Prince George's County Police Pension Plan

Actuarial Valuation as of July 1, 2018

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June 14, 2019

Board of Trustees
Prince George's County
1400 McCormick Drive
Largo, Maryland 20774

Subject: Actuarial Valuation Report for the Year Beginning July 1, 2018

Dear Trustees:

The results of the annual actuarial valuation of the Police Pension Plan (the "Plan") as of July 1, 2018, are presented in this report.

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

The purposes of the actuarial valuation are to measure the Plan's funding progress, to determine the contribution rates for the fiscal year ending June 30, 2020, and to analyze plan experience during the prior year. This report should not be relied on for any purpose other than the purposes described herein. Determinations of financial results associated with the benefits described in this report, for purposes other than those identified above, may be significantly different.

The contribution rate in this report is determined using the actuarial assumptions and methods disclosed in Section C of this report. This report includes risk metrics beginning on page A-12 but does not include a more robust assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment.

The computed County contribution rate shown on page A-1 is best viewed as the minimum contribution rate that complies with the Board's funding policy. Users of this report should be aware that contributions made at that rate do not guarantee benefit security. Until the plan is fully funded, we encourage the plan sponsor to contribute in excess of the computed contribution rate.

This actuarial valuation assumes the continuing ability of the plan sponsor to make the contributions necessary to fund this plan. A determination regarding whether or not the plan sponsor is actually able to do so is outside our scope of expertise and was not performed.

This actuarial valuation is based upon:

Data relative to the members of the Plan – Data for active members and persons receiving benefits from the Plan was provided by the Plan's staff. We have tested this data for reasonableness.

Asset Values – The asset amounts of the Plan were provided by the Plan's auditors and the Plan's staff. The results for the funding actuarial valuation use an actuarial value of assets.

Actuarial Method – The actuarial method utilized for the Plan is the Individual Entry Age Normal Actuarial Cost Method. The objective of this method is to amortize the cost of Plan benefits over the entire career of each member as a level percentage of compensation. Any Unfunded Actuarial Accrued Liability (UAAL) under this method is separately financed. All actuarial gains and losses under this method are reflected in the UAAL.

Actuarial Assumptions – The actuarial assumptions including the investment return assumption, mortality rates, retirement rates, termination rates, disability rates, and salary increase rates were updated based on the recommendations from the experience study for the period July 1, 2013 through July 1, 2017. It is our opinion that the actuarial assumptions used for the actuarial valuation are reasonable. Additional information about the actuarial assumptions is included in Section C of this report.

Benefit Provisions – There have been no changes in benefit provisions since the previous valuation.

The funding objective is to provide the benefits of the Plan when due, with employee and employer contributions which, over time, will remain level as a percent of payroll.

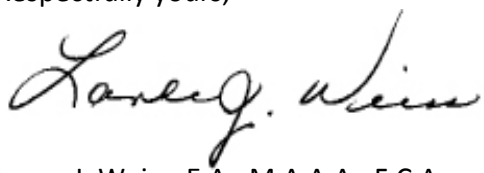
The findings in this report are based on data and other information through July 1, 2018. The actuarial valuation was based upon information furnished by Prince George's County staff, concerning Plan benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. 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 Prince George's County staff.

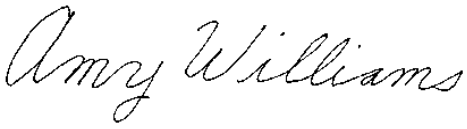
This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. To the best of our knowledge the information contained in this report is accurate and fairly presents the actuarial position of the Plan as of the actuarial valuation date. All calculations have been made in conformity with generally accepted actuarial principles and practices and with the Actuarial Standards of Practice issued by the Actuarial Standards Board.

Lance J. Weiss and Amy Williams are Members of the American Academy of Actuaries (M.A.A.A.), and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein.

The signing actuaries are independent of the plan sponsor.

Respectfully yours,





Lance J. Weiss, E.A., M.A.A.A., F.C.A.
Senior Consultant and Team Leader

Amy Williams, A.S.A., M.A.A.A., F.C.A.
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AW:kb

SECTION A.

ACTUARIAL VALUATION RESULTS

Table 1
Comparative Actuarial Valuation Results [1]
30-Year Closed Period Level Percent of Pay Amortization [4]

	Results as of July 1, 2017		Results as of July 1, 2018	
A. Basic Data				
1. Active Participants				
a. Number	1,694		1,664	
b. Total Base Payroll	$ 124,693,300		$ 128,137,700	
c. Average Annual Base Payroll	73,609		77,006	
d. Average Attained Age	38.0		38.2	
e. Average Years of Credited Service	11.4		11.8	
2. Retired Participants and Beneficiaries				
a. Age Retirees and Surviving Spouses				
i. Number	1,298		1,330	
ii. Total Annual Pension Being Paid	$ 72,697,400		$ 75,227,800	
b. Disability Retirees				
i. Number	334		335	
ii. Total Annual Pension Being Paid	$ 13,876,500		$ 14,073,500	
3. Terminated Participants with Vested Benefits				
a. Number	27		23	
b. Total Annual Vested Pension	$ 436,600		$ 434,000	
B. Valuation Results				
1. Actuarial Accrued Liability				
a. Active Participants	$ 509,754,200		$ 564,607,200	
b. Retired Participants and Beneficiaries [2]	1,042,935,500		1,105,116,600	
c. Terminated Participants with Vested Benefits	4,388,900		4,640,300	
d. Total	1,557,078,600		1,674,364,100	
2. Actuarial Value of Assets	941,764,800		995,519,200	
3. Unfunded Actuarial Accrued Liability (B.1.d. - B.2.)	615,313,800		678,844,900	
4. Funded Ratio (B.2. / B.1.d.)	60.5%		59.5%	
5. Annual Normal Cost [3]				
a. Retirement, Termination, and Death Benefits	$ 33,082,200	(26.53%)	$ 36,665,900	(28.61%)
b. Expenses of Administration	615,500	(0.49%)	629,000	(0.49%)
c. Total	33,697,700	(27.02%)	37,294,900	(29.10%)
6. Annual Contribution Requirement [3, 6]				
a. Normal Cost	33,697,700	(27.02%)	37,294,900	(29.10%)
b. Amortization of Unfunded Liability Over a Closed 30 Years [4]	37,612,500	(30.16%)	41,353,300	(32.27%)
c. Adjustment Due to Anticipated Contributions in Upcoming Year [5]	(677,700)	-(0.54%)	(455,100)	-(0.35%)
d. Total	70,632,500	(56.64%)	78,193,100	(61.02%)
7. Annual Contribution Requirement [3, 6]				
a. County Portion	62,042,000	(49.76%)	69,471,600	(54.22%)
b. Employee Portion	8,590,500	(6.88%)	8,721,500	(6.80%)
c. Total	70,632,500	(56.64%)	78,193,100	(61.02%)

[1] *Most amounts rounded to nearest $100.*

[2] *Retired participant actuarial accrued liability as of July 1, 2018, includes an amount for members with no benefits payable but who have an expected future refund payout, and was increased by an additional 3.00% of the liability for members currently in pay status to account for a potential future obligation to pay benefits from the plan for participants not reported in the census data provided for the actuarial valuation as of July 1, 2018.*

[3] *Figures in parentheses show contribution as a percentage of total base payroll.*

[4] *Unfunded liability is amortized over a 30-year closed period beginning July 1, 2014. 26 years are remaining in the amortization period as of July 1, 2018.*

[5] *Adjustment made to contribution rate to account for the one year lag between the actuarial valuation date at which the contribution rate is determined and the beginning of the fiscal year in which the contribution rate applies. Adjustment first effective with the actuarial valuation as of July 1, 2014, and the change to a closed period amortization policy.*

[6] *The Annual Contribution Requirement from the actuarial valuation as of July 1, 2017, applies to FY2019 and the Annual Contribution Requirement from the actuarial valuation as of July 1, 2018, applies to FY2020.*

Table 2
Reconciliation of Market Value of Assets

	As of June 30	
	2017	**2018**
Additions:		
Contributions:		
Employer	$ 61,636,821	$ 65,648,402
Employee	8,835,456	8,988,620
Total contributions	70,472,277	74,637,022
Transfers (to)/from other funds	(169,993)	-
Investment income:		
Net appreciation (depreciation) in fair value of assets	54,631,488	119,833,565
Interest and dividends	24,846,069	16,654,569
Total investment income	79,477,557	136,488,134
Less investment expense	2,849,336	2,890,512
Net investment income	76,628,221	133,597,622
Total additions	146,930,505	208,234,644
Deductions:		
Benefits	83,930,734	87,719,094
Refunds of contributions	4,557,046	5,034,971
General and administrative expenses	545,459	623,566
Transfers to/(from) other funds	-	-
Total deductions	89,033,239	93,377,631
Net increase (decrease)	57,897,266	114,857,013
Net assets held in trust for pension benefits, beginning of year	844,013,458	901,910,724
Net assets held in trust for pension benefits, end of year	$ 901,910,724	$ 1,016,767,737

Table 3
Development of Actuarial Value of Assets

Year Ending June 30	2017	2018	2019	2020	2021	2022
Beginning of Year:						
(1) Market Value of Assets	$844,013,458	$901,910,724				
(2) Actuarial Value of Assets (Excluding Asset Transfer)	900,121,117	941,764,750				
(2a) Actuarial Value of Assets (Including Asset Transfer)	900,102,492	941,764,750				
End of Year:						
(3) Market Value of Assets	901,910,724	1,016,767,737				
(4) Net of Contributions and Disbursements	(18,730,955)	(18,740,609)				
(5) Total Investment Income						
=(3)-(1)-(4)	76,628,221	133,597,622				
(6) Projected Rate of Return	7.50%	7.50%				
(7) Projected Investment Income						
=(1)x(6)+([1+(6)]^.5-1)x(4)	62,611,297	66,953,236				
(8) Investment Income in Excess of Projected Income						
=(5)-(7)	14,016,924	66,644,386				
(9) Excess Investment Income Recognized						
This Year (5-year recognition)						
(9a) From This Year	2,803,385	13,328,877				
(9b) From One Year Ago	(16,942,113)	2,803,385	$ 13,328,877			
(9c) From Two Years Ago	(6,592,949)	(16,942,113)	2,803,385	$ 13,328,877		
(9d) From Three Years Ago	12,944,674	(6,592,949)	(16,942,113)	2,803,385	$ 13,328,877	
(9e) From Four Years Ago	5,550,294	12,944,672	(6,592,948)	(16,942,114)	2,803,384	$ 13,328,878
(9f) Total Recognized Investment Gain/(Loss)	(2,236,709)	5,541,872	(7,402,799)	(809,852)	16,132,261	13,328,878
(10) Change in Actuarial Value of Assets						
=(4)+(7)+(9f)	41,643,633	53,754,499				
End of Year:						
(3) Market Value of Assets	**901,910,724**	**1,016,767,737**				
(11) Preliminary Actuarial Value of Assets =(2)+(10)	941,764,750	995,519,249				
(11a) Upper Corridor Limit 120% x (3)	1,082,292,869	1,220,121,284				
(11b) Lower Corridor Limit 80% x (3)	721,528,579	813,414,190				
(12) Adjustment to Remain within 20% Corridor	0	0				
(13) Actuarial Value of Assets =(11)+(12)	**941,764,750**	**995,519,249**				
(14) Pending Asset Transfer	0	0				
(15) Final Actuarial Value of Assets =(13)+(14)	**941,764,750**	**995,519,249**				

Table 4
Historical Comparison of Results

Year Ending June 30	2014	2015	2016	2017	2018
(1) Market Value of Assets	$ 856,085,105	$ 881,311,161	$ 843,994,833	$ 901,910,724	$ 1,016,767,737
(2) Actuarial Value of Assets	$ 793,565,098	$ 868,353,032	$ 900,102,492	$ 941,764,750	$ 995,519,249
(3) Difference Between Market & Actuarial Values	$ 62,520,007	$ 12,958,129	$ (56,107,659)	$ (39,854,026)	$ 21,248,488
(4) Estimated Market Value Rate of Return	16.27 %	3.64 %	(2.21)%	9.18 %	14.97 %
(5) Estimated Actuarial Value Rate of Return	12.08 %	10.19 %	5.79 %	6.78 %	7.78 %
(6) Ratio of Actuarial Value to Market Value	93 %	99 %	107 %	104 %	98 %
(7) Funded Ratio (Market Value of Assets)	60.3%	60.1%	55.6%	57.9%	60.7%
(8) Funded Ratio (Actuarial Value of Assets)	55.9%	59.2%	59.3%	60.5%	59.5%

Market value of assets and actuarial value of assets as of June 30, 2015, and June 30, 2016, include an adjustment for the pending asset transfer.

Table 5
Reconciliation of Total Annual Contribution Requirement

Valuation as of July 1	2014	2015	2016	2017	2018
Total contribution rate at previous valuation	61.00%	56.19%	55.17%	57.27%	56.64%
Expected total contribution rate at current valuation	59.87%	56.43%	56.52%	57.26%	57.49%
Change due to:					
Recognition of asset (gains)/losses	-1.61%	-1.08%	0.75%	0.33%	-0.13%
Salary increases	0.41%	0.13%	0.24%	0.00%	-0.06%
Other plan experience	0.03%	-0.30%	-0.24%	-0.95%	-0.50%
Net transfers	0.00%	-0.01%	0.00%	0.00%	0.00%
Change in actuarial assumptions	-2.51%	0.00%	0.00%	0.00%	4.22%
Plan improvements	0.00%	0.00%	0.00%	0.00%	0.00%
Measurement improvements	0.00%	0.00%	0.00%	0.00%	0.00%
Total change	-3.68%	-1.26%	0.75%	-0.62%	3.53%
Actual total contribution rate at current valuation	56.19%	55.17%	57.27%	56.64%	61.02%

EMPLOYEE/COUNTY CONTRIBUTION RATES

Valuation as of July 1	2014	2015	2016	2017	2018
Employee Contribution Rates					
Hired before 7/1/1995	6.00%	6.00%	6.00%	6.00%	6.00%
Hired on or after 7/1/1995, < 5 Years of Service	9.00%	9.00%	9.00%	9.00%	9.00%
Hired on or after 7/1/1995, 5 < Years of Service < 10	8.00%	8.00%	8.00%	8.00%	8.00%
Hired on or after 7/1/1995, > 10 Years of Service	6.00%	6.00%	6.00%	6.00%	6.00%
Hired after 7/1/2013	9.00%	9.00%	9.00%	9.00%	9.00%
Composite	7.13%	7.08%	6.98%	6.88%	6.80%
County Contribution Rates					
Hired before 7/1/1995	50.19%	49.17%	51.27%	50.64%	55.02%
Hired on or after 7/1/1995, < 5 Years of Service	47.19%	46.17%	48.27%	47.64%	52.02%
Hired on or after 7/1/1995, 5 < Years of Service < 10	48.19%	47.17%	49.27%	48.64%	53.02%
Hired on or after 7/1/1995, > 10 Years of Service	50.19%	49.17%	51.27%	50.64%	55.02%
Hired after 7/1/2013	47.19%	46.17%	48.27%	47.64%	52.02%
Composite	49.06%	48.09%	50.29%	49.76%	54.22%

Table 6
Reconciliation of Unfunded Liability and Funded Ratio

Valuation as of July 1	2014	2015	2016	2017	2018
Unfunded liability at previous valuation	$ 602,406,800	$ 625,761,800	$ 598,236,000	$ 618,520,800	$ 615,313,800
Expected unfunded liability at current valuation					
Normal cost for plan year	38,937,200	33,064,200	33,470,200	32,970,300	33,697,700
Interest on unfunded liability and normal cost	46,614,300	48,149,600	46,100,100	47,603,100	47,389,400
Contributions with interest to current valuation date	77,039,800	77,156,500	69,614,000	73,067,200	77,385,300
Total expected change in unfunded liability at current valuation	8,511,700	4,057,300	9,956,300	7,506,200	3,701,800
Total expected unfunded liability at current valuation	610,918,500	629,819,100	608,192,300	626,027,000	619,015,600
Change due to:					
Recognition of asset (gains)/losses	(32,496,200)	(21,801,200)	14,510,200	6,601,000	(2,552,700)
Salary increases	(4,050,400)	(3,917,300)	618,700	(444,500)	15,965,500
Other plan experience	2,254,300	(5,759,000)	(4,792,100)	(16,869,700)	(6,664,700)
Net transfers	0	(105,600)	(8,300)	0	0
Change in actuarial assumptions	49,135,600	0	0	0	53,081,200
Plan improvements	0	0	0	0	0
Measurement improvements	0	0	0	0	0
Total change	14,843,300	(31,583,100)	10,328,500	(10,713,200)	59,829,300
Unfunded liability at current valuation	625,761,800	598,236,000	618,520,800	615,313,800	678,844,900

RECONCILIATION OF FUNDED RATIO (BASED ON ACTUARIAL VALUE OF ASSETS)

Valuation as of July 1	2014	2015	2016	2017	2018
Funded ratio at previous valuation	54.2%	55.9%	59.2%	59.3%	60.5%
Expected funded ratio at current valuation	55.5%	57.3%	60.1%	60.2%	61.6%
Change due to:					
Recognition of asset gains/(losses)	2.3%	1.5%	-0.9%	-0.4%	0.2%
Salary increases	0.1%	0.1%	-0.1%	0.0%	-0.7%
Other plan experience	-0.1%	0.3%	0.2%	0.7%	0.3%
Net transfers	0.0%	0.0%	0.0%	0.0%	0.0%
Change in actuarial assumptions	-1.9%	0.0%	0.0%	0.0%	-1.9%
Plan improvements	0.0%	0.0%	0.0%	0.0%	0.0%
Measurement improvements	0.0%	0.0%	0.0%	0.0%	0.0%
Total change	0.4%	1.9%	-0.8%	0.3%	-2.1%
Funded ratio at current valuation	55.9%	59.2%	59.3%	60.5%	59.5%
Market value of assets funded ratio at current valuation	60.3%	60.1%	55.6%	57.9%	60.7%

Table 7
Actuarial Participant Data – Active Members
Police Pension Plan A

Age Group	Completed Years of Service at Valuation Date								Valuation Payroll
	0-4	5-9	10-14	15-19	20-24	25-29	30&Up	Total	
Under 20									$ -
20-24									-
25-29									-
30-34									-
35-39									-
40-44									-
45-49									-
50-54						3	2	5	552,225
55-59						4	1	5	493,137
60+							2	2	240,002
Total	0	0	0	0	0	7	5	12	$ 1,285,364

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

Age:	56.4 years
Service:	31.0 years
Annual Pay	$107,114

Table 7
Actuarial Participant Data – Active Members
Police Pension Plan B

Age Group	Completed Years of Service at Valuation Date								Valuation Payroll
	0-4	5-9	10-14	15-19	20-24	25-29	30&Up	Total	
Under 20									$ -
20-24	75							75	3,871,892
25-29	143	104						247	14,225,008
30-34	79	181	117					377	25,167,871
35-39	15	76	210	27				328	24,935,547
40-44	13	13	72	59	46			203	17,683,974
45-49	2	5	52	53	135	11		258	24,812,681
50-54		4	26	16	41	22	4	113	10,962,675
55-59		3	2	4	16	8	5	38	3,920,284
60+		1	1		4	2	5	13	1,272,358
Total	327	387	480	159	242	43	14	1,652	$126,852,290

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

Age:	38.1 years
Service:	11.6 years
Annual Pay	$76,787

Active Participants*	Hired On or Before 7/1/2013	Hired After 7/1/2013	Total
Number	1,374	290	1,664
Valuation Payroll	$ 112,706,466	$ 15,431,189	$ 128,137,654

**Includes active participants in plans A and B.*

Members hired on or before July 1, 2013, contribute 9 percent for the first 5 years, 8 percent for the second five years and 6 percent thereafter. Officers hired after July 1, 2013, contribute 9 percent of pay. Members hired on or after July 1, 2013, have a 10-year vesting requirement and members hired before July 1, 2013, have a 5-year vesting requirement.

Table 8
Actuarial Participant Data – Terminated Vested Members and Members in Pay Status

Retired Participants, Disability Retirees, and Beneficiaries*			
Age Group	Number		Annual Pension Being Paid
Under 55	518	$	29,838,388
55-59	275		15,607,297
60-64	191		10,470,306
65-69	301		15,358,446
70 & Over	380		18,026,862
Total	**1,665**	**$**	**89,301,299**

Terminated Vested Participants			
Age Group	Number		Annual Deferred Pension
Under 25	-	$	-
25-34	4		108,084
35-44	12		202,073
45-54	7		123,802
55 & Over	-		-
Total	**23**	**$**	**433,959**

**Number and benefits paid to alternate payees are classified based on the retiree's age.*
Does not include estimated benefit amounts for members with unknown status.

A. PURPOSES OF THE ACTUARIAL VALUATION

This report presents the results of an actuarial valuation of the Plan as of July 1, 2018. The purposes of the actuarial valuation are to determine the funding status of the Plan as of the valuation date, to develop contribution rates for fiscal year 2020, and to analyze the experience of the Plan during the past year. The required accounting information for pension plans, under GASB Statement No. 67, is provided in a separate report beginning for fiscal year ending June 30, 2014. The required accounting information for pension plan sponsors, under GASB Statement No. 68, is provided in a separate report beginning for fiscal year ending June 30, 2015. Historical accounting information can be found in the funding actuarial valuation report as of July 1, 2014.

B. EXPERIENCE DURING FY 2018

In summary, the results of the actuarial valuation indicate a total contribution rate for the fiscal year beginning July 1, 2019, of 61.02 percent of covered payroll, representing payment of the normal cost and amortization of the unfunded actuarial accrued liability over a 30-year closed level-percent-of-pay amortization period (26 years remaining as of July 1, 2018). Based on the current actuarial valuation, the average employee contribution is 6.80 percent of pay, with the County contributing the remaining 54.22 percent of pay on average. The total contribution rate increased from 56.64 percent of pay at the last actuarial valuation to 61.02 percent of pay.

As of July 1, 2018, the actuarial accrued liability of $1,674,364,100 is 59.5 percent funded by the actuarial value of assets of $995,519,200, leaving an unfunded actuarial accrued liability of $678,844,900. The funded ratio decreased from 60.5 percent at the last actuarial valuation to 59.5 percent for the current actuarial valuation.

The estimated asset return during the year ended June 30, 2018, was 14.97 percent on a market value of assets basis and 7.78 percent on an actuarial value of assets basis. The estimated asset return on a market value basis and on an actuarial value of assets basis was higher than the assumed asset return of 7.50 percent during fiscal year 2018. The asset gains in fiscal years 2014, 2017 and 2018, partially offset by the asset losses in fiscal years 2015 and 2016 resulted in a net decrease in the contribution rate and a net increase in the funded ratio attributable to investment performance. Table 4 has information on historical investment returns and asset values.

The actuarial accrued liability for retired participants as of July 1, 2018, was increased by 3.00 percent to account for a potential future obligation to pay benefits from the plan for participants included in the actuarial valuation as of July 1, 2017, who were not reported in the census data in the actuarial valuation as of July 1, 2018.

There was unfavorable salary increase experience and favorable demographic plan experience (retirements, disabilities, terminations and deaths) compared to what was expected under the actuarial assumptions.

The change in actuarial assumptions decreased the funded ratio and increased the contribution rate.

Tables 5 and 6 have reconciliations of the contribution rates, unfunded actuarial accrued liability and funded ratio, including changes due to asset returns, plan experience, changes in actuarial assumptions and changes in plan provisions.

C. PLAN PROVISIONS

There have been no changes in benefit provisions since the previous actuarial valuation. The plan provisions are summarized in Section B.

D. ACTUARIAL ASSUMPTIONS AND METHODS

Section C contains a summary of the actuarial assumptions and methods used in the actuarial valuation. The Board adopted changes in the actuarial assumptions first effective with this actuarial valuation as of July 1, 2018, based on an experience study performed for the period July 1, 2013 to July 1, 2017.

The funding method is based on the Individual Entry Age Normal Actuarial Cost Method and 30-year closed-period level-percent-of-pay amortization of the unfunded liability beginning with the valuation as of July 1, 2014. (30-year open-period level-percent-of-pay amortization was used prior to the valuation as of July 1, 2014.) Funding under the 30-year closed-period policy is expected to gradually improve the funded status over time and increase the funded ratio to 100 percent at the end of the 30-year period.

E. ACCOUNTING INFORMATION UNDER GASB

A separate actuarial valuation report with calculations completed in accordance with the provisions of GASB Statement Nos. 67 and 68 has been issued.

F. OTHER OBSERVATIONS

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

Given the Plan's contribution allocation procedure, if all actuarial assumptions are met (including the assumption of the Plan earning 7.25 percent on the actuarial value of assets), it is expected that:

1) The County normal cost as a percentage of pay will decrease to the level of the normal cost for members hired after January 1, 2016 (with later retirement eligibility conditions, a longer vesting requirement and higher employee contribution rates) as time passes and the majority of the active population is comprised of these members. The unfunded liability contribution will remain level as a percentage of pay through the end of the closed amortization period;
2) The unfunded actuarial accrued liabilities will be fully amortized after 30 years from the fiscal year ending June 30, 2016 (June 30, 2045), which corresponds to the beginning of the closed amortization period established in the actuarial valuation as of July 1, 2014; and
3) The funded status of the plan will increase gradually towards a 100 percent 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 Plan assets to cover the estimated cost of settling the Plan'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 Plan'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 percent is not synonymous with no required future contributions. If the funded status were 100 percent, the Plan 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.

G. RISK MEASURES

Risks Associated With Measuring the Accrued Liability and Actuarially Determined Contribution

The determination of the accrued liability and the actuarially determined contribution requires the use of actuarial assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the actuarial assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the actuarially determined contribution that result from the differences between actual experience and the actuarial assumptions.

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

Examples of risk that may reasonably be anticipated to significantly affect the plan's future financial condition include:

1) Investment risk – actual investment returns may differ from the expected returns;
2) Asset/Liability mismatch – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently

altering the funded status and contribution requirements;

3) Contribution risk – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll or other relevant contribution base;
4) Salary and Payroll risk – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5) Longevity risk – members may live longer or shorter than expected and receive pensions for a period of time other than assumed;
6) Other demographic risks – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example, if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

The County contribution rates shown in Table 5 may be considered as a minimum contribution rate that complies with the County's funding policy. The timely receipt of the actuarially determined contributions is critical to support the financial health of the plan. Users of this report should be aware that contributions made at the actuarially determined rate do not necessarily guarantee benefit security.

Plan Maturity Measures

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Generally accepted plan maturity measures include the following:

	2017	2018
Ratio of the market value of assets to total payroll	7.23	7.93
Ratio of actuarial accrued liability to payroll	12.49	13.07
Ratio of actives to retirees and beneficiaries	1.04	1.00
Ratio of net cash flow to market value of assets	-2%	-2%

Ratio of Market Value of Assets to Payroll

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 2.0 times the payroll, a return on assets 5 percent different than assumed would equal 10 percent of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.

Ratio of Actuarial Accrued Liability to Payroll

The relationship between actuarial accrued liability and payroll is a useful indicator of the potential volatility of contributions for a fully funded plan. A funding policy that targets a funded ratio of 100 percent is expected to result in the ratio of assets to payroll and the ratio of liability to

payroll converging over time.

The ratio of liability to payroll may also be used as a measure of sensitivity of the liability itself. For example, if the actuarial accrued liability is 2.5 times the payroll, a change in liability 2 percent other than assumed would equal 5 percent of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

Ratio of Actives to Retirees and Beneficiaries

A young plan with many active members and few retirees will have a high ratio of active to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

Ratio of Net Cash Flow to Market Value of Assets

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means existing funds are being used to make payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

Additional Risk Assessment

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability.

SECTION B.

SUMMARY OF PLAN PROVISIONS

Brief Summary of Plan Provisions

1. Effective Date:	May 1, 1962, as amended through July 1, 2018.
2. Eligibility:	All full-time police officers are required to participate in the Plan. Officers hired after December 31, 1989, automatically participate in Plan B. Other officers had a one-time election between Plan A and Plan B. During 1999, Plan A participants were provided an election between Plan A and Plan A-52% with an increased normal retirement benefit and a decreased service-connected disability benefit. During 2001, Plan A participants were provided an election between Plan A and Plan A-54% with an increased normal retirement benefit and a decreased service-connected disability benefit. In 2005, Plan A members were given the opportunity to elect to be covered under Plan B provided the member paid the full cost of transferring.
3. Credited Service:	Credited service includes all continuous service (up to a maximum of 30 years) during which contributions are made, and interruptions of continuous service due to disability, or to military service (no more than 5 years of credit). Also, certain other periods of service can be credited if the employee elects to make the required contributions, or if contributions are transferred from the prior plan.
4. Average Annual Compensation:	Average of basic compensation over the 24 highest consecutive months, plus Education Incentive Pay. For any employee retiring on or after July 1, 1991, the employee's normal rate of compensation is imputed for any period of furlough. Also, for any employee retiring on or after July 1, 1991, average annual compensation is calculated assuming that the 7 percent increase payable from April 5, 1992, had been paid from July 14, 1991.
5. Retirement Dates:	
a. Normal -	<u>Hired On or Before July 1, 2013:</u> Age 55 with 5 years or 20 years of County service. <u>Hired After July 1, 2013, and on or before January 1, 2016:</u> Age 55 with 10 years or 20 years of County service. <u>Hired after January 1, 2016:</u> Age 55 with 10 years or 25 years of County service.
b. Late -	An employee may work beyond Normal Retirement Date.

5. Retirement Dates (Cont'd):

c. Disability -

(i) Service-Connected - No minimum service requirement, but not beyond Normal Retirement Date (except for permanent and total line of duty disability for an employee in Plan B).

(ii) Non-Service Connected - <u>Hired On or Before July 1, 2013:</u>
5 years of credited service.
<u>Hired After July 1, 2013:</u>
10 years of credited service.

(iii) Permanent and Total Line of Duty - No minimum service requirement.

6. Annual Retirement Benefits (As a Percentage of Average Annual Compensation):

	Plan A	Plan B
a. Normal or Late -		
(i) First 20 Years of Credited Service[1] -	2.5%	3%
(ii) Thereafter -	2.5%	2.5%
(iii) Maximum -	75%	85%
b. Disability -		
(i) Service-Connected[2] -	70%	55% (70% for 1st year for those hired before1/1/90)
(ii) Non-Service-Connected -	50%	50%
(iii) Permanent and Total Line of Duty -	N/A	90%

[1] *Increases to 2.7 percent with the 54% Plan A variation and to 2.6 percent with the 52% Plan A variation.*
[2] *Decreases to 60 percent with the 54% Plan A variation and to 64 percent with the 52% Plan A variation.*

7. Termination Benefits:

(a) Under 5 years of credited service for members hired on or before July 1, 2013, or under 10 years of credited service for members hired after July 1, 2013: Return of employee contributions with interest.

(b) 5 or more years of credited service for members hired on or before July 1, 2013, or 10 or more years of credited service for members hired after July 1, 2013: If contributions are left in the fund, an employee is entitled to a vested benefit payable at Normal Retirement Date equal to 50 percent of the benefit accrued to date of termination plus an additional 5 percent for each complete year of credited service in excess of 5, to a maximum of 100 percent after 15 years of credited service.

8. Death Benefits:

Return of employee contributions with interest, less any benefits paid prior to death. If an employee dies after Normal Retirement Date while still employed, his spouse receives a lifetime benefit equal to 100 percent of the employee's pension, reduced for election of the joint and contingent form of payment provided the Contingent Annuitant Election form has been completed.

Effective July 1, 2016, the spouse of a Participant with 15 or more years of Actual Service but less than 20 years of Actual Service who dies while an Employee shall receive a monthly benefit for the spouse's life in an amount equal to the benefit the spouse would have received if the Participant had terminated employment on the day before the date of death and then survived until the Normal Retirement Date and elected a joint and 50 percent contingent annuitant benefit with the spouse named to receive the benefit. The spouse's benefit shall be payable as of the first day of the month following the Employee's death, and there shall be no actuarial reduction for payment prior to what would have been the Participant's Normal Retirement Date.

Effective July 1, 2016, the spouse of a Participant who dies at or after his Normal Retirement Date while an Employee shall receive a monthly benefit for the spouse's life in an amount equal to the benefit the spouse would have received if the Participant had retired on the day before he died and had elected to receive a reduced benefit for his

	life with a 100 percent Contingent Annuitant benefit payable to his spouse. Retroactive to December 1, 2002, the spouse of a participant, whose death is a death in the line of duty, is eligible for a pre-retirement survivor annuity. The benefit is payable immediately and equals 100 percent of the employee pension assuming the employee had exactly 20 years of service, reduced for election of a joint and contingent annuity payment, assuming the employee retires at the Normal Retirement Date. Effective January 1, 2016, the spouse of a participant, whose death is a death in the line of duty and died on or before November 30, 2002, is eligible for a pre-retirement survivor annuity beginning January 1, 2016, equal to $1,000 per month and payable for the spouse's remaining lifetime.
9. Payment of Retirement Benefits:	The normal form of payment is for the life of the participant only. An actuarially reduced joint and contingent form of payment may be elected. However, if the contingent annuitant predeceases the participant, the benefit returns to the level it would have been had this reduced benefit form never been elected. The benefit is not further reduced to reflect this "pop-back" feature.
10. Employee Contributions:	5½ percent of basic compensation. Officers hired on or after July 1, 1995, contribute an additional 2½ percent for the first 5 years, and an additional 1½ percent for the next 5 years. Effective December 15, 2013, officers hired on or before July 1, 2013, contribute 9 percent for the first 5 years, 8 percent for the second 5 years and 6 percent thereafter. Officers hired after July 1, 2013, contribute 9 percent of pay.
11. Post-Retirement Increases:	Effective February 1, 1986, 1988, 1990 and every year thereafter, retirees will receive an increase in their benefit based on total investment returns in excess of the actuarial assumption annually since the last increase. All retirees will receive an identical dollar increase, not to exceed $135 per month ($125 per month prior to 2003). This increase will be at least $30 per month in 1990 and 1991, and $35 per month thereafter.

These provisions have resulted in the following increases:

Effective Date	Monthly Amount	Effective Date	Monthly Amount
2/1/1986	$ 79.50	2/1/2004	$35.00
2/1/1988	$ 0.00	2/1/2005	$35.00
2/1/1990	$100.00	2/1/2006	$35.00
2/1/1991	$ 30.00	2/1/2007	$35.00
2/1/1992	$100.00	2/1/2008	$35.00
2/1/1993	$ 84.14	2/1/2009	$35.00
2/1/1994	$100.00	2/1/2010	$35.00
2/1/1995	$ 35.00	2/1/2011	$35.00
2/1/1996	$125.00	2/1/2012	$35.00
2/1/1997	$125.00	2/1/2013	$35.00
2/1/1998	$125.00	2/1/2014	$35.00
2/1/1999	$125.00	2/1/2015	$35.00
2/1/2000	$125.00	2/1/2016	$35.00
2/1/2001	$ 35.00	2/1/2017	$35.00
2/1/2002	$ 35.00	2/1/2018	$35.00
2/1/2003	$ 35.00		

12. Additional Benefits for Employees Retiring with 20 or More Years of Service:

An eligible employee may elect to receive either a lump sum or an increased monthly pension based on accumulated sick and annual leave. 40 hours of annual leave or 80 hours of sick leave are convertible to one month of credited service.

SECTION C.

ACTUARIAL ASSUMPTIONS AND METHODS

Actuarial Assumptions and Methods

The actuarial assumptions and methods are first effective with the actuarial valuation as of July 1, 2018, and are based on the experience study for the period July 1, 2013 to July 1, 2017.

1. Interest: 7.25 percent compounded annually, net of investment expenses (based on assumed price inflation assumption of 2.50 percent).

2. Mortality: The mortality assumptions are based on the following Public Sector 2010 Mortality tables. The rates are projected from 2010 using projection scale MP-2018 (generational mortality) and therefore include a provision for future mortality improvement.

Type	Assumption
Post-retirement non-disabled	Pub-2010 Healthy Retiree Mortality Table (for Safety Employees), sex distinct
Post-retirement disabled	Pub-2010 Disabled Retiree Mortality Table (for Safety Employees), sex distinct
Pre-retirement non-service connected	Pub-2010 Employee Mortality Table (for Safety Employees), sex distinct
Pre-retirement service connected	30% of the rates from the Pub-2010 Employee Mortality Table (for Safety Employees), sex distinct

3. Expenses: Non-investment expenses equivalent to 105 percent of the average administrative expenses incurred in the last three fiscal years as supplied by the County and incorporated in the Normal Cost.

Valuation Year	Actual Administrative Expenses				Assumed Expenses Added to Normal Cost
	3 Years Prior	2 Years Prior	1 Year Prior	3-Year Average	
2017	$ 585,034	$ 628,194	$ 545,459	$ 586,229	$ 615,500
2018	628,194	545,459	623,566	599,073	629,000

4. Salary Scale:

The following illustrative annual rates of salary increase were used:

Service	Salary Increase
1	3.50%
2	4.25%
3	4.75%
4 - 5	5.75%
6	6.00%
7	5.50%
8	5.25%
9 - 13	4.50%
14	4.25%
15 - 17	3.75%
18	4.00%
19 - 21	4.25%
22 - 25	3.50%
26 - 32	3.25%
33+	3.00%

5. Turnover:

The following illustrative annual rates of withdrawal were used:

Service Beginning of Year	Percentage of Employees Terminating Employment Annually
0	12.00%
1	6.25%
2	2.75%
3	2.25%
4	2.25%
5	1.75%
6	1.75%
7	1.75%
8	1.25%
9	1.25%
10	0.75%
11-15	0.50%
16+	0.25%

6. Disability:

The following illustrative annual rates of disability were used:

Rate of Disability Per 1,000 Participants

Age	Total	Service Connected [1]	Non-Service Connected
Under 25	1.00	0.85	0.15
25-29	1.00	0.85	0.15
30-34	2.00	1.70	0.30
35-39	3.00	2.55	0.45
40-44	6.00	5.10	0.90
45-49	8.00	6.80	1.20
50-54	10.00	8.50	1.50
55-59	20.00	17.00	3.00
60+	20.00	17.00	3.00

[1] *5% of service-connected disabilities in Plan B were assumed to be permanent and total.*

7. Retirement Age:

The following annual rates of retirement were used:

	For members hired before January 1, 2016	For members hired on or after January 1, 2016	
	Earlier of Age 55 and 20 yrs	Earlier of Age 55 and 25 yrs	
Service	Retirement Rate	First Elg.	Ultimate Rate
5 - 14	5.0%	5.0%	5.0%
15 - 19	12.5%	12.5%	12.5%
20	17.5%	17.5%	17.5%
21	17.5%	30.0%	17.5%
22	17.5%	45.0%	17.5%
23	17.5%	55.0%	17.5%
24	17.5%	60.0%	17.5%
25	20.0%	70.0%	20.0%
26 - 27	20.0%		20.0%
28 - 29	15.0%		15.0%
30 - 34	20.0%		20.0%
35+	100.0%		100.0%

100 percent retirement is assumed at the earlier of age 65 and 35 years of service.

8.	**Asset Valuation Method:**	The calculated value is determined by adjusting the market value of assets to reflect the investment gains and losses (the difference between the actual investment return and the expected investment return) during each of the last five years at the rate of 20 percent per year. A corridor is then applied to the calculated value such that it is not greater than 120 percent or less than 80 percent of the market value of assets.
9.	**Cost Method:**	Entry age normal cost method, under which the normal cost as a percentage of pay for each employee remains level from entry age to retirement, and the accrued liability represents the fund which would now be on hand if all past normal costs had actually been paid, and all current assumptions had been realized.
10.	**Amortization Method:**	30-Year Closed as of July 1, 2014, Level Percentage of Payroll.
11.	**Payroll Growth:**	Total payroll is assumed to increase by 3.0 percent per year.
12.	**Benefit Service:**	Exact fractional years of service are used to determine the amount of benefit payable.
13.	**Decrement Timing:**	All decrements are assumed to occur mid-year.
14.	**Decrement Relativity:**	Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
15.	**Decrement Operation:**	Turnover decrement does not operate after member reaches retirement eligibility.
16.	**Eligibility Testing:**	Eligibility for benefits is determined based upon the age nearest birthday and service on the date the decrement is assumed to occur.
17.	**Marriage Assumption:**	85 percent of members are assumed to be married for purposes of valuing death-in-service benefits. The male spouse is assumed to be three years older than the female spouse.
18.	**Pay Increase Timing:**	End of (fiscal) year.
19.	**Unused Leave:**	Employees retiring with 20 or more years of County service are assumed to have unused leave equivalent to additional

years of credited service based on the number of years of service at retirement.

Years at Retirement	20-24 Years	25+ Years
Police	4.0 Years	3.0 Years

Sick leave hours in excess of the service cap are refunded at the rate of pay at retirement times hours of excess sick leave. Excess sick leave hours are determined using the assumption that 55 hours of sick leave time is equal to 1 month of additional service credit.

20. Data Adjustments/Missing Data:

There were active participants included in the previous actuarial valuation as of July 1, 2017, who were not reported in the census data for the current actuarial valuation as of July 1, 2018. Therefore, the actuarial accrued liability for retired participants was increased by 3.00 percent to account for a potential future obligation to pay benefits from the plan for these participants with unknown status.

A minimum salary of $46,610 was used for active participants for valuation purposes.

The actuarial accrued liability for retired participants includes an amount of $1,946,939 for inactive/deferred members reported with a benefit of $0 as of July 1, 2018, who are expected to receive a future refund payout.

SECTION D.

GLOSSARY OF TERMS

Glossary of Terms

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

Actuarial Assumptions. Estimates of future plan experience such as investment return, expected lifetimes and the likelihood of receiving a pension from the Pension Plan. Demographic, or "people" assumptions, include rates of mortality, retirement and separation. Economic, or "money" assumptions, include expected investment return, inflation and salary increases.

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

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

Actuarial Value of Assets (AVA). Smoothed value of assets that recognizes the difference between the expected investment return using the valuation assumption and the actual investment return over a five-year period. Dampens volatility of asset value over time.

Amortization. Paying off an interest-bearing liability by means of periodic payments of interest and principal, as opposed to paying it off with a lump sum payment.

Annual Required Contribution. The sum of the normal cost and amortization of the unfunded actuarial accrued liability.

Asset Return. The net investment return for the asset divided by the mean asset value. Example: if $1.00 is invested and yields $1.07 after a year, the asset return is 7.00 percent.

Funded Ratio. The actuarial value of assets divided by the actuarial accrued liability. Measures the portion of the actuarial accrued liability that is currently funded.

Market Value of Assets (MVA). The value of assets currently held in the trust available to pay for benefits of the Pension Plan. Each of the investments in the trust is valued at market price which is the price at which buyers and sellers trade similar items in the open market.

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

Unfunded Actuarial Accrued Liability (UAAL). The difference between the actuarial accrued liability and valuation assets. Sometimes referred to as "unfunded accrued liability."