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PERA

Public Employees
Retirement Association
of New Mexico

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**Public Employees Retirement Association (PERA)
of New Mexico
Annual Actuarial Valuation
as of June 30, 2019**





Cavanaugh Macdonald

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The experience and dedication you deserve

October 31, 2019

The Retirement Board
Public Employees Retirement Association
Santa Fe, New Mexico

Members of the Board:

We have conducted the annual actuarial valuation of the Public Employees Retirement Association (PERA) of New Mexico as of June 30, 2019; the results of the valuation are contained in the following report. The annual valuation is used to determine the sufficiency of the statutory contribution rates and, if necessary, the amount required to fund the annual normal cost and amortize the unfunded actuarial accrued liability over a 30-year period. The results of this valuation apply to the fiscal year beginning July 1, 2019 and ending June 30, 2020 (FY 2020). Information contained in our report for plan years prior to June 30, 2010 is based upon valuations performed by the association's prior actuary.

In performing the valuation, we relied on data supplied by the Public Employees Retirement Association (PERA) and performed limited tests on the data for consistency and reasonableness. In determining the Fund's liabilities, future events, such as investment returns, deaths, retirements, etc., are anticipated based upon the set of actuarial assumptions as approved by the Board.

Future actuarial results may differ significantly from the current results presented in this report due to such factors as the following: fund experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; and changes in plan provisions or applicable law. Since the potential impact of such factors is outside the scope of a normal annual actuarial valuation, an analysis of the range of results is not presented herein.

This actuarial valuation was performed to determine the adequacy of statutory contributions to fund the plan. The asset values used to determine unfunded liabilities and funded ratios are not market values but less volatile market related values. A smoothing technique is applied to market values to determine the market related values. The unfunded liability amounts and funded ratios using the market value of assets would be different. The interest rate used for determining liabilities is based on the expected return on assets. Therefore, liability amounts in this report cannot be used to assess a settlement of the obligation.



Measuring pension obligations and actuarially determined contributions requires the use of assumptions regarding future economic and demographic experience. Whenever assumptions are made about future events, there is risk that actual experience will differ from expected. Actuarial valuations include the risk that actual future measurements will deviate from expected future measurements due to actual experience that is different than the actuarial assumptions. The primary areas of risk in this actuarial valuation are:

- Investment Risk – the potential that investment returns will be different than expected. Appendix D of this report demonstrates the sensitivity of future projected results to asset returns deviating from expected returns.
- Longevity and Other Demographic Risks – the potential that mortality or other demographic experience will be different than expected.
- Contribution Risk – The potential that actual contributions are different than the actuarially determined contributions.

Annual actuarial valuations are performed for PERA which re-measure the assets and liabilities and compute a new actuarially determined contribution. PERA also has experience studies performed every four to five years to analyze the discrepancies between actuarial assumptions and actual experience and determine if the actuarial assumptions need to be changed. Annual actuarial valuations and periodic experience studies are practical ways to monitor and reassess risk.

This is to certify that the undersigned are members of the American Academy of Actuaries and have experience in performing valuations for public retirement systems, that the valuation was prepared in accordance with principles of practice prescribed by the Actuarial Standards Board, and that the actuarial calculations were performed by qualified actuaries in accordance with accepted actuarial procedures, based on the current provisions of the Fund.

Respectfully submitted,

A handwritten signature in blue ink that reads 'John J. Garrett'.

John J. Garrett, ASA, FCA, MAAA
Principal and Consulting Actuary

A handwritten signature in blue ink that reads 'Jonathan T. Craven'.

Jonathan T. Craven, ASA, EA, FCA, MAAA
Consulting Actuary



TABLE OF CONTENTS

<u>Section</u>	<u>Item</u>	<u>Page No.</u>
I	Board Summary	1
II	Membership Data	13
III	PERA Assets	18
IV	PERA Liabilities	24
V	Actuarial Funding Calculation	29
VI	Additional Disclosure Information	36
 <u>Appendices</u>		
A	Additional Membership Data	43
B	Summary of Actuarial Assumptions and Methods	53
C	Summary of Plan Provisions	62
D	Investment Risk Sensitivity	69



Section I: Board Summary

The table below summarizes the results of the June 30, 2019 actuarial valuation as compared with the prior year.

Table I-1(a): Comparative Summary of Principal Results (All PERA Divisions)

Valuation Date	June 30, 2019	June 30, 2018
Total Annual Payroll	\$ 2,271,770,279	\$ 2,221,079,274
Total Valuation Payroll	\$ 2,339,923,387	\$ 2,287,711,652
Actuarial Accrued Liability (AAL)		
Active and Deferred Vested Members	\$ 7,073,283,818	\$ 6,850,306,745
Retired Members and Survivors	<u>15,089,714,530</u>	<u>14,463,144,438</u>
Total	\$ 22,162,998,348	\$ 21,313,451,183
Actuarial Value of Assets	\$ 15,500,330,667	\$ 15,252,860,672
Funded Ratio	69.9 %	71.6 %
Unfunded Actuarial Accrued Liability (UAAL) (AAL - Actuarial Value of Assets)	\$ 6,662,667,681	\$ 6,060,590,511
Calculation of Required Contribution		
Statutory Contribution Rate		
Employer Contribution Rate	15.12 %	14.81 %
Member Contribution Rate	<u>12.01 %</u>	<u>12.03 %</u>
Total	27.13 %	26.84 %
Less Normal Cost:		
Retirement	10.74 %	10.73 %
Termination	3.82 %	3.81 %
Pre-Retirement Survivors	0.84 %	1.10 %
Disability	<u>0.86 %</u>	<u>0.95 %</u>
Total Normal Cost	16.26 %	16.59 %
Less Administrative Expenses	0.50 %	0.50 %
Amount Remaining to Amortize UAAL	10.37 %	9.75 %
Amortization Period	Infinite	Infinite
Increase in Statutory Rate Necessary to Amortize UAAL over 30 Years	6.27 %	5.73 %



Section I: Board Summary

Summary of Key Findings – PERA

An objective of the Board’s funding policy is to maximize the stability in the statutory contribution rates while maintaining the adequacy of funding necessary for the actuarial soundness of each Division in the Fund. The Board has set forth criteria for measuring actuarial soundness and making recommendations for adjustments to the statutory rates of each Division. The funding method for PERA determines the sufficiency of statutorily required contribution rates to fund the sum of the annual normal cost, administrative expenses and an amount to fully amortize the unfunded actuarial accrued liability (UAAL) over no more than 30 years for each Division.

The investment earnings of PERA is allocated on the basis of each Divisions’ share of the total PERA Fund balance as of the valuation date. Therefore, each Division shares in the asset experience of the total Fund and will demonstrate similar experience.

- The total PERA Fund experienced an investment return of approximately \$935.6 million on the market value of assets. The actuarial value of assets smooth the unexpected portion of the market return over a four year period. The return on the actuarial value of assets was 5.92% compared to an expected return of 7.25%. As of June 30, 2019, the actuarial value of assets is 100.23% of market value. Table III-4 provides the development of the actuarial value of assets.
- The total actuarial loss due to the investment experience of the total PERA Fund is \$198.9 million. The loss on non-investment related items totaled \$202.5 million. The net loss due to the plan’s experience was \$401.4 million.
- The total increase to the UAAL of PERA is \$602.1 million since the previous valuation and the funded ratio decreased from 71.6% to 69.9%.
- The financing period for the unfunded liability based upon the statutory contribution rates is an infinite period.

The summary of results and discussion of key findings for each Division begins on the following page.



Section I: Board Summary

Table I-1(b): Comparative Summary of Principal Results (State General Division)

Valuation Date	June 30, 2019	June 30, 2018
Total Annual Payroll	\$ 935,478,450	\$ 900,513,193
Total Valuation Payroll	\$ 963,542,804	\$ 927,528,589
Actuarial Accrued Liability (AAL)		
Active and Deferred Vested Members	\$ 2,932,732,812	\$ 2,846,188,979
Retired Members and Survivors	<u>6,603,870,095</u>	<u>6,349,256,438</u>
Total	\$ 9,536,602,907	\$ 9,195,445,417
Actuarial Value of Assets	\$ 5,805,041,751	\$ 5,799,854,720
Funded Ratio	60.9 %	63.1 %
Unfunded Actuarial Accrued Liability (UAAL) (AAL - Actuarial Value of Assets)	\$ 3,731,561,156	\$ 3,395,590,697
Calculation of Required Contribution		
Statutory Contribution Rate		
Employer Contribution Rate	17.24 %	16.99 %
Member Contribution Rate	<u>8.92 %</u>	<u>8.92 %</u>
Total	26.16 %	25.91 %
Less Normal Cost:		
Retirement	9.75 %	9.74 %
Termination	3.68 %	3.68 %
Pre-Retirement Survivors	0.82 %	1.16 %
Disability	<u>1.05 %</u>	<u>1.15 %</u>
Total Normal Cost	15.30 %	15.73 %
Less Administrative Expenses	0.50 %	0.50 %
Amount Remaining to Amortize UAAL	10.36 %	9.68 %
Amortization Period	Infinite	Infinite
Increase in Statutory Rate Necessary to Amortize UAAL over 30 Years	12.27 %	11.71 %



Section I: Board Summary

Summary of Key Findings – State General Division

The UAAL increased from \$3.40 billion to \$3.73 billion. The funded ratio decreased from 63.1% to 60.9%. Table IV-3 provides the reconciliation of the UAAL. In the course of preparing the valuation report, we note the following key findings:

- The State General Division experienced a net actuarial loss of \$187.5 million during the plan year ended June 30, 2019. The non-investment related loss of \$109.3 million is primarily due to higher than expected salary increases and new members. In addition the plan experienced a \$78.2 million loss due to investment related experience. Table IV-4 provides the detailed information on the sources and magnitude of actuarial gains and losses.
- The financing period for the unfunded liability based upon the statutory contribution rates is an infinite period for the eleventh consecutive year.



Section I: Board Summary

Table I-1(c): Comparative Summary of Principal Results (State Police/Corrections Division)

Valuation Date	June 30, 2019	June 30, 2018
Total Annual Payroll	\$ 88,220,403	\$ 84,845,998
Total Valuation Payroll	\$ 90,867,015	\$ 87,391,378
Actuarial Accrued Liability (AAL)		
Active and Deferred Vested Members	\$ 299,347,891	\$ 275,833,201
Retired Members and Survivors	<u>685,634,245</u>	<u>670,133,517</u>
Total	\$ 984,982,136	\$ 945,966,718
Actuarial Value of Assets	\$1,282,058,570	\$1,231,975,474
Funded Ratio	130.2 %	130.2 %
Unfunded Actuarial Accrued Liability (UAAL) (AAL - Actuarial Value of Assets)	\$ (297,076,434)	\$ (286,008,756)
Calculation of Required Contribution		
Statutory Contribution Rate		
Employer Contribution Rate	25.58 %	25.58 %
Member Contribution Rate	<u>8.74 %</u>	<u>8.75 %</u>
Total	34.32 %	34.33 %
Less Normal Cost:		
Retirement	15.98 %	16.09 %
Termination	4.08 %	4.12 %
Pre-Retirement Survivors	0.71 %	0.75 %
Disability	<u>1.60 %</u>	<u>1.79 %</u>
Total Normal Cost	22.37 %	22.75 %
Less Administrative Expenses	0.50 %	0.50 %
Amount Remaining to Amortize UAAL	11.45 %	11.08 %
Amortization Period	0	0
Increase in Statutory Rate Necessary to Amortize UAAL over 30 Years	N/A	N/A



Section I: Board Summary

Summary of Key Findings – State Police/Corrections Division

As of June 30, 2019, the actuarial value of assets exceeded accrued liabilities by \$297.1 million. As of June 30, 2018, the actuarial value of assets exceeded accrued liabilities by \$286.0 million. This represents a decrease in the UAAL of about \$11.1 million from the previous year. The funded ratio remained at 130.2%. Table IV-3 provides the reconciliation of the UAAL. In the course of preparing the valuation report, we note the following key findings:

- The State Police/Corrections Division experienced a net actuarial loss of \$20.0 million during the plan year ended June 30, 2019. The actuarial loss is comprised of a \$15.2 million investment related loss and a \$4.8 million loss due to non-investment related experience, primarily due to salary increases greater than expected. Table IV-4 provides the detailed information on the sources and magnitude of actuarial gains and losses.



Section I: Board Summary

Table I-1(d): Comparative Summary of Principal Results (Municipal General Division)

Valuation Date	June 30, 2019	June 30, 2018
Total Annual Payroll	\$ 901,598,748	\$ 901,617,649
Total Valuation Payroll	\$ 928,646,710	\$ 928,666,178
Actuarial Accrued Liability (AAL)		
Active and Deferred Vested Members	\$ 2,477,879,338	\$ 2,437,854,958
Retired Members and Survivors	<u>4,579,055,430</u>	<u>4,360,288,421</u>
Total	\$ 7,056,934,768	\$ 6,798,143,379
Actuarial Value of Assets	\$ 5,301,086,178	\$ 5,184,797,302
Funded Ratio	75.1 %	76.3 %
Unfunded Actuarial Accrued Liability (UAAL) (AAL - Actuarial Value of Assets)	\$ 1,755,848,590	\$ 1,613,346,077
Calculation of Required Contribution		
Statutory Contribution Rate		
Employer Contribution Rate	10.02 %	9.78 %
Member Contribution Rate	<u>13.49 %</u>	<u>13.47 %</u>
Total	23.51 %	23.25 %
Less Normal Cost:		
Retirement	8.13 %	8.11 %
Termination	4.08 %	4.05 %
Pre-Retirement Survivors	0.91 %	1.20 %
Disability	<u>0.73 %</u>	<u>0.80 %</u>
Total Normal Cost	13.85 %	14.16 %
Less Administrative Expenses	0.50 %	0.50 %
Amount Remaining to Amortize UAAL	9.16 %	8.59 %
Amortization Period	45 years	43 years
Increase in Statutory Rate Necessary to Amortize UAAL over 30 Years	1.89 %	1.56 %



Section I: Board Summary

Summary of Key Findings – Municipal General Division

The UAAL increased from \$1.61 billion to \$1.76 billion. The current statutory rate will amortize the UAAL over a 45-year period. The funded ratio decreased from 76.3% to 75.1%. Table IV-3 provides the reconciliation of the UAAL. In the course of preparing the valuation report, we note the following key findings:

- The Municipal General Division experienced a net actuarial loss of \$102.4 million during the plan year ended June 30, 2019. The actuarial loss is comprised of a \$66.8 million investment related loss and a \$35.6 million loss due to non-investment related experience.
- The amortization period increased from 43 years to 45 years.
- Table IV-5 provides the detailed information on the sources and magnitude of actuarial gains and losses.



Section I: Board Summary

Table I-1(e): Comparative Summary of Principal Results (Municipal Police Division)

Valuation Date	June 30, 2019	June 30, 2018
Total Annual Payroll	\$ 214,508,600	\$ 206,898,932
Total Valuation Payroll	\$ 220,943,858	\$ 213,105,900
Actuarial Accrued Liability (AAL)		
Active and Deferred Vested Members	\$ 808,317,496	\$ 760,169,317
Retired Members and Survivors	<u>2,075,880,383</u>	<u>1,990,208,711</u>
Total	\$ 2,884,197,879	\$ 2,750,378,028
Actuarial Value of Assets	\$ 2,109,268,722	\$ 2,058,403,842
Funded Ratio	73.1 %	74.8 %
Unfunded Actuarial Accrued Liability (UAAL) (AAL - Actuarial Value of Assets)	\$ 774,929,157	\$ 691,974,186
Calculation of Required Contribution		
Statutory Contribution Rate		
Employer Contribution Rate	18.91 %	18.66 %
Member Contribution Rate	<u>17.24 %</u>	<u>17.21 %</u>
Total	36.15 %	35.87 %
Less Normal Cost:		
Retirement	17.55 %	17.74 %
Termination	3.77 %	3.77 %
Pre-Retirement Survivors	0.68 %	0.71 %
Disability	<u>0.53 %</u>	<u>0.58 %</u>
Total Normal Cost	22.53 %	22.80 %
Less Administrative Expenses	0.50 %	0.50 %
Amount Remaining to Amortize UAAL	13.12 %	12.57 %
Amortization Period	Infinite	Infinite
Increase in Statutory Rate Necessary to Amortize UAAL over 30 Years	7.38 %	6.41 %



Section I: Board Summary

Summary of Key Findings – Municipal Police Division

The UAAL increased from \$692.0 million to \$774.9 million. The funded ratio decreased from 74.8% to 73.1%. Table IV-3 provides the reconciliation of the UAAL. In the course of preparing the valuation report, we note the following key findings:

- The Municipal Police Division experienced a net actuarial loss of \$66.9 million and a 1.7% decrease to the funded ratio during the plan year ended June 30, 2019. The loss is comprised of a \$26.3 million investment related loss and a \$40.6 million loss due to non-investment related experience. Table IV-5 provides the detailed information on the sources and magnitude of actuarial gains and losses.
- The financing period for the unfunded liability based upon the statutory contribution rates is infinite for the second consecutive year.



Section I: Board Summary

Table I-1(f): Comparative Summary of Principal Results (Municipal Fire Division)

Valuation Date	June 30, 2019	June 30, 2018
Total Annual Payroll	\$ 131,964,078	\$ 127,203,502
Total Valuation Payroll	\$ 135,923,000	\$ 131,019,607
Actuarial Accrued Liability (AAL)		
Active and Deferred Vested Members	\$ 555,006,281	\$ 530,260,290
Retired Members and Survivors	<u>1,145,274,377</u>	<u>1,093,257,351</u>
Total	\$ 1,700,280,658	\$ 1,623,517,641
Actuarial Value of Assets	\$ 1,002,875,446	\$ 977,829,334
Funded Ratio	59.0 %	60.2 %
Unfunded Actuarial Accrued Liability (UAAL) (AAL - Actuarial Value of Assets)	\$ 697,405,212	\$ 645,688,307
Calculation of Required Contribution		
Statutory Contribution Rate		
Employer Contribution Rate	21.80 %	21.55 %
Member Contribution Rate	<u>17.56 %</u>	<u>17.55 %</u>
Total	39.36 %	39.10 %
Less Normal Cost:		
Retirement	21.06 %	21.37 %
Termination	2.92 %	2.90 %
Pre-Retirement Survivors	0.75 %	0.76 %
Disability	<u>0.52 %</u>	<u>0.56 %</u>
Total Normal Cost	25.25 %	25.59 %
Less Administrative Expenses	0.50 %	0.50 %
Amount Remaining to Amortize UAAL	13.61 %	13.01 %
Amortization Period	Infinite	Infinite
Increase in Statutory Rate Necessary to Amortize UAAL over 30 Years	16.37 %	15.79 %



Section I: Board Summary

Summary of Key Findings – Municipal Fire Division

The UAAL increased from \$645.7 million to \$697.4 million and the funded ratio decreased from 60.2 % to 59.0%. Table IV-3 provides the reconciliation of the UAAL. In the course of preparing the valuation report, we note the following key findings:

- The Municipal Fire Division experienced a net actuarial loss of \$24.6 million. The loss is comprised of a \$12.3 million investment related loss and a \$12.3 million loss due to non-investment related experience. Table IV-5 provides the detailed information on the sources and magnitude of actuarial gains and losses.
- The financing period for the unfunded liability based upon the statutory contribution rates is an infinite period for the eleventh consecutive year.

Section II of the report provides summarized information on the membership data used in the valuation. Section III covers the Fund's assets and Section IV covers the Fund's liabilities. The results of the valuation are provided in Section V and additional disclosure information is in Section VI. The appendices provide additional information on A) the Fund members, B) the actuarial assumptions and methods, and C) the summary of the benefit provisions of the Fund. It is important to note that all information contained in this report for periods prior to June 30, 2010 were produced by a prior actuarial consulting firm.



Section II: Membership Data

Data regarding the membership of the Fund for use in the valuation were furnished by PERA. The following tables summarize the membership data as of June 30, 2019.

Table II-1: Summary of Membership Data as of June 30, 2019

Group	Count					
	State General	State Police/ Corrections	Municipal General	Municipal Police	Municipal Fire	Totals
Total Active Members	18,923	1,863	21,198	3,687	2,389	48,060
Inactive Members						
Deferred Vested	3,115	125	2,185	220	119	5,764
Other	5,339	446	7,368	513	193	13,859
Total Inactive Members	8,454	571	9,553	733	312	19,623
Retirees						
Service*	16,310	1,312	11,565	3,299	1,781	34,267
Disabled	723	47	588	67	16	1,441
Beneficiaries	2,217	208	1,882	339	196	4,842
Total Retirees	19,250	1,567	14,035	3,705	1,993	40,550
Totals	46,627	4,001	44,786	8,125	4,694	108,233

* Counts include Co-Payees as follows:

State General - 354

State Police – 94

Municipal General - 348

Municipal Police - 267

Municipal Fire - 151



Section II: Membership Data

Table II-2: Summary of Active Membership Valuation Data

Division	Number		Annual Payroll*		Average Salary	
	2019	2018	2019	2018	2019	2018
State Division						
General	18,923	19,114	\$ 935,478,450	\$ 900,513,193	\$49,436	\$47,113
Police	560	552	34,925,740	32,666,748	62,367	59,179
Adult Corrections	1,026	1,090	42,131,193	41,681,140	41,064	38,240
Juvenile Corrections	277	286	11,163,470	10,498,110	40,301	36,707
Total State Division	20,786	21,042	\$1,023,698,853	\$ 985,359,191	\$49,249	\$46,828
Municipal Division						
General Coverage Plans						
Plan 1	1,023	984	\$ 36,240,607	\$ 35,014,808	\$35,426	\$35,584
Plan 2	6,288	6,403	247,111,667	252,855,591	39,299	39,490
Plan 3	12,537	12,743	563,040,025	558,724,065	44,910	43,846
Plan 4	711	714	27,070,205	26,762,028	38,073	37,482
Detention Officers Plan 1	639	667	28,136,244	28,261,157	44,032	42,371
Total General	21,198	21,511	\$ 901,598,748	\$ 901,617,649	\$42,532	\$41,914
Police Coverage Plans						
Plan 1	109	105	\$ 4,986,938	\$ 4,744,770	\$45,752	\$45,188
Plan 2	58	60	2,606,424	2,750,179	44,938	45,836
Plan 3	55	62	2,689,508	2,982,425	48,900	48,104
Plan 4	129	133	6,124,580	6,370,159	47,477	47,896
Plan 5	3,336	3,388	198,101,150	190,051,399	59,383	56,095
Total Police	3,687	3,748	\$ 214,508,600	\$ 206,898,932	\$58,180	\$55,202
Fire Coverage Plans						
Plan 1	19	18	\$ 901,469	\$ 856,218	\$47,446	\$47,568
Plan 2	19	21	885,365	1,055,438	46,598	50,259
Plan 3	7	6	342,370	280,706	48,910	46,784
Plan 4	6	6	325,220	235,462	54,203	39,244
Plan 5	2,338	2,258	129,509,654	124,775,678	55,393	55,259
Total Fire	2,389	2,309	\$ 131,964,078	\$ 127,203,502	\$55,238	\$55,090
Total Municipal Division	27,274	27,568	\$1,248,071,426	\$1,235,720,083	\$45,760	\$44,824
Total PERA	48,060	48,610	\$2,271,770,279	\$2,221,079,274	\$47,269	\$45,692

* Beginning with the 2016 valuation, annual payroll reflects the change from total to pensionable earnings.



Section II: Membership Data

Table II-3: Summary of Deferred Vested Members as of June 30, 2019

Division	Number	Average Age	Average Service	Average Annual Benefit
State Division				
General	3,115	51.04	9.30	\$ 13,059
Police/Hazardous Duty	<u>125</u>	49.18	10.59	12,225
Total State Division	3,240	50.97	9.35	\$ 13,027
Municipal Division				
General	2,185	52.07	9.37	\$ 10,783
Police	220	45.50	8.94	13,766
Fire	<u>119</u>	44.32	8.59	15,107
Total Municipal Division	2,524	51.13	9.30	\$ 11,247
PERA Totals	5,764	51.04	9.32	\$ 12,247



Section II: Membership Data

Table II-4: Summary of Retirees and Survivors as of June 30, 2019

Type of Retirement	Division					Total
	State General	State Police/ Corrections	Municipal General	Municipal Police	Municipal Fire	
Service						
Number	16,310	1,312	11,565	3,299	1,781	34,267
Total Annual Benefits	\$ 498,587,560	\$ 45,517,182	\$ 326,978,303	\$ 136,287,415	\$ 77,896,189	\$ 1,085,266,649
Avg Annual Benefit	\$ 30,569	\$ 34,693	\$ 28,273	\$ 41,312	\$ 43,737	\$ 31,671
Avg Age	69.79	63.83	68.91	60.38	62.24	67.97
Disability						
Number	723	47	588	67	16	1,441
Total Annual Benefits	\$ 12,924,799	\$ 862,314	\$ 10,377,935	\$ 1,847,781	\$ 425,917	\$ 26,438,746
Avg Annual Benefit	\$ 17,877	\$ 18,347	\$ 17,650	\$ 27,579	\$ 26,620	\$ 18,347
Avg Age	58.85	58.33	57.76	51.83	52.58	57.99
Survivors						
Number	2,217	208	1,882	339	196	4,842
Total Annual Benefits	\$ 42,939,480	\$ 5,124,618	\$ 34,081,804	\$ 9,558,153	\$ 6,360,115	\$ 98,064,170
Avg Annual Benefit	\$ 19,368	\$ 24,638	\$ 18,109	\$ 28,195	\$ 32,450	\$ 20,253
Avg Age	70.41	67.52	69.44	65.68	71.60	69.63
Total						
Number	19,250	1,567	14,035	3,705	1,993	40,550
Total Annual Benefits	\$ 554,451,839	\$ 51,504,114	\$ 371,438,042	\$ 147,693,349	\$ 84,682,221	\$ 1,209,769,565
Avg Annual Benefit	\$ 28,803	\$ 32,868	\$ 26,465	\$ 39,863	\$ 42,490	\$ 29,834
Avg Age	69.45	64.15	68.51	60.71	63.08	67.81



Section II: Membership Data

Table II-5: Summary of Historical Active Membership Valuation Data by Division

Valuation Date	Number	Annual Payroll*	Average Annual Pay	% Change In Average Pay
State General Division				
6/30/2019	18,923	\$ 935,478,450	\$ 49,436	4.93 %
6/30/2018	19,114	900,513,193	47,113	(2.55)%
6/30/2017	19,213	928,864,843	48,346	5.02 %
6/30/2016	19,655	904,829,688	46,036	(0.62)%
6/30/2015	20,253	938,168,776	46,322	7.33 %
State Police/Corrections Division				
6/30/2019	1,863	\$ 88,220,403	\$ 47,354	7.60 %
6/30/2018	1,928	84,845,998	44,007	(4.57)%
6/30/2017	1,907	87,941,130	46,115	10.00 %
6/30/2016	1,866	78,225,782	41,922	(19.04)%
6/30/2015	1,880	97,352,917	51,783	10.35 %
Municipal General Division				
6/30/2019	21,198	\$ 901,598,748	\$ 42,532	1.47 %
6/30/2018	21,511	901,617,649	41,914	4.22 %
6/30/2017	21,673	871,633,574	40,217	1.16 %
6/30/2016	21,274	845,735,646	39,754	(1.61)%
6/30/2015	21,217	857,243,239	40,404	6.51 %
Municipal Police Division				
6/30/2019	3,687	\$ 214,508,600	\$ 58,180	5.39 %
6/30/2018	3,748	206,898,932	55,202	4.53 %
6/30/2017	3,726	196,767,735	52,809	1.63 %
6/30/2016	3,708	192,670,656	51,961	(14.67)%
6/30/2015	3,647	222,085,818	60,895	7.32 %
Municipal Fire Division				
6/30/2019	2,389	\$ 131,964,078	\$ 55,238	0.27 %
6/30/2018	2,309	127,203,502	55,090	3.15 %
6/30/2017	2,232	119,207,608	53,408	2.86 %
6/30/2016	2,190	113,709,690	51,922	(15.31)%
6/30/2015	2,176	133,403,526	61,307	7.51 %

Table II-6: Summary of Historical Active Membership Valuation Data for All Divisions

Valuation Date	Number	Annual Payroll*	Average Annual Pay	% Change In Average Pay
6/30/2019	48,060	\$ 2,271,770,279	\$ 47,269	3.45 %
6/30/2018	48,610	2,221,079,274	45,692	1.05 %
6/30/2017	48,751	2,204,414,890	45,218	3.12 %
6/30/2016	48,693	2,135,171,462	43,850	(4.09)%
6/30/2015	49,173	2,248,254,276	45,721	7.19 %

* Beginning with the 2016 valuation, annual payroll reflects the change from total to pensionable earnings.



Section III: PERA Assets

The following tables provide a summary of PERA's market value and actuarial value of assets (excluding Legislative Division) as of June 30, 2019.

Table III-1: Market Value Summary as of June 30, 2019

Division	June 30, 2019	June 30, 2018
State General	\$ 5,791,625,077	\$ 5,767,630,979
State Police/Corrections	1,279,095,463	1,225,130,672
Municipal General	5,288,834,252	5,155,990,793
Municipal Police	2,104,393,758	2,046,967,440
Municipal Fire	<u>1,000,557,590</u>	<u>972,396,557</u>
Total Market Value of Assets	\$ 15,464,506,140	\$ 15,168,116,441

Table III-2: Actuarial Value Summary as of June 30, 2019

Division	June 30, 2019	June 30, 2018
State General	\$ 5,805,041,751	\$ 5,799,854,720
State Police/Corrections	1,282,058,570	1,231,975,474
Municipal General	5,301,086,178	5,184,797,302
Municipal Police	2,109,268,722	2,058,403,842
Municipal Fire	<u>1,002,875,446</u>	<u>977,829,334</u>
Total Actuarial Value of Assets	\$ 15,500,330,667	\$ 15,252,860,672



Section III: PERA Assets

The following tables provide information on PERA's assets at market value and cash flow.

Table III-3: Market Value Reconciliation (Total PERA with Legislature)

	June 30, 2019	June 30, 2018
Beginning of Year Market Value	\$ 15,210,482,641	\$ 14,798,917,909
Audit Adjustment	-	(745,145)
Revised Beginning of Year Market Value	\$ 15,210,482,641	\$ 14,798,172,764
Revenues:		
a. Member Contributions	\$ 274,026,281	\$ 273,679,996
b. Employer Contributions	339,676,103	319,499,468
c. Appropriations	-	-
d. Purchases of Service	7,616,812	9,167,491
e. Investment Income		
1. Interest, dividends, etc.	415,268,426	367,541,008
2. Realized/Unrealized gains (losses)	581,382,118	694,887,277
3. Security lending and other gains (losses)	3,351,124	3,462,298
f. Other Income	2,046,688	2,109,772
g. Settlement Award	-	-
h. Total Revenues	\$ 1,623,367,552	\$ 1,670,347,310
Expenditures :		
a. Benefit Payments	\$ 1,193,943,794	\$ 1,133,417,826
b. Refunds of Member Contributions	54,336,705	50,288,373
c. Investment Expenses	64,440,773	61,663,978
d. Administrative Expenses	13,583,372	12,667,256
e. Total Expenditures	\$ 1,326,304,644	\$ 1,258,037,433
End of Year Market Value	\$ 15,507,545,549	\$ 15,210,482,641

The market value rate of return for the plan year is 6.28% on both an adjusted basis and an unadjusted basis. This return is based on a simplified dollar-weighted basis which may not match more precise time-weighted return calculations. PERA's cash flow is (4.16)% as a percentage of average market value. A mature system such as PERA is expected to exhibit negative net cash flow as the number of members receiving benefit payments becomes a larger portion of total membership. There are 1.19 contributing active members for each member receiving a benefit as of June 30, 2019. We expect this measure to decline over future years and result in an increase in the percentage of negative cash flow.



Section III: PERA Assets

The actuarial value of assets represents a "smoothed" value developed with the purpose of dampening the impact of market volatility on the assets used in determining valuation results. The actuarial value of assets has been calculated by spreading the recognition of excess investment income over four years. The amount of excess investment income in each year is the difference between expected actuarial value investment income and actual market value investment income. Table III-4 provides the calculation of the amount of the current year excess investment income to be phased-in as well as the amount of deferred investment income from the prior years.

**Table III-4: Development of Actuarial Value of Assets as of June 30, 2019
(Total PERA with Legislative Division)**

A. Actuarial Value Beginning of Year		\$	15,295,463,572
B. Market Value End of Year			15,507,545,549
C. Revised Market Value Beginning of Year			15,210,482,641
D. Cash Flow			
D1. Contributions & Appropriations		\$	613,702,384
D2. Service Purchases			7,616,812
D3. Benefit Payments and Refunds			(1,248,280,499)
D4. Administrative Expenses			(13,583,372)
D5. Other			2,046,688
D6. Net		\$	(638,497,987)
E. Investment Income			
E1. Market Total (B - C - D6)		\$	935,560,895
E2. Assumed Rate			7.25%
E3. Amount for Immediate Recognition			1,085,775,557
E4. Amount for Phased-In Recognition			(150,214,662)
F. Phased-In Recognition of Investment Income			
F1. Current Year: 0.25 *E4		\$	(37,553,666)
F2. First Prior Year (2017/2018)	\$ (73,898,297) x 25%		(18,474,574)
F3. Second Prior Year (2016/2017)	454,743,664 x 25%		113,685,916
F4. Third Prior Year (2015/2016)	(1,027,716,151) x 25%		(256,929,038)
F5. Total Recognized Investment Gain		\$	(199,271,362)
G. Audit Adjustment		\$	-
H. Actuarial Value End of Year			\$15,543,469,780
(A + D6 + E3 + F5 + G)			
I. Difference Between Market & Actuarial Values		\$	(35,924,231)
J. Rate of Return on Actuarial Value			5.92 %
K. Actuarial Value as a Percentage of Market Value			100.23 %



Section III: PERA Assets

Table III-5: Allocation of Actuarial Value by Division as of June 30, 2019

	State Division		PERA Totals w/o Legislative
	General	Police	
Member Contribution Fund	\$ 896,762,967	\$ 69,799,978	\$ 2,645,244,267
Employer Contribution Fund	1,689,099,661	405,445,691	4,135,749,215
Retirement Reserve Fund	3,205,762,449	803,849,794	8,683,512,658
Total Fund Balances	\$ 5,791,625,077	\$ 1,279,095,463	\$ 15,464,506,140
Approximate % of Total Fund Balance*	37.45%	8.27%	100%
Actuarial Value Adjustment*	13,416,674	2,963,107	35,824,527
Total Actuarial Value of Assets	\$ 5,805,041,751	\$ 1,282,058,570	\$ 15,500,330,667

	Municipal Division			PERA Totals w/o Legislative
	General	Police	Fire	
Member Contribution Fund	\$ 1,161,061,009	\$ 303,167,527	\$ 214,452,786	\$ 2,645,244,267
Employer Contribution Fund	1,282,861,714	538,971,275	219,370,874	4,135,749,215
Retirement Reserve Fund	2,844,911,529	1,262,254,956	566,733,930	8,683,512,658
Total Fund Balances	\$ 5,288,834,252	\$ 2,104,393,758	\$ 1,000,557,590	\$ 15,464,506,140
Approximate % of Total Fund Balance*	34.20%	13.61%	6.47%	100.00%
Actuarial Value Adjustment*	12,251,926	4,874,964	2,317,856	35,824,527
Total Actuarial Value of Assets	\$ 5,301,086,178	\$ 2,109,268,722	\$ 1,002,875,446	\$ 15,500,330,667

* The actuarial value adjustment is the difference between the actuarial value of assets derived in Table III-4 and the total fund balance at market value. It was allocated to each group in proportion to the Total PERA Fund Balance. Please note that the Legislature Division accounted for approximately 0.28% of the Total PERA Fund Balance and is detailed in a separate report.



Section III: PERA Assets

The actuarial valuation assumes the rate of investment return on the assets of the Plan is 7.25% annually. This assumption is based upon the reasonable long-term expected return on the assets. In each year, the Fund will experience actuarial gains and losses due to the actual investment return of the assets. Table III-6 provides the calculation of the gain or loss due to the investment experience on the actuarial value of assets for the year ended June 30, 2019.

Table III-6: Actuarial Investment Gain (Loss) for the Year Ending June 30, 2019
(Dollar Amounts in Millions)

	State General	State Police/ Corrections	Municipal General	Municipal Police	Municipal Fire	Total
1. Beginning of Year Actuarial Value of Assets (AVA)	\$ 5,799.9	\$ 1,232.0	\$ 5,184.8	\$ 2,058.4	\$ 977.8	\$ 15,252.9
2. Employee and Employer Contributions	244.5	30.8	209.6	83.1	53.3	621.3
3. Benefit Payments	(565.6)	(53.1)	(391.8)	(151.1)	(84.8)	(1,246.3)
4. Administrative Expenses	(5.1)	(1.1)	(4.6)	(1.8)	(0.9)	(13.5)
5. Other	0.8	0.2	0.7	0.3	0.1	2.1
6. Interest [1 x 7.25% + (2 + 3 + 4 + 5) x 7.25% x 0.5]	408.7	88.5	369.2	146.7	69.7	1,082.8
7. Expected End of Year AVA	\$ 5,883.2	\$ 1,297.3	\$ 5,367.9	\$ 2,135.6	\$ 1,015.2	\$ 15,699.3
8. Actual End of Year AVA	5,805.0	1,282.1	5,301.1	2,109.3	1,002.9	15,500.4
9. Actuarial Investment Gain (Loss) (8 - 7)	\$ (78.2)	\$ (15.2)	\$ (66.8)	\$ (26.3)	\$ (12.3)	\$ (198.9)



Section III: PERA Assets

Statutory Reserve Transfers

Each year following receipt of the report of the annual actuarial valuation, the excess, if any, of the actuarial present value of pensions and refunds being paid or likely to be paid to members and survivors over the balance in the retirement reserve fund (RRF) shall be transferred to the retirement reserve fund from the employers accumulation fund (EAF). Table III-7 shows the necessary transfer amounts.

Table III-7: Statutory Reserve Transfers as of June 30, 2019

Division	Reported Fund Balances	Actuarial Present Value of Pensions Being Paid	Transfer
State General			
Members Contribution Fund	\$ 896,762,967		
Employers Accumulation Fund	1,689,099,661		\$ (3,398,107,646)
Retirement Reserve Fund	3,205,762,449	\$ 6,603,870,095	3,398,107,646
State Police/Corrections			
Members Contribution Fund	69,799,978		
Employers Accumulation Fund	405,445,691		-
Retirement Reserve Fund	803,849,794	685,634,245	-
Municipal General			
Members Contribution Fund	1,161,061,009		
Employers Accumulation Fund	1,282,861,714		(1,734,143,901)
Retirement Reserve Fund	2,844,911,529	4,579,055,430	1,734,143,901
Municipal Police			
Members Contribution Fund	303,167,527		
Employers Accumulation Fund	538,971,275		(813,625,427)
Retirement Reserve Fund	1,262,254,956	2,075,880,383	813,625,427
Municipal Fire			
Members Contribution Fund	214,452,786		
Employers Accumulation Fund	219,370,874		(578,540,447)
Retirement Reserve Fund	566,733,930	1,145,274,377	578,540,447
Total End of Year Market Value	\$ 15,464,506,140		



Section IV: PERA Liabilities

The total actuarial present value of benefits is the value as of the valuation date of all future benefits expected to be paid to current members of the Fund. An actuarial cost method allocates each individual's present value of benefits to past and future years of service. The actuarial accrued liability includes the portion of the active member present value of benefits allocated to past service as well as the entire present value of benefits for retirees, beneficiaries and inactive members. The portion of the actuarial present value allocated to the future service of active members is called the present value of future normal costs. Table IV-1 presents the calculation and allocation of the actuarial present value of benefits.

Table IV-1: Calculation and Allocation of the Actuarial Present Value as of June 30, 2019

	Actuarial Accrued Liability	Present Value of Future Normal Cost	Total Actuarial Present Value
Active Members			
Service Retirement	\$ 6,015,499,719	\$ 1,834,426,825	\$ 7,849,926,544
Termination Benefits	297,313,028	674,032,789	971,345,817
Survivor Benefits	147,207,298	135,533,335	282,740,633
Disability Retirement	88,355,681	145,810,072	234,165,753
Total for Active Members	\$ 6,548,375,726	\$ 2,789,803,021	\$ 9,338,178,747
Inactive Members	\$ 524,908,092		\$ 524,908,092
Retirees and Beneficiaries			
Service Retirements	\$ 13,667,413,078		\$ 13,667,413,078
Beneficiaries	1,009,020,507		1,009,020,507
Disability Retirements	413,280,945		413,280,945
Total for Retirees and Beneficiaries	\$ 15,089,714,530		\$ 15,089,714,530
Total	\$ 22,162,998,348	\$ 2,789,803,021	\$ 24,952,801,369

Under the valuation funding method, an unfunded actuarial accrued liability (UAAL) exists to the extent that the actuarial accrued liability exceeds the actuarial value of assets as presented in Section III. The calculation of the UAAL by Division as of the valuation date is shown in Table IV-2 on the following page.



Section IV: PERA Liabilities

Table IV-2: Calculation of the Unfunded Actuarial Accrued Liability and Funded Ratio
(Dollar Amounts in Millions)

	State General	State Police/ Corrections	Municipal General	Municipal Police	Municipal Fire
1. Actuarial Accrued Liability	\$ 9,536.6	\$ 985.0	\$ 7,056.9	\$ 2,884.2	\$ 1,700.3
2. Actuarial Value of Assets	5,805.0	1,282.1	5,301.1	2,109.3	1,002.9
3. Unfunded Actuarial Accrued Liability (1-2)	3,731.6	(297.1)	1,755.8	774.9	697.4
Funded Ratio (2 / 1)	60.9%	130.2%	75.1%	73.1%	59.0%

Although the terminology used to describe the excess of PERA’s actuarial accrued liability over the actuarial value of assets is call the “unfunded” actuarial accrued liability, the calculated annual contribution rates in the valuation include an annual amortization payment required to fully amortize the UAAL within 30 years. In some cases, the current statutory rates are less than these calculated rates.

The funded ratio is the ratio of the actuarial value of assets (Table III-2) divided by the actuarial accrued liability (Table IV-1) as of the valuation date. As of June 30, 2019, the funded ratio of PERA is 69.9% as compared to a ratio of 71.6% as of June 30, 2018. The ratio is a commonly used measure of the funding progress and can be useful in reviewing the historical trend of a Fund’s funding progress. Such a review should also consider the impact to this measure over the historical period due to changes to fund benefits, changes to the actuarial assumptions and methods, and the significant impact that investment experience can have on the ratio over short-term periods. We caution that no single “point in time” measure can provide a universal basis for comparing one plan’s funded status to another.



Section IV: PERA Liabilities

The calculation of PERA’s actuarial assets and liabilities requires the use of several assumptions concerning the future experience of PERA and its members. In each annual valuation, the latest year of actual experience is compared to that expected by the prior valuation. The differences are actuarial gains and losses which decrease or increase the UAAL. Table IV-3 provides the reconciliation of the UAAL.

Table IV-3: Reconciliation of the UAAL
(Dollar Amounts in Millions)

	State General	State Police/ Corrections	Municipal General	Municipal Police	Municipal Fire
1. Beginning of Year UAAL	\$ 3,395.6	\$ (286.0)	\$ 1,613.3	\$ 692.0	\$ 645.7
2. Normal Cost	145.9	19.9	131.5	48.6	33.5
3. Contributions	(244.5)	(30.8)	(209.5)	(83.1)	(53.3)
4. Other Income/Expense	4.3	0.9	3.8	1.5	0.8
5. Interest [(1 x 7.25%) + (2 + 3 + 4) x 7.25% x 0.5]	242.8	(21.1)	114.3	49.0	46.1
6. Expected End of Year	3,544.1	(317.1)	1,653.4	708.0	672.8
7. Assumption Changes	0	0	0	0	0
8. Other Changes	0	0	0	0	0
9. Expected UAAL after changes (6 + 7 + 8)	3,544.1	(317.1)	1,653.4	708.0	672.8
10. Actual UAAL	3,731.6	(297.1)	1,755.8	774.9	697.4
11. Total Actuarial Gain (Loss)	(187.5)	(20.0)	(102.4)	(66.9)	(24.6)

Tables IV-4 and IV-5 on the following pages provide details of the sources of actuarial gains and losses for state divisions and municipal divisions, respectively.



Section IV: PERA Liabilities

Table IV-4: Actuarial Gains & Losses by Source for State Divisions
(Dollar Amounts in Millions)

Source	State General			State Police/Corrections		
	UAAL	Funded Ratio	Contribution Rate*	UAAL	Funded Ratio	Contribution Rate*
Expected Value	\$3,544.1	62.4 %	21.49 %	(\$317.1)	132.4 %	(20.39)%
Retirement	\$12.4	(0.1)%	0.08 %	\$0.4	(0.1)%	0.03 %
Disability	\$0.9	0.0 %	0.01 %	(\$0.4)	0.1 %	(0.03)%
Pre-Retirement Death	(\$3.0)	0.0 %	(0.02)%	(\$0.2)	0.0 %	(0.01)%
Withdrawal	\$3.4	0.0 %	0.02 %	(\$0.6)	0.1 %	(0.04)%
Pay Increases	\$51.9	(0.3)%	0.32 %	\$7.1	(0.8)%	0.45 %
New Entrants	\$37.8	(0.2)%	0.23 %	\$3.7	(0.5)%	0.24 %
Post-Retirement Death	\$2.4	0.0 %	0.01 %	(\$4.0)	0.5 %	(0.26)%
Data Adjustments	\$6.0	0.0 %	0.04 %	(\$0.3)	0.0 %	(0.02)%
Other	(\$2.5)	(0.1)%	(0.02)%	(\$0.9)	0.1 %	(0.06)%
Investment Return	\$78.2	(0.8)%	0.47 %	\$15.2	(1.6)%	0.98 %
Total (Gain) or Loss	\$187.5	(1.5)%	1.14 %	\$20.0	(2.2)%	1.28 %
Assumption Changes	\$0.0	0.0 %	0.00 %	\$0.0	0.0 %	0.00 %
Other Changes	\$0.0	0.0 %	0.00 %	\$0.0	0.0 %	0.00 %
Actual Value	\$3,731.6	60.9 %	22.63 %	(\$297.1)	130.2 %	(19.11)%

* Impact on Contribution Rate based on 30 year period and valuation payroll.



Section IV: PERA Liabilities

Table IV-5: Actuarial Gains & Losses by Source for Municipal Divisions
(Dollar Amounts in Millions)

Source	Municipal General			Municipal Police			Municipal Fire		
	UAAL	Funded Ratio	Contribution Rate*	UAAL	Funded Ratio	Contribution Rate*	UAAL	Funded Ratio	Contribution Rate*
Expected Value	\$1,653.4	76.5 %	10.40 %	\$708.0	75.1 %	18.73 %	\$672.8	60.1 %	28.93 %
Retirement	\$13.2	(0.1)%	0.08 %	\$7.9	(0.2)%	0.21 %	\$4.2	(0.1)%	0.18 %
Disability	\$3.3	0.0 %	0.02 %	\$1.7	0.0 %	0.04 %	(\$0.1)	0.0 %	0.00 %
Pre-Retirement Death	(\$4.0)	0.0 %	(0.03)%	(\$0.5)	0.0 %	(0.01)%	(\$0.3)	0.0 %	(0.01)%
Withdrawal	(\$4.3)	0.0 %	(0.03)%	\$3.6	(0.1)%	0.10 %	\$4.3	(0.1)%	0.18 %
Pay Increases	(\$0.8)	0.0 %	(0.01)%	\$22.0	(0.6)%	0.57 %	\$0.6	0.0 %	0.03 %
New Entrants	\$28.1	(0.3)%	0.18 %	\$9.7	(0.3)%	0.26 %	\$4.2	(0.1)%	0.18 %
Post-Retirement Death	(\$2.0)	0.0 %	(0.01)%	(\$2.8)	0.1 %	(0.07)%	(\$1.5)	0.0 %	(0.06)%
Data Adjustments	\$4.3	0.0 %	0.03 %	\$0.0	0.0 %	0.00 %	\$1.3	0.0 %	0.04 %
Other	(\$2.2)	0.0 %	0.00 %	(\$1.0)	0.0 %	(0.03)%	(\$0.4)	(0.1)%	(0.02)%
Investment Return	\$66.8	(1.0)%	0.42 %	\$26.3	(0.9)%	0.70 %	\$12.3	(0.7)%	0.53 %
Total (Gain) or Loss	\$102.4	(1.4)%	0.65 %	\$66.9	(2.0)%	1.77 %	\$24.6	(1.1)%	1.05 %
Assumption Changes	\$0.0	0.0 %	0.00 %	\$0.0	0.0 %	0.00 %	\$0.0	0.0 %	0.00 %
Other Changes	\$0.0	0.0 %	0.00 %	\$0.0	0.0 %	0.00 %	\$0.0	0.0 %	0.00 %
Actual Value	\$1,755.8	75.1 %	11.05 %	\$774.9	73.1 %	20.50 %	\$697.4	59.0 %	29.98 %

* Impact on Contribution Rate based on 30 year period and valuation payroll.



Section V: Actuarial Funding Calculation

Section IV of this report presented PERA's actuarial accrued liability as the portion of the present value of benefits allocated to past years of service. The portion of the active members' present value of benefits allocated to future years of service is funded through annual normal cost contributions comprised of both active member and employer contributions.

The annual required contribution rate is the percentage of valuation payroll necessary to fund the annual normal cost of the Fund and fully amortize the UAAL over 30 years in accordance with the Board's funding objectives. The calculated rate is expected to remain constant over the remaining amortization period and is provided in Table V-1.

Table V-1(a): Valuation Results for State General Division

	June 30, 2019	June 30, 2018
1. Total Valuation Payroll	\$ 963,542,804	\$ 927,528,589
2. Present Value of Future Benefits	10,575,027,384	10,219,925,047
3. Present Value of Future Normal Costs	1,038,424,477	1,024,479,630
4. Actuarial Accrued Liability (2 - 3)	\$9,536,602,907	\$9,195,445,417
5. Actuarial Value of Assets	5,805,041,751	5,799,854,720
6. Unfunded Actuarial Accrued Liability (UAAL) (4 - 5)	\$3,731,561,156	\$3,395,590,697
7. UAAL Amortization Payment (30 year funding)	\$ 218,060,985	\$ 198,427,902
a. Amortization Payment as a Percent of Payroll (7 / 1)	22.63 %	21.39 %
8. Total Normal Cost	\$ 147,459,227	\$ 145,925,699
a. Normal Cost as a Percent of Payroll (8 / 1)	15.30 %	15.73 %
9. Expected Administrative Expenses	\$ 4,817,714	\$ 4,637,643
a. Administrative Expense as a Percent of Payroll (9 / 1)	0.50 %	0.50 %
10. Actuarially Determined Contribution (ADC)	\$ 370,337,926	\$ 348,991,244
a. ADC Rate (7a + 8a + 9a)	38.43 %	37.62 %
11. Expected Statutory Contribution Rates		
a. Employer Contribution Rate	17.24 %	16.99 %
b. Member Contribution Rate	8.92 %	8.92 %
c. Total Statutory Contribution Rate (a + b)	26.16 %	25.91 %
12. (Excess) Shortfall of Statutory Rates (10a - 11c)	12.27 %	11.71 %



Section V: Actuarial Funding Calculation

Table V-1(b): Valuation Results for State Police/Correction Division

	June 30, 2019	June 30, 2018
1. Total Valuation Payroll	\$ 90,867,015	\$ 87,391,378
2. Present Value of Future Benefits	1,147,989,270	1,106,047,043
3. Present Value of Future Normal Costs	163,007,134	160,080,325
4. Actuarial Accrued Liability (2 - 3)	\$ 984,982,136	\$ 945,966,718
5. Actuarial Value of Assets	1,282,058,570	1,231,975,474
6. Unfunded Actuarial Accrued Liability (UAAL) (4 - 5)	\$(297,076,434)	\$(286,008,756)
7. UAAL Amortization Payment (30 year funding)	\$ (17,360,235)	\$ (16,713,474)
a. Amortization Payment as a Percent of Payroll (7 / 1)	(19.11)%	(19.12)%
8. Total Normal Cost	\$ 20,322,473	\$ 19,879,816
a. Normal Cost as a Percent of Payroll (8 / 1)	22.37 %	22.75 %
9. Expected Administrative Expenses	\$ 454,335	\$ 436,957
a. Administrative Expense as a Percent of Payroll (9 / 1)	0.50 %	0.50 %
10. Actuarially Determined Contribution (ADC)	\$ 3,416,573	\$ 3,603,299
a. ADC Rate (7a + 8a + 9a)	3.76 %	4.13 %
11. Expected Statutory Contribution Rates		
a. Employer Contribution Rate	25.58 %	25.58 %
b. Member Contribution Rate	<u>8.74 %</u>	<u>8.75 %</u>
c. Total Statutory Contribution Rate (a + b)	34.32 %	34.33 %
12. (Excess) Shortfall of Statutory Rates (10a - 11c)	(30.56)%	(30.20)%



Section V: Actuarial Funding Calculation

Table V-1(c): Valuation Results for Municipal General Division

	June 30, 2019	June 30, 2018
1. Total Valuation Payroll	\$ 928,646,710	\$ 928,666,178
2. Present Value of Future Benefits	7,977,381,962	7,732,647,850
3. Present Value of Future Normal Costs	920,447,194	934,504,471
4. Actuarial Accrued Liability (2 - 3)	\$7,056,934,768	\$6,798,143,379
5. Actuarial Value of Assets	5,301,086,178	5,184,797,302
6. Unfunded Actuarial Accrued Liability (UAAL) (4 - 5)	\$1,755,848,590	\$1,613,346,077
7. UAAL Amortization Payment (30 year funding)	\$ 102,606,405	\$ 94,278,995
a. Amortization Payment as a Percent of Payroll (7 / 1)	11.05 %	10.15 %
8. Total Normal Cost	\$ 128,576,278	\$ 131,545,530
a. Normal Cost as a Percent of Payroll (8 / 1)	13.85 %	14.16 %
9. Expected Administrative Expenses	\$ 4,643,234	\$ 4,643,331
a. Administrative Expense as a Percent of Payroll (9 / 1)	0.50 %	0.50 %
10. Actuarially Determined Contribution (ADC)	\$ 235,825,917	\$ 230,467,856
a. ADC Rate (7a + 8a + 9a)	25.40 %	24.81 %
11. Expected Statutory Contribution Rates		
a. Employer Contribution Rate	10.02 %	9.78 %
b. Member Contribution Rate	<u>13.49 %</u>	<u>13.47 %</u>
c. Total Statutory Contribution Rate (a + b)	23.51 %	23.25 %
12. (Excess) Shortfall of Statutory Rates (10a - 11c)	1.89 %	1.56 %



Section V: Actuarial Funding Calculation

Table V-1(d): Valuation Results for Municipal Police Division

	June 30, 2019	June 30, 2018
1. Total Valuation Payroll	\$ 220,943,858	\$ 213,105,900
2. Present Value of Future Benefits	3,263,285,332	3,124,368,877
3. Present Value of Future Normal Costs	379,087,453	373,990,849
4. Actuarial Accrued Liability (2 - 3)	\$2,884,197,879	\$2,750,378,028
5. Actuarial Value of Assets	2,109,268,722	2,058,403,842
6. Unfunded Actuarial Accrued Liability (UAAL) (4 - 5)	\$ 774,929,157	\$ 691,974,186
7. UAAL Amortization Payment (30 year funding)	\$ 45,284,482	\$ 40,436,848
a. Amortization Payment as a Percent of Payroll (7 / 1)	20.50 %	18.98 %
8. Total Normal Cost	\$ 49,768,564	\$ 48,588,408
a. Normal Cost as a Percent of Payroll (8 / 1)	22.53 %	22.80 %
9. Expected Administrative Expenses	\$ 1,104,719	\$ 1,065,530
a. Administrative Expense as a Percent of Payroll (9 / 1)	0.50 %	0.50 %
10. Actuarially Determined Contribution (ADC)	\$ 96,157,765	\$ 90,090,786
a. ADC Rate (7a + 8a + 9a)	43.53 %	42.28 %
11. Expected Statutory Contribution Rates		
a. Employer Contribution Rate	18.91 %	18.66 %
b. Member Contribution Rate	<u>17.24 %</u>	<u>17.21 %</u>
c. Total Statutory Contribution Rate (a + b)	36.15 %	35.87 %
12. (Excess) Shortfall of Statutory Rates (10a - 11c)	7.38 %	6.41 %



Section V: Actuarial Funding Calculation

Table V-1(e): Valuation Results for Municipal Fire Division

	June 30, 2019	June 30, 2018
1. Total Valuation Payroll	\$ 135,923,000	\$ 131,019,607
2. Present Value of Future Benefits	1,989,117,421	1,906,232,784
3. Present Value of Future Normal Costs	288,836,763	282,715,143
4. Actuarial Accrued Liability (2 - 3)	\$1,700,280,658	\$1,623,517,641
5. Actuarial Value of Assets	1,002,875,446	977,829,334
6. Unfunded Actuarial Accrued Liability (UAAL) (4 - 5)	\$ 697,405,212	\$ 645,688,307
7. UAAL Amortization Payment (30 year funding)	\$ 40,754,221	\$ 37,732,044
a. Amortization Payment as a Percent of Payroll (7 / 1)	29.98 %	28.80 %
8. Total Normal Cost	\$ 34,325,836	\$ 33,528,110
a. Normal Cost as a Percent of Payroll (8 / 1)	25.25 %	25.59 %
9. Expected Administrative Expenses	\$ 679,615	\$ 655,098
a. Administrative Expense as a Percent of Payroll (9 / 1)	0.50 %	0.50 %
10. Actuarially Determined Contribution (ADC)	\$ 75,759,672	\$ 71,915,252
a. ADC Rate (7a + 8a + 9a)	55.73 %	54.89 %
11. Expected Statutory Contribution Rates		
a. Employer Contribution Rate	21.80 %	21.55 %
b. Member Contribution Rate	17.56 %	17.55 %
c. Total Statutory Contribution Rate (a + b)	39.36 %	39.10 %
12. (Excess) Shortfall of Statutory Rates (10a - 11c)	16.37 %	15.79 %



Section V: Actuarial Funding Calculation

Table V-1(f): Valuation Results for All PERA Divisions

	June 30, 2019	June 30, 2018
1. Total Valuation Payroll	\$ 2,339,923,387	\$ 2,287,711,652
2. Present Value of Future Benefits	24,952,801,369	24,089,221,601
3. Present Value of Future Normal Costs	2,789,803,021	2,775,770,418
4. Actuarial Accrued Liability (2 - 3)	\$22,162,998,348	\$21,313,451,183
5. Actuarial Value of Assets	15,500,330,667	15,252,860,672
6. Unfunded Actuarial Accrued Liability (UAAL) (4 - 5)	\$ 6,662,667,681	\$ 6,060,590,511
7. UAAL Amortization Payment (30 year funding)	\$ 389,345,858	\$ 354,162,315
a. Amortization Payment as a Percent of Payroll (7 / 1)	16.64 %	15.48 %
8. Total Normal Cost	\$ 380,452,378	\$ 379,467,564
a. Normal Cost as a Percent of Payroll (8 / 1)	16.26 %	16.59 %
9. Expected Administrative Expenses	\$ 11,699,617	\$ 11,438,558
a. Administrative Expense as a Percent of Payroll (9 / 1)	0.50 %	0.50 %
10. Actuarially Determined Contribution (ADC)	\$ 781,497,853	\$ 745,068,437
a. ADC Rate (7a + 8a + 9a)	33.40 %	32.57 %
11. Expected Statutory Contribution Rates		
a. Employer Contribution Rate	15.12 %	14.81 %
b. Member Contribution Rate	12.01 %	12.03 %
c. Total Statutory Contribution Rate (a + b)	27.13 %	26.84 %
12. (Excess) Shortfall of Statutory Rates (10a - 11c)	6.27 %	5.73 %

Table V-2: Contribution Rate Summary

Division	Employer Only		
	Current Statutory Rate	30-year Rate	(Excess)/ Shortfall
State General	17.24 %	29.51 %	12.27 %
State Police/Corrections	25.58 %	(4.98)%	(30.56)%
Municipal General	10.02 %	11.91 %	1.89 %
Municipal Police	18.91 %	26.29 %	7.38 %
Municipal Fire	21.80 %	38.17 %	16.37 %
PERA Total	15.12 %	21.39 %	6.27 %



Section V: Actuarial Funding Calculation

Table V-3: Statutory Contribution Rate Summary

Division and Coverage Plan	Contribution Rates	
	Member	Employer
State Division		
General Coverage Plan 3	8.92 %	17.24 %
Police and Adult Corrections Plan 1	9.10 %	25.50 %
Hazardous Duty (Juvenile Correctional Officers) Plan 2	6.28 %	26.12 %
Weighted Average for Police/Corrections*	8.74 %	25.58 %
Municipal Division		
General Coverage Plans		
Plan 1	8.50 %	7.65 %
Plan 2	10.65 %	9.80 %
Plan 3	14.65 %	9.80 %
Plan 4	17.15 %	12.30 %
Detention Officers Plan 1	18.15 %	17.30 %
Weighted Average*	13.49 %	10.02 %
Police Coverage Plans		
Plan 1	8.50 %	10.65 %
Plan 2	8.50 %	15.65 %
Plan 3	8.50 %	19.15 %
Plan 4	13.85 %	19.15 %
Plan 5	17.80 %	19.15 %
Weighted Average*	17.24 %	18.91 %
Fire Coverage Plans		
Plan 1	9.50 %	11.65 %
Plan 2	9.50 %	18.15 %
Plan 3	9.50 %	21.90 %
Plan 4	14.30 %	21.90 %
Plan 5	17.70 %	21.90 %
Weighted Average*	17.56 %	21.80 %

* PERA financial records do not provide an asset breakdown by coverage plan which necessitates the use of a weighted average contribution rate for the purpose of comparing assets to the actuarial accrued liability and determining the financing period for the unfunded actuarial accrued liability. Contribution rates are weighted by payroll.



Section VI: Additional Disclosure Information

The tables provided in this section present information relevant for the annual financial reporting of PERA. GASB Statement No. 67 required disclosure information will be provided in a separate supplemental report. Additional disclosure information is provided below.

Table VI-1: Schedule of Funding Progress

Actuarial Valuation Date	Actuarial Value of Plan Assets (a)	Actuarial Accrued Liability (AAL) Entry Age (b)	Unfunded AAL (UAAL) (b - a)	Funded Ratio (a / b)	Annual Payroll*	UAAL as a Percentage of Annual Payroll ((b - a) / c)
6/30/2019	\$ 15,500,330,667	\$ 22,162,998,348	\$6,662,667,681	69.9 %	\$2,271,770,279	293.3 %
6/30/2018	15,252,860,672	21,313,451,183	6,060,590,511	71.6 %	2,221,079,274	272.9 %
6/30/2017	15,124,167,297	20,194,698,290	5,070,530,993	74.9 %	2,204,414,890	230.0 %
6/30/2016	14,654,814,373	19,474,241,384	4,819,427,011	75.3 %	2,135,171,462	225.7 %
6/30/2015	14,074,919,042	18,786,486,550	4,711,567,508	74.9 %	2,248,254,276	209.6 %
6/30/2014	13,482,815,522	17,784,376,686	4,301,561,164	75.8 %	2,102,265,325	204.6 %
6/30/2013	12,438,151,665	17,057,380,022	4,619,228,357	72.9 %	2,049,737,510	225.4 %
6/30/2012	11,612,047,019	17,788,043,847	6,175,996,828	65.3 %	1,994,280,107	309.7 %
6/30/2011	11,855,217,373	16,826,392,409	4,971,175,036	70.5 %	1,935,013,761	256.9 %
6/30/2010	12,243,712,850	15,601,461,460	3,357,748,610	78.5 %	1,993,516,921	168.4 %
6/30/2009	12,553,985,916	14,908,279,200	2,354,293,284	84.2 %	2,081,259,498	113.1 %

* Beginning with the 2016 valuation, annual payroll reflects the change from total to pensionable earnings.



Section VI: Additional Disclosure Information

Table VI-2: Solvency Test by Division

State General

Valuation Date	Aggregate Accrued Liabilities For				Actuarial Value of Assets	Portion of Accrued Liabilities Covered by Actuarial Value of Assets		
	(1) Active Member Contributions	(2) Retirees, Survivors and Inactive Members	(3) Active Members (Employer Financed Portion)	(1)		(2)	(3)	
6/30/2019	\$ 896,762,967	\$ 6,893,274,726	\$ 1,746,565,214	\$ 5,805,041,751	100.00%	71.20%	0.00%	
6/30/2018	892,279,750	6,620,228,801	1,682,936,866	5,799,854,720	100.00	74.13	0.00	
6/30/2017	878,994,137	6,218,179,179	1,714,643,642	5,831,916,099	100.00	79.65	0.00	
6/30/2016	853,069,949	6,055,630,306	1,620,222,312	5,720,834,981	100.00	80.38	0.00	
6/30/2015	849,806,169	5,646,053,464	1,705,146,120	5,549,137,149	100.00	83.23	0.00	

State Police/Corrections

Valuation Date	Aggregate Accrued Liabilities For				Actuarial Value of Assets	Portion of Accrued Liabilities Covered by Actuarial Value of Assets		
	(1) Active Member Contributions	(2) Retirees, Survivors and Inactive Members	(3) Active Members (Employer Financed Portion)	(1)		(2)	(3)	
6/30/2019	\$ 69,799,978	\$ 695,901,232	\$ 219,280,926	\$ 1,282,058,570	100.00%	100.00%	100.00%	
6/30/2018	67,111,945	677,224,121	201,630,652	1,231,975,474	100.00	100.00	100.00	
6/30/2017	64,332,242	645,636,929	199,904,014	1,196,338,715	100.00	100.00	100.00	
6/30/2016	59,921,229	635,036,352	180,402,152	1,136,076,589	100.00	100.00	100.00	
6/30/2015	58,543,902	595,623,306	236,967,557	1,075,204,637	100.00	100.00	100.00	



Section VI: Additional Disclosure Information

Municipal General

Valuation Date	Aggregate Accrued Liabilities For				Portion of Accrued Liabilities Covered by Actuarial Value of Assets		
	(1) Active Member Contributions	(2) Retirees, Survivors and Inactive Members	(3) Active Members (Employer Financed Portion)	Actuarial Value of Assets	(1)	(2)	(3)
6/30/2019	\$ 1,161,061,009	\$ 4,771,658,727	\$ 1,124,215,032	\$ 5,301,086,178	100.00%	86.76%	0.00%
6/30/2018	1,137,899,276	4,528,287,174	1,131,956,929	5,184,797,302	100.00	89.37	0.00
6/30/2017	1,104,575,618	4,191,453,200	1,099,006,703	5,106,489,938	100.00	95.48	0.00
6/30/2016	1,053,649,176	4,071,034,047	1,035,772,981	4,916,985,846	100.00	94.90	0.00
6/30/2015	1,033,953,619	3,756,083,836	1,069,558,300	4,696,871,223	100.00	97.52	0.00

Municipal Police

Valuation Date	Aggregate Accrued Liabilities For				Portion of Accrued Liabilities Covered by Actuarial Value of Assets		
	(1) Active Member Contributions	(2) Retirees, Survivors and Inactive Members	(3) Active Members (Employer Financed Portion)	Actuarial Value of Assets	(1)	(2)	(3)
6/30/2019	\$ 303,167,527	\$ 2,095,697,284	\$ 485,333,068	\$ 2,109,268,722	100.00%	86.18%	0.00%
6/30/2018	289,967,593	2,011,087,857	449,322,578	2,058,403,842	100.00	87.93	0.00
6/30/2017	275,702,207	1,882,156,157	404,904,171	2,027,593,334	100.00	93.08	0.00
6/30/2016	260,474,657	1,810,426,144	382,129,648	1,952,310,191	100.00	93.45	0.00
6/30/2015	258,992,011	1,649,950,363	493,438,566	1,865,190,859	100.00	97.35	0.00

Municipal Fire

Valuation Date	Aggregate Accrued Liabilities For				Portion of Accrued Liabilities Covered by Actuarial Value of Assets		
	(1) Active Member Contributions	(2) Retirees, Survivors and Inactive Members	(3) Active Members (Employer Financed Portion)	Actuarial Value of Assets	(1)	(2)	(3)
6/30/2019	\$ 214,452,786	\$ 1,158,090,653	\$ 327,737,219	\$ 1,002,875,446	100.00%	68.08%	0.00%
6/30/2018	205,989,875	1,099,223,887	318,303,879	977,829,334	100.00	70.22	0.00
6/30/2017	194,507,068	1,033,070,516	287,632,507	961,829,211	100.00	74.28	0.00
6/30/2016	175,510,949	1,026,377,371	254,584,111	928,606,766	100.00	73.37	0.00
6/30/2015	171,569,805	934,914,512	325,885,020	888,515,174	100.00	76.69	0.00



Section VI: Additional Disclosure Information

Table VI-2: Solvency Test for All PERA Divisions

PERA Totals

Valuation Date	Aggregate Accrued Liabilities For				Portion of Accrued Liabilities Covered by Actuarial Value of Assets		
	(1) Active Member Contributions	(2) Retirees, Survivors and Inactive Members	(3) Active Members (Employer Financed Portion)	Actuarial Value of Assets	(1)	(2)	(3)
6/30/2019	\$ 2,645,244,267	\$ 15,614,622,622	\$ 3,903,131,459	\$ 15,500,330,667	100.00%	82.33%	0.00%
6/30/2018	2,593,248,439	14,936,051,840	3,784,150,904	15,252,860,672	100.00	84.76	0.00
6/30/2017	2,518,111,272	13,970,495,981	3,706,091,037	15,124,167,297	100.00	90.23	0.00
6/30/2016	2,402,625,960	13,598,504,220	3,473,111,204	14,654,814,373	100.00	90.10	0.00
6/30/2015	2,372,865,506	12,582,625,481	3,830,995,563	14,074,919,042	100.00	93.00	0.00



Section VI: Additional Disclosure Information

**Table VI-3: Schedule of Retirants Added to and Removed from Rolls by Division
State General**

Valuation Date	Added to Rolls		Removed from Rolls		Rolls End of Year		% Increase in Annual Allowances	Average Annual Allowances
	Number Added	Annual Allowances	Number Removed	Annual Allowances	Number	Annual Allowances		
6/30/2019	1,017	\$38,014,119	537	\$12,503,719	19,250	\$554,451,839	4.82%	\$ 28,803
6/30/2018	986	35,111,580	427	9,977,306	18,770	528,941,439	4.99	28,180
6/30/2017	912	31,124,051	536	11,387,703	18,211	503,807,165	4.08	27,665
6/30/2016	1,105	30,796,909	440	9,067,427	17,835	484,070,817	4.70	27,142
6/30/2015	1,499	32,859,803	418	8,741,632	17,170	462,341,335	5.50	26,927

State Police/Corrections

Valuation Date	Added to Rolls		Removed from Rolls		Rolls End of Year		% Increase in Annual Allowances	Average Annual Allowances
	Number Added	Annual Allowances	Number Removed	Annual Allowances	Number	Annual Allowances		
6/30/2019	58	\$ 2,826,753	44	\$ 1,195,773	1,567	\$51,504,114	3.27%	\$ 32,868
6/30/2018	62	2,532,699	31	992,132	1,553	49,873,134	3.19	32,114
6/30/2017	51	2,309,111	38	882,314	1,522	48,332,567	3.04	31,756
6/30/2016	65	2,479,773	26	578,925	1,509	46,905,770	4.22	31,084
6/30/2015	108	3,301,453	40	1,047,237	1,470	45,004,922	5.27	30,616



Section VI: Additional Disclosure Information

Municipal General

Valuation Date	Added to Rolls		Removed from Rolls		Rolls End of Year		% Increase in Annual Allowances	Average Annual Allowances
	Number Added	Annual Allowances	Number Removed	Annual Allowances	Number	Annual Allowances		
6/30/2019	946	\$29,052,180	426	\$ 8,634,982	14,035	\$371,438,042	5.82%	\$ 26,465
6/30/2018	911	27,278,930	313	6,346,069	13,515	351,020,844	6.34	25,973
6/30/2017	717	21,257,836	418	7,607,253	12,917	330,087,983	4.31	25,555
6/30/2016	933	24,135,156	342	6,564,419	12,618	316,437,400	5.88	25,078
6/30/2015	1,066	24,563,648	331	6,177,685	12,027	298,866,663	6.56	24,850

Municipal Police

Valuation Date	Added to Rolls		Removed from Rolls		Rolls End of Year		% Increase in Annual Allowances	Average Annual Allowances
	Number Added	Annual Allowances	Number Removed	Annual Allowances	Number	Annual Allowances		
6/30/2019	177	\$ 9,107,704	70	\$ 2,029,823	3,705	\$147,693,349	5.03%	\$ 39,863
6/30/2018	165	8,523,713	44	1,491,360	3,598	140,615,468	5.26	39,082
6/30/2017	166	8,150,488	61	1,633,073	3,477	133,583,115	5.13	38,419
6/30/2016	211	9,918,243	49	1,493,127	3,372	127,065,700	7.10	37,683
6/30/2015	204	8,516,186	37	994,098	3,210	118,640,584	6.77	36,960

Municipal Fire

Valuation Date	Added to Rolls		Removed from Rolls		Rolls End of Year		% Increase in Annual Allowances	Average Annual Allowances
	Number Added	Annual Allowances	Number Removed	Annual Allowances	Number	Annual Allowances		
6/30/2019	95	\$ 5,867,307	40	\$ 1,447,080	1,993	\$84,682,221	5.51%	\$ 42,490
6/30/2018	81	4,982,102	27	1,063,296	1,938	80,261,994	5.13	41,415
6/30/2017	34	2,496,048	22	816,881	1,884	76,343,188	2.25	40,522
6/30/2016	110	5,799,234	33	1,012,932	1,872	74,664,021	6.85	39,885
6/30/2015	93	4,762,883	34	1,134,858	1,795	69,877,719	5.48	38,929



Section VI: Additional Disclosure Information

Table VI-3: Schedule of Retirants Added to and Removed from Rolls for All PERA Divisions

PERA Totals

Valuation Date	Added to Rolls		Removed from Rolls		Rolls End of Year		% Increase in Annual Allowances	Average Annual Allowances
	Number Added	Annual Allowances	Number Removed	Annual Allowances	Number	Annual Allowances		
6/30/2019	2,293	\$84,868,063	1,117	\$25,811,377	40,550	\$ 1,209,769,565	5.13%	\$ 29,834
6/30/2018	2,205	78,429,024	842	19,870,163	39,374	1,150,712,879	5.36	29,225
6/30/2017	1,880	65,337,534	1,075	22,327,224	38,011	1,092,154,018	4.10	28,733
6/30/2016	2,424	73,129,315	890	18,716,830	37,206	1,049,143,708	5.47	28,198
6/30/2015	2,970	74,003,974	860	18,095,510	35,672	994,731,223	5.96	27,885

Table VI-4: Summary of Actuarial Methods and Assumptions

Valuation date	June 30, 2019
Actuarial cost method	Entry Age Normal
Amortization method	Level Percent of Payroll, Open
Payroll growth rate	3.00%
Remaining amortization period	30 years
Asset valuation method	4-year Smoothed Market
Actuarial assumptions:	
Investment rate of return*	7.25%
Administrative expenses	0.50% of payroll
Projected salary increases*	3.25% – 13.50%
Post-retirement benefit increases	2.00% compounded annually (2.50% for certain retirees and disabled participants with annual benefits less than \$20,000)

* Includes inflation at 2.50%



Appendix A: Additional Membership Data

Table A-1: Schedule of Active Participant Data as of June 30, 2019 by Division

State General

Nearest Age	Completed Years of Service								Total	Payroll
	Under 5	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30+			
Under 20	28							28	\$ 826,117	
20 to 24	511	3						514	16,623,768	
25 to 29	1,289	201	6					1,496	56,402,582	
30 to 34	1,355	622	232	6				2,215	95,833,187	
35 to 39	1,011	611	609	198	9			2,438	115,654,986	
40 to 44	851	490	493	433	183	1		2,451	125,543,101	
45 to 49	703	456	467	492	449	58	1	2,626	139,933,608	
50 to 54	594	435	449	439	358	102	2	2,379	126,708,835	
55 to 59	529	413	472	466	349	110	6	2,345	120,386,838	
60	85	68	87	94	58	15	4	411	23,126,337	
61	96	53	96	72	58	12	1	388	20,265,383	
62	71	56	93	63	39	13	5	340	18,105,856	
63	64	56	75	50	23	23	2	293	16,914,314	
64	51	44	51	45	29	16	7	243	14,445,022	
65	52	35	43	28	24	7	2	191	10,846,676	
66	28	20	33	19	11	6	4	121	7,104,533	
67	24	30	23	11	9	8	6	111	6,913,947	
68	17	20	16	10	9	3		75	4,422,475	
69	16	11	11	14	5	8	2	67	4,102,916	
70	6	15	18	5	5		1	50	2,846,177	
71	9	7	3	5	8	2		34	1,713,661	
72	4	3	5	4	1		1	18	1,041,620	
73	8	2	9	3	2		2	26	1,694,046	
74	3	2		1	1	1		8	549,382	
75	3	5	1	3	1			13	1,021,243	
76	3	3	4	5	1		1	17	929,745	
77	2	1	2	1	1	1		8	446,385	
78	1	2	1					4	204,186	
79				1	1			2	87,341	
80 & Over	2	2	1	2	2		2	11	784,185	
Total	7,416	3,666	3,300	2,470	1,636	386	49	18,923	\$ 935,478,450	

Average Age: 45.07

Average Service: 9.14



Appendix A: Additional Membership Data

State Police/Corrections

Nearest Age	Completed Years of Service								Total	Payroll
	Under 5	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30+			
Under 20	4								4	\$ 161,291
20 to 24	163	3							166	6,859,861
25 to 29	219	121	8	1					349	15,255,503
30 to 34	138	115	86	18					357	16,314,321
35 to 39	71	53	50	80	34				288	13,765,239
40 to 44	33	24	48	56	67	12			240	13,025,602
45 to 49	35	21	38	36	53	20	1		204	10,988,594
50 to 54	11	15	18	25	29	9	3		110	5,208,059
55 to 59	13	12	17	19	19	2	4		86	3,900,676
60	1	1	1	5	5				13	584,366
61	2		3	2	1	1			9	393,196
62	1		3	2	6				12	542,774
63				4		1	1		6	340,824
64		1	1	1	3	1	1		8	391,024
65		1	1			1	1		4	171,083
66		1							1	45,429
67										
68				2	2				4	179,530
69										
70										
71					2				2	93,031
72										
73										
74										
75										
76										
77										
78										
79										
80 & Over										
Total	691	368	274	251	221	47	11	1,863	1,863	\$ 88,220,403

Average Age: 37.20

Average Service: 10.05



Appendix A: Additional Membership Data

Municipal General

Nearest Age	Completed Years of Service							Total	Payroll
	Under 5	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30+		
Under 20	307							307	\$ 10,050,798
20 to 24	1,187	12						1,199	36,971,445
25 to 29	1,633	310	22					1,965	66,680,668
30 to 34	1,289	633	342	14				2,278	86,266,685
35 to 39	1,042	602	563	224	11			2,442	102,537,393
40 to 44	898	541	536	338	182	5		2,500	112,387,066
45 to 49	805	474	548	375	393	62	2	2,659	125,609,443
50 to 54	732	453	447	369	332	110	5	2,448	115,251,723
55 to 59	680	469	539	401	358	113	35	2,595	119,374,115
60	141	77	104	90	80	22	6	520	23,830,015
61	125	60	96	55	34	16	8	394	17,138,044
62	76	86	89	63	36	24	8	382	17,773,284
63	90	66	79	42	43	14	9	343	15,505,409
64	48	55	56	28	16	8	4	215	10,600,229
65	47	58	41	30	22	10	3	211	9,779,853
66	39	35	39	18	18	5	2	156	6,819,812
67	28	31	25	16	7	3	2	112	5,383,755
68	28	22	15	14	6	4	3	92	4,003,054
69	24	13	24	9	5	2	1	78	3,560,350
70	19	20	16	8	3	4	1	71	3,354,645
71	22	13	12	1	7	2	3	60	2,542,388
72	20	8	7	2	5	3	2	47	1,830,838
73	9	6	3	5		1	1	25	1,043,342
74	7	6	2	3				18	741,081
75	7	4	1	2	3		1	18	539,541
76	5	4	2	1	1		1	14	522,081
77	6	1			3			10	213,104
78	4	1	2	1	1			9	376,427
79	4		1		1	1		7	234,186
80 & Over	9	4	3	3	2	1	1	23	677,975
Total	9,331	4,064	3,614	2,112	1,569	410	98	21,198	\$ 901,598,748

Average Age: 44.05

Average Service: 8.41



Appendix A: Additional Membership Data

Municipal Police

Nearest Age	Completed Years of Service							Total	Payroll
	Under 5	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30+		
Under 20									
20 to 24	204	5						209	\$ 9,264,951
25 to 29	498	164	4					666	33,006,997
30 to 34	288	296	150	6				740	40,217,733
35 to 39	138	163	271	115				687	41,385,229
40 to 44	69	96	152	211	41			569	36,784,671
45 to 49	46	43	73	153	81	6		402	26,856,418
50 to 54	18	27	50	78	39	8	1	221	14,488,192
55 to 59	13	21	25	36	17	6	3	121	8,032,580
60	1		3	6	2	1		13	755,432
61	2	3	6	6	1			18	1,117,828
62	1		1	1	2		1	6	462,301
63	2	2	2	1	2			9	467,489
64	2	1	2	3				8	477,479
65		2	2	2	1	1		8	490,039
66	1					1		2	194,597
67	1		1					2	153,625
68		1					1	2	118,126
69							1	1	88,872
70									
71									
72		1						1	23,840
73	1							1	65,000
74									
75									
76									
77									
78									
79									
80 & Over		1						1	57,200
Total	1,285	826	742	618	186	23	7	3,687	\$ 214,508,600

Average Age: 37.25

Average Service: 9.17



Appendix A: Additional Membership Data

Municipal Fire

Nearest Age	Completed Years of Service								Total	Payroll
	Under 5	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30+			
Under 20	4								4	\$ 125,379
20 to 24	161	1							162	5,697,462
25 to 29	270	88	4						362	15,257,581
30 to 34	169	174	117	1					461	23,521,695
35 to 39	79	132	218	72	1				502	28,613,813
40 to 44	33	61	157	153	31				435	27,068,635
45 to 49	14	18	67	93	61	4			257	17,622,226
50 to 54	10	6	30	38	34	3	2		123	8,193,100
55 to 59	5	2	9	15	17	3	2		53	3,835,480
60	1		4	1	1		1		8	526,094
61				2	1				3	239,442
62					1				1	78,036
63		2			2	1			5	392,419
64		1	1		1		1		4	271,973
65	1								1	78,915
66				1			1		2	148,812
67							1		1	77,707
68										
69										
70	1	1			1				3	118,957
71										
72										
73										
74	1								1	30,691
75										
76										
77										
78										
79				1					1	65,659
80 & Over										
Total	749	486	607	377	151	11	8	2,389	\$ 131,964,078	

Average Age: 37.01

Average Service: 9.71



Appendix A: Additional Membership Data

All PERA Divisions

Nearest Age	Completed Years of Service								Total	Payroll
	Under 5	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30+			
Under 20	343							343	\$ 11,163,584	
20 to 24	2,226	24						2,250	75,417,487	
25 to 29	3,909	884	44	1				4,838	186,603,331	
30 to 34	3,239	1,840	927	45				6,051	262,153,621	
35 to 39	2,341	1,561	1,711	689	55			6,357	301,956,659	
40 to 44	1,884	1,212	1,386	1,191	504	18		6,195	314,809,075	
45 to 49	1,603	1,012	1,193	1,149	1,037	150	4	6,148	321,010,290	
50 to 54	1,365	936	994	949	792	232	13	5,281	269,849,909	
55 to 59	1,240	917	1,062	937	760	234	50	5,200	255,529,689	
60	229	146	199	196	146	38	11	965	48,822,244	
61	225	116	201	137	95	29	9	812	39,153,893	
62	149	142	186	129	84	37	14	741	36,962,252	
63	156	126	156	97	70	39	12	656	33,620,455	
64	101	102	111	77	49	25	13	478	26,185,728	
65	100	96	87	60	47	19	6	415	21,366,566	
66	68	56	72	38	29	12	7	282	14,313,184	
67	53	61	49	27	16	11	9	226	12,529,034	
68	45	43	31	26	17	7	4	173	8,723,185	
69	40	24	35	23	10	10	4	146	7,752,138	
70	26	36	34	13	9	4	2	124	6,319,780	
71	31	20	15	6	17	4	3	96	4,349,080	
72	24	12	12	6	6	3	3	66	2,896,299	
73	18	8	12	8	2	1	3	52	2,802,388	
74	11	8	2	4	1	1		27	1,321,153	
75	10	9	2	5	4		1	31	1,560,783	
76	8	7	6	6	2		2	31	1,451,826	
77	8	2	2	1	4	1		18	659,489	
78	5	3	3	1	1			13	580,613	
79	4		1	2	2	1		10	387,186	
80 & Over	11	7	4	5	4	1	3	35	1,519,361	
Total	19,472	9,410	8,537	5,828	3,763	877	173	48,060	\$ 2,271,770,279	

Average Age: 43.31

Average Service: 8.88



Appendix A: Additional Membership Data

Table A-2: Number of Annual Retirement Allowances of Benefit Recipients as of June 30, 2019

Type of Pension	Number	Total Annual Benefits	Average Annual Pension
Service Retirement Pensions			
Single Life Pension Terminating Upon Death*	15,571	\$ 475,991,087	\$ 30,569
Two Life 100% Survivor Pension			
Retired Member Recipient*	13,562	434,725,915	32,055
Survivor Recipient	2,476	60,647,476	24,494
Two Life 50% Survivor Pension			
Retired Member Recipient*	4,930	166,585,035	33,790
Survivor Recipient	951	13,150,784	13,828
Single Life with Temporary Child Survivor Pension			
Retired Member Recipient*	189	7,870,229	41,641
Child Recipient	6	152,792	25,465
Total Service Retirement Pensions	37,685	\$ 1,159,123,318	\$ 30,758
Disability Retirement Pensions			
Single Life Pension Terminating Upon Death*	487	\$ 8,882,199	\$ 18,239
Two Life 100% Survivor Pension			
Retired Member Recipient*	774	13,787,766	17,814
Survivor Recipient	205	3,295,869	16,077
Two Life 50% Survivor Pension			
Retired Member Recipient*	186	3,719,808	19,999
Survivor Recipient	27	226,014	8,371
Single Life with Temporary Child Survivor Pension			
Retired Member Recipient*	9	143,358	15,929
Child Recipient	0	0	N/A
Total Disability Retirement Pensions	1,688	\$ 30,055,014	\$ 17,805
Pre-Retirement Survivor Pensions			
Spouse Recipient	1,137	\$ 20,173,213	17,742
Child Recipient	40	418,020	10,451
Total Pre-Retirement Survivor Pensions	1,177	\$ 20,591,233	\$ 17,495
Total Pensions Being Paid	40,550	\$ 1,209,769,565	\$ 29,834

* Includes Co-Payees



Appendix A: Additional Membership Data

Table A-3: Distribution of Participants Receiving Benefits as of June 30, 2019

Attained Age	Retired Member		Disabled Member		Survivor Beneficiaries		Totals	
	Number	Annual Pensions	Number	Annual Pensions	Number	Annual Pensions	Number	Annual Pensions
Under 40	13	\$ 203,175	28	497,034	254	\$ 4,046,941	295	\$ 4,747,150
40 to 44	203	8,136,801	71	1,455,550	112	1,770,855	386	11,363,206
45 to 49	1,087	44,537,153	142	2,969,474	158	2,826,351	1,387	50,332,978
50 to 54	2,386	95,909,919	235	4,956,099	230	4,210,388	2,851	105,076,406
55 to 59	3,815	151,620,484	315	6,187,361	339	6,848,520	4,469	164,656,365
60 to 64	5,243	182,796,877	393	6,756,235	489	10,446,061	6,125	199,999,173
65 to 69	7,229	214,790,177	222	3,314,103	613	14,039,700	8,064	232,143,980
70 to 74	6,462	186,220,571	35	302,890	677	15,111,449	7,174	201,634,910
75 to 79	3,855	103,157,512			662	14,088,464	4,517	117,245,976
80 to 84	2,319	59,088,732			584	11,294,907	2,903	70,383,639
85 to 89	1,086	26,327,850			427	8,546,349	1,513	34,874,199
90 to 94	470	10,737,718			214	3,516,934	684	14,254,652
95 to 99	82	1,550,372			75	1,255,770	157	2,806,142
100 & Over	17	189,308			8	61,481	25	250,789
Total	34,267	\$ 1,085,266,649	1,441	\$ 26,438,746	4,842	\$ 98,064,170	40,550	\$ 1,209,769,565



Appendix A: Additional Membership Data

**Table A-4: Distribution of Retirees by Years of Service at Retirement
(not including Disabled Members, Beneficiaries, and Co-Payees)**

Division	Years of Credited Service at Retirement							
	Under 5	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30+	Total
State General								
Average Monthly Benefit*	\$ 843	\$ 885	\$ 1,492	\$ 2,163	\$ 2,943	\$ 3,465	\$3,514	\$2,583
Number of Retirees*	748	1,825	1,922	1,818	2,294	6,661	595	15,863
State Police/Corrections								
Average Monthly Benefit*	\$ 1,774	\$1,606	\$ 1,738	\$ 2,352	\$ 2,891	\$ 3,459	\$4,002	\$3,023
Number of Retirees*	36	58	61	81	348	557	64	1,205
Municipal General								
Average Monthly Benefit*	\$ 1,192	\$ 751	\$ 1,258	\$ 1,957	\$ 2,767	\$ 3,306	\$3,528	\$2,400
Number of Retirees*	462	1,329	1,473	1,396	1,643	4,380	428	11,111
Municipal Police								
Average Monthly Benefit*	\$ 2,610	\$1,597	\$ 2,148	\$ 3,313	\$ 3,796	\$ 4,457	\$4,364	\$3,647
Number of Retirees*	62	59	88	457	2,137	153	40	2,996
Municipal Fire								
Average Monthly Benefit*	\$ 3,473	\$2,411	\$ 2,883	\$ 3,526	\$ 3,962	\$ 4,721	\$3,724	\$3,865
Number of Retirees*	26	27	53	200	1,206	67	38	1,617
Totals for All Divisions								
Average Monthly Benefit*	\$ 1,122	\$ 869	\$ 1,437	\$ 2,296	\$ 3,303	\$ 3,426	\$3,582	\$2,697
Number of Retirees*	1,334	3,298	3,597	3,952	7,628	11,818	1,165	32,792

* Does not include the following number of retirees with missing years of service at retirement

- State General – 93
- State Police/Corrections – 13
- Municipal General – 106
- Municipal Police – 36
- Municipal Fire – 13



Appendix A: Additional Membership Data

**Table A-5: Distribution of Recent Retiree Ages at Retirement
(not including Disabled Members, Beneficiaries, and Co-Payees)**

Division	2014-15 Retirees	2015-16 Retirees	2016-17 Retirees	2017-18 Retirees	2018-19 Retirees	All Current Retirees
State General						
Number	765	856	690	747	807	15,956
Average Monthly Benefit at Retirement	\$ 2,264	\$ 2,379	\$ 2,179	\$ 2,406	\$ 2,566	\$ 2,070
Average Age at Retirement	60.00	59.77	61.20	60.74	60.56	57.69
State Police/Corrections						
Number	57	46	28	44	37	1,218
Average Monthly Benefit at Retirement	\$ 2,743	\$ 2,638	\$ 3,063	\$ 2,776	\$ 3,489	\$ 2,433
Average Age at Retirement	50.25	51.62	51.44	54.01	51.47	51.07
Municipal General						
Number	606	681	504	673	720	11,217
Average Monthly Benefit at Retirement	\$ 2,129	\$ 2,116	\$ 1,920	\$ 2,172	\$ 2,159	\$ 1,976
Average Age at Retirement	59.88	60.69	61.95	60.69	61.42	58.15
Municipal Police						
Number	136	163	115	122	136	3,032
Average Monthly Benefit at Retirement	\$ 3,408	\$ 3,676	\$ 3,459	\$ 3,890	\$ 3,705	\$ 2,963
Average Age at Retirement	48.88	48.97	49.09	50.45	49.57	47.72
Municipal Fire						
Number	58	90	18	61	73	1,630
Average Monthly Benefit at Retirement	\$ 4,229	\$ 3,913	\$ 3,570	\$ 4,137	\$ 4,438	\$ 3,047
Average Age at Retirement	50.18	49.13	51.16	49.27	49.99	47.94
Totals for All Current Retirees						
Number	1,622	1,836	1,355	1,647	1,773	33,053
Average Monthly Benefit at Retirement	\$ 2,396	\$ 2,478	\$ 2,228	\$ 2,495	\$ 2,584	\$ 2,182
Average Age at Retirement	58.33	58.43	60.12	59.35	59.44	56.21



Appendix B: Summary of Actuarial Assumptions and Methods

Actuarial Cost Methods Used for the Valuation

An actuarial cost method is a procedure for allocating the actuarial present value of benefits and expenses to time periods. The method used for this valuation is known as the individual entry-age actuarial cost method and has the following characteristics:

- (i) The annual normal costs for each individual active member are sufficient to accumulate the value of the member's pension at the time of retirement.
- (ii) Each annual normal cost is a constant percentage of the member's year-by-year projected compensation.

The individual entry-age actuarial cost method allocates the actuarial present value of each member's projected benefits on a level basis over the member's compensation between the entry-age of the member and the expected exit ages. The expected annual administrative expenses are included in the determination of the actuarially determined contributions.

The portion of the actuarial present value allocated to the valuation year is called the normal cost. The portion of the actuarial present value not provided for by the actuarial present value of future costs is called the actuarial accrued liability. Deducting actuarial value of assets from the actuarial accrued liability determines the unfunded actuarial accrued liability. Unfunded actuarial accrued liability was amortized as a level percent of payroll over 30 years to determine the actuarial determined contribution. This period is consistent with the policy established by the Retirement Board in October 1996.

Active member payroll was projected to increase 3.00% per year for the purpose of determining the contribution needed to amortize the unfunded actuarial accrued liability. This estimate is consistent with the base rate of increase in salaries used to calculate actuarial present values.

The actuarial value of assets used for funding purposes is derived as follows: prior year actuarial value of assets is increased by contributions and expected investment income and reduced by refunds, benefit payments and expenses. To this amount 25% of the difference between expected and actual investment income for each of the previous four years is added.



Appendix B: Summary of Actuarial Assumptions and Methods

Actuarial Assumptions Used for the Valuation (effective with June 30, 2018 Valuation, except as otherwise noted)

Assumed Rate of Investment Return. 7.25% per annum net of investment expenses. The administrative expenses are now loaded to the normal cost developed in each annual valuation.

Administrative Expenses. 0.50% of payroll.

Price Inflation. 2.50% per annum, compounded annually.

Real Investment Return. 4.75% over price inflation (4.00% over wage growth). This is the expected rate of return (net of investment expenses) above the rate of price inflation.

Salary Increases. Salary increases occur in recognition of (i) individual merit and longevity, (ii) inflation-related depreciation of the purchasing power of salaries, and (iii) other factors such as productivity gains and competition from other employers for personnel. Sample rates follow:

Attributable to:	Annual Rates of Salary Increase for Sample Years of Service				
	1	5	10	15	20
General Increase in Wage Level Due to:					
Inflation	2.50%	2.50%	2.50%	2.50%	2.50%
Other Factors	0.75	0.75	0.75	0.75	0.75
Increase Due to Merit/Longevity:					
State General	5.00	1.25	0.50	0.00	0.00
State Police	10.25	5.75	1.25	1.25	1.25
State Corrections	9.75	3.50	2.00	1.50	1.50
Municipal General*	2.50	1.50	0.50	0.00	0.00
Municipal Police	7.75	2.75	1.50	0.75	0.75
Municipal Fire	7.75	2.75	1.50	1.25	1.25

* Includes Municipal Detention Officers



Appendix B: Summary of Actuarial Assumptions and Methods

In the following schedules, State Corrections includes Adult Corrections Officers, Juvenile Corrections Officers and Municipal Detention Officers unless otherwise noted.

Mortality Assumption. The mortality assumptions are based on the RPH-2014 Blue Collar mortality table with female ages set forward one year. Future improvement in mortality rates is assumed using 60% of the MP-2017 projection scale generationally. For non-public safety groups, 25% of in-service deaths are assumed to be duty related and 35% are assumed to be duty-related for public safety groups.

Rates are shown for sample ages in the following schedule. Note that sex distinct mortality rates are used solely for determining the funded status and contribution rate adequacy. All benefit amounts are based on merged gender mortality rates.

Sample Mortality Rates (Base Rates)								
Pre-Commencement			Post-Commencement			Post-Commencement		
Age	Male	Female	Age	Male	Female	Age	Male	Female
25	0.000733	0.000244	35	0.001793	0.001169	80	0.053460	0.042932
30	0.000717	0.000317	40	0.002156	0.001611	85	0.088524	0.072752
35	0.000797	0.000417	45	0.003275	0.002671	90	0.146859	0.125111
40	0.000958	0.000598	50	0.005604	0.004235	95	0.223428	0.197901
45	0.001455	0.001013	55	0.007342	0.005165	100	0.313988	0.291040
50	0.002490	0.001685	60	0.009893	0.006890	105	Disabled retirees use the same assumption as healthy lives.	
55	0.004071	0.002510	65	0.014089	0.010092	110		
60	0.006743	0.003606	70	0.021101	0.016038	115		
65	0.011612	0.005456	75	0.032952	0.026199	120		



Appendix B: Summary of Actuarial Assumptions & Methods

Rates of Retirement.

First Eligibility Rates: These rates are used to measure the probability of members retiring in the first year eligible for retirement at the indicated ages.

Sample Percent Retiring at First Eligibility by Age									
Ages	State General		State Police		State	Municipal General		Municipal	Municipal
	Male	Female	Tier 1	Tier 2	Corrections	Male	Female	Police	Fire
40	25%	25%	25%	40%	40%	20%	25%	30%	30%
45	25	25	25	40	40	20	25	30	25
50	25	25	25	40	40	20	25	30	20
55	25	25	25	40	40	20	25	30	25
60	30	25	50	40	35	15	25	30	20
65	25	25	100	100	35	15	25	30	20
70	25	20			100	20	15	100	100
75	25	20				20	15		
80	100	100				100	100		

Subsequent Eligibility Rates: These rates are used to measure the probability of members retiring after the first year eligible for retirement at the indicated ages.

Sample Percent Retiring After First Eligibility by Age*										
Ages	State General		State Police**		State	Municipal General		Municipal Police***		Municipal
	Male	Female	Tier 1	Tier 2	Corrections	Male	Female	Tier 1	Tier 2	Fire
40	25%	25%	35%	20%	20%	20%	25%	35%	40%	30%
45	25	25	35	20	20	20	25	35	40	25
50	25	25	35	20	20	20	25	35	40	20
55	25	25	35	20	20	20	25	35	40	25
60	20	35	50	20	20	15	15	35	30	20
65	30	35	100	100	20	15	10	30	30	20
70	25	20			100	20	15	100	100	100
75	25	20				20	15			
80	100	100				100	100			

* Rates are 70% at 30 years of service for all ages except State General and Municipal General Tier 2 uses 75% at 36 years of service and Municipal Police Tier 1 uses 75% at 26 years of service.

** Rates for State Police Tier 1 are 45% at 27 years of service, 55% at 28 years of service, and 65% at 29 years of service.

*** Rates for Municipal Police Tier 1 are 35% at 21 years of service, 40% at 22 years of service, and 45% at 23 years of service, 55% at 24 years of service, and 65% at 25 years of service.

*** Rates for Municipal Police Tier 2 are 35% at 25 years of service, 40% at 26 years of service, and 45% at 27 years of service, 55% at 28 years of service, and 65% at 29 years of service.



Appendix B: Summary of Actuarial Assumptions & Methods

Rates of Withdrawal from Active Membership. The rates are used to measure probabilities of active members terminating for a reason other than disability or death. The rates do not apply to members who are within the retirement rate range. Assumptions for State General and Municipal General are gender distinct and both based on age and service. Assumptions for all other plans are not gender distinct and are service related only; these rates do not vary by age.

State General Males					
Rates of Active Members Terminating During Year					
Sample Ages	Sample Service (Yr):				
	2	4	6	8	10+
20	18.76%	10.86%	8.21%	7.78%	5.11%
25	17.72	11.06	8.10	7.07	4.65
30	16.45	11.27	7.97	6.18	4.13
35	15.31	10.81	7.59	5.58	3.89
40	14.30	9.97	7.08	5.40	3.86
45	13.55	9.06	6.63	5.40	3.86
50	13.26	8.45	6.49	5.40	3.86
55	13.26	8.37	6.49	5.40	3.86
60	13.26	8.37	6.49	5.40	3.86
65	13.26	8.37			
70	13.26	8.37			

State General Females					
Rates of Active Members Terminating During Year					
Sample Ages	Sample Service (Yr):				
	2	4	6	8	10+
20	18.13%	11.95%	8.22%	6.05%	4.83%
25	17.76	11.95	8.02	5.81	4.25
30	17.28	11.89	7.81	5.54	3.55
35	16.34	11.23	7.45	5.28	3.46
40	15.22	10.24	6.99	5.06	3.46
45	14.19	9.20	6.58	4.95	3.46
50	13.52	8.55	6.45	4.80	3.46
55	13.37	8.50	6.45	4.70	3.46
60	13.37	8.50	6.45	4.70	3.46
65	13.37	8.50			
70	13.37	8.50			



Appendix B: Summary of Actuarial Assumptions & Methods

Rates of Withdrawal from Active Membership (cont.)

Municipal General Males					
Rates of Active Members Terminating During Year					
Sample Ages	Sample Service (Yr):				
	2	4	6	8	10+
20	21.70%	14.59%	11.29%	8.93%	8.54%
25	20.00	13.52	10.26	8.05	7.32
30	17.73	12.04	8.96	6.94	5.69
35	15.77	10.65	8.01	6.20	4.61
40	14.06	9.37	7.29	5.73	3.92
45	12.80	8.39	6.87	5.58	3.65
50	12.20	8.01	6.79	5.58	3.65
55	12.18	8.01	6.79	5.58	3.65
60	12.18	8.01	6.79	5.58	3.65
65	12.18	8.01			
70	12.18	8.01			

Municipal General Females					
Rates of Active Members Terminating During Year					
Sample Ages	Sample Service (Yr):				
	2	4	6	8	10+
20	24.40%	17.77%	14.41%	11.94%	7.51%
25	21.96	16.06	12.80	10.32	6.38
30	18.85	13.77	10.63	8.16	4.94
35	16.69	11.96	9.08	6.70	4.09
40	15.16	10.49	7.84	5.74	3.67
45	14.28	9.49	6.50	5.31	3.62
50	14.01	9.14	6.50	5.30	3.62
55	14.01	9.14	6.50	5.30	3.62
60	14.01	9.14	6.50	5.30	3.62
65	14.01	9.14			
70	14.01	9.14			



Appendix B: Summary of Actuarial Assumptions & Methods

Rates of Withdrawal from Active Membership (cont.)

Service Based Rates of Active Members Terminating During Year					
All Ages	Sample Service (Yr):				
	1	3	5	7	8+
State Police	8.00%	7.00%	4.00%	4.00%	4.00%
State Corrections	20.00	16.00	9.00	8.00	5.75
Municipal Detention	22.00	16.00	10.00	10.00	6.00
Municipal Police	14.00	9.50	6.80	5.15	3.50
Municipal Fire	10.00	7.50	5.00	3.30	2.75

Rates of Disability. The rates are used to measure the probabilities of active members becoming disabled. Rates for sample ages follow. For non-public safety groups, 25% disabilities are assumed to be duty related and 35% are assumed to be duty-related for public safety groups.

Rates Becoming Disabled at Indicated Ages (State Division)					
Sample Ages	State General		State	State	
	Male	Female	Police	Corrections	
25	0.02%	0.02%	0.03%	0.14%	
30	0.04	0.03	0.06	0.16	
35	0.08	0.06	0.08	0.21	
40	0.13	0.12	0.21	0.27	
45	0.24	0.20	0.25	0.46	
50	0.41	0.39	0.41	0.90	
55	0.57	0.61	0.95	1.40	
60	0.74	0.73	1.39	1.88	
65	0.75	0.73	1.39	1.88	

Rates Becoming Disabled at Indicated Ages (Municipal Division)					
Sample Ages	Municipal General		Municipal	Municipal	Municipal
	Male	Female	Detention	Police	Fire
25	0.03%	0.04%	0.06%	0.01%	0.02%
30	0.06	0.04	0.10	0.01	0.02
35	0.09	0.04	0.15	0.05	0.02
40	0.13	0.06	0.22	0.11	0.08
45	0.18	0.14	0.32	0.18	0.08
50	0.30	0.25	0.51	0.28	0.33
55	0.49	0.39	0.85	0.46	0.33
60	0.60	0.51	1.04	0.74	1.17
65	0.62	0.59	1.07	1.08	1.17



Appendix B: Summary of Actuarial Assumptions & Methods

Miscellaneous and Technical Assumptions

Marriage Assumption:	100% of males and 100% 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. It is assumed that spouses have no eligible children for purposes of death-in-service benefits.
Pay Increase Timing:	Beginning of plan year. This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date.
Decrement Timing:	All decrements are assumed to occur at the beginning of the plan year.
Eligibility Testing:	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
Decrement Relativity:	Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
Decrement Operation:	Neither disability nor withdrawal decrements operate during retirement eligibility.
Loads:	Retiree liabilities were increased by 1% to account for the pop-up provision.
Incidence of Contributions:	Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report and the actual payroll payable at the time contributions are made.
Benefit Service:	Exact fractional service is used to determine the amount of benefit payable.
Data Changes:	For missing dates of birth for active members, we assumed to enter the system at the average entry age. For retiree records with a joint and survivor option and a missing beneficiary date of birth, the beneficiary was assumed to be 3 years younger if the member was male and 3 years older if the member was female.



Appendix B: Summary of Actuarial Assumptions & Methods

Definitions of Technical Terms

Actuarial Accrued Liability. The difference between the actuarial present value of future benefits payments and the actuarial present value of future normal costs.

Actuarial Cost Method. A mathematical procedure for allocating the dollar amount of the “actuarial present value of future benefit payments” between future normal cost and actuarial accrued liability.

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 payment.

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

Experience Gain (Loss). The difference between actual actuarial costs and anticipated actuarial costs – during the period between two valuation dates.

Normal Cost. The actuarial cost allocated to the current year by the actuarial cost method.

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



Appendix C: Summary of Plan Provisions

Benefit Tier

Effective July 1, 2013, Senate Bill 27 establishes two tiers of benefits under each PERA coverage plan:

Tier 1

- Current active members employed by a PERA affiliate on June 30, 2013
- Inactive members who did not receive a refund and have employee contributions on account on June 30, 2013
- Currently retired or will retire on or before June 30, 2013

Note: State and Municipal General members hired between July 1, 2010 and June 30, 2013 are grandfathered into Tier 1 coverage plans.

Tier 2

- Active members first hired on or after July 1, 2013
- Members who received a refund of employee contributions on or before June 30, 2013 and return to work for a PERA affiliate on or after July 1, 2013

Normal Retirement Eligibility Conditions

Tier 1

Applicable to all members:

- Any age with 25 or more years of credited service; or
- Age 60 or older with 20 or more years of credited service; or
- Age 61 or older with 17 or more years of credited service; or
- Age 62 or older with 14 or more years of credited service; or
- Age 63 or older with 11 or more years of credited services or
- Age 64 or older with 8 or more years of credited service; or
- Age 65 or older with 5 or more years of credited service.

Applicable to Municipal Police (Plans 3, 4, & 5) and Municipal Fire (Plans 3, 4, & 5) members:

- Any age with 20 or more years of credited service



Appendix C: Summary of Plan Provisions

Normal Retirement Eligibility Conditions (cont.)

Tier 2

Applicable to State General and Municipal General (Plan 1-4) members:

- Age 65 or older with 8 or more years of credited service; or
- Any age if the sum of the member's age and years of credited service equals at least 85, provided member has at least 8 years of credited service.

Applicable to State Police Officers, Adult Correctional Officers, Peace Officers, Juvenile Correctional Officers, Municipal Police, Municipal Fire, and Municipal Detention Officers:

- Age 60 or older with 6 or more years of credited service; or
- Any age with 25 or more years of credited service

Normal Retirement Pension Amount

The amount of normal retirement pension is based on:

- Final average salary:
 - For Tier 1 members, the average of salary for the 36 consecutive months of credited service producing the largest average;
 - For Tier 2 members, the average of salary for the 60 consecutive months of credited service producing the largest average;
- Credited service (years and months); and the
- Coverage plan.



Appendix C: Summary of Plan Provisions

The pension accrual factor and maximum pension, as a percent of final average salary, under each coverage plan are shown below:

Coverage Plan	Pension Factor Per Year of Credited Service		Maximum Pension as Percent of Final Average Salary
	Tier 1	Tier 2	Tier 1 & Tier 2
State General Member Coverage Plan 3	3.0%	2.5%	90%
Peace Officers Coverage Plan 3	3.0	3.0	90
State Police and Adult Corrections Officers Member Coverage Plan 1	3.0	3.0	90
Hazardous Duty (Juvenile Corrections Officer) Coverage Plan 2	3.0	3.0	90
Municipal General Member Coverage Plan 1	2.0	2.0	90
Municipal General Member Coverage Plan 2	2.5	2.0	90
Municipal General Member Coverage Plan 3	3.0	2.5	90
Municipal General Member Coverage Plan 4	3.0	2.5	90
Municipal Detention Officer Coverage Plan 1	3.0	3.0	90
Municipal Police Member Coverage Plan 1	2.0	2.0	90
Municipal Police Member Coverage Plan 2	2.5	2.0	90
Municipal Police Member Coverage Plan 3	2.5	2.0	90
Municipal Police Member Coverage Plan 4	3.0	2.5	90
Municipal Police Member Coverage Plan 5	3.5	3.0	90
Municipal Fire Member Coverage Plan 1	2.0	2.0	90
Municipal Fire Member Coverage Plan 2	2.5	2.0	90
Municipal Fire Member Coverage Plan 3	2.5	2.0	90
Municipal Fire Member Coverage Plan 4	3.0	2.5	90
Municipal Fire Member Coverage Plan 5	3.5	3.0	90



Appendix C: Summary of Plan Provisions

Vested Termination of Membership (Employment)

Termination of employment and membership with at least 5 years of credited service for Tier 1 members. For Tier 2 State General and Municipal General (Non-Public Safety) members, vesting is 8 years. Tier 2 Public Safety members (State Police Officers, Adult Correctional Officers, Peace Officers, Juvenile Correctional Officers, Municipal Police, Fire, Detention Officers) are vested with at least 6 years of credited service. Accumulated member contributions must be left on deposit. Payment of the pension is available upon eligibility for normal retirement. In addition, certain disability and survivor pension provisions apply.

Normal and Optional Forms of Payment

The normal form of payment is for life. Optional contingent survivor beneficiary forms of payment are available on an actuarial equivalent basis. Total pension payments can never be less than the member's accumulated contributions.

Survivor Pensions – Death in the Line of Duty

Pensions are paid to the eligible spouse and eligible children if survivor coverage has not been elected under the Elective Survivor Pension Beneficiary provision. The amount of pension payable for life to an eligible spouse is the greater of 1) 50% of final average salary or 2) the accrued normal retirement pension reduced for option B election. The amount of pension payable to each eligible child is an equal share of 25% of final average salary. If there is not an eligible spouse or the eligible spouse dies, and if there are 2 or more eligible children, the amount of pension payable to each eligible child is an equal share of 50% of final average salary. An eligible child is an unmarried natural or adopted child who is under age 18. A child's pension terminates upon death, marriage or reaching age 18. The pension of any remaining eligible children is recalculated whenever a child's pension is terminated.



Appendix C: Summary of Plan Provisions

Survivor Pensions – Death Not in the Line of Duty

Requires 5 years of credited service for Tier 1 members, 6 years for Tier 2 Public Safety, and 8 years for Tier 2 Non-Public Safety. Benefit applies to members and vested former members who have not elected coverage under the Elective Survivor Pension Beneficiary provision. Pensions are paid to an eligible spouse OR eligible children. The amount of pension payable for the life of an eligible spouse is the greater of 1) 30% of final average salary or 2) accrued normal retirement pension reduced for option B election. An eligible child pension is paid if there is not an eligible spouse or following the death of an eligible spouse. The pension is payable to each child in equal shares. An eligible child is an unmarried natural or adopted child who is under age 18. A child's pension terminates upon death, marriage or reaching age 18. The pension of any remaining eligible children is recalculated whenever a child's pension is terminated.

Elective Survivor Beneficiary Pension

Applicable to Tier 1 members with 5 years of credited service, Tier 2 Public Safety with 6 years, and Tier 2 Non-Public Safety with 8 years. Also applicable to vested former members who have elected option B and designated a survivor pension beneficiary who has an insurable interest. The amount of pension is the amount of accrued normal retirement pension under optional form of payment B (100% continuation to beneficiary).

Disability Retirement

Applicable to Tier 1 members with 5 years of credited service, Tier 2 Public Safety with 6 years, and Tier 2 Non-Public Safety with 8 years. Also applicable to vested former members. The credited service requirement is waived if the disability is incurred in line of duty. The amount of disability pension is the accrued normal retirement pension at time of disability retirement. If the disability is in line of duty, the credited service used is the amount that would have been acquired when first eligible for normal retirement.



Appendix C: Summary of Plan Provisions

Cost-of-Living Increases

For Tier 1 Members, pensions are increased each July 1 by 2% subject to the following eligibility periods:

- If member retires prior to July 1, 2014, Cost-of-Living Adjustment (COLA) is payable after retirement has been in effect for at least 2 full calendar years.
- If member retires on or after July 1, 2014 but prior to July 1, 2015, COLA is payable after retirement has been in effect for at least 3 full calendar years.
- If member retires on or after July 1, 2015 but prior to July 1, 2016, COLA is payable after retirement has been in effect for at least 4 full calendar years.
- If member retires on or after July 1, 2016, COLA is payable after retirement has been in effect for at least 7 full calendar years.
- If retired on account of disability or if at least age 65, the waiting period is reduced to 1 full calendar year.

For Tier 2 Members, pensions are increased each July 1 by 2% subject to the following eligibility periods:

- COLA is payable after retirement has been in effect for at least 7 full calendar years.
- If retired on account of disability or if at least age 65, the waiting period is reduced to 1 full calendar year.

For certain Tier 1 and Tier 2 retirees, pensions are increased each July 1 by 2.5% subject the eligibility periods listed above, provided the conditions below are met:

- Retirees who retired with at least 25 years of service and whose annual pension is \$20,000 or less.
- Disabled retirees whose annual pension is \$20,000 or less.

Service Credit

Tier 1 Members in the State Police and Adult Corrections Officers Coverage Plan and members in the Municipal Detention Officers Coverage Plan receive 1.2 years of credited service for each year of service rendered. All other members receive 1.0 year of credited service for each year of service rendered.



Appendix C: Summary of Plan Provisions

Contributions by Members and Employers

Contributions by members and affiliated public employers are at the following rates shown below.

Coverage Plan	Percent of Salary Member*	Contribution Rate Employer
State General Member Coverage Plan 3	8.92%	17.24%
State Police Member and Adult Correctional Officer Member Coverage Plan 1	9.10	25.50
Hazardous Duty (Juvenile Corrections) Member Coverage Plan 2	6.28	26.12
Municipal General Member Coverage Plan 1	8.50	7.65
Municipal General Member Coverage Plan 2	10.65	9.80
Municipal General Member Coverage Plan 3	14.65	9.80
Municipal General Member Coverage Plan 4	17.15	12.30
Municipal Detention Officer Member Coverage Plan 1	18.15	17.30
Municipal Police Member Coverage Plan 1	8.50	10.65
Municipal Police Member Coverage Plan 2	8.50	15.65
Municipal Police Member Coverage Plan 3	8.50	19.15
Municipal Police Member Coverage Plan 4	13.85	19.15
Municipal Police Member Coverage Plan 5	17.80	19.15
Municipal Fire Member Coverage Plan 1	9.50	11.65
Municipal Fire Member Coverage Plan 2	9.50	18.15
Municipal Fire Member Coverage Plan 3	9.50	21.90
Municipal Fire Member Coverage Plan 4	14.30	21.90
Municipal Fire Member Coverage Plan 5	17.70	21.90

Interest is credited to member contributions on each June 30 at the rates set annually by the Retirement Board. Effective July 1, 2012, the interest crediting rate for member contributions is 2%.

* For employees whose annual salary is \$20,000 or less, the employee contribution rates shown above are reduced by 1.5%



Appendix D: Investment Risk Sensitivity

