The logo for the SRPS Actuarial Section is centered on the page. It features the letters "SRPS" in a large, bold, serif font. Below "SRPS" is the text "Actuarial Section" in a smaller, elegant, cursive script. The entire logo is set against a light gray square background that has a subtle, larger-scale version of the "SRPS" text and a decorative floral or geometric pattern.

SRPS
Actuarial Section



December 14, 2017

Board of Trustees
Maryland State Retirement and Pension System
120 East Baltimore Street
Baltimore, MD 21202

Dear Members of the Board:

The results of the **June 30, 2018 annual actuarial valuation** of the Maryland State Retirement and Pension System (“MSRPS”) are summarized in this Section.

The purposes of the annual actuarial valuation are as follows:

- Measure the financial position of MSRPS with regard to funding,
- Provide the Board with State and Participating Governmental Unit (“PGU”) contribution rates for certification,
- Determine actuarial and statutory contribution rates with reinvested savings,
- Discuss some of the risks associated with achieving the funding objectives of MSRPS, and
- Analyze the aggregate experience of the State Systems over the past year.

Information required by Statements No. 67 and No. 68 of the Governmental Accounting Standards Board (“GASB”) for fiscal year 2018 is provided in the GASB Statement Nos 67 and 68 Accounting and Financial Reporting For Pensions Report.

The following schedules in the Actuarial Section, of the Comprehensive Annual Financial Report (CAFR) were prepared by Gabriel, Roeder, Smith & Company based upon certain information presented in the previously mentioned June 30, 2016 Annual Actuarial Valuation Report:

Actuarial Section

- Summary of Valuation Results
- Actuary’s Comments
- Other Observations
- Prior Year Asset Experience
- Trends
- Summary of Assumptions
- Schedules of Active Membership by Plan
- Summary of Unfunded Liabilities/Solvency Test
- Summary of Retirees and Beneficiaries
- Summary of Principal Results

The individual member data required for the valuations was furnished by the Maryland State Retirement Agency (“MSRA”), together with pertinent data on financial operations (unaudited). The cooperation and collaboration of MSRA staff in furnishing these materials is acknowledged with appreciation. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by the MSRA.

Actuarial valuations are based upon assumptions regarding future activity in specific risk areas including the rates of investment return and payroll growth, eligibility for the various classes of benefits, and longevity among retired lives. The Board adopts these assumptions after considering the advice of the actuary and other professionals. The assumptions and methods used for funding and financial reporting purposes are in conformity with the Actuarial Standards of Practice issued by the Actuarial Standards Board. They are also in conformity with the Board’s funding policy.

Each actuarial valuation takes into account all prior differences between actual and assumed experience in each risk area and adjusts the contribution rates as needed. GRS performed an experience study of MSRPS for the period 2010-2014 after completion of the June 30, 2014 valuations. Assumptions from the experience study including investment return, inflation, COLA increases, mortality rates, retirement rates, withdrawal rates, disability rates, and rates of salary increase were adopted by the Board for first use in the June 30, 2015 valuation. The Board adopted the use of an investment return assumption of 7.45% and an inflation assumption of 2.60% for first use in the June 30, 2018 valuation. It is our opinion that the actuarial assumptions used for the valuation remain reasonable. Based upon the results of a projection performed in accordance with GASB Statement No. 67 parameters, the Single Discount rate for purpose of discounting pension liabilities for pension financial reporting purpose is also 7.45%.

New funding methodology set forth by Maryland legislation was first reflected in the June 30, 2015 valuation. The legislation removed the corridor funding method effective with the June 30, 2015 valuation.

The computed contribution rates may be considered as a minimum contribution rate that complies with the funding policy stated in the Statutes. Users of this report should be aware that contributions made at that rate do not guarantee benefit security. Given the importance of benefit security to any retirement system, we suggest that contributions to the System in excess of those presented in this report be considered.

This actuarial valuation schedules appearing in this section assume the continuing ability of the participating employers to make the contributions necessary to fund this system. A determination regarding whether or not each participating employer is actually able to do so is outside our scope of expertise. Consequently, we did not perform such an analysis.

The benefit provisions valued in the actuarial valuation as of June 30, 2018 are the same as the provisions from the last actuarial valuation as of June 30, 2017, with the exception of State Police and LEOPS. Portions of the savings from the 2011 pension reforms passed by the General Assembly are to be reinvested as additional contributions into the Systems. Legislation enacted in 2015 reduced the amount of reinvested savings to \$75 million per year beginning in fiscal year 2016 until the combined funded ratio of the Systems reaches 85% at which point the additional contributions cease.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. The actuary did not perform an analysis of the potential range of such future measurements in the June 30, 2018 actuarial valuation report.

The previously listed schedules prepared by the actuaries in this section were prepared by actuaries who have substantial experience valuing public employee retirement systems. We certify that, to the best of our knowledge, the schedules are complete and accurate and have been prepared in accordance with Maryland's Annotated Code and generally recognized and accepted actuarial principles and practices which are consistent with the Code of Professional Conduct and applicable Actuarial Standards of Practice as promulgated by the Actuarial Standards Board. In particular, the assumptions and methods used for funding purposes meet the parameters set by the applicable Actuarial Standards of Practice.

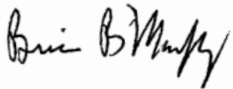


This schedules presented in the Actuarial Section of this CAFR should not be relied on for any purpose other than the purposes previously described. Determinations of the financial results associated with benefits described in this report in a manner other than the intended purpose may produce significantly different results.

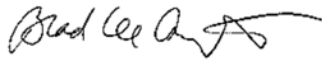
The signing actuaries are independent of the plan sponsor.

Brian B. Murphy, Brad L. Armstrong, and Jeffrey T. Tebeau are Members of the American Academy of Actuaries (MAAA), and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

Respectfully submitted,



Brian B. Murphy, FSA, MAAA
Consulting Actuary



Brad L. Armstrong, ASA, MAAA
Consulting Actuary



Jeffrey T. Tebeau, ASA, EA, MAAA
Consulting Actuary

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INTRODUCTION

The funding valuation report, from which the schedules that appear in this section were derived, presents the results of the June 30, 2018 annual actuarial valuation of the Maryland State Retirement and Pension System (MSRPS). The purposes of the annual funding valuations are as follows:

- Measure the financial position of MSRPS with regard to funding,
- Provide the Board with State and Participating Governmental Unit (“PGU”) contribution rates for certification,
- Determine actuarial and statutory contribution rates with reinvested savings,
- Discuss some of the risks associated with achieving the funding objectives of MSRPS, and
- Analyze the aggregate experience of the State Systems over the past year.

A summary of the primary funding valuation results as of June 30, 2018 is presented on the following page.

The Governmental Accounting Standards Board (GASB) No. 67 and No. 68 valuation report presents the results of the June 30, 2018 annual accounting valuation of the Maryland State Retirement and Pension System (MSRPS). The purpose of the annual accounting valuations is as follows:

- Provide actuarial reporting and disclosure information for the MSRPS and State’s financial report.

The accounting valuation results for the year ended June 30, 2018 are presented in a separate report.

SUMMARY OF VALUATION RESULTS
JUNE 30, 2018
(\$ IN MILLIONS)
(STATE AND MUNICIPAL)

	2018						2017		% Change
	TCS	ECS	State			CORS ¹	Total	Total	
			Police	Judges	LEOPS				
A. Demographic Information									
1. Active Number Counts	106,846	81,208	1,347	316	2,617	97	192,431	192,742	-0.2%
2. Active Payroll	\$ 6,941	\$ 4,301	\$ 100	\$ 47	\$ 171	\$ 5	\$ 11,566	\$ 11,419	1.3%
3. Retired Number Counts	77,201	78,287	2,477	421	1,954	34	160,374	156,366	2.6%
4. Annual Benefits for Retired Members ²	\$ 2,190	\$ 1,374	\$ 124	\$ 33	\$ 70	\$ 1	\$ 3,791	\$ 3,587	5.7%
5. Deferred / Inactive Number Counts	25,188	26,698	99	9	305	2	52,301	53,628	-2.5%
6. Total Number Counts	209,235	186,193	3,923	746	4,876	133	405,106	402,736	0.6%
B. Assets									
1. Market Value (MV)	\$ 31,480	\$ 17,429	\$ 1,447	\$ 470	\$ 977	\$ 24	\$ 51,827	\$ 48,987	5.8%
³ 2. Rate of Return on MV							8.05 %	9.95 %	
3. Actuarial Value (AV)	\$ 31,946	\$ 17,680	\$ 1,469	\$ 477	\$ 991	\$ 25	\$ 52,587	\$ 50,250	4.6%
4. Rate of Return on AV							6.83 %	6.96 %	
5. Ratio of AV to MV							101.5%	102.6%	
C. Actuarial Results									
1. Normal Cost as a % of Payroll	11.38%	10.24%	32.04%	39.18%	21.72%	13.63%	11.40%	11.42%	
2. Actuarial Accrued Liability (AAL)									
a. Active	\$ 17,054	\$ 9,034	\$ 460	\$ 179	\$ 495	\$ 12	\$ 27,234	\$ 26,869	1.4%
b. Retired	24,650	15,410	1,775	374	1,013	14	43,237	41,112	5.2%
c. Deferred/Inactive	1,036	1,018	16	4	31	0	2,105	2,005	5.0%
d. Total	\$ 42,740	\$ 25,462	\$ 2,251	\$ 557	\$ 1,539	\$ 26	\$ 72,575	\$ 69,987	3.7%
3. Unfunded AAL (UAAL)	\$ 10,794	\$ 7,783	\$ 782	\$ 80	\$ 549	\$ 1	\$ 19,988	\$ 19,736	1.3%
4. Funded Ratio	74.75 %	69.43 %	65.25 %	85.68 %	64.36 %	94.27 %	72.46 %	71.80 %	
D. Contribution Rates⁴									
	STATE PORTION ONLY								
	FY 2020						FY 2019	FY 2018	
	TCS	ECS	State Police	Judges	LEOPS	Total	Total	Total	
1. Pension Contributions									
a. Employer Normal Cost	4.38%	3.85%	24.04%	32.49%	15.07%	4.65%	4.66%	4.69%	
b. Member Contribution Rate	7.00%	6.74%	8.00%	6.69%	7.00%	6.93%	6.93%	6.92%	
c. UAAL Contribution Rate	<u>11.21%</u>	<u>15.71%</u>	<u>55.54%</u>	<u>11.95%</u>	<u>26.30%</u>	<u>13.17%</u>	<u>12.76%</u>	<u>12.91%</u>	
d. Total	22.59%	26.30%	87.58%	51.13%	48.37%	24.75%	24.35%	24.52%	
2. Total Actuarial Employer Rate (1.a + 1.c)	15.59%	19.56%	79.58%	44.44%	41.37%	17.82%	17.42%	17.60%	
3. Total Employer Budgeted Rate									
a. Employer Budgeted Rate	15.59%	19.56%	79.58%	44.44%	41.37%	17.82%	17.42%	17.60%	
b. Reinvested Savings Rate	<u>0.71%</u>	<u>0.66%</u>	<u>1.00%</u>	<u>0.00%</u>	<u>1.03%</u>	<u>0.72%</u>	<u>0.73%</u>	<u>0.74%</u>	
c. Total Employer Budgeted Rate	16.30%	20.22%	80.58%	44.44%	42.40%	18.54%	18.15%	18.34%	

¹Includes CORS Municipal only. State CORS included in ECS.

²Retiree benefit amounts include the cost-of-living-adjustment granted July 1, 2018 and July 1, 2017, respectively.

³Actuarial estimation method used is expected to produce results that differ modestly from figures reported by State Street.

⁴Contribution rates shown in the "Total" column are for informational purposes only and are not used for funding purposes. Totals may not add due to rounding.

ACTUARY'S COMMENTS

For the year ended June 30, 2018, the System's assets earned **8.05%** based on our estimate and **8.06%** (time-weighted) as reported by State Street (using a slightly different computation method) on a market value basis and **6.83%** on a smoothed or actuarial value basis. The smoothed rate of return is less than the 7.50% assumed rate of investment return. Recognized asset losses from fiscal years 2015 and 2016 offset recognized asset gains from fiscal years 2014, 2017 and 2018 in the actuarial value of assets as of June 30, 2018. This resulted in a loss under the asset smoothing method.

**UAAL and Actuarial Gain/(Loss)
(\$ in Millions)**

	State	Municipal	Total SRPS
Unfunded Actuarial Accrued Liability (UAAL) as of June 30, 2017	\$18,854	\$ 882	\$19,736
Expected UAAL as of June 30, 2018 before changes	18,815	882	19,697
Changes in benefit provisions	1	2	3
Changes in methods and assumptions	140	14	154
Expected UAAL as of June 30, 2018 after changes	18,956	898	19,854
Actual UAAL as of June 30, 2018	19,038	950	19,988
Net actuarial gain/(loss)	(82)	(52)	(134)
Actuarial gain/(loss) by source			
Actuarial investment experience	(305)	(30)	(335)
Actuarial accrued liability experience	223	(22)	201
<i>Totals may not add due to rounding</i>			

Changes in benefit provisions included increasing the cap on retirement allowances for LEOPS members (from 60% of average final compensation to 65%) and extending the length of time a State Police member may participate in the Deferred Retirement Option Plan (DROP) by one year. Changes in assumptions included reducing the assumed rate of investment return to 7.45% and price inflation to 2.60%.

In relative terms, the overall System funded ratio of actuarial value of assets to liabilities increased from 71.80% in 2017 to **72.46%** this year. If market value of assets were the basis for the measurements, the funded ratio would have increased from 70.00% to 71.41% funded.

The market value of assets exceeds the retiree liabilities by about 20% in total (or 2.5% if accumulated member contributions of about \$7.5 billion are netted out), an increase from 19% last year. This is referred to as a short condition test and is demonstrated in the chart at the bottom of this page. It is looking at the current retiree liabilities as the benefits that will be paid the soonest since these benefits are already in pay status. Active liabilities and deferred vested liabilities do not have associated immediate cash flow requirements. Although the market value of assets exceeds the current retiree liabilities in total, this is not true for two of the smaller systems. For State Police and LEOPS, the market value of assets is less than the retiree liabilities.

Summary of Contribution Rates by State System (\$ in Millions)							
	TCS	ECS	State Police	Judges	LEOPS	CORS	Total
Fair Value of Assets (FVA)	\$31,480	\$17,429	\$ 1,447	\$ 470	\$ 977	\$ 24	\$51,827
Retiree Liability	24,650	15,410	1,775	374	1,013	14	43,237
FVA as % of Retiree Liability	128%	113%	81%	126%	96%	178%	120%

In the 2013 legislative session, the Legislature changed the method used to fund the State Systems of the MSRPS. The unfunded liability for each State System is being amortized over a single closed 25-year period beginning July 1, 2014 and ending June 30, 2039 (20 years remaining as of the June 30, 2018 valuation, which determines the fiscal year 2020 contribution). In addition, the corridor method used by the Teachers' Combined System and the State portion of the

Employees' Combined System, which was established in 2001, was being phased-out over a 10-year period. In 2015, the Legislature removed the corridor funding method effective with the June 30, 2015 valuation.

The Teachers' Combined System (TCS) remained out of the corridor since the June 30, 2005 valuation and the State portion of the Employees Combined System (ECS) remained out of the corridor since the June 30, 2004 valuation resulting in contribution rates for TCS and ECS that were less than actuarial rates. With the elimination of the corridor effective with the June 30, 2015 valuation report, TCS and ECS began to contribute based on the actuarially determined rate beginning in fiscal year 2017.

Beginning in fiscal year 2012, employers pay a per-member fee to cover the Retirement Agency's operating expenses (i.e., administrative expenses). The State pays the fee for libraries.

In 2011, the General Assembly enacted pension reforms which were effective July 1, 2011, and affected both current actives and new hires. The member contribution rate was increased for members of the Teachers' Pension System and Employees' Pension System from 5% to 7%. The member contribution rate was increased from 4% to 7% for LEOPS. In addition, the benefit attributable to service on or after July 1, 2011 is subject to cost-of-living adjustments (COLAs) that are based on the increase in the Consumer Price Index and capped at 2.5% or 1.0%. The cap is 2.5% if market value investment return from the preceding calendar year was higher or lower than the investment return assumption used in the valuation (currently 7.45%), and 1.0% otherwise. There were also that affected only those members hired on or after July 1, 2011.

In addition to the benefit provision changes, a portion of the savings from the pension reforms is to be reinvested in certain State Systems (TCS, ECS, State Police, and LEOPS). Reinvested savings of \$191 million was contributed in fiscal year 2013. Legislation enacted in 2014 changed the amount of reinvested savings from \$300 million each year beginning in fiscal year 2014 to \$100 million each year for fiscal years 2014 and 2015, \$150 million for fiscal year 2016, \$200 million for fiscal year 2017, \$250 million for fiscal year 2018, \$300 million each year beginning in fiscal year 2019 and thereafter. The \$300 million would then continue until the later of the combined funded ratio of the Systems reaching 85%, and the corridor funding method being fully phased-out. Legislation enacted in 2015 further reduced the amount of reinvested savings to \$75 million per year beginning in fiscal year 2016 until the combined funded ratio of the Systems reaches 85% at which point the reinvestment ceases. The allocation of reinvested savings by System is in proportion to the savings from the pension reforms as measured in the actuarial valuation as of June 30, 2011.

The actuarially determined rates are equal to the employer normal cost plus the Unfunded Actuarial Accrued Liability contribution rate. The unfunded actuarial contribution rate is equal to the payment resulting from amortizing the remaining unfunded liability as a level percentage of pay over a single 25- year closed period beginning July 1, 2014 and ending June 30, 2039 (20 years remaining as of the June 30, 2018 valuation).

The fiscal year 2020 budgeted rates for TCS, ECS, State Police, and LEOPS are equal to the actuarially determined rate. The budgeted rates with reinvested savings are based on a projection of payroll. It is our understanding that the Retirement Agency will monitor contributions to ensure that the System receives the proper amount of reinvested dollar savings during fiscal year 2020. The fiscal year 2020 budgeted rate for Judges is equal to the actuarially determined contribution rate.

Beginning in fiscal year 2013, local employers contributed a portion of the statutory normal cost contribution for the Teachers Combined System. The required portion of normal cost contribution amounts for local employers for fiscal years 2013 through 2016 was defined by the Maryland statutes. Beginning in fiscal year 2017, local employers contribute the full normal cost contribution on behalf of their employees.

The schedules required under Government Accounting Standards Board (GASB) Statement No. 67 (beginning with fiscal year 2014) and No. 68 (beginning with fiscal year 2015) are provided in a separate report.

OTHER OBSERVATIONS

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

Given the System's contribution allocation procedure, if all actuarial assumptions are met (including the assumption of the System earning 7.45% on the actuarial value of assets), it is expected that:

1. The employer normal cost as a percentage of pay will decrease to the level of the Reformed Benefit Plan's (i.e., plans for members hired after July 1, 2011) normal cost as time passes and the active population is comprised entirely of Reformed Plan members,
2. The unfunded actuarial accrued liabilities will be fully amortized after 20 years (June 30, 2039), and
3. The funded status of the plan will increase gradually towards a 100% funded ratio.

Limitations of Funded Status Measurements

Unless otherwise indicated, a funded status measurement presented in this report is based upon the Actuarial Accrued Liability and the actuarial value of assets. Unless otherwise indicated, with regard to any funded status measurements presented in this report:

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

PRIOR YEAR EXPERIENCE

Assets (State and Municipal)

Plan assets for this System are measured on both a market value and an actuarial or smoothed value basis. The actuarial smoothing method, described again on page Appendix A-17, annually recognizes 20% of the difference between (a) the expected investment return if the market value of assets had earned the assumed rate of 7.50% during FY 2018, and (b) the actual investment return. Bear in mind that the expected return for this purpose is based on the assumed return from the prior year's actuarial valuation. In addition, there is a market value collar that constrains the actuarial value to be within 20% of the market value of assets. In periods of high returns, this method defers the amount of asset gains above the assumed return (7.50%). Conversely, in periods of returns below the assumed rate, recognition of the losses is deferred. This method limits the effect of temporary asset value fluctuations on contribution rates. The System does not immediately feel the full impact of lower (or higher) costs when asset values fluctuate dramatically.

For the year ended June 30, 2018, the System's assets earned **8.05%** based on our estimate and **8.06%** (time-weighted) as reported by State Street (using a slightly different computation method) on a market value basis and **6.83%** on an actuarial value basis. The System experienced an investment gain of **\$264** million on a market value basis and a loss of **\$335** million on an actuarial basis. More detail can be found in Section III. Reconciliations of market value and actuarial value of assets are presented below:

**(STATE AND MUNICIPAL)
TRENDS (STATE AND MUNICIPAL)**

Item (In Millions)	Market Value	Actuarial Value
June 30, 2017 Value	\$ 48,987	\$ 50,251
June 30, 2017 Municipal Withdrawals / New Entrants	-	-
Employer Contributions	1,995	1,995
Member Contributions	792	792
Benefit Payments and Other Disbursements	(3,846)	(3,846)
Expected Investment Earnings (7.50% in FY2018)	3,635	3,730
Expected Value June 30, 2018	<u>\$ 51,563</u>	<u>\$ 52,922</u>
Investment Gain/(Loss)	264	(335)
June 30, 2018 Value	\$ 51,827	\$ 52,587
<i>Figures may not add correctly due to rounding</i>		

One of the best ways to measure or evaluate the financial condition of a pension plan is to examine the historical trends that are evolving. Below are three charts which illustrate trend information from 1993 through the end of 2018, on the System's assets and liabilities, annual cash flows in and out of the fund, and the State contribution rate. Our comments on each follow.

Chart A:
Assets/Liabilities

Chart A: Assets/Liabilities

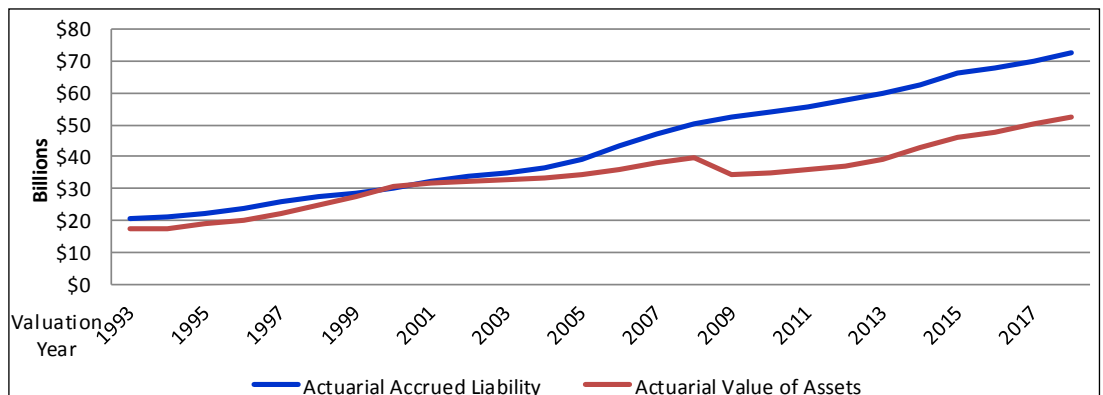


Chart B:
Benefits vs Contributions

Chart B: Benefits vs. Contributions

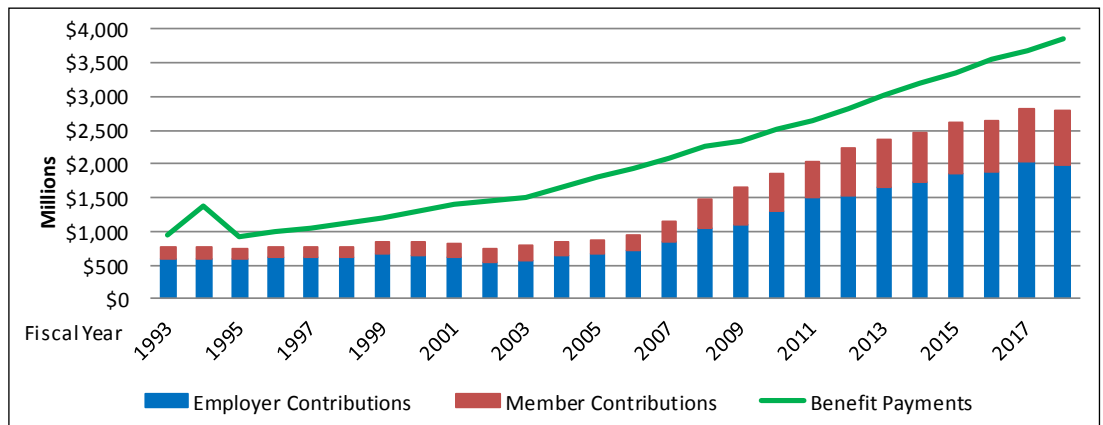
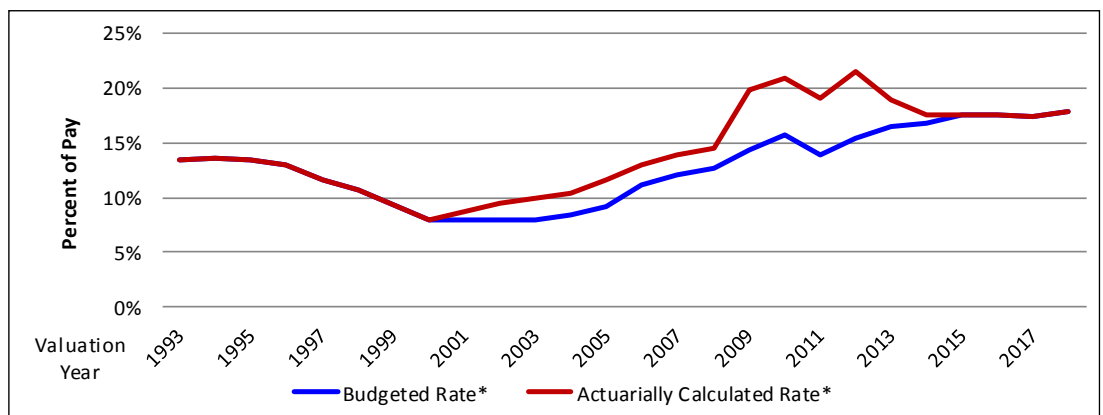


Chart C:
State Contribution Rate

Chart C: State Contributions Rate



* Excludes reinvested savings in valuation years 2010. 2010 rates are prior to the 2011 GA Reforms.

COMMENTS

Chart A displays a comparison of the actuarial value of assets and the Actuarial Accrued Liability (AAL). The difference between the actuarial value of assets and the AAL is the Unfunded Actuarial Accrued Liability. The Unfunded Actuarial Accrued Liability is about \$20 billion as of June 30, 2018, and increased by about \$252 million since the last valuation as of June 30, 2017. As of June 30, 2018, the actuarial value of assets under the 5-year asset smoothing method is 101% of the market value of assets, compared with 103% as of June 30, 2017.

Chart B presents non-investment cash flow trend information that can have investment implications. With the aging and retirements of the baby boom generation, MSRPS has seen increases in payments to retirees. This is expected for mature retirement systems such as MSRPS. Benefit payments, which are the total amount below the green line, exceeds the total contributions, which is the total amount below the top of the red bar. The amount needed to pay the excess of benefit payments over total contributions comes from either investment return or liquidation of current assets. If the difference between the total benefit payments and total contributions increases, a larger portion of investment return will be needed to pay benefits and may require a change in asset allocation. The corridor method increased the extent of negative cash

flows. The corridor funding method was eliminated first effective with the June 30, 2015 valuation. The budgeted rates have been equal to the actuarial rates since fiscal year 2017.

Finally, **Chart C** looks at the composite actuarially determined and budgeted State contribution rates. The budgeted contribution rates by System determine the fiscal year State appropriation. It shows the impact of the 1990's sustained investment gains and a continuous lowering of the rate until 2000. Effective with the 2001 valuation, the State appropriations were performed under a corridor funding method for the two largest plans, TCS and ECS. The appropriation remained essentially level for a few years before increasing with the 2004 valuation. Legislation enacted in 2015 removed the corridor funding method for TCS and ECS beginning with the valuation as of June 30, 2015. The budgeted rate is now equal to the actuarial rate for TCS and ECS.

Chart C further illustrates that the corridor method consistently acted to reduce the State's contributions calculated in valuations between 2001 and 2015.

SUMMARY OF UNFUNDED ACTUARIAL
(STATE AND

Valuation Date June 30,	Actuarial Liabilities For			Total Liabilities	Actuarial Value of Assets
	Active Member Contributions	Retirees, Term Vested and Inactives	Active Members Employer Fin. Portion		
2009	\$ 2,959,415,829	\$ 28,914,824,184	\$ 20,854,931,317	\$ 52,729,171,330	\$ 34,284,568,617
2010	3,389,265,622	29,900,015,751	20,795,799,745	54,085,081,118	34,688,345,696
2011	3,732,934,034	31,901,090,890	20,283,517,888	55,917,542,812	36,177,655,993
2012	4,274,269,025	34,208,190,190	19,386,686,257	57,869,145,472	37,248,400,780
2013	4,818,674,217	36,001,888,558	19,239,528,603	60,060,091,378	39,350,969,353
2014	5,369,806,786	37,679,277,545	19,561,109,243	62,610,193,574	42,996,956,526
2015	5,908,597,531	40,321,760,550	20,051,422,798	66,281,780,879	46,170,624,066
2016	6,437,712,138	41,640,894,712	19,703,317,255	67,781,924,105	47,803,679,296
2017	7,023,662,251	43,117,075,812	19,845,837,454	69,986,575,517	50,250,464,717
2018	7,557,858,673	45,341,184,229	19,675,645,860	72,574,688,762	52,586,527,740

SUMMARY OF RETIREES AND BENEFICIARIES ADDED TO AND REMOVED FROM ROLLS
(STATE AND MUNICIPAL)

Fiscal Year Ended	Added to Rolls		Removed from Rolls		Rolls-End of Year		% Increase in Annual Allowances	Average Annual Allowance
	Number	Annual Allowance	Number	Annual Allowances	Number	Annual Allowances		
2009	6,700	\$ 218,347,411	3,115	\$ 56,523,577	116,007	\$ 2,337,981,534	7.44%	\$ 20,154
2010	6,908	147,419,991	2,668	50,510,952	120,247	2,434,890,574	4.14%	20,249
2011	8,639	226,843,465	1,715	55,062,716	127,171	2,606,671,323	7.05%	20,497
2012	7,936	264,562,994	2,614	58,769,603	132,493	2,812,464,714	7.89%	21,227
2013	7,874	238,239,133	2,442	62,081,371	137,925	2,988,622,476	6.26%	21,668
2014	7,698	217,542,920	2,736	58,512,733	142,887	3,147,652,663	5.32%	22,029
2015	8,459	239,724,802	3,496	64,129,306	147,850	3,323,248,158	5.58%	22,477
2016	8,243	201,205,015	3,527	75,486,723	152,566	3,448,966,450	3.87%	22,606
2017	7,384	211,608,686	3,584	73,321,980	156,366	3,587,253,156	4.01%	22,941
2018	8,105	268,295,042	4,097	64,344,782	160,374	3,791,203,416	5.69%	23,640

Notes: Members added to rolls were estimated based on a retirement date/change date after June 30, 2017.
Annual allowances added to rolls include COLA increases for continuing members.
COLA increases were estimated based on the benefits for the continuing members.

LIABILITIES / SOLVENCY TEST
MUNICIPAL)

Ratio of Assets to Actuarial Liabilities			Funded Ratio (Assets/Liab. Coverage)	Unfunded Actuarial Accrued Liability (UAAL)	Covered Payroll	UAAL as % of Covered Payroll
Active Member Contributions	Retirees Term Vested and Inactives	Active Members Employer Fin. Portion				
100.00%	100.00%	11.56%	65.02%	\$ 18,444,602,713	\$ 10,714,167,517	172%
100.00%	100.00%	6.73%	64.14%	19,396,735,421	10,657,943,561	182%
100.00%	100.00%	2.68%	64.70%	19,739,886,819	10,478,799,565	188%
100.00%	96.39%	0.00%	64.37%	20,620,744,692	10,336,536,835	199%
100.00%	95.92%	0.00%	65.52%	20,709,122,025	10,477,544,241	198%
100.00%	99.86%	0.00%	68.67%	19,613,237,049	10,803,632,045	182%
100.00%	99.85%	0.00%	69.66%	20,111,156,814	11,063,961,664	182%
100.00%	99.34%	0.00%	70.53%	19,978,224,809	11,155,923,517	179%
100.00%	100.00%	0.55%	71.80%	19,736,110,801	11,418,973,317	173%
100.00%	99.31%	0.00%	72.46%	19,988,161,021	11,566,219,797	173%

MARYLAND STATE RETIREMENT
ACCOUNTING STATEMENT
AS OF
(STATE AND

	Teachers' Combined System	Employees' Combined System
1. Actuarial Accrued Liability		
a. Employee Contributions	\$ 4,697,166,828	\$ 2,626,791,463
b. Retirees, Term. Vesteds & Inactives	25,685,708,501	16,428,253,379
c. Active Members	12,356,686,403	6,407,451,989
2. Total Actuarial Accrued Liability (1(a) + 1(b) + 1(c))	\$ 42,739,561,732	\$ 25,462,496,831
3. Actuarial Value of Assets	<u>31,945,910,198</u>	<u>17,679,879,601</u>
4. Unfunded Actuarial Accrued Liability: (2-3)	<u>\$ 10,793,651,534</u>	<u>\$ 7,782,617,230</u>
5. Funded Ratio	74.75%	69.43%
6. Annual Payroll	\$ 6,941,096,601	\$ 4,301,247,490
7. UAAL as % of Payroll	156%	181%

AND PENSION SYSTEM
INFORMATION
JUNE 30, 2018
MUNICIPAL)

State Police	Judges	LEOPS	CORS	Total MSRPS
\$ 93,768,875	\$ 32,689,683	\$ 104,918,402	\$ 2,523,422	\$ 7,557,858,673
1,790,910,673	378,115,428	1,044,491,553	13,704,695	45,341,184,229
366,019,371	145,941,319	389,758,374	9,788,404	19,675,645,860
\$ 2,250,698,919	\$ 556,746,430	\$ 1,539,168,329	\$ 26,016,521	\$72,574,688,762
<u>1,468,640,940</u>	<u>477,005,959</u>	<u>990,564,212</u>	<u>24,526,829</u>	<u>52,586,527,740</u>
<u>\$ 782,057,979</u>	<u>\$ 79,740,471</u>	<u>\$ 548,604,117</u>	<u>\$ 1,489,692</u>	<u>\$19,988,161,022</u>
65.25%	85.68%	64.36%	94.27%	72.46%
\$ 100,324,842	\$ 47,498,152	\$ 170,555,081	\$ 5,497,631	\$11,566,219,797
780%	168%	322%	27%	173%

REPORT OF THE ACTUARY ON THE VALUATION OF THE
TEACHERS' COMBINED SYSTEM OF THE STATE OF MARYLAND
Summary of Principal Plan Results

	Actuarial Valuation Performed		% Change
	June 30, 2018 (for FY2020)	June 30, 2017 (for FY2019)	
A. Demographic Information			
Active Number Count	106,846	106,302	0.5%
Retired Member and Beneficiary Count	77,201	75,509	2.2%
Vested Former Member Count	25,188	25,493	-1.2%
Total Number Count	209,235	207,304	0.9%
Active Payroll	\$ 6,941,096,601	\$ 6,780,838,352	2.4%
Annual Benefits for Retired Members	\$ 2,189,605,461	\$ 2,088,365,347	4.8%
B. Actuarial Results			
Actuarial Accrued Liability	\$ 42,739,561,732	\$ 41,198,985,451	3.7%
Actuarial Value of Assets	31,945,910,198	30,500,872,500	4.7%
Unfunded Actuarial Accrued Liability (UAAL)	\$ 10,793,651,534	\$ 10,698,112,951	0.9%
Funded Ratio	74.75%	74.03%	
C. Contribution Rates (State Portion Only)			
Employer Normal Cost Rate	4.38%	4.41%	
UAAL Amortization Rate	11.21%	11.02%	
Total Actuarial Employer Contribution Rate	15.59%	15.43%	

REPORT OF THE ACTUARY ON THE VALUATION OF THE
EMPLOYEES' COMBINED SYSTEM OF THE STATE OF MARYLAND
(STATE AND MUNICIPAL)

Summary of Principal Plan Results

	Actuarial Valuation Performed		% Change
	June 30, 2018 (for FY2020)	June 30, 2017 (for FY2019)	
A. Demographic Information			
Active Number Count	81,208	82,087	-1.1%
Retired Member and Beneficiary Count	78,287	75,940	3.1%
Vested Former Member Count	<u>26,698</u>	<u>27,737</u>	-3.7%
Total Number Count	186,193	185,764	0.2%
Active Payroll	\$ 4,301,247,490	\$ 4,319,052,898	-0.4%
Annual Benefits for Retired Members	\$ 1,373,595,058	\$ 1,281,519,462	7.2%
B. Actuarial Results			
Actuarial Accrued Liability	\$ 25,462,496,831	\$ 24,579,829,945	3.6%
Actuarial Value of Assets	<u>17,679,879,601</u>	<u>16,939,887,409</u>	4.4%
Unfunded Actuarial Accrued Liability (UAAL)	\$ 7,782,617,230	\$ 7,639,942,536	1.9%
Funded Ratio	69.43%	68.92%	
C. Contribution Rates (State Portion Only)			
Employer Normal Cost Rate	3.85%	3.83%	
UAAL Amortization Rate	<u>15.71%</u>	<u>14.75%</u>	
Total Actuarial Employer Contribution Rate	19.56%	18.58%	

REPORT OF THE ACTUARY ON THE VALUATION OF THE
STATE POLICE RETIREMENT SYSTEM OF THE STATE OF MARYLAND

Summary of Principal Plan Results

	June 30, 2018 (for FY2020)	June 30, 2017 (for FY2019)	% Change
A. Demographic Information			
Active Number Count	1,347	1,371	-1.8%
Retired Member and Beneficiary Count	2,477	2,572	-3.7%
Vested Former Member Count	<u>99</u>	<u>90</u>	10.0%
Total Number Count	3,923	4,033	-2.7%
Active Payroll	\$ 100,324,842	\$ 100,384,047	-0.1%
Annual Benefits for Retired Members	\$ 123,862,208	\$ 120,251,026	3.0%
B. Actuarial Results			
Actuarial Accrued Liability	\$ 2,250,698,919	\$ 2,198,336,541	2.4%
Actuarial Value of Assets	<u>1,468,640,940</u>	<u>1,408,753,508</u>	4.3%
Unfunded Actuarial Accrued Liability (UAAL)	\$ 782,057,979	\$ 789,583,033	-1.0%
Funded Ratio	65.25%	64.08%	
C. Contribution Rates (State Portion Only)			
Employer Normal Cost Rate	24.04%	24.18%	
UAAL Amortization Rate	<u>55.54%</u>	<u>54.23%</u>	
Total Actuarial Employer Contribution Rate	79.58%	78.41%	

REPORT OF THE ACTUARY ON THE VALUATION OF THE
PENSION PLAN OF JUDGES AND THEIR SURVIVING SPOUSES

Summary of Principal Plan Results

	June 30, 2018 (for FY2020)	June 30, 2017 (for FY2019)	% Change
A. Demographic Information			
Active Number Count	316	312	1.3%
Retired Member and Beneficiary Count	421	417	1.0%
Vested Former Member Count	<u>9</u>	<u>9</u>	0.0%
Total Number Count	746	738	1.1%
Active Payroll	\$ 47,498,152	\$ 46,875,642	1.3%
Annual Benefits for Retired Members	\$ 33,319,561	\$ 31,359,577	6.3%
B. Actuarial Results			
Actuarial Accrued Liability	\$ 556,746,430	\$ 535,901,658	3.9%
Actuarial Value of Assets	<u>477,005,959</u>	<u>453,133,735</u>	5.3%
Unfunded Actuarial Accrued Liability (UAAL)	\$ 79,740,471	\$ 82,767,923	-3.7%
Funded Ratio	85.68%	84.56%	
C. Contribution Rates (State Portion Only)			
Employer Normal Cost Rate	32.49%	32.44%	
UAAL Amortization Rate	<u>11.95%</u>	<u>12.09%</u>	
Total Actuarial Employer Contribution Rate	44.44%	44.53%	

REPORT OF THE ACTUARY ON THE VALUATION OF THE
LAW ENFORCEMENT OFFICERS' PENSION SYSTEM OF THE STATE OF MARYLAND
(STATE AND MUNICIPAL)

Summary of Principal Plan Results

	June 30, 2018	June 30, 2017	
	(for FY2020)	(for FY2019)	% Change
A. Demographic Information			
Active Number Count	2,617	2,574	1.7%
Retired Member and Beneficiary Count	1,954	1,896	3.1%
Vested Former Member Count	305	295	3.4%
Total Number Count	<u>4,876</u>	<u>4,765</u>	2.3%
Active Payroll	\$ 170,555,081	\$ 166,560,857	2.4%
Annual Benefits for Retired Members	\$ 69,878,318	\$ 64,927,090	7.6%
B. Actuarial Results			
Actuarial Accrued Liability	\$ 1,539,168,329	\$ 1,449,365,359	6.2%
Actuarial Value of Assets	990,564,212	924,705,438	7.1%
Unfunded Actuarial Accrued Liability (UAAL)	<u>\$ 548,604,117</u>	<u>\$ 524,659,921</u>	4.6%
Funded Ratio	64.36%	63.80%	
C. Contribution Rates (State Portion Only)			
Employer Normal Cost Rate	15.07%	15.07%	
UAAL Amortization Rate	<u>26.30%</u>	<u>24.71%</u>	
Total Actuarial Employer Contribution Rate	41.37%	39.78%	

REPORT OF THE ACTUARY ON THE VALUATION OF THE
CORRECTIONAL OFFICERS' RETIREMENT SYSTEM OF THE STATE OF MARYLAND
(MUNICIPAL)

Summary of Principal Plan Results

	June 30, 2018 (for FY2020)	June 30, 2017 (for FY2019)	% Change
A. Demographic Information			
Active Number Count	97	96	1.0%
Retired Member and Beneficiary Count	34	32	6.3%
Vested Former Member Count	<u>2</u>	<u>4</u>	100.0%
Total Number Count	133	132	0.8%
Active Payroll	\$ 5,497,631	\$ 5,261,521	4.5%
Annual Benefits for Retired Members	\$ 942,809	\$ 830,653	13.5%
B. Actuarial Results			
Actuarial Accrued Liability	\$ 26,016,521	\$ 24,156,563	7.7%
Actuarial Value of Assets	<u>24,526,829</u>	<u>23,112,127</u>	6.1%
Unfunded Actuarial Accrued Liability (UAAL)	\$ 1,489,692	\$ 1,044,436	42.6%
Funded Ratio	94.27%	95.68%	

SCHEDULE OF ACTIVE MEMBERSHIP VALUATION DATA BY PLAN

Teachers' Retirement

Valuation Date As of June 30,	Number	Annual Payroll	Annual Average Pay	% Increase Avg. Pay
2009	3,554	\$ 306,096,545	\$ 86,127	0.66 %
2010	3,111	269,775,400	86,717	0.68
2011	2,589	225,118,122	86,952	0.27
2012	2,040	178,541,246	87,520	-0.65
2013	1,630	145,207,003	89,084	1.79
2014	1,276	116,356,416	91,188	2.36
2015	986	91,396,562	92,694	1.65
2016	724	68,494,031	94,605	2.06
2017	537	51,836,368	96,530	2.03
2018	418	41,497,070	99,275	2.84

Teachers' Pension

Valuation Date As of June 30,	Number	Annual Payroll	Annual Average Pay	% Increase Avg. Pay
2009	102,553	\$ 5,888,637,495	\$ 57,420	1.44 %
2010	103,162	5,984,872,410	58,014	1.03
2011	102,939	5,971,858,330	58,014	0.00
2012	101,654	5,902,062,066	58,060	0.08
2013	102,398	6,039,968,791	58,985	1.59
2014	103,194	6,193,896,978	60,022	1.76
2015	104,540	6,379,309,714	61,023	1.67
2016	104,823	6,542,543,808	62,415	2.28
2017	105,765	6,729,001,984	63,622	1.93
2018	106,428	6,899,599,531	64,829	1.90

Employees' Retirement

(State and Municipal)

Valuation Date As of June 30,	Number	Annual Payroll	Annual Average Pay	% Increase Avg. Pay
2009	9,962	\$ 483,871,203	\$ 48,572	0.06 %
2010	9,665	463,375,639	47,944	-1.29
2011	9,189	432,469,190	47,064	-1.84
2012	9,113	421,320,077	46,233	-1.77
2013	8,976	417,020,134	46,459	0.49
2014	8,741	423,960,682	48,503	4.40
2015	8,566	429,223,262	50,108	3.31
2016	7,923	395,490,050	49,917	-0.38
2017	7,632	389,389,294	51,021	2.21
2018	7,725	397,640,605	51,475	0.89

SCHEDULE OF ACTIVE MEMBERSHIP VALUATION DATA BY PLAN
(continued)

Employees' Pension
(State and Municipal)

Valuation Date As of June 30,	Number	Annual Payroll	Annual Average Pay	% Increase Avg. Pay
2009	79,418	\$ 3,765,664,905	\$ 47,416	2.05 %
2010	77,660	3,674,098,155	47,310	-0.22
2011	76,264	3,595,340,448	47,143	-0.35
2012	76,061	3,577,154,799	47,030	-0.24
2013	75,701	3,613,240,787	47,730	1.49
2014	76,084	3,791,019,971	49,827	4.39
2015	75,228	3,871,524,469	51,464	3.29
2016	74,702	3,849,843,225	51,536	0.14
2017	74,455	3,929,663,604	52,779	2.41
2018	73,483	3,903,606,885	53,123	0.65

Judges' Retirement

Valuation Date As of June 30,	Number	Annual Payroll	Annual Average Pay	% Increase Avg. Pay
2009	297	\$ 40,266,330	\$ 135,577	2.19 %
2010	294	39,960,883	135,921	0.25
2011	286	38,810,261	135,700	-0.16
2012	294	39,955,368	135,903	0.15
2013	288	40,000,518	138,891	2.20
2014	301	42,313,395	140,576	1.21
2015	307	44,612,624	145,318	3.37
2016	298	44,711,221	150,038	3.25
2017	312	46,875,642	150,242	0.14
2018	316	47,498,152	150,311	0.05

State Police Retirement

Valuation Date As of June 30,	Number	Annual Payroll	Annual Average Pay	% Increase Avg. Pay
2009	1,408	\$ 85,585,708	\$ 60,785	0.25 %
2010	1,354	81,705,369	59,946	0.71
2011	1,295	75,551,283	58,341	-3.32
2012	1,332	77,689,914	58,326	-0.03
2013	1,320	79,848,029	60,491	3.71
2014	1,351	85,660,006	63,405	4.82
2015	1,394	91,049,875	65,316	3.01
2016	1,402	93,490,648	66,684	2.09
2017	1,371	100,384,047	73,220	9.80
2018	1,347	100,324,842	74,480	1.72

SCHEDULE OF ACTIVE MEMBERSHIP VALUATION DATA BY PLAN

*(continued)***Law Enforcement Officers' Pension**

(STATE AND MUNICIPAL)

Valuation Date As of June 30,	Number	Annual Payroll	Annual Average Pay	% Increase Avg. Pay
2009	2,445	\$ 140,071,292	\$ 57,289	-0.10 %
2010	2,474	140,199,243	56,669	-1.08
2011	2,411	135,176,780	56,067	-1.06
2012	2,410	135,185,336	56,094	0.05
2013	2,407	137,612,972	57,172	1.92
2014	2,484	145,672,538	58,644	2.58
2015	2,488	151,955,067	61,075	4.15
2016	2,529	156,396,298	61,841	1.25
2017	2,574	166,560,857	64,709	4.64
2018	2,617	170,555,081	65,172	0.72

Correctional Officers' Retirement System

(MUNICIPAL)

Valuation Date As of June 30,	Number	Annual Payroll	Annual Average Pay	% Increase Avg. Pay
2010	66	\$ 3,956,462	\$ 59,946	0.71 %
2011	86	4,475,151	52,037	-13.19
2012	90	4,628,029	51,423	-1.18
2013	90	4,646,007	51,622	0.39
2014	91	4,752,059	52,220	1.16
2015	91	4,890,091	53,737	2.90
2016	93	4,954,236	53,271	-0.87
2017	96	5,261,521	54,808	2.88
2018	97	5,497,631	56,677	3.41