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PERA

Public Employees
Retirement Association
of New Mexico

INVESTED IN TOMORROW.

**Public Employees Retirement Association (PERA)
of New Mexico
Annual Actuarial Valuation
as of June 30, 2017**





Cavanaugh Macdonald

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The experience and dedication you deserve

October 26, 2017

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, 2017; 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, 2017 and ending June 30, 2018 (FY 2018). 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.

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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' in a cursive style.

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

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

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



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Section I: Board Summary

The table below summarizes the results of the June 30, 2017 actuarial valuation as compared with the prior year.

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

Valuation Date	June 30, 2017	June 30, 2016
Total Annual Payroll	\$ 2,204,414,890	\$ 2,135,171,462
Total Valuation Payroll	\$ 2,265,036,299	\$ 2,193,888,677
Actuarial Accrued Liability (AAL)		
Active and Deferred Vested Members	\$ 6,640,876,002	\$ 6,275,078,080
Retired Members and Survivors	<u>13,553,822,288</u>	<u>13,199,163,304</u>
Total	\$ 20,194,698,290	\$ 19,474,241,384
Actuarial Value of Assets	\$ 15,124,167,297	\$ 14,654,814,373
Funded Ratio	74.9 %	75.3 %
Unfunded Actuarial Accrued Liability (UAAL) (AAL - Actuarial Value of Assets)	\$ 5,070,530,993	\$ 4,819,427,011
Calculation of Required Contribution		
Statutory Contribution Rate		
Employer Contribution Rate	14.86 %	14.86 %
Member Contribution Rate	<u>11.90 %</u>	<u>11.95 %</u>
Total	26.76 %	26.81 %
Less Normal Cost:		
Retirement	10.60 %	10.81 %
Termination	3.68 %	3.70 %
Pre-Retirement Survivors	0.56 %	0.58 %
Disability	<u>0.97 %</u>	<u>0.98 %</u>
Total Normal Cost	15.81 %	16.07 %
Less Administrative Expenses	0.45 %	0.45 %
Amount Remaining to Amortize UAAL	10.50 %	10.29 %
Amortization Period	55 years	56 years
Increase in Statutory Rate Necessary to Amortize UAAL over 30 Years	2.93 %	2.91 %



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 \$1.50 billion 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 6.97% compared to an expected return of 7.25%. As of June 30, 2017, the actuarial value of assets is 102.5% 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 \$39.7 million. The loss on non-investment related items totaled \$111.6 million. The net loss due to the plan’s experience was \$151.3 million.
- The total increase to the UAAL of PERA is \$251.1 million since the previous valuation and the funded ratio decreased from 75.3% to 74.9%.
- Based on the current statutory rates and actuarial assumptions, the UAAL is projected to be fully amortized in 55 years.

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, 2017	June 30, 2016
Total Annual Payroll	\$ 928,864,843	\$ 904,829,688
Total Valuation Payroll	\$ 954,408,626	\$ 929,712,504
Actuarial Accrued Liability (AAL)		
Active and Deferred Vested Members	\$ 2,838,047,375	\$ 2,710,277,993
Retired Members and Survivors	<u>5,973,769,583</u>	<u>5,818,644,574</u>
Total	\$ 8,811,816,958	\$ 8,528,922,567
Actuarial Value of Assets	\$ 5,831,916,099	\$ 5,720,834,981
Funded Ratio	66.2 %	67.1 %
Unfunded Actuarial Accrued Liability (UAAL) (AAL - Actuarial Value of Assets)	\$ 2,979,900,859	\$ 2,808,087,586
Calculation of Required Contribution		
Statutory Contribution Rate		
Employer Contribution Rate	16.99 %	16.99 %
Member Contribution Rate	<u>8.92 %</u>	<u>8.92 %</u>
Total	25.91 %	25.91 %
Less Normal Cost:		
Retirement	9.89 %	10.09 %
Termination	3.52 %	3.55 %
Pre-Retirement Survivors	0.59 %	0.60 %
Disability	<u>1.05 %</u>	<u>1.06 %</u>
Total Normal Cost	15.05 %	15.30 %
Less Administrative Expenses	0.45 %	0.45 %
Amount Remaining to Amortize UAAL	10.41 %	10.16 %
Amortization Period	Infinite	Infinite
Increase in Statutory Rate Necessary to Amortize UAAL over 30 Years	8.32 %	7.99 %



Section I: Board Summary

Summary of Key Findings – State General Division

The UAAL increased from \$2.81 billion to \$2.98 billion. The funded ratio decreased from 67.1% to 66.2%. 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 General Division experienced a net actuarial loss of \$73.4 million during the plan year ended June 30, 2017. The non-investment related loss of \$51.3 million is primarily due to higher than expected salary increases and service credit changes. In addition the plan experienced a \$22.1 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 ninth consecutive year.

Section I: Board Summary



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

Valuation Date	June 30, 2017	June 30, 2016
Total Annual Payroll	\$ 87,941,130	\$ 78,225,782
Total Valuation Payroll	\$ 90,359,511	\$ 80,376,991
Actuarial Accrued Liability (AAL)		
Active and Deferred Vested Members	\$ 270,894,903	\$ 246,170,322
Retired Members and Survivors	<u>638,978,282</u>	<u>629,189,411</u>
Total	\$ 909,873,185	\$ 875,359,733
Actuarial Value of Assets	\$1,196,338,715	\$1,136,076,589
Funded Ratio	131.5 %	129.8 %
Unfunded Actuarial Accrued Liability (UAAL) (AAL - Actuarial Value of Assets)	\$ (286,465,530)	\$ (260,716,856)
Calculation of Required Contribution		
Statutory Contribution Rate		
Employer Contribution Rate	25.58 %	25.59 %
Member Contribution Rate	<u>8.73 %</u>	<u>8.70 %</u>
Total	34.31 %	34.29 %
Less Normal Cost:		
Retirement	14.75 %	15.25 %
Termination	3.75 %	3.77 %
Pre-Retirement Survivors	0.50 %	0.50 %
Disability	<u>1.81 %</u>	<u>1.83 %</u>
Total Normal Cost	20.81 %	21.35 %
Less Administrative Expenses	0.45 %	0.45 %
Amount Remaining to Amortize UAAL	13.05 %	12.49 %
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, 2017, the actuarial value of assets exceeded accrued liabilities by \$286.5 million. As of June 30, 2016, the actuarial value of assets exceeded accrued liabilities by \$260.7 million. This represents a decrease in the UAAL of about \$25.8 million from the previous year. The funded ratio increased from 129.8% to 131.5%. 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 \$5.1 million during the plan year ended June 30, 2017. The actuarial loss is comprised of a \$1.0 million investment related loss and a \$4.1 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, 2017	June 30, 2016
Total Annual Payroll	\$ 871,633,574	\$ 845,735,646
Total Valuation Payroll	\$ 895,603,497	\$ 868,993,376
Actuarial Accrued Liability (AAL)		
Active and Deferred Vested Members	\$ 2,347,545,739	\$ 2,225,312,415
Retired Members and Survivors	<u>4,047,489,782</u>	<u>3,935,143,789</u>
Total	\$ 6,395,035,521	\$ 6,160,456,204
Actuarial Value of Assets	\$ 5,106,489,938	\$ 4,916,985,846
Funded Ratio	79.9 %	79.8 %
Unfunded Actuarial Accrued Liability (UAAL) (AAL - Actuarial Value of Assets)	\$ 1,288,545,583	\$ 1,243,470,358
Calculation of Required Contribution		
Statutory Contribution Rate		
Employer Contribution Rate	9.73 %	9.81 %
Member Contribution Rate	<u>13.41 %</u>	<u>13.54 %</u>
Total	23.14 %	23.35 %
Less Normal Cost:		
Retirement	8.07 %	8.33 %
Termination	3.93 %	3.95 %
Pre-Retirement Survivors	0.56 %	0.58 %
Disability	<u>0.86 %</u>	<u>0.88 %</u>
Total Normal Cost	13.42 %	13.74 %
Less Administrative Expenses	0.45 %	0.45 %
Amount Remaining to Amortize UAAL	9.27 %	9.16 %
Amortization Period	26 years	26 years
Increase in Statutory Rate Necessary to Amortize UAAL over 30 Years	N/A	N/A



Section I: Board Summary

Summary of Key Findings – Municipal General Division

The UAAL increased from \$1.24 billion to \$1.29 billion. The current statutory rate will amortize the UAAL over a 26-year period and exceeds the minimum required contribution. The funded ratio increased slightly from 79.8% to 79.9%. Table IV-3 provides the reconciliation of the UAAL. In the course of preparing the valuation report, we note the following key findings:

- The Municipal General Division experienced a net actuarial loss of \$36.5 million during the plan year ended June 30, 2017. The actuarial loss is comprised of a \$10.3 million investment related loss and a \$26.2 million loss due to non-investment related experience.
- The amortization period remained the same at 26 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, 2017	June 30, 2016
Total Annual Payroll	\$ 196,767,735	\$ 192,670,656
Total Valuation Payroll	\$ 202,178,848	\$ 197,969,099
Actuarial Accrued Liability (AAL)		
Active and Deferred Vested Members	\$ 696,153,419	\$ 657,284,475
Retired Members and Survivors	<u>1,866,609,116</u>	<u>1,795,745,974</u>
Total	\$ 2,562,762,535	\$ 2,453,030,449
Actuarial Value of Assets	\$ 2,027,593,334	\$ 1,952,310,191
Funded Ratio	79.1 %	79.6 %
Unfunded Actuarial Accrued Liability (UAAL) (AAL - Actuarial Value of Assets)	\$ 535,169,201	\$ 500,720,258
Calculation of Required Contribution		
Statutory Contribution Rate		
Employer Contribution Rate	18.66 %	18.68 %
Member Contribution Rate	<u>17.22 %</u>	<u>17.22 %</u>
Total	35.88 %	35.90 %
Less Normal Cost:		
Retirement	16.85 %	17.07 %
Termination	3.74 %	3.74 %
Pre-Retirement Survivors	0.51 %	0.51 %
Disability	<u>0.92 %</u>	<u>0.93 %</u>
Total Normal Cost	22.02 %	22.25 %
Less Administrative Expenses	0.45 %	0.45 %
Amount Remaining to Amortize UAAL	13.41 %	13.20 %
Amortization Period	42 years	39 years
Increase in Statutory Rate Necessary to Amortize UAAL over 30 Years	2.47 %	2.00 %



Section I: Board Summary

Summary of Key Findings – Municipal Police Division

The UAAL increased from \$500.7 million to \$535.2 million. The funded ratio decreased from 79.6% to 79.1%. 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 \$30.2 million and a 0.5% decrease to the funded ratio during the plan year ended June 30, 2017. The loss is comprised of a \$4.2 million investment related loss and a \$26.0 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 42 years compared to 39 years for the plan year ended June 30, 2016.



Section I: Board Summary

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

Valuation Date	June 30, 2017	June 30, 2016
Total Annual Payroll	\$ 119,207,608	\$ 113,709,690
Total Valuation Payroll	\$ 122,485,817	\$ 116,836,706
Actuarial Accrued Liability (AAL)		
Active and Deferred Vested Members	\$ 488,234,566	\$ 436,032,875
Retired Members and Survivors	<u>1,026,975,525</u>	<u>1,020,439,556</u>
Total	\$ 1,515,210,091	\$ 1,456,472,431
Actuarial Value of Assets	\$ 961,829,211	\$ 928,606,766
Funded Ratio	63.5 %	63.8 %
Unfunded Actuarial Accrued Liability (UAAL) (AAL - Actuarial Value of Assets)	\$ 553,380,880	\$ 527,865,665
Calculation of Required Contribution		
Statutory Contribution Rate		
Employer Contribution Rate	21.57 %	21.57 %
Member Contribution Rate	<u>17.58 %</u>	<u>17.56 %</u>
Total	39.15 %	39.13 %
Less Normal Cost:		
Retirement	21.22 %	21.43 %
Termination	2.92 %	2.92 %
Pre-Retirement Survivors	0.55 %	0.55 %
Disability	<u>0.50 %</u>	<u>0.50 %</u>
Total Normal Cost	25.19 %	25.40 %
Less Administrative Expenses	0.45 %	0.45 %
Amount Remaining to Amortize UAAL	13.51 %	13.28 %
Amortization Period	Infinite	Infinite
Increase in Statutory Rate Necessary to Amortize UAAL over 30 Years	13.59 %	13.87 %



Section I: Board Summary

Summary of Key Findings – Municipal Fire Division

The UAAL increased from \$527.9 million to \$553.4 million and the funded ratio decreased from 63.8% to 63.5%. 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 \$6.1 million. The loss is comprised of a \$2.2 million investment related loss and a \$3.9 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 ninth 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 the accounting 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, 2017.

Table II-1: Summary of Membership Data as of June 30, 2017

Group	Count					Totals
	State General	State Police/ Corrections	Municipal General	Municipal Police	Municipal Fire	
Total Active Members	19,213	1,907	21,673	3,726	2,232	48,751
Inactive Members						
Deferred Vested	2,916	120	1,941	199	103	5,279
Other	4,252	372	5,891	417	157	11,089
Total Inactive Members	7,168	492	7,832	616	260	16,368
Retirees						
Service*	15,440	1,279	10,622	3,097	1,692	32,130
Disabled	660	48	532	56	14	1,310
Beneficiaries	2,111	195	1,763	324	178	4,571
Total Retirees	18,211	1,522	12,917	3,477	1,884	38,011
Totals	44,592	3,921	42,422	7,819	4,376	103,130

* Counts include Co-Payees as follows:

State General - 321

State Police – 84

Municipal General - 306

Municipal Police - 249

Municipal Fire - 144

Section II: Membership Data



Table II-2: Summary of Active Membership Valuation Data

Division	Number		Annual Payroll*		Average Salary	
	2017	2016	2017	2016	2017	2016
State Division						
General	19,213	19,655	\$ 928,864,843	\$ 904,829,688	\$48,346	\$46,036
Police	536	535	32,930,817	31,054,893	61,438	58,047
Adult Corrections	1,070	1,024	43,573,552	36,129,282	40,723	35,283
Juvenile Corrections	<u>301</u>	<u>307</u>	<u>11,436,761</u>	<u>11,041,607</u>	<u>37,996</u>	<u>35,966</u>
Total State Division	21,120	21,521	\$1,016,805,973	\$ 983,055,470	\$48,144	\$45,679
Municipal Division						
General Coverage Plans						
Plan 1	1,308	788	\$ 48,165,970	\$ 25,737,713	\$36,824	\$32,662
Plan 2	6,361	6,336	235,929,766	236,052,243	37,090	37,256
Plan 3	12,606	12,684	534,617,870	528,692,904	42,410	41,682
Plan 4	735	772	26,644,716	27,715,603	36,251	35,901
Detention Officers Plan 1	<u>663</u>	<u>694</u>	<u>26,275,252</u>	<u>27,537,183</u>	<u>39,631</u>	<u>39,679</u>
Total General	21,673	21,274	\$ 871,633,574	\$ 845,735,646	\$40,217	\$39,754
Police Coverage Plans						
Plan 1	110	98	\$ 4,634,739	\$ 4,135,901	\$42,134	\$42,203
Plan 2	60	56	2,458,661	2,332,602	40,978	41,654
Plan 3	65	69	2,734,191	3,121,272	42,064	45,236
Plan 4	132	129	5,924,929	5,821,797	44,886	45,130
Plan 5	<u>3,359</u>	<u>3,356</u>	<u>181,015,215</u>	<u>177,259,084</u>	<u>53,890</u>	<u>52,819</u>
Total Police	3,726	3,708	\$ 196,767,735	\$ 192,670,656	\$52,809	\$51,961
Fire Coverage Plans						
Plan 1	16	17	\$ 666,333	\$ 672,047	\$41,646	\$39,532
Plan 2	20	18	872,793	736,501	43,640	40,917
Plan 3	4	5	162,902	219,327	40,726	43,865
Plan 4	7	18	261,391	777,785	37,342	43,210
Plan 5	<u>2,185</u>	<u>2,132</u>	<u>117,244,189</u>	<u>111,304,030</u>	<u>53,659</u>	<u>52,206</u>
Total Fire	2,232	2,190	\$ 119,207,608	\$ 113,709,690	\$53,408	\$51,922
Total Municipal Division	27,631	27,172	\$1,187,608,917	\$1,152,115,992	\$42,981	\$42,401
Total PERA	48,751	48,693	\$2,204,414,890	\$2,135,171,462	\$45,218	\$43,850

* 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, 2017

Division	Number	Average Age	Average Service	Average Annual Benefit
State Division				
General	2,916	51.16	9.25	\$ 12,579
Police/Hazardous Duty	<u>120</u>	48.59	9.76	10,273
Total State Division	3,036	51.06	9.27	\$ 12,487
Municipal Division				
General	1,941	52.22	9.13	\$ 9,615
Police	199	45.38	9.07	13,692
Fire	<u>103</u>	43.45	7.54	11,850
Total Municipal Division	2,243	51.21	9.05	\$ 10,079
PERA Totals	5,279	51.12	9.17	\$ 11,464

Section II: Membership Data



Table II-4: Summary of Retirees and Survivors as of June 30, 2017

Type of Retirement	Division					Total
	State General	State Police/ Corrections	Municipal General	Municipal Police	Municipal Fire	
Service						
Number	15,440	1,279	10,622	3,097	1,692	32,130
Total Annual Benefits	\$454,143,032	\$ 42,973,762	\$290,973,307	\$123,771,165	\$70,461,597	\$ 982,322,863
Avg Annual Benefit	\$ 29,413	\$ 33,600	\$ 27,393	\$ 39,965	\$ 41,644	\$ 30,573
Avg Age	69.22	63.12	68.40	59.54	61.69	67.37
Disability						
Number	660	48	532	56	14	1,310
Total Annual Benefits	\$ 11,364,643	\$ 814,101	\$ 8,882,594	\$ 1,399,703	\$ 393,784	\$ 22,854,825
Avg Annual Benefit	\$ 17,219	\$ 16,960	\$ 16,697	\$ 24,995	\$ 28,127	\$ 17,446
Avg Age	57.68	56.34	56.47	50.83	50.70	56.77
Survivors						
Number	2,111	195	1,763	324	178	4,571
Total Annual Benefits	\$ 38,299,490	\$ 4,544,704	\$ 30,232,082	\$ 8,412,247	\$ 5,487,807	\$ 86,976,330
Avg Annual Benefit	\$ 18,143	\$ 23,306	\$ 17,148	\$ 25,964	\$ 30,830	\$ 19,028
Avg Age	69.96	66.10	68.88	65.57	71.79	69.13
Total						
Number	18,211	1,522	12,917	3,477	1,884	38,011
Total Annual Benefits	\$503,807,165	\$ 48,332,567	\$330,087,983	\$133,583,115	\$76,343,188	\$ 1,092,154,018
Avg Annual Benefit	\$ 27,665	\$ 31,756	\$ 25,555	\$ 38,419	\$ 40,522	\$ 28,733
Avg Age	68.89	63.29	67.97	59.96	62.56	67.22

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				
6/30/2017	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 %
6/30/2014	20,015	863,797,166	43,157	3.17 %
6/30/2013	19,980	835,817,618	41,833	0.57 %
State Police/Corrections Division				
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 %
6/30/2014	1,951	91,551,934	46,926	1.73 %
6/30/2013	1,956	90,225,253	46,127	1.43 %
Municipal General Division				
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 %
6/30/2014	21,480	814,827,128	37,934	4.46 %
6/30/2013	22,123	803,398,205	36,315	(1.66)%
Municipal Police Division				
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 %
6/30/2014	3,685	209,092,483	56,742	5.42 %
6/30/2013	3,744	201,525,064	53,826	0.28 %
Municipal Fire Division				
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 %
6/30/2014	2,157	122,996,614	57,022	6.05 %
6/30/2013	2,209	118,771,370	53,767	0.18 %

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
6/30/2017	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 %
6/30/2014	49,288	2,102,265,325	42,653	4.07 %
6/30/2013	50,012	2,049,737,510	40,985	(0.36)%

* 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, 2017.

Table III-1: Market Value Summary as of June 30, 2017

Division	June 30, 2017	June 30, 2016
State General	\$ 5,690,516,137	\$ 5,382,688,209
State Police/Corrections	1,167,332,425	1,068,925,442
Municipal General	4,982,678,574	4,626,352,941
Municipal Police	1,978,432,541	1,836,913,157
Municipal Fire	938,508,811	873,718,733
Total Market Value of Assets	\$ 14,757,468,488	\$ 13,788,598,482

Table III-2: Actuarial Value Summary as of June 30, 2017

Division	June 30, 2017	June 30, 2016
State General	\$ 5,831,916,099	\$ 5,720,834,981
State Police/Corrections	1,196,338,715	1,136,076,589
Municipal General	5,106,489,938	4,916,985,846
Municipal Police	2,027,593,334	1,952,310,191
Municipal Fire	961,829,211	928,606,766
Total Actuarial Value of Assets	\$ 15,124,167,297	\$ 14,654,814,373



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, 2017	June 30, 2016
Beginning of Year Market Value	\$ 13,826,658,367	\$ 14,255,528,543
Audit Adjustment	6,447,404	1,177,045
Revised Beginning of Year Market Value	\$ 13,833,105,771	\$ 14,256,705,588
Revenues:		
a. Member Contributions	\$ 264,939,116	\$ 257,624,761
b. Employer Contributions	331,473,332	322,351,997
c. Appropriations	1,000,000	2,400,000
d. Purchases of Service	7,889,996	7,904,417
e. Investment Income		
1. Interest, dividends, etc.	313,099,791	316,381,293
2. Realized/Unrealized gains (losses)	1,240,713,990	(249,588,439)
3. Security lending and other gains (losses)	3,965,163	2,551,424
f. Other Income	470,441	661,825
g. Settlement Award	1,024	11,655,695
h. Total Revenues	\$ 2,163,552,853	\$ 671,942,973
Expenditures :		
a. Benefit Payments	\$ 1,084,818,276	\$ 1,024,399,237
b. Refunds of Member Contributions	44,396,305	44,937,505
c. Investment Expenses	57,020,360	21,899,730
d. Administrative Expenses	11,505,774	10,753,722
e. Total Expenditures	\$ 1,197,740,715	\$ 1,101,990,194
End of Year Market Value	\$ 14,798,917,909	\$ 13,826,658,367

The market value rate of return for the plan year is 11.06% on an adjusted basis and 11.12% on an unadjusted basis. These returns are based on a simplified dollar-weighted basis which may not match more precise time-weighted return calculations. PERA's cash flow is (3.74)% 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 1.28 contributing active members for each member receiving a benefit as of June 30, 2017. 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, 2017
(Total PERA with Legislative Division)**

A. Actuarial Value Beginning of Year		\$ 14,695,265,225
B. Market Value End of Year		14,798,917,909
C. Revised Market Value Beginning of Year		13,833,105,771
D. Cash Flow		
D1. Contributions & Appropriations		\$ 597,412,448
D2. Service Purchases		7,889,996
D3. Benefit Payments and Refunds		(1,129,214,581)
D4. Administrative Expenses		(11,505,774)
D5. Other		471,465
D6. Net		\$ (534,946,446)
E. Investment Income		
E1. Market Total (B - C - D6)		\$ 1,500,758,584
E2. Assumed Rate		7.25%
E3. Amount for Immediate Recognition		1,046,014,920
E4. Amount for Phased-In Recognition		454,743,664
F. Phased-In Recognition of Investment Income		
F1. Current Year: 0.25 *E4		\$ 113,685,916
F2. First Prior Year (2015/2016)	\$(1,027,716,151) x 25%	(256,929,038)
F3. Second Prior Year (2014/2015)	(779,713,717) x 25%	(194,928,429)
F4. Third Prior Year (2013/2014)	1,168,148,463 x 25%	292,037,116
F5. Total Recognized Investment Gain		\$ (46,134,435)
G. Audit Adjustment		\$ 6,447,404
H. Actuarial Value End of Year		\$15,166,646,668
(A + D6 + E3 + F5 + G)		
I. Difference Between Market & Actuarial Values		\$ (367,728,759)
J. Rate of Return on Actuarial Value		6.97 %
K. Actuarial Value as a Percentage of Market Value		102.48 %

Section III: PERA Assets



Table III-5: Allocation of Actuarial Value by Division as of June 30, 2017

	State Division		PERA Totals w/o Legislative
	General	Police	
Member Contribution Fund	\$ 878,994,137	\$ 64,332,242	\$ 2,518,111,272
Employer Contribution Fund	1,751,803,984	420,305,670	4,185,145,246
Retirement Reserve Fund	3,059,718,016	682,694,513	8,054,211,970
Total Fund Balances	\$ 5,690,516,137	\$ 1,167,332,425	\$ 14,757,468,488
Approximate % of Total Fund Balance*	38.56%	7.91%	100%
Actuarial Value Adjustment*	141,399,962	29,006,290	366,698,809
Total Actuarial Value of Assets	\$ 5,831,916,099	\$ 1,196,338,715	\$ 15,124,167,297

	Municipal Division			PERA Totals w/o Legislative
	General	Police	Fire	
Member Contribution Fund	\$ 1,104,575,618	\$ 275,702,207	\$ 194,507,068	\$ 2,518,111,272
Employer Contribution Fund	1,283,791,988	525,282,759	203,960,845	4,185,145,246
Retirement Reserve Fund	2,594,310,968	1,177,447,575	540,040,898	8,054,211,970
Total Fund Balances	\$ 4,982,678,574	\$ 1,978,432,541	\$ 938,508,811	\$ 14,757,468,488
Approximate % of Total Fund Balance*	33.76%	13.41%	6.36%	100.00%
Actuarial Value Adjustment*	123,811,364	49,160,793	23,320,400	366,698,809
Total Actuarial Value of Assets	\$ 5,106,489,938	\$ 2,027,593,334	\$ 961,829,211	\$ 15,124,167,297

* 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 for the first 9 years and 7.75% thereafter. 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, 2017.

Table III-6: Actuarial Investment Gain (Loss) for the Year Ending June 30, 2017
(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)	\$ 5,720.8	\$ 1,136.1	\$ 4,917.0	\$ 1,952.3	\$ 928.6	\$ 14,654.8
2. Employee and Employer Contributions	247.9	29.6	201.8	76.4	48.5	604.2
3. Benefit Payments	(515.4)	(49.1)	(349.3)	(134.9)	(78.6)	(1,127.3)
4. Administrative Expenses	(4.4)	(0.9)	(3.9)	(1.5)	(0.7)	(11.4)
5. Other	0.2	-	0.2	0.1	-	0.5
6. Interest [1 x 7.25% + (2 + 3 + 4 + 5) x 7.25% x 0.5]	404.9	81.6	351.0	139.4	66.2	1,043.1
7. Expected End of Year AVA	\$ 5,854.0	\$ 1,197.3	\$ 5,116.8	\$ 2,031.8	\$ 964.0	\$ 15,163.9
8. Actual End of Year AVA	5,831.9	1,196.3	5,106.5	2,027.6	961.8	15,124.2
9. Actuarial Investment Gain (Loss) (8 - 7)	\$ (22.1)	\$ (1.0)	\$ (10.3)	\$ (4.2)	\$ (2.2)	\$ (39.7)



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, 2017

Division	Reported Fund Balances	Actuarial Present Value of Pensions Being Paid	Transfer
State General			
Members Contribution Fund	\$ 878,994,137		
Employers Accumulation Fund	1,751,803,984		\$ (2,914,051,567)
Retirement Reserve Fund	3,059,718,016	\$ 5,973,769,583	2,914,051,567
State Police/Corrections			
Members Contribution Fund	64,332,242		
Employers Accumulation Fund	420,305,670		-
Retirement Reserve Fund	682,694,513	638,978,282	-
Municipal General			
Members Contribution Fund	1,104,575,618		
Employers Accumulation Fund	1,283,791,988		(1,453,178,814)
Retirement Reserve Fund	2,594,310,968	4,047,489,782	1,453,178,814
Municipal Police			
Members Contribution Fund	275,702,207		
Employers Accumulation Fund	525,282,759		(689,161,541)
Retirement Reserve Fund	1,177,447,575	1,866,609,116	689,161,541
Municipal Fire			
Members Contribution Fund	194,507,068		
Employers Accumulation Fund	203,960,845		(486,934,627)
Retirement Reserve Fund	540,040,898	1,026,975,525	486,934,627
Total End of Year Market Value	\$ 14,757,468,488		



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, 2017

	Actuarial Accrued Liability	Present Value of Future Normal Cost	Total Actuarial Present Value
Active Members			
Service Retirement	\$ 5,749,939,269	\$ 1,663,278,885	\$ 7,413,218,154
Termination Benefits	287,749,702	591,921,732	879,671,434
Survivor Benefits	89,161,043	85,562,812	174,723,855
Disability Retirement	97,352,295	148,092,912	245,445,207
Total for Active Members	\$ 6,224,202,309	\$ 2,488,856,341	\$ 8,713,058,650
Inactive Members	\$ 416,673,693		\$ 416,673,693
Retirees and Beneficiaries			
Service Retirements	\$ 12,307,810,161		\$ 12,307,810,161
Beneficiaries	899,811,249		899,811,249
Disability Retirements	346,200,878		346,200,878
Total for Retirees and Beneficiaries	\$ 13,553,822,288		\$ 13,553,822,288
Total	\$ 20,194,698,290	\$ 2,488,856,341	\$ 22,683,554,631

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	\$ 8,811.8	\$ 909.9	\$ 6,395.0	\$ 2,562.8	\$ 1,515.2
2. Actuarial Value of Assets	5,831.9	1,196.3	5,106.5	2,027.6	961.8
3. Unfunded Actuarial Accrued Liability (1-2)	2,979.9	(286.4)	1,288.5	535.2	553.4
Funded Ratio (2 / 1)	66.2%	131.5%	79.9%	79.1%	63.5%

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, 2017, the funded ratio of PERA is 74.9% as compared to a ratio of 75.3% as of June 30, 2016. 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	\$ 2,808.1	\$ (260.7)	\$ 1,243.5	\$ 500.7	\$ 527.9
2. Normal Cost	142.2	17.2	119.4	44.0	29.7
3. Contributions	(247.9)	(29.6)	(201.8)	(76.4)	(48.5)
4. Other Income/Expense	4.2	0.9	3.7	1.5	0.7
5. Interest [(1 x 7.25%) + (2 + 3 + 4) x 7.25% x 0.5]	199.9	(19.3)	87.2	35.2	37.5
6. Expected End of Year	2,906.5	(291.5)	1,252.0	505.0	547.3
7. Assumption Changes	0	0	0	0	0
8. Other Changes	0	0	0	0	0
9. Expected UAAL after changes (6 +7 + 8)	2,906.5	(291.5)	1,252.0	505.0	547.3
10. Actual UAAL	2,979.9	(286.4)	1,288.5	535.2	553.4
11. Total Actuarial Gain (Loss)	(73.4)	(5.1)	(36.5)	(30.2)	(6.1)

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	\$2,906.5	66.8 %	18.27 %	(\$291.5)	132.2 %	(19.35)%
Retirement	(\$21.7)	0.2 %	(0.14)%	(\$1.4)	0.2 %	(0.09)%
Disability	(\$0.2)	0.0 %	0.00 %	\$0.2	0.0 %	0.01 %
Pre-Retirement Death	(\$2.5)	0.0 %	(0.02)%	(\$0.2)	0.0 %	(0.01)%
Withdrawal	(\$6.9)	0.1 %	(0.04)%	(\$0.1)	0.0 %	(0.01)%
Pay Increases	\$44.6	(0.3)%	0.28 %	\$4.3	(0.6)%	0.28 %
New Entrants	\$29.9	(0.2)%	0.19 %	\$3.9	(0.6)%	0.25 %
Post-Retirement Death	(\$13.8)	0.1 %	(0.09)%	(\$2.5)	0.4 %	(0.16)%
Data Adjustments	\$24.6	(0.3)%	0.15 %	\$0.5	(0.1)%	0.03 %
Other	(\$2.7)	0.0 %	(0.01)%	(\$0.6)	0.1 %	(0.03)%
Investment Return	\$22.1	(0.2)%	0.14 %	\$1.0	(0.1)%	0.06 %
Total (Gain) or Loss	\$73.4	(0.6)%	0.46 %	\$5.1	(0.7)%	0.33 %
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	\$2,979.9	66.2 %	18.73 %	(\$286.4)	131.5 %	(19.02)%

* 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	\$1,252.0	80.3 %	8.39 %	\$505.0	80.1 %	14.98 %	\$547.3	63.8 %	26.81 %
Retirement	(\$22.3)	0.3 %	(0.14)%	\$4.5	(0.1)%	0.13 %	(\$2.9)	0.1 %	(0.14)%
Disability	\$3.3	0.0 %	0.02 %	\$0.1	0.0 %	0.00 %	\$0.1	0.0 %	0.00 %
Pre-Retirement Death	(\$2.8)	0.0 %	(0.02)%	(\$0.5)	0.0 %	(0.01)%	(\$0.3)	0.0 %	(0.01)%
Withdrawal	\$5.6	(0.1)%	0.04 %	\$5.7	(0.2)%	0.17 %	\$2.9	(0.1)%	0.14 %
Pay Increases	\$5.1	(0.1)%	0.03 %	\$4.7	(0.1)%	0.14 %	(\$0.3)	0.0 %	(0.01)%
New Entrants	\$29.3	(0.3)%	0.19 %	\$10.3	(0.3)%	0.31 %	\$4.0	(0.1)%	0.19 %
Post-Retirement Death	(\$11.8)	0.1 %	(0.08)%	(\$0.3)	0.0 %	(0.01)%	(\$0.5)	0.0 %	(0.02)%
Data Adjustments	\$21.4	(0.2)%	0.14 %	\$2.1	(0.1)%	0.06 %	\$1.5	0.0 %	0.07 %
Other	(\$1.6)	0.0 %	(0.01)%	(\$0.6)	0.0 %	(0.02)%	(\$0.6)	0.0 %	(0.03)%
Investment Return	\$10.3	(0.1)%	0.07 %	\$4.2	(0.2)%	0.13 %	\$2.2	(0.2)%	0.10 %
Total (Gain) or Loss	\$36.5	(0.4)%	0.24 %	\$30.2	(1.0)%	0.90 %	\$6.1	(0.3)%	0.29 %
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	\$1,288.5	79.9 %	8.63 %	\$535.2	79.1 %	15.88 %	\$553.4	63.5 %	27.10 %

* 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, 2017	June 30, 2016
1. Total Valuation Payroll	\$ 954,408,626	\$ 929,712,504
2. Present Value of Future Benefits	9,784,272,274	9,497,381,322
3. Present Value of Future Normal Costs	972,455,316	968,458,755
4. Actuarial Accrued Liability (2 - 3)	\$8,811,816,958	\$8,528,922,567
5. Actuarial Value of Assets	5,831,916,099	5,720,834,981
6. Unfunded Actuarial Accrued Liability (UAAL) (4 - 5)	\$2,979,900,859	\$2,808,087,586
7. UAAL Amortization Payment (30 year funding)	\$ 178,763,250	\$ 168,729,503
a. Amortization Payment as a Percent of Payroll (7 / 1)	18.73 %	18.15 %
8. Total Normal Cost	\$ 143,634,918	\$ 142,237,570
a. Normal Cost as a Percent of Payroll (8 / 1)	15.05 %	15.30 %
9. Expected Administrative Expenses	\$ 4,294,839	\$ 4,183,706
a. Administrative Expense as a Percent of Payroll (9 / 1)	0.45 %	0.45 %
10. Actuarially Determined Contribution (ADC)	\$ 326,693,007	\$ 315,150,779
a. ADC Rate (7a + 8a + 9a)	34.23 %	33.90 %
11. Expected Statutory Contribution Rates		
a. Employer Contribution Rate	16.99 %	16.99 %
b. Member Contribution Rate	<u>8.92 %</u>	<u>8.92 %</u>
c. Total Statutory Contribution Rate (a + b)	25.91 %	25.91 %
12. (Excess) Shortfall of Statutory Rates (10a - 11c)	8.32 %	7.99 %

Section V: Actuarial Funding Calculation



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

	June 30, 2017	June 30, 2016
1. Total Valuation Payroll	\$ 90,359,511	\$ 80,376,991
2. Present Value of Future Benefits	1,052,355,342	1,008,652,260
3. Present Value of Future Normal Costs	142,482,157	133,292,527
4. Actuarial Accrued Liability (2 - 3)	\$ 909,873,185	\$ 875,359,733
5. Actuarial Value of Assets	1,196,338,715	1,136,076,589
6. Unfunded Actuarial Accrued Liability (UAAL) (4 - 5)	\$(286,465,530)	\$(260,716,856)
7. UAAL Amortization Payment (30 year funding)	\$ (17,184,971)	\$ (15,665,689)
a. Amortization Payment as a Percent of Payroll (7 / 1)	(19.02)%	(19.49)%
8. Total Normal Cost	\$ 18,799,517	\$ 17,158,015
a. Normal Cost as a Percent of Payroll (8 / 1)	20.81 %	21.35 %
9. Expected Administrative Expenses	\$ 406,618	\$ 361,696
a. Administrative Expense as a Percent of Payroll (9 / 1)	0.45 %	0.45 %
10. Actuarially Determined Contribution (ADC)	\$ 2,021,164	\$ 1,854,022
a. ADC Rate (7a + 8a + 9a)	2.24 %	2.31 %
11. Expected Statutory Contribution Rates		
a. Employer Contribution Rate	25.58 %	25.59 %
b. Member Contribution Rate	<u>8.73 %</u>	<u>8.70 %</u>
c. Total Statutory Contribution Rate (a + b)	34.31 %	34.29 %
12. (Excess) Shortfall of Statutory Rates (10a - 11c)	(32.07)%	(31.98)%

Section V: Actuarial Funding Calculation



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

	June 30, 2017	June 30, 2016
1. Total Valuation Payroll	\$ 895,603,497	\$ 868,993,376
2. Present Value of Future Benefits	7,185,676,363	6,951,916,531
3. Present Value of Future Normal Costs	<u>790,640,842</u>	<u>791,460,327</u>
4. Actuarial Accrued Liability (2 - 3)	\$6,395,035,521	\$6,160,456,204
5. Actuarial Value of Assets	<u>5,106,489,938</u>	<u>4,916,985,846</u>
6. Unfunded Actuarial Accrued Liability (UAAL) (4 - 5)	\$1,288,545,583	\$1,243,470,358
7. UAAL Amortization Payment (30 year funding)	\$ 77,299,416	\$ 74,716,379
a. Amortization Payment as a Percent of Payroll (7 / 1)	8.63 %	8.60 %
8. Total Normal Cost	\$ 120,210,367	\$ 119,367,784
a. Normal Cost as a Percent of Payroll (8 / 1)	13.42 %	13.74 %
9. Expected Administrative Expenses	\$ 4,030,216	\$ 3,910,470
a. Administrative Expense as a Percent of Payroll (9 / 1)	0.45 %	0.45 %
10. Actuarially Determined Contribution (ADC)	\$ 201,539,999	\$ 197,994,633
a. ADC Rate (7a + 8a + 9a)	22.50 %	22.79 %
11. Expected Statutory Contribution Rates		
a. Employer Contribution Rate	9.73 %	9.81 %
b. Member Contribution Rate	<u>13.41 %</u>	<u>13.54 %</u>
c. Total Statutory Contribution Rate (a + b)	23.14 %	23.35 %
12. (Excess) Shortfall of Statutory Rates (10a - 11c)	(0.64)%	(0.56)%

Section V: Actuarial Funding Calculation



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

	June 30, 2017	June 30, 2016
1. Total Valuation Payroll	\$ 202,178,848	\$ 197,969,099
2. Present Value of Future Benefits	2,897,672,780	2,788,847,148
3. Present Value of Future Normal Costs	<u>334,910,245</u>	<u>335,816,699</u>
4. Actuarial Accrued Liability (2 - 3)	\$2,562,762,535	\$2,453,030,449
5. Actuarial Value of Assets	<u>2,027,593,334</u>	<u>1,952,310,191</u>
6. Unfunded Actuarial Accrued Liability (UAAL) (4 - 5)	\$ 535,169,201	\$ 500,720,258
7. UAAL Amortization Payment (30 year funding)	\$ 32,104,620	\$ 30,086,768
a. Amortization Payment as a Percent of Payroll (7 / 1)	15.88 %	15.20 %
8. Total Normal Cost	\$ 44,513,769	\$ 44,039,213
a. Normal Cost as a Percent of Payroll (8 / 1)	22.02 %	22.25 %
9. Expected Administrative Expenses	\$ 909,805	\$ 890,861
a. Administrative Expense as a Percent of Payroll (9 / 1)	0.45 %	0.45 %
10. Actuarially Determined Contribution (ADC)	\$ 77,528,194	\$ 75,016,842
a. ADC Rate (7a + 8a + 9a)	38.35 %	37.90 %
11. Expected Statutory Contribution Rates		
a. Employer Contribution Rate	18.66 %	18.68 %
b. Member Contribution Rate	<u>17.22 %</u>	<u>17.22 %</u>
c. Total Statutory Contribution Rate (a + b)	35.88 %	35.90 %
12. (Excess) Shortfall of Statutory Rates (10a - 11c)	2.47 %	2.00 %

Section V: Actuarial Funding Calculation



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

	June 30, 2017	June 30, 2016
1. Total Valuation Payroll	\$ 122,485,817	\$ 116,836,706
2. Present Value of Future Benefits	1,763,577,872	1,704,386,711
3. Present Value of Future Normal Costs	248,367,781	247,914,280
4. Actuarial Accrued Liability (2 - 3)	\$1,515,210,091	\$1,456,472,431
5. Actuarial Value of Assets	961,829,211	928,606,766
6. Unfunded Actuarial Accrued Liability (UAAL) (4 - 5)	\$ 553,380,880	\$ 527,865,665
7. UAAL Amortization Payment (30 year funding)	\$ 33,197,133	\$ 31,717,854
a. Amortization Payment as a Percent of Payroll (7 / 1)	27.10 %	27.15 %
8. Total Normal Cost	\$ 30,851,817	\$ 29,671,708
a. Normal Cost as a Percent of Payroll (8 / 1)	25.19 %	25.40 %
9. Expected Administrative Expenses	\$ 551,186	\$ 525,765
a. Administrative Expense as a Percent of Payroll (9 / 1)	0.45 %	0.45 %
10. Actuarially Determined Contribution (ADC)	\$ 64,600,136	\$ 61,915,327
a. ADC Rate (7a + 8a + 9a)	52.74 %	53.00 %
11. Expected Statutory Contribution Rates		
a. Employer Contribution Rate	21.57 %	21.57 %
b. Member Contribution Rate	<u>17.58 %</u>	<u>17.56 %</u>
c. Total Statutory Contribution Rate (a + b)	39.15 %	39.13 %
12. (Excess) Shortfall of Statutory Rates (10a - 11c)	13.59 %	13.87 %

Section V: Actuarial Funding Calculation



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

	June 30, 2017	June 30, 2016
1. Total Valuation Payroll	\$ 2,265,036,299	\$ 2,193,888,677
2. Present Value of Future Benefits	22,683,554,631	21,951,183,972
3. Present Value of Future Normal Costs	2,488,856,341	2,476,942,588
4. Actuarial Accrued Liability (2 - 3)	\$20,194,698,290	\$19,474,241,384
5. Actuarial Value of Assets	15,124,167,297	14,654,814,373
6. Unfunded Actuarial Accrued Liability (UAAL) (4 - 5)	\$ 5,070,530,993	\$ 4,819,427,011
7. UAAL Amortization Payment (30 year funding)	\$ 304,179,449	\$ 289,584,815
a. Amortization Payment as a Percent of Payroll (7 / 1)	13.43 %	13.20 %
8. Total Normal Cost	\$ 358,010,389	\$ 352,474,289
a. Normal Cost as a Percent of Payroll (8 / 1)	15.81 %	16.07 %
9. Expected Administrative Expenses	\$ 10,192,663	\$ 9,872,499
a. Administrative Expense as a Percent of Payroll (9 / 1)	0.45 %	0.45 %
10. Actuarially Determined Contribution (ADC)	\$ 672,382,501	\$ 651,931,603
a. ADC Rate (7a + 8a + 9a)	29.69 %	29.72 %
11. Expected Statutory Contribution Rates		
a. Employer Contribution Rate	14.86 %	14.86 %
b. Member Contribution Rate	11.90 %	11.95 %
c. Total Statutory Contribution Rate (a + b)	26.76 %	26.81 %
12. (Excess) Shortfall of Statutory Rates (10a - 11c)	2.93 %	2.91 %

Table V-2: Contribution Rate Summary

Division	Employer Only		
	Current Statutory Rate	30-year Rate	(Excess)/ Shortfall
State General	16.99 %	25.31 %	8.32 %
State Police/Corrections	25.58 %	(6.49)%	(32.07)%
Municipal General	9.73 %	9.09 %	(0.64)%
Municipal Police	18.66 %	21.13 %	2.47 %
Municipal Fire	21.57 %	35.16 %	13.59 %
PERA Total	14.86 %	17.79 %	2.93 %

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 %	16.99 %
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*	8.73 %	25.58 %
Municipal Division		
General Coverage Plans		
Plan 1	8.50 %	7.40 %
Plan 2	10.65 %	9.55 %
Plan 3	14.65 %	9.55 %
Plan 4	17.15 %	12.05 %
Detention Officers Plan 1	18.15 %	17.05 %
Weighted Average*	13.41 %	9.73 %
Police Coverage Plans		
Plan 1	8.50 %	10.40 %
Plan 2	8.50 %	15.40 %
Plan 3	8.50 %	18.90 %
Plan 4	13.85 %	18.90 %
Plan 5	17.80 %	18.90 %
Weighted Average*	17.22 %	18.66 %
Fire Coverage Plans		
Plan 1	9.50 %	11.40 %
Plan 2	9.50 %	17.90 %
Plan 3	9.50 %	21.65 %
Plan 4	14.30 %	21.65 %
Plan 5	17.70 %	21.65 %
Weighted Average*	17.58 %	21.57 %

* 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: Accounting 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. GASB Statement No. 25 information is provided below.

Table VI-1: GASB Statement No. 25 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* (c)	UAAL as a Percentage of Annual Payroll ((b - a) / c)
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 %
6/30/2008	12,816,218,012	13,740,335,321	924,117,309	93.3 %	1,965,064,160	47.0 %
6/30/2007	12,032,214,874	12,962,480,229	930,265,355	92.8 %	1,908,519,615	48.7 %

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



Section VI: Accounting 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)	
6/30/2017	\$ 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	
6/30/2014	826,785,813	5,390,816,297	1,568,388,787	5,334,025,804	100.00	83.61	0.00	
6/30/2013	841,174,061	5,064,595,209	1,617,991,066	4,996,425,681	100.00	82.05	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)	
6/30/2017	\$ 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	
6/30/2014	57,705,918	569,659,307	222,557,567	1,016,533,008	100.00	100.00	100.00	
6/30/2013	58,260,570	525,211,454	246,248,914	926,108,695	100.00	100.00	100.00	

Section VI: Accounting 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)
6/30/2017	\$ 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
6/30/2014	1,023,202,668	3,548,792,552	965,182,192	4,515,120,417	100.00	98.40	0.00
6/30/2013	1,000,561,795	3,309,385,678	1,005,890,251	4,108,957,408	100.00	93.93	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)
6/30/2017	\$ 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
6/30/2014	249,816,375	1,551,716,281	462,032,152	1,772,210,104	100.00	98.11	0.00
6/30/2013	247,882,167	1,413,249,313	485,163,146	1,627,455,783	100.00	97.62	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)
6/30/2017	\$ 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
6/30/2014	162,999,130	893,055,155	291,666,492	844,926,189	100.00	76.36	0.00
6/30/2013	163,287,521	822,738,793	255,740,084	779,204,098	100.00	74.86	0.00



Section VI: Accounting Information

Table VI-2: Solvency Test for All PERA Divisions

PERA Totals

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)
6/30/2017	\$ 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
6/30/2014	2,320,509,904	11,954,039,592	3,509,827,190		13,482,815,522	100.00	93.38	0.00
6/30/2013	2,311,166,114	11,135,180,447	3,611,033,461		12,438,151,665	100.00	90.95	0.00



Section VI: Accounting 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		
6/30/2017	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
6/30/2014	1,150	37,217,020	379	7,574,003	16,089	438,223,164	7.26	27,237
6/30/2013	1,285	43,656,998	358	7,006,726	15,318	408,580,147	8.71	26,673

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		
6/30/2017	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
6/30/2014	110	4,049,560	34	937,729	1,402	42,750,706	7.85	30,493
6/30/2013	60	2,706,075	23	725,085	1,326	39,638,875	5.26	29,894



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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		
6/30/2017	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
6/30/2014	849	24,476,772	268	4,923,518	11,292	280,480,700	7.49	24,839
6/30/2013	933	29,438,538	281	4,828,481	10,711	260,927,446	10.41	24,361

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		
6/30/2017	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
6/30/2014	222	10,277,993	34	988,805	3,043	111,118,496	9.12	36,516
6/30/2013	177	8,276,701	46	1,276,954	2,855	101,829,308	7.38	35,667

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		
6/30/2017	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
6/30/2014	112	5,738,384	29	946,274	1,736	66,249,694	7.80	38,162
6/30/2013	70	4,239,651	20	590,379	1,653	61,457,584	6.31	37,179



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		
6/30/2017	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	74,003,973	860	18,095,510	35,672	994,731,223	5.96	27,885
6/30/2014	2,443	81,759,729	744	15,370,329	33,562	938,822,760	7.61	27,973
6/30/2013	2,525	88,317,964	728	14,427,625	31,863	872,433,360	9.25	27,381

Table VI-4: Summary of Actuarial Methods and Assumptions

Valuation date	June 30, 2017
Actuarial cost method	Entry Age Normal
Amortization method	Level Percent of Payroll, Open
Payroll growth rate	2.75% for 1st 9 years, 3.25% thereafter
Remaining amortization period	30 years
Asset valuation method	4-year Smoothed Market
Actuarial assumptions:	
Investment rate of return*	7.25% for 1st 9 years, 7.75% thereafter
Administrative expenses	0.45% 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 2.25% for the first 9 years and 2.75% thereafter



Appendix A: Additional Membership Data

Table A-1: Schedule of Active Participant Data as of June 30, 2017 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	22								22	\$ 606,631
20 to 24	478	8							486	14,547,860
25 to 29	1,288	193	12						1,493	54,901,966
30 to 34	1,373	530	282	5	1				2,191	93,376,159
35 to 39	1,087	556	567	226	9				2,445	114,500,260
40 to 44	880	418	529	494	127	1			2,449	120,962,454
45 to 49	814	420	535	500	426	45			2,740	142,910,899
50 to 54	710	394	498	435	415	84	6		2,542	129,358,741
55 to 59	611	401	492	463	388	91	9		2,455	126,817,321
60	91	79	88	89	51	18	3		419	21,320,535
61	91	56	108	73	53	14	2		397	21,091,361
62	80	53	97	76	46	19	5		376	21,146,476
63	67	43	73	34	32	5	2		256	13,289,381
64	60	40	50	30	26	10	2		218	12,007,601
65	54	32	45	39	25	16	5		216	12,652,699
66	27	22	34	19	14	8			124	7,064,978
67	20	18	14	15	11	6	3		87	5,076,953
68	26	13	17	5	4	2	2		69	3,880,729
69	11	9	11	11	10	1			53	3,039,708
70	9	10	12	6	2	3			42	2,469,052
71	8	8	8	2	3	1	1		31	1,898,692
72	4	7	2	1	1	1			16	1,046,489
73	4	4	3	4					15	1,113,413
74	6	6	5	4	2	1	1		25	1,361,511
75	4	1	5	1	1	1			13	701,093
76	4	3	2		1				10	483,693
77	1		1	1	1				4	149,718
78	3			2					5	310,900
79	1		1	1		1	1		5	285,217
80 & Over	3	1	1	2	1		1		9	492,354
Total	7,837	3,325	3,492	2,538	1,650	328	43	19,213	\$ 928,864,843	

Average Age: 45.21

Average Service: 9.24



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	10							10	\$ 519,598
20 to 24	185	18						203	8,799,393
25 to 29	247	106	13					366	15,248,622
30 to 34	141	88	88	24				341	14,960,619
35 to 39	57	50	63	87	23			280	13,291,499
40 to 44	29	28	43	74	60	10		244	13,081,273
45 to 49	30	32	38	49	42	22		213	10,805,212
50 to 54	9	10	29	22	31	8	1	110	4,919,470
55 to 59	14	10	19	22	18	6	2	91	4,175,654
60		1	4	4	4			13	561,790
61		1	2	3		1	1	8	389,043
62	1	1		4	3		1	10	444,337
63		3	2		2		1	8	320,580
64	1							1	36,575
65						1		1	49,964
66		1	1	2	1			5	204,491
67				1				1	38,181
68									
69				1	1			2	94,829
70									
71									
72									
73									
74									
75									
76									
77									
78									
79									
80 & Over									
Total	724	349	302	293	185	48	6	1,907	\$ 87,941,130

Average Age: 36.71

Average Service: 9.62



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	524							524	\$ 20,979,784	
20 to 24	1,164	20						1,184	33,238,362	
25 to 29	1,515	357	21					1,893	58,083,721	
30 to 34	1,274	715	312	5				2,306	81,622,461	
35 to 39	1,038	598	575	212	8			2,431	95,365,688	
40 to 44	949	544	530	334	184	2		2,543	108,016,110	
45 to 49	871	549	499	414	415	71	2	2,821	125,029,393	
50 to 54	788	478	476	375	360	106	11	2,594	114,746,475	
55 to 59	685	512	510	431	347	110	24	2,619	114,811,698	
60	127	105	92	72	62	34	11	503	21,903,703	
61	140	89	86	79	61	28	7	490	21,873,253	
62	83	88	74	56	30	15	4	350	15,630,597	
63	67	68	76	29	27	17	5	289	12,808,228	
64	61	59	37	38	23	12	1	231	9,945,562	
65	51	54	45	37	16	5	1	209	9,315,110	
66	39	29	31	22	17	9	5	152	7,079,510	
67	33	28	25	12	9		1	108	4,923,237	
68	25	22	20	13	10	4		94	4,023,618	
69	31	21	13	9	5	3	2	84	3,497,654	
70	22	13	9	6	7	1	1	59	2,407,237	
71	16	9	7	3	4	4		43	1,751,643	
72	12	11	3	1				27	723,937	
73	8	4	10	3	4		1	30	1,197,008	
74	5	8	3	1	2	1	1	21	650,184	
75	6		2	1	5			14	352,405	
76	3	3	3	1	1			11	405,862	
77	4	2	2	1	2			11	396,520	
78	1	2		2				5	127,738	
79	4		1		1			6	117,279	
80 & Over	6	2	5	5	2	1		21	609,597	
Total	9,552	4,390	3,467	2,162	1,602	423	77	21,673	\$ 871,633,574	

Average Age: 43.86

Average Service: 8.32



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	2	1						3	\$ 111,203
20 to 24	232	7						239	9,145,881
25 to 29	493	167	5					665	29,500,731
30 to 34	269	301	139					709	35,871,167
35 to 39	147	190	256	98	0	0	0	691	37,942,393
40 to 44	74	96	145	236	28	1		580	34,310,867
45 to 49	51	57	85	163	66	2		424	25,545,637
50 to 54	17	48	49	80	31	10		235	13,900,477
55 to 59	12	19	31	33	11	2	2	110	6,350,456
60	3	1	1	3	1	1	1	11	644,957
61	3	1	5	5				14	682,911
62	3	2	4	1				10	513,401
63		4	2	4	1	2		13	846,939
64	1				2			3	219,461
65	3	2	2		1	1		9	519,734
66		1			1		1	3	171,782
67				2			1	3	208,075
68							1	1	110,273
69									
70				1				1	59,687
71	1							1	60,125
72									
73									
74									
75									
76									
77									
78									
79									
80 & Over		1						1	51,579
Total	1,311	898	724	626	142	19	6	3,726	\$ 196,767,735

Average Age: 37.25
 Average Service: 8.97



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	3							3	\$ 88,429
20 to 24	106							106	3,598,807
25 to 29	230	83	2					315	12,914,507
30 to 34	153	207	107	2				469	22,635,197
35 to 39	85	140	227	65	3			520	28,299,878
40 to 44	22	62	129	140	21	1		375	23,027,530
45 to 49	17	26	55	103	40	5		246	15,542,618
50 to 54	8	8	25	48	25	8		122	8,023,081
55 to 59	1	4	9	21	12	2	3	52	3,545,890
60	1				1			2	93,551
61	1		1	2	1	1		6	403,039
62		1	1	1	1		1	5	323,924
63						1		1	120,078
64				2			1	3	204,153
65							1	1	73,139
66									
67							1	1	100,246
68	2				1			3	109,550
69	1							1	42,559
70									
71									
72									
73									
74									
75									
76									
77			1					1	61,432
78									
79									
80 & Over									
Total	630	531	557	384	105	18	7	2,232	\$ 119,207,608

Average Age: 37.30

Average Service: 9.90



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	561	1						562	\$ 22,305,644	
20 to 24	2,165	53						2,218	69,330,303	
25 to 29	3,773	906	53					4,732	170,649,547	
30 to 34	3,210	1,841	928	36	1			6,016	248,465,603	
35 to 39	2,414	1,534	1,688	688	43			6,367	289,399,717	
40 to 44	1,954	1,148	1,376	1,278	420	15		6,191	299,398,234	
45 to 49	1,783	1,084	1,212	1,229	989	145	2	6,444	319,833,758	
50 to 54	1,532	938	1,077	960	862	216	18	5,603	270,948,245	
55 to 59	1,323	946	1,061	970	776	211	40	5,327	255,701,019	
60	222	186	185	168	119	53	15	948	44,524,537	
61	235	147	202	162	115	44	10	915	44,439,607	
62	167	145	176	138	80	34	11	751	38,058,736	
63	134	118	153	67	62	25	8	567	27,385,206	
64	123	99	87	70	51	22	4	456	22,413,353	
65	108	88	92	76	42	23	7	436	22,610,646	
66	66	53	66	43	33	17	6	284	14,520,761	
67	53	46	39	30	20	6	6	200	10,346,691	
68	53	35	37	18	15	6	3	167	8,124,169	
69	43	30	24	21	16	4	2	140	6,674,750	
70	31	23	21	13	9	4	1	102	4,935,976	
71	25	17	15	5	7	5	1	75	3,710,460	
72	16	18	5	2	1	1		43	1,770,426	
73	12	8	13	7	4		1	45	2,310,421	
74	11	14	8	5	4	2	2	46	2,011,695	
75	10	1	7	2	6	1		27	1,053,498	
76	7	6	5	1	2			21	889,555	
77	5	2	4	2	3			16	607,670	
78	4	2		4				10	438,638	
79	5		2	1	1	1	1	11	402,496	
80 & Over	9	4	6	7	3	1	1	31	1,153,529	
Total	20,054	9,493	8,542	6,003	3,684	836	139	48,751	\$ 2,204,414,890	

Average Age: 43.30

Average Service: 8.86



Appendix A: Additional Membership Data

Table A-2: Number of Annual Retirement Allowances of Benefit Recipients as of June 30, 2017

Type of Pension	Number	Total Annual Benefits	Average Annual Pension
Service Retirement Pensions			
Single Life Pension Terminating Upon Death*	14,404	\$ 426,262,930	\$ 29,593
Two Life 100% Survivor Pension			
Retired Member Recipient*	12,742	393,244,230	30,862
Survivor Recipient	2,293	52,370,761	22,839
Two Life 50% Survivor Pension			
Retired Member Recipient*	4,751	154,216,776	32,460
Survivor Recipient	905	11,973,711	13,231
Single Life with Temporary Child Survivor Pension			
Retired Member Recipient*	215	8,498,507	39,528
Child Recipient	6	147,907	24,651
Total Service Retirement Pensions	35,316	\$ 1,046,714,822	\$ 29,639
Disability Retirement Pensions			
Single Life Pension Terminating Upon Death*	407	\$ 7,081,485	\$ 17,399
Two Life 100% Survivor Pension			
Retired Member Recipient*	751	12,681,154	16,886
Survivor Recipient	195	3,016,340	15,468
Two Life 50% Survivor Pension			
Retired Member Recipient*	162	3,077,199	18,995
Survivor Recipient	23	200,451	8,715
Single Life with Temporary Child Survivor Pension			
Retired Member Recipient*	8	115,407	14,426
Child Recipient	1	6,363	6,363
Total Disability Retirement Pensions	1,547	\$ 26,178,399	\$ 16,922
Pre-Retirement Survivor Pensions			
Spouse Recipient	1,103	\$ 18,806,996	17,051
Child Recipient	45	453,801	10,084
Total Pre-Retirement Survivor Pensions	1,148	\$ 19,260,797	\$ 16,778
Total Pensions Being Paid	38,011	\$ 1,092,154,018	\$ 28,733

* Includes Co-Payees



Appendix A: Additional Membership Data

Table A-3: Distribution of Participants Receiving Benefits as of June 30, 2017

Attained Age	Retired Member		Disabled Member		Survivor Beneficiaries		Totals	
	Number	Annual Pensions	Number	Annual Pensions	Number	Annual Pensions	Number	Annual Pensions
Under 40	10	\$ 215,959	32	533,831	259	\$ 3,940,935	301	\$ 4,690,725
40 to 44	247	9,465,775	76	1,536,698	109	1,766,201	432	12,768,674
45 to 49	1,173	46,141,929	153	3,017,505	155	2,700,179	1,481	51,859,613
50 to 54	2,509	97,247,625	215	4,192,902	231	4,016,383	2,955	105,456,910
55 to 59	3,723	141,687,981	306	5,746,289	347	6,696,185	4,376	154,130,455
60 to 64	5,025	169,110,916	368	6,154,300	479	10,063,686	5,872	185,328,902
65 to 69	7,087	203,469,168	159	1,671,339	579	12,239,046	7,825	217,379,553
70 to 74	5,490	150,076,482	1	1,961	590	12,632,522	6,081	162,710,965
75 to 79	3,371	84,158,697			621	11,930,876	3,992	96,089,573
80 to 84	1,984	48,811,442			515	9,735,702	2,499	58,547,144
85 to 89	1,032	22,646,636			413	7,358,682	1,445	30,005,318
90 to 94	381	7,903,949			214	3,006,026	595	10,909,975
95 to 99	75	1,210,499			50	803,405	125	2,013,904
100 & Over	23	175,805			9	86,502	32	262,307
Total	32,130	\$982,322,863	1,310	\$ 22,854,825	4,571	\$ 86,976,330	38,011	\$ 1,092,154,018



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*	\$ 443	\$ 842	\$ 1,431	\$ 2,075	\$ 2,824	\$ 3,326	\$3,282	\$2,483
Number of Retirees*	597	1,680	1,755	1,718	2,212	6,235	644	14,841
State Police/Corrections								
Average Monthly Benefit*	\$ 1,433	\$1,720	\$ 1,606	\$ 2,281	\$ 2,912	\$ 3,352	\$3,925	\$2,952
Number of Retirees*	31	55	63	84	237	500	67	1,037
Municipal General								
Average Monthly Benefit*	\$ 654	\$ 725	\$ 1,202	\$ 1,878	\$ 2,672	\$ 3,204	\$3,365	\$2,322
Number of Retirees*	332	1,191	1,322	1,282	1,523	4,052	388	10,090
Municipal Police								
Average Monthly Benefit*	\$ 1,851	\$1,404	\$ 2,136	\$ 3,253	\$ 3,680	\$ 4,157	\$3,848	\$3,531
Number of Retirees*	36	47	81	443	1,968	148	38	2,761
Municipal Fire								
Average Monthly Benefit*	\$ 2,346	\$2,170	\$ 2,750	\$ 3,380	\$ 3,821	\$ 4,070	\$3,440	\$3,689
Number of Retirees*	11	25	50	205	1,127	62	36	1,516
Totals for All Divisions								
Average Monthly Benefit*	\$ 614	\$ 831	\$ 1,379	\$ 2,223	\$ 3,191	\$ 3,297	\$3,369	\$2,602
Number of Retirees*	1,007	2,998	3,271	3,732	7,067	10,997	1,173	30,245

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

- State General – 278
- State Police/Corrections – 158
- Municipal General – 226
- Municipal Police – 87
- Municipal Fire – 32



Appendix A: Additional Membership Data

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

Division	2012-13 Retirees	2013-14 Retirees	2014-15 Retirees	2015-16 Retirees	2016-17 Retirees	All Current Retirees
State General						
Number	916	878	772	871	698	15,119
Average Monthly Benefit at Retirement	\$ 2,324	\$ 2,304	\$ 2,266	\$ 2,386	\$ 2,185	\$ 1,991
Average Age at Retirement	59.42	59.00	60.02	59.82	61.28	57.50
State Police/Corrections						
Number	54	70	59	48	28	1,195
Average Monthly Benefit at Retirement	\$ 2,597	\$ 2,864	\$ 2,765	\$ 2,615	\$ 3,063	\$ 2,357
Average Age at Retirement	52.57	50.65	50.26	51.54	51.44	51.05
Municipal General						
Number	630	688	619	695	502	10,316
Average Monthly Benefit at Retirement	\$ 2,156	\$ 2,201	\$ 2,115	\$ 2,104	\$ 1,930	\$ 1,912
Average Age at Retirement	59.71	59.58	60.02	60.81	61.92	57.91
Municipal Police						
Number	150	159	143	163	118	2,848
Average Monthly Benefit at Retirement	\$ 3,319	\$ 3,640	\$ 3,385	\$ 3,699	\$ 3,490	\$ 2,869
Average Age at Retirement	48.44	48.60	48.95	48.93	49.23	47.60
Municipal Fire						
Number	59	86	60	90	18	1,548
Average Monthly Benefit at Retirement	\$ 3,606	\$ 3,844	\$ 4,141	\$ 3,911	\$ 3,570	\$ 2,896
Average Age at Retirement	48.58	48.94	50.36	49.13	51.16	47.85
Totals for All Current Retirees						
Number	1,809	1,881	1,653	1,867	1,362	31,026
Average Monthly Benefit at Retirement	\$ 2,398	\$ 2,471	\$ 2,392	\$ 2,475	\$ 2,240	\$ 2,105
Average Age at Retirement	58.05	57.56	58.37	58.51	60.14	56.00



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 2.75% per year for 9 years and 3.25% after the 9th 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, 2014 Valuation, except as otherwise noted)

Assumed Rate of Investment Return (effective June 30, 2016). 7.25% per annum net of investment expenses for the first 9 years, 7.75% thereafter.

Administrative Expenses. 0.45% of payroll.

Price Inflation (effective June 30, 2016). 2.25% per annum for the first 9 years, 2.75% thereafter.

Real Investment Return (effective June 30, 2016). 5.0% over price inflation (4.5% over wage growth). This is the expected rate of return (net of investment expenses) above the rate of price inflation.

Salary Increases (effective June 30, 2016). 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	2.25%	2.25%	2.25%	2.25%	2.25%
Other Factors	0.50	0.50	0.50	0.50	0.50
Increase Due to Merit/Longevity:					
State General	7.75	1.75	0.50	0.50	0.50
State Police	10.75	6.25	1.75	1.75	1.75
State Corrections	9.75	2.75	1.75	1.75	1.75
Municipal General*	2.25	1.75	0.50	0.50	0.50
Municipal Police	8.25	3.25	2.00	1.25	1.25
Municipal Fire	8.25	3.25	2.00	2.00	2.00

* 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 RP-2000 Mortality Tables (Combined table for healthy post-retirement, Employee table for active members, and Disabled table for disabled retirees before retirement age) with projection to 2018 using Scale AA. 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								
Pre-Retirement			Post-Retirement			Disabled		
Age	Male	Female	Age	Male	Female	Age	Male	Female
25	0.03%	0.02%	45	0.12%	0.08%	45	1.78%	0.56%
30	0.04	0.02	50	0.15	0.12	50	2.09	0.85
35	0.07	0.04	55	0.26	0.24	55	2.51	1.43
40	0.09	0.05	60	0.50	0.46	60	3.14	2.00
45	0.12	0.08	65	0.99	0.89	65	Uses healthy post-retirement rates upon surviving to normal retirement age.	
50	0.15	0.12	70	1.69	1.53	70		
55	0.21	0.22	75	2.94	2.43	75		
60	0.36	0.36	80	5.37	4.04	80		
65	0.59	0.53	85	9.76	6.95	85		



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	State	Municipal General		Municipal	Municipal
	Male	Female	Police	Corrections	Male	Female	Police	Fire
40	55%	60%	60%	60%	55%	55%	60%	45%
45	55	60	60	60	55	55	50	35
50	55	60	50	50	55	55	50	30
55	55	60	50	50	55	55	50	50
60	35	40	50	50	30	30	50	50
65	25	30	100	50	30	35	50	50
70	25	30		100	25	25	100	100
75	25	30			25	25		
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	State	Municipal General		Municipal	Municipal
	Male	Female	Police	Corrections	Male	Female	Police	Fire
40	40%	35%	40%	50%	35%	35%	30%	40%
45	40	35	40	50	35	35	30	35
50	40	35	50	50	40	40	30	30
55	40	35	35	50	30	25	30	30
60	30	40	35	50	30	30	30	20
65	30	35	100	40	35	35	50	50
70	25	30		100	25	25	100	100
75	25	25			25	25		
80	100	100			100	100		



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 Service (Yr):				
Sample Ages	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 Service (Yr):				
Sample Ages	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	10+
State Police	8.00%	7.00%	4.00%	4.00%	4.00%
State Corrections	20.00	16.00	9.00	8.00	6.00
Municipal Detention	22.00	16.00	10.00	10.00	6.00
Municipal Police	14.00	9.50	6.80	5.15	3.80
Municipal Fire	10.00	7.50	5.00	3.30	3.00

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%	0.05%	0.14%
30	0.04	0.03	0.09	0.16
35	0.08	0.06	0.14	0.21
40	0.13	0.12	0.35	0.27
45	0.24	0.20	0.42	0.46
50	0.41	0.39	0.69	0.90
55	0.57	0.61	1.59	1.40
60	0.74	0.73	2.31	1.88
65	0.75	0.73	2.31	1.88

Rates Becoming Disabled at Indicated Ages (Municipal Division)					
Sample Ages	Municipal General		Municipal	Municipal	Municipal
	Male	Female	Detention	Police	Fire
25	0.05%	0.04%	0.06%	0.07%	0.02%
30	0.08	0.04	0.10	0.08	0.02
35	0.12	0.04	0.15	0.12	0.02
40	0.17	0.06	0.22	0.17	0.08
45	0.25	0.14	0.32	0.26	0.08
50	0.40	0.25	0.51	0.42	0.33
55	0.65	0.39	0.85	0.73	0.33
60	0.80	0.51	1.04	1.22	1.17
65	0.82	0.59	1.07	1.22	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
Coverage Plan 2	2.5	2.0	90
Coverage Plan 3	3.0	2.5	90
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
Coverage Plan 2	2.5	2.0	90
Coverage Plan 3	2.5	2.0	90
Coverage Plan 4	3.0	2.5	90
Coverage Plan 5	3.5	3.0	90
Municipal Fire Member Coverage Plan 1	2.0	2.0	90
Coverage Plan 2	2.5	2.0	90
Coverage Plan 3	2.5	2.0	90
Coverage Plan 4	3.0	2.5	90
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%	16.99%
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	7.40
Municipal General Member Coverage Plan 2	10.65	9.55
Municipal General Member Coverage Plan 3	14.65	9.55
Municipal General Member Coverage Plan 4	17.15	12.05
Municipal Detention Officer Member Coverage Plan 1	18.15	17.05
Municipal Police Member Coverage Plan 1	8.50	10.40
Municipal Police Member Coverage Plan 2	8.50	15.40
Municipal Police Member Coverage Plan 3	8.50	18.90
Municipal Police Member Coverage Plan 4	13.85	18.90
Municipal Police Member Coverage Plan 5	17.80	18.90
Municipal Fire Member Coverage Plan 1	9.50	11.40
Municipal Fire Member Coverage Plan 2	9.50	17.90
Municipal Fire Member Coverage Plan 3	9.50	21.65
Municipal Fire Member Coverage Plan 4	14.30	21.65
Municipal Fire Member Coverage Plan 5	17.70	21.65

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%