuarial assumption is based on the System's investment policy, capital market expectations, and demographic experience. Actuarial assumptions were last reviewed in conjunction with the December 31, 2017 actuarial valuation.

Investment Return. 6.50% per year, net of investment expenses.

Wage Inflation. 3.00% per year.

Price Inflation. 2.50% per year.

	Year Ended December 31					3-Year	5-Year
	2017	2016	2015	2014	2013	Average	Average
Market Rate of Investment Return	9.4 %	5.8 %	3.0 %	5.4 %	12.9 %	6.0 %	7.2 %
Valuation Rate of Investment Return	7.1 %	7.1 %	6.0 %	7.4 %	9.4 %	6.7 %	7.4 %

These economic assumptions were first used for the December 31, 2017 valuation. Approximate rates of investment return, for the purpose of comparisons with assumed rates, are shown above.

> The nominal rate of return was computed using the approximate *formula i = I divided by 1/2 (A + B - I),* where I is actual investment income (gross), 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 -- ***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 (merit and longevity) were first used for the March 31, 1974 valuation.

Sample Ages	Annual Rate of Pay Increase for Sample Ages		
	Base (Economic)	Merit and Longevity	Total
20	3.00 %	3.50 %	6.50 %
25	3.00	3.50	6.50
30	3.00	3.10	6.10
35	3.00	1.60	4.60
40	3.00	0.70	3.70
45	3.00	0.70	3.70
50	3.00	0.70	3.70
55	3.00	0.60	3.60
60	3.00	0.50	3.50

If the number of active members remains constant, the total active member payroll is assumed to increase 3.0% annually, the base portion of the individual pay increase assumptions. This increasing payroll was recognized in amortizing unfunded actuarial accrued liabilities.

Changes actually experienced in average pay and total payroll have been as follows:

Increase in	Year Ended December 31,					3-Year Average	5-Year Average
	2017	2016	2015	2014	2013		
Average pay *	5.6 %	5.5 %	0.2 %	7.4 %	(2.9) %	3.8 %	3.1 %
Total Payroll	(8.7)	2.9	0.2	9.6	(2.9)	(2.0)	0.0

** Based on persons who were active members at both the beginning and end of the year.*

Mortality Table. This assumption is used to measure the probabilities of members dying before retirement and the probabilities of each benefit payment being made after retirement. These tables were first used for the December 31, 2017 valuation.

- Pre-Retirement : RP-2014 Employee Mortality Tables.
- Healthy Post-Retirement: RP-2014 Healthy Annuitant Mortality Tables.
- Disabled Retirement: RP-2014 Disabled Mortality Tables.

The tables described above were adjusted backwards to 2006 with MP-2014 scale. A base year of 2006 with future mortality improvements using scale MP-2017 was used. Additional margin for future mortality improvements are included in the projection scale.

Sample Ages	Single Life Retirement Values					
	Actuarial Present Value of $1 Monthly for Life		Percent Dying Next Year		Future Life Expectancy (Years)	
	Men	Women	Men	Women	Men	Women
50	$159.26	$164.18	0.4106%	0.2755%	34.18	36.78
55	150.88	156.45	0.5870%	0.3855%	29.45	31.86
60	140.72	146.92	0.8181%	0.5737%	24.92	27.13
65	128.58	135.31	1.1698%	0.8511%	20.64	22.61
70	114.12	121.12	1.7432%	1.3250%	16.59	18.29
75	97.30	104.45	2.7953%	2.1784%	12.83	14.27
80	78.99	86.02	4.7230%	3.7208%	9.49	10.67

Seventy percent of pre-retirement deaths were assumed to be duty related. This assumption is used to measure the probabilities of members dying before retirement and for projecting disability costs, respectively.

Rates of separation from active membership. The rates do not apply to members eligible to retire and do not include separation on account of death or disability. This assumption measures the probabilities of members remaining in employment.

Sample Ages	Years of Service	Percent Separating within Next Year
ALL	0	10.0 %
	1	7.0
	2	5.0
	3	4.0
	4	3.5
25	5 & Over	3.5
30		2.9
35		1.5
40		0.6
45		0.5
50		0.5
55		0.5
60		0.5

The rates were first used for the March 31, 1977 valuation.

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

Sample Ages	Percent 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

These rates were first used for the December 31, 1981 valuation.

Seventy percent of disabilities were assumed to be duty related.

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

Years of Service	Percents of Eligible Active Members Retiring within Next Year	
	Hired before January 1, 2014	Hired on or after January 1, 2014
25	50 %	60 %
26	50	50
27	50	50
28	50	70
29	60	80
30 or more	100	100

100% of members are assumed to retire upon reaching age 60. A member was assumed eligible for retirement after 25 years of service, or, after attaining age 60 regardless of service. Retirement rates reflect ultimate end of employment.

These rates were first used for the December 31, 2013 valuation. Rates for members hired on or after January 1, 2014 were first used for the December 31, 2014 valuation.

Active Member Group Size. The number of active members was assumed to remain constant. This assumption is unchanged from previous valuations.

Summary of Assumptions Used
December 31, 2017
Miscellaneous and Technical Assumptions

Marriage Assumption:	90% of males and 90% of females are assumed to be married for purposes of both the death-in-service benefits and death-after retirement benefits.
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 service nearest whole year on the date the decrement is assumed to occur.
Benefit Service:	Exact fractional service is used to determine the amount of benefit payable.
Decrement Relativity:	Decrement rates are used directly, without adjustment for multiple decrement table effects.
Decrement Operation:	Disability and mortality decrements do not operate during the first 5 years of service. Disability and turnover do not operate during retirement eligibility.
Normal Form of Benefit:	The assumed normal form of benefit is the straight life form with 60% continued to spouse, if any.
Liability Adjustments:	Active liabilities for retirement benefit were adjusted by 10% to account for accrued vacation time and compensatory time.
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. New entrant normal cost contributions are applied to the funding of new entrant benefits.
DROP Funding:	Employer contribution rates are determined as the level percent of payroll from members' entry to the ultimate end of employment which means employer contribution rates apply to total DROP and non-DROP payroll. DROP assets are included in plan reported assets.
Administrative Expenses:	Administrative expenses are included in the normal cost.

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.

Definitions of Technical Terms (concluded)

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."

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 their amount (after due allowance for devaluation of the dollar).

SECTION D

ACTUARIAL FUNDING POLICY

CHARTER TOWNSHIP OF YPSILANTI
POLICE AND FIREFIGHTER'S RETIREMENT SYSTEM

Charter Township of Ypsilanti Police and Firefighter's Retirement System – Actuarial Funding Policy	
Category: Board Governance	
Date Adopted: 5/26/2015	**Date(s) Amended:8/8/2018**
Legal Review By:	**Date(s) Reviewed:**

I. INTRODUCTION

(A) Purpose

(1) This document and the attached glossary of terms comprise the Actuarial Funding Policy for the Charter Township of Ypsilanti Police and Firefighter's Retirement System (the Retirement System). The purpose of this Actuarial Funding Policy (Funding Policy) for the Defined Benefit Plan is to establish the funding objectives and policy set by the Retirement Board for the Retirement System. The Retirement Board establishes this Funding Policy to help ensure the systematic funding of future benefit payments for members of the Retirement System.

(B) Act 314

(1) Section 20m of the Public Employee Retirement System Investment Act, Public Act 314 of 1965, as amended ("Act 314") [MCL 38.1140m], provides for the Retirement Board's duties and responsibilities with respect to determining and certifying the annual required employer contribution to the Retirement System in relevant part as follows:

(a) The governing board vested with the general administration, management, and operation of a system or other decision-making body that is responsible for implementation and supervision of any system shall confirm in the annual actuarial valuation required under section 20h and the summary annual report required under section 13 that each system under this act provides for the payment of the required employer contribution as provided in this section and shall confirm in the summary annual report that the system has received the required employer contribution for the year covered in the summary annual report. The required employer contribution is the actuarially determined contribution amount. An annual required employer contribution in a system under this act shall consist of a current service cost payment and a payment of at least the annual accrued amortized interest on any unfunded actuarial liability and the payment of the annual accrued amortized portion of the unfunded principal liability. For fiscal years that begin before January 1, 2006, the required employer contribution shall not be determined using an amortization period greater than 40 years. Except as otherwise provided in this section, for fiscal years that begin after December 31, 2005, the required employer contribution shall not be determined using an amortization period greater than 30 years. In a plan year, any current service cost payment may be offset by a credit for amortization of accrued assets, if any, in excess of actuarial accrued liability. A required employer contribution for a system administered under this act shall allocate the

actuarial present value of future plan benefits between the current service costs to be paid in the future and the actuarial accrued liability. The governing board vested with the general administration, management, and operation of a system or other decision-making body that is responsible for implementation and supervision of a system shall act upon the recommendation of an actuary and the board and the actuary shall take into account the standards of practice of the actuarial standards board of the American academy of actuaries in making the determination of the required employer contribution.

(C) GASB

(1) In 2012, the Governmental Accounting Standards Board (GASB) approved two new financial reporting standards. GASB Statement No. 67, "Financial Reporting for Pension Plans" replaces the requirements of GASB Statement No. 25. GASB Statement No. 68, "Accounting and Financial Reporting for Pensions" replaces the requirements of Statements No. 27 and No. 50. Prior to the changes, the Annual Required Contribution (ARC) rate was used as a basis for funding decisions. The new GASB statements separate accounting cost (expense) from funding cost (contributions), necessitating the creation of this Funding Policy.

II. FUNDING OBJECTIVES

(A) General

(1) Maintain a targeted funded ratio of 100%.

(2) Maintain adequate assets so that current plan assets plus future contributions (Employer and Member) and investment earnings are expected to be sufficient to fund all benefits expected to be paid to members and their beneficiaries.

(3) Maintain stability of employer contribution rates, consistent with these funding objectives.

(4) Maintain public policy goals of accountability and transparency. Each policy element is clear in intent and effect, and each should allow an assessment of whether, how and when the funding requirements of the plan will be met.

(5) Monitor material risks to assist in any risk management strategies the Retirement Board deems appropriate.

(6) Promote intergenerational equity. Each generation of members and employers should incur the cost of benefits for the employees who provide services to them, rather than deferring those costs to future members and employers.

(7) Provide a reasonable margin for adverse experience to help offset risks.

(8) Review investment return assumption, potentially in conjunction with a periodic experience study and in consideration of the Retirement System's Investment Policy.

(9) Continue progress of systematic reduction of the Unfunded Actuarial Accrued Liabilities (UAAL).

III. ELEMENTS OF ACTUARIAL FUNDING POLICY

(A) Actuarial Cost Method

(1) The Individual Entry Age Normal actuarial cost method of valuation shall be used in determining Actuarial Accrued Liability (AAL) and Normal Cost in accordance with Section 141-36 of the Retirement Ordinance. Differences in the past between assumed experience and actual experience other than investment experience ("actuarial gains and losses") shall become part of the AAL. The Normal Cost shall be determined on an individual basis for each active member.

(B) Asset Smoothing Method

(1) The investment gains or losses of each valuation period, resulting from the difference between actual investment return and assumed investment return, shall be recognized annually in level amounts over a period of 5 years in calculating the Funding Value of Assets.

(C) Amortization Method

(1) A level percent of payroll amortization method shall be used to systematically pay off the UAAL over a closed amortization period not to exceed 30 years as required under Section 20m of Act 314 (MCL 38.1140m).

(2) The amortization period in the December 31, 2017 valuation for unfunded accrued liabilities shall be 20 years. The Retirement Board may elect to create a new 15-year amortization schedule for unfunded liabilities arising during subsequent valuations, and to continue the amortization of preexisting unfunded liabilities to their scheduled end date.

(3) Unfunded liabilities associated with benefit changes or assumption changes may be funded over a separate period not exceeding 15 years.

(4) Unfunded liabilities arising from benefit increases provided to retirees or in conjunction with early retirement incentive programs offered by the employer may be separately funded over a period not exceeding 5 future years.

(5) In order to stabilize contributions, the Retirement Board may from time to time elect to combine separate amortization schedules arising from III(C) into a single schedule over the average remaining amortization period being used.

(6) In the event that the plan's assets exceed the plan's liabilities, all amortization schedules other than those related to benefit changes for retirees or early retirement incentive programs offered by the employer shall be considered completed and employer contributions will be set based upon the Normal Cost plus the completion of any remaining amortizations due to benefit changes for retirees or early retirement incentive programs offered by the employer, without regard to such overfunding.

(D) Risk Management

(1) Actuarial Assumption Changes

(a) The actuarial assumptions used for funding shall be those last adopted by the Retirement Board based on the most recent experience study or assumption review and upon the advice and recommendation of the actuary and the investment consultant. The Retirement Board shall direct the actuary to conduct an experience study or an assumption review at least every

five years. The results of the study shall be the basis for the actuarial assumptions recommended to the Retirement Board.

(b) The actuarial assumptions can be updated during the five-year period between experience studies, as advised by the actuary, if significant plan design changes or other significant events occur.

(2) Risk Control

(a) The Retirement Board shall carefully monitor the risk measures outlined below and shall consider steps to mitigate risk, with particular regard to funded ratio increases. Risk mitigation may involve a reduction in the assumed rate of investment return. Examples of risk mitigating techniques include, but are not limited to:

i. Review asset allocation with investment advisors and actuary with a goal of reducing the standard deviation of the portfolio return once the Retirement System becomes fully (100%) funded.

ii. Reduce asset-liability mismatching.

iii. Should such de-risking or future unfavorable experiences cause unfunded liabilities to arise again, such liabilities shall be funded over a closed period of 15 future years.

(3) Risk Measures

(a) The following risk measures will be annually determined by the Retirement System's actuary to provide quantifiable measurements of risk and its movement over time:

i. Funded ratio (assets/accrued liabilities)

ii. Average UAAL amortization period (years required to pay down the UAAL based on current funding schedule)

iii. Total UAAL/Total Defined Benefit Plan Active Member Payroll - Measures the risk associated with contribution decreases relative impact on the ability to fund the UAAL. A decrease in this measure indicates a decrease in contribution risk.

iv. Total Assets/Total Defined Benefit Plan Active Payroll - Measures the risk associated with the ability to respond to asset experience through adjustments in contributions. A decrease in this measure indicates a decrease in asset risk.

v. Total AAL/Total Defined Benefit Plan Active Payroll - Measures the risk associated with the ability to respond to liability experience through adjustments in contributions. A decrease in this measure indicates a decrease in experience risk. This also provides a long-term measure of the asset risk in situations where the Retirement System has a funded ratio below 100%.

(4) Closed Group Funding

(a) Closed groups arise when new hires of a group participating in the Defined Benefit Plan of the Retirement System are no longer allowed to participate in said defined benefit plan, or when active members of a group are transferred out of the Retirement System, leaving only retirees and vested former members in the Retirement System.

(b) Upon the closing of the Defined Benefit Plan, the amortization method shall be changed to a level dollar amount and the amortization period shall be closed.

APPENDIX A

GLOSSARY

1. **Actuarial Accrued Liability (AAL):** 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."
2. **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 actuarial assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic actuarial 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.
3. **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."
4. **Actuarial 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. For example, if during a given year the assets earn more than the investment return assumption, the amount of earnings above the assumption will cause an unexpected reduction in UAAL, or "actuarial gain" as of the next valuation. These include contribution gains and losses that result from actual contributions made being greater or less than the level determined under the policy.
5. **Actuary:** A person who is trained in the application of probability and compound interest to solve 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 (MAAA). *For the purpose of this Funding Policy, Actuary shall only refer to the System's actuary.*
6. **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.
7. **Entry Age Normal Actuarial Cost Method:** A funding method that calculates the Normal Cost as a level percentage of pay over the working lifetime of the plan's members.
8. **Experience Study:** An actuarial investigation of demographic and economic experiences of the System during the period studied. The investigation is made for the purpose of updating the actuarial assumptions used in valuing the actuarial liabilities.
9. **Funded Ratio:** The ratio of the Funding Value of Assets to the Actuarial Accrued Liability.
10. **Funding Value of Assets**: The value of current plan assets recognized for valuation purposes. Generally based on a phased-in recognition of all or a portion of market related investment return. Sometimes referred to as Actuarial Value of Assets.
11. **Market Value of Assets:** The fair value of plan assets as reported in the plan's audited financial statements.
12. **Normal Cost (NC):** 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.
13. **Unfunded Actuarial Accrued Liability (UAAL):** The positive difference, if any, between the actuarial accrued liability and valuation assets. Sometimes referred to as "unfunded accrued liability."