Howard County Retirement Plan

Actuarial Valuation as of July 1, 2017 to Determine the County's Contribution for the Fiscal Year Ending June 30, 2019

BOLTON PARTNERS
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BOLTON PARTNERS

January 25, 2018

Retirement Plan Committee
Howard County Retirement Plan
c/o Office of Human Resources
3430 Court House Drive
Ellicott City, MD 21043

Re: Howard County Retirement Plan

Dear Committee Members:

The following sets forth the actuarial valuation of the Howard County Retirement Plan as of July 1, 2017. Section 1 of the report provides a summary while Sections 2 through 6 contain the development of the County's contribution for the 2019 fiscal year along with a summary of the census and asset data, plan provisions, assumptions and actuarial methods. Section 7 provides a glossary of the terms used in this report. The appendices of the report provide additional information on the plan's funded status and a discussion on risk.

We are available to answer any questions on the material in this report or to provide explanations or further details as appropriate. The undersigned credentialed actuaries meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained in this report. We are not aware of any direct or material indirect financial interest or relationship, including investments or other services that could create a conflict of interest, which would impair the objectivity of our work.

Respectfully submitted,

BOLTON PARTNERS, INC.

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Employee Benefits and Investment Consulting

Section I. Executive Summary

Background

Bolton Partners, Inc. has prepared the following report that sets forth the actuarial valuation of the Howard County Retirement Plan as of July 1, 2017.

Actuarially Determined Contributions

The actuarially determined contribution (ADC) amount decreased this year. The primary causes of the change are investment gains and gains due to the retiree COLA which was less than the assumed annual COLA offset by a loss due to higher than expected pay increases. The ADC is the percentage of pay amount that will be applied to the actual covered payroll during the Fiscal Year.

	FY2017	FY2018	FY2019
ADC	$12,854,151	$13,647,657	$14,296,317
Percent of Total Payroll	11.6%	11.7%	11.5%

Details of the determination of the County's contribution for FY2019 are shown in Section 2 of this report.

Funding Measures

Funding Measures	7/1/2016	7/1/2017	Percent Change
1. Actuarial Accrued Liability			
a. Active	$ 212,074,393	$ 224,910,502	6.1%
b. Vested Terminated	11,649,386	11,409,894	(2.1%)
c. Disabled	4,594,402	4,559,187	(0.8%)
d. Retired and Beneficiaries	172,193,526	190,086,752	10.4%
e. Total	$ 400,511,707	$ 430,966,335	7.6%
2. Actuarial Value of Assets	$ 378,013,335	$ 410,364,203	8.6%
3. Plan Funded Ratio (2 / 1.e.)	94.4%	95.2%	
4. Market Value of Assets	$ 362,299,533	$ 410,114,885	13.2%
5. Funded Ratio if Market Value of Assets was used (4 / 1.e.)	90.5%	95.2%	

Section I. Executive Summary

(continued)

Risk Measures

The risks that a plan sponsor incurs from a defined benefit plan are primarily the risk of substantial increases in annual contributions. These increases occur most frequently due to variation in the investment returns. This valuation reflects the smoothing of asset returns, which reduces the risk of wide year-by-year contribution changes, but does not ultimately reduce the risk inherent in a defined benefit plan. The following table shows four commonly used measures of the relative riskiness of a pension plan, relative to the plan sponsor and the employee group covered by the plan. Additional information is shown in Appendix 2.

Risk Measure	7/1/2015	7/1/2016	7/1/2017	Conservative Measures
Retiree Liability as a Percent of Total Liability	44%	44%	45%	<50%
Market Value of Assets to Payroll	3.4	3.3	3.5	<5
Liabilities to Payroll	3.6	3.6	3.7	<5
Benefit Payments to Contributions	0.7	0.8	0.9	1-3

Section I. Executive Summary

(continued)

Experience Analysis

The following factors affected the County's contribution as a percentage of payroll:

- Investment returns during FY2017 were about $18.2 million higher than expected. A portion of this gain is reflected in this valuation, with the remaining portions to be reflected in future valuations. There is a total of $0.2 million in net deferred investment losses as of July 1, 2017 that will be reflected in future valuations.
- Retiree COLAs were less than expected, resulting in a gain of $2,440,000.
- The average pay increase was 6.4% (which was more than expected) resulting in a loss of $1,650,000.
- Total participant payroll increased by 6.4% over the prior year (in part because of a 2.4% increase in the number of employees). This caused the contribution rate (as a percentage of payroll) to decline.

The above factors and other sources of gains and losses had the following effect on the County's unfunded liability since last year's valuation. Every $1,000,000 gain or loss is about 0.23% of the liability.

Source	Gain/(Loss)
1. Investment Gain/(Loss)	$ 1,520,000
2. Expenses	0
3. Pay Increases	(1,650,000)
4. Mortality	(700,000)
5. Turnover	(430,000)
6. Disability	(60,000)
7. Retirement	640,000
8. New Entrants	(520,000)
9. Gain/(Loss) from FY2018 Expected Funding[1]	(70,000)
10. COLA	2,440,000
11. All other Sources (including data changes)	190,000
12. Total Gain/(Loss) as of July 1, 2017 (sum of above)	$ 1,360,000

[1] Due to one-year time lag between valuation date and fiscal year

Section I. Executive Summary

(continued)

Changes in Method, Assumptions, and Plan Amendments

There were no method changes, assumption changes, or plan amendments adopted that affect benefits since the prior valuation.

Sources of Information

The July 1, 2017 participant data and market value of assets were provided by or at the direction of Howard County. While we have reviewed this data for consistency and completeness, we have not audited this data.

Section I. Executive Summary

(continued)

Actuarial Certification

This actuarial valuation sets forth our calculation of an estimate of the liabilities of the Howard County Retirement Plan (the Plan), together with a comparison of these liabilities with the value of the plan assets, as submitted by Howard County Government (the County). This calculation and comparison with assets is applicable for the valuation date only. The future is uncertain, and the plan may become better funded or more poorly funded in the future. This valuation does not provide any guarantee that the plan will be able to provide the promised benefits in the future.

This is a deterministic valuation in that it is based on a single set of assumptions. This set of assumptions is one possible basis for our calculations. Other assumptions may be equally valid. The future is uncertain and the plan's actual experience will differ from those assumptions; these differences may be significant or material because these results are very sensitive to the assumptions made and, in some cases, to the interaction between the assumptions. We may consider that some factors are not material to the valuation of the plan and may not provide a specific assumption for those factors. We may have used other assumptions in the past. We will likely consider changes in assumptions at a future date.

Different assumptions or scenarios within the range of possibilities may also be reasonable and results based on those assumptions would be different. As a result of the uncertainty inherent in a forward looking projection over a very long period of time, no one projection is uniquely "correct" and many alternative projections of the future could also be regarded as reasonable. Two different actuaries could, quite reasonably, arrive at different results based on the same data and different views of the future. A "sensitivity analysis" shows the degree to which results would be different if you substitute alternative assumptions within the range of possibilities for those utilized in this report. We have not been engaged to perform such a sensitivity analysis and thus the results of such an analysis are not included in this report. At the County's request, Bolton Partners, Inc. is available to perform such a sensitivity analysis.

The County is responsible for selecting the plan's funding policy, actuarial valuation methods, asset valuation methods, and assumptions. The policies, methods and assumptions used in this valuation are those that have been so prescribed and are described in this report. The County is solely responsible for communicating to Bolton Partners, Inc. any changes required thereto.

The County could reasonably ask how the valuation would change if we used a different assumption set or if plan experience exhibited variations from our assumptions. This report does not contain such an analysis. This type of analysis would be a separate assignment.

Section I. Executive Summary

(continued)

Actuarial Certification (cont.)

In addition, decisions regarding benefit improvements, benefit changes, the trust's investment policy, and similar issues should not be based on this valuation. These are complex issues and other factors should be considered when making such decisions. These other factors might include the anticipated vitality of the local economy and future growth expectations, as well as other economic and financial factors.

The cost of this plan is determined by the benefits promised by the plan, the plan's participant population, the investment experience of the plan and many other factors. An actuarial valuation is a budgeting tool for the County. It does not affect the cost of the plan. Different funding methods provide for different timing of contributions to the plan. As the experience of the plan evolves, it is normal for the level of contributions to the plan to change. If a contribution is not made for a particular year, either by deliberate choice or because of an error in a calculation, that contribution can be made in later years. We will not be responsible for contributions that are made at a future time rather than an earlier time. The plan sponsor is responsible for funding the cost of the plan.

We make every effort to ensure that our calculations are accurately performed. These calculations are complex. Despite our best efforts, we may make a mistake. We reserve the right to correct any potential errors by amending the results of this report or by including the corrections in a future valuation report.

Because modeling all aspects of a situation is not possible or practical, we may use summary information, estimates, or simplifications of calculations to facilitate the modeling of future events in an efficient and cost-effective manner. We may also exclude factors or data that are immaterial in our judgment. Use of such simplifying techniques does not, in our judgment, affect the reasonableness of valuation results for the plan.

This report is based on plan provisions, census data, and asset data submitted by the County. We have relied on this information for purposes of preparing this report, but have not performed an audit. The accuracy of the results presented in this report is dependent upon the accuracy and completeness of the underlying information. The plan sponsor is solely responsible for the validity and completeness of this information.

The County is solely responsible for selecting the plan's investment policies, asset allocations and individual investments. Bolton Partners, Inc.'s actuaries have not provided any investment advice to the County.

Section I. Executive Summary

(continued)

Actuarial Certification (cont.)

The information in this report was prepared for the internal use of the County and its auditors in connection with our actuarial valuations of the pension plan. It is neither intended nor necessarily suitable for other purposes. Bolton Partners, Inc. is not responsible for the consequences of any other use or the reliance upon this report by any other party.

The only purpose of this report is to:

- Provide the recommended employer contribution for the 2019 fiscal year

This report may not be used for any other purpose; Bolton Partners, Inc. is not responsible for the consequences of any unauthorized use.

The calculation of actuarial liabilities for valuation purposes is based on a current estimate of future benefit payments. The calculation includes a computation of the “present value” of those estimated future benefit payments using an assumed discount rate; the higher the discount rate assumption, the lower the estimated liability will be. For purposes of estimating the liabilities (future and accrued) in this report, you selected an assumption based on the expected long-term rate of return on plan investments. Using a lower discount rate assumption, such as a rate based on long-term bond yields, could substantially increase the estimated present value of future and accrued liabilities.

Because valuations are a snapshot in time and are based on estimates and assumptions that are not precise and will differ from actual experience, contribution calculations are inherently imprecise. There is no uniquely “correct” level of contributions for the coming plan year.

This report provides certain financial calculations for use by the auditor. These values have been computed in accordance with our understanding of generally accepted actuarial principles and practices and fairly reflect the actuarial position of the Plan. The various actuarial assumptions and methods which have been used are, in our opinion, appropriate for the purposes of this report.

Section I. Executive Summary

(continued)

Actuarial Certification (cont.)

The report is conditioned on the assumption of an ongoing plan and is not meant to present the actuarial position of the Plan in the case of Plan termination. 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 County should notify Bolton Partners, Inc. promptly after receipt of this report if the County disagrees with anything contained in the report or is aware of any information that would affect the results of the report that has not been communicated to Bolton Partners, Inc. or incorporated therein. The report will be deemed final and acceptable to the County unless the County promptly provides such notice to Bolton Partners, Inc.

The undersigned credentialed actuaries meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein. We are currently compliant with the Continuing Professional Development Requirement of the Society of Actuaries. We are not aware of any direct or material indirect financial interest or relationship, including investments or other services, which could create a conflict of interest that would impair the objectivity of our work.

We are available to answer any questions on the material in this report to provide explanations or further details as appropriate.

Bolton Partners, Inc.

Thomas B. Lowman, FSA, EA, MAAA

Ann M. Sturner

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Section II. Determination of County Contributions

Liabilities and Actuarial Gain/(Loss)

Below is a summary of the actuarial accrued liability of the future benefits expected to be paid from the plan and the development of the actuarial gain/(loss).

Valuation Date	7/1/2016	7/1/2017
1. Actuarial Accrued Liability		
a. Active Participants	$ 212,074,393	$ 224,910,502
b. Vested Terminated Participants	11,649,386	11,409,894
c. Disabled	4,594,402	4,559,187
d. Retired Participants and Beneficiaries	172,193,526	190,086,752
e. Total	$ 400,511,707	$ 430,966,335
2. Actuarial Asset Value	378,013,335	410,364,203
3. Unfunded Actuarial Liability (1.e.-2.)	$ 22,498,372	$ 20,602,132
4. Funded Ratio (2. ÷ 1.e.)	94.4%	95.2%
5. Projected Unfunded Liability as of July 1 following valuation date	$ 22,475,618	$ 20,193,258
6. Expected Unfunded Liability as of July 1 following valuation date	$ 22,613,798	$ 21,551,937
7. Plan Change	$ 0	$ 0
8. Assumption Change	$ 0	$ 0
9. Actuarial Gain/(Loss) (6. – 5. – 7. – 8.)	$ 138,180	$ 1,358,679

Section II. Determination of County Contributions

(continued)

Development of County Contributions

The County's contribution is based on (1) the Normal Cost plus (2) an amortization payment less (3) expected employee contributions. All amortization amounts are based on a "level percentage of pay" method which assumed payments (and covered payroll) increase by 2.75% each year.

The valuation determines the County contribution for the next fiscal year.

Actuarially Determined Contribution		FYE 6/30/2019	Percentage of Payroll[2]
1. Total Normal Cost	$	16,003,010	12.9%
2. Amortization Amount	$	2,459,453	2.0%
3. Total Contribution (1. + 2.)	$	18,462,463	14.9%
4. Expected Participant Contributions	$	4,166,146	3.4%
5. Howard County's Contribution (3. – 4.)	$	14,296,317	11.5%
6. Active payroll (Rate as of 7/1/2017)	$	117,741,696	

Actuarially Determined Contribution		FYE 6/30/2018	Percentage of Payroll[3]
1. Total Normal Cost	$	15,032,276	12.9%
2. Amortization Amount	$	2,516,683	2.2%
3. Total Contribution (1. + 2.)	$	17,548,959	15.1%
4. Expected Participant Contributions	$	3,901,302	3.4%
5. Howard County's Contribution (3. – 4.)	$	13,647,657	11.7%
6. Active payroll (Rate as of 7/1/2016)	$	110,622,450	

[2] Based on payroll shown as of 7/1/2017 increased by 2.75% per year for two years.
[3] Based on payroll shown as of 7/1/2016 increased by 2.75% per year for two years.

Section II. Determination of County Contributions

(continued)

Projected and Expected Unfunded Liability

Below is a summary of the projected and expected unfunded liability for the following plan year.

Projected Unfunded Liability		7/1/2018
1. Unfunded Actuarial Liability at July 1, 2017	$	20,602,132
2. Expected County Contributions	$	13,965,195
3. Expected Employee Contributions	$	4,054,643
4. Expected Administrative Expenses	$	353,000
5. Normal Cost Before Expenses	$	15,221,706
6. Projected Unfunded Liability at July 1, 2018 (1. – 2. – 3. + 4. + 5., including interest adjustment for each line)	$	20,193,258

Expected Unfunded Liability		7/1/2018
1. Projected Unfunded Actuarial Liability at July 1, 2017	$	22,475,618
2. Expected County Contributions	$	13,647,657
3. Expected Employee Contributions	$	3,901,302
4. Normal Cost Including Expenses	$	15,032,276
5. Expected Unfunded Liability at July 1, 2018 (1. – 2. – 3. + 4., including interest adjustment for each line)	$	21,551,937

Expected Unfunded Liability is calculated by rolling forward assets and liabilities one year. The roll-forward of assets is based on the actuarial value of assets as of the valuation date without regard to any recognition of additional gains or losses under the smoothing method.

Section II. Determination of County Contributions

(continued)

Schedule of Amortization Bases

Below is a schedule of the amortization bases as of July 1, 2018.

Description	Remaining Years		Amount to be Amortized as of 7/1/2018		Payment / (Credit)
Original Unfunded Liability	8	$	(1,705,610)	$	(257,550)
Corrections Improvement	10	$	1,134,933	$	143,002
Plan Changes	11	$	6,805,519	$	795,940
Corrections Improvement	13	$	337,434	$	34,795
Corrections Improvement	14	$	1,816,763	$	177,527
COLA and Early Retirement Plan Changes	14	$	8,920,895	$	871,716
Plan Change	16	$	103,954	$	9,252
2009 Plan Change	22	$	1,141,255	$	82,992
2013 Plan Change	5	$	1,728,001	$	391,422
2013 Assumption Change	11	$	9,214,319	$	1,077,661
2013 Cumulative Gains/Losses	11	$	11,212,824	$	1,311,397
2014 Assumption Change	12	$	2,972,670	$	325,345
2014 (Gain)/Loss	12	$	(14,567,108)	$	(1,594,303)
2015 (Gain)/Loss	13	$	(8,182,206)	$	(843,724)
2016 (Gain)/Loss	14	$	618,294	$	60,417
2017 (Gain)/Loss	15	$	(1,358,679)	$	(126,436)
Totals		$	20,193,258	$	2,459,453

The July 1, 2018 amortization payment of $2,459,453 is sufficient to cover the interest on the plan’s unfunded liability.

Bases are amortized as an equal percent of payroll each year. Total payroll is assumed to increase 2.75% annually. Payments are assumed to be made mid-year.

Section III. Valuation of Assets

Reconciliation of Assets

Below is a reconciliation of assets for FY2016 and FY2017 from the trust asset statements provided by the County.

	FY2016	FY2017
1. Beginning of Year Assets	$ 354,412,830	$ 362,299,533
2. Additions		
a. Contributions		
i. Employer	$ 13,428,152	$ 14,179,325
ii. Employee	3,757,264	3,904,407
b. Total Contributions	$ 17,185,416	$ 18,083,732
c. Investment Income		
i. Net Appreciation in Fair Value of Investments	$ (2,989,734)	$ 37,749,526
ii. Interest	2,045,244	1,947,053
iii. Dividends	6,751,837	6,798,188
iv. Other, Net	50,549	180,581
v. Total Investment Income	$ 5,857,896	$ 46,675,348
vi. Less Investment Expenses	1,114,525	1,228,843
d. Net Investment Income	$ 4,743,371	$ 45,446,505
e. Total Additions (2.b. + 2.d.)	$ 21,928,787	$ 63,530,237
3. Deductions		
a. Benefit Payments		
i. Annuities	$ 13,269,777	$ 14,584,705
ii. Death	83,348	374,213
iii. Refund of Contributions	347,225	419,901
b. Total Benefits	$ 13,700,350	$ 15,378,819
c. Administrative Expenses	341,734	336,066
d. Total Deductions (3.b. + 3.c.)	$ 14,042,084	$ 15,714,885
4. Net Change (2.e. – 3.d.)	$ 7,886,703	$ 47,815,352
5. End of Year Assets (1. + 4.)	$ 362,299,533	$ 410,114,885

Section III. Valuation of Assets

(continued)

Statement of Assets

Below is a statement of assets as of June 30, 2016 and June 30, 2017 from the trust asset statetments provided by the County.

		6/30/2016		6/30/2017
1. Receivables				
a. Employer Contributions	$	789,413	$	926,467
b. Employee Contributions		210,612		246,441
c. Interest and Dividends		460,408		486,367
d. Due from Sale of Investments		204,662		15,697
e. Other		5,666		149,614
f. Total Receivables	$	1,670,761	$	1,824,586
2. Investments at Fair Value				
a. Equities	$	151,573,301	$	173,888,883
b. Alternative Investments		79,708,088		94,306,395
c. Money Market Mutual Funds		6,134,081		7,714,253
d. Fixed Income		107,307,546		117,865,670
e. Real Estate		17,530,175		15,147,443
f. Other		0		0
g. Total Investments	$	362,253,191	$	408,922,644
3. Prepaid Insurance		19,750		19,750
4. Total Assets (1.f. + 2.g. + 3.)	$	363,943,702	$	410,766,980
5. Liabilities				
a. Investments Purchased	$	1,375,994	$	373,017
b. Accounts Payable		268,175		279,078
c. Other		0		0
d. Total Liabilities	$	1,644,169	$	652,095
6. End of Year Assets (4. – 5.d.)	$	362,299,533	$	410,114,885

Section III. Valuation of Assets

(continued)

Calculation of Actuarial Asset Value

The actuarial asset value is determined by spreading the asset gain or loss for each year over a five-year period. The asset gain or loss is the amount by which the actual asset return differs from the expected asset return.

							7/1/2017
1.	Market Value of Assets					$	410,114,885
2.	Net Investment Income					$	45,446,505
3.	Estimated Net Rate of Return						12.50%
4.	Valuation Interest Rate						7.50%
5.	(Gain)/Loss					$	(18,178,602)
6.	Spreading of Investment (Gain)/Loss						
	BOY	EOY		(Gain)/Loss	% Deferred		Amount Deferred
	2016	2017	$	(18,178,602)	80%	$	(14,542,882)
	2015	2016		22,004,962	60%		13,202,977
	2014	2015		15,658,698	40%		6,263,479
	2013	2014		(23,371,278)	20%		(4,674,256)
	Total Deferred						249,318
7.	Actuarial Value of Assets (1. + 6.)					$	410,364,203
8.	Rate of Return on Actuarial Value of Assets						7.9%

							7/1/2016
1.	Market Value of Assets					$	362,299,533
2.	Net Investment Income					$	4,743,371
3.	Estimated Net Rate of Return						1.33%
4.	Valuation Interest Rate						7.50%
5.	(Gain)/Loss					$	22,004,962
6.	Spreading of Investment (Gain)/Loss						
	BOY	EOY		(Gain)/Loss	% Deferred		Amount Deferred
	2015	2016	$	22,004,962	80%	$	17,603,970
	2014	2015		15,658,698	60%		9,395,219
	2013	2014		(23,371,278)	40%		(9,348,511)
	2012	2013		(9,684,381)	20%		(1,936,876)
	Total Deferred						15,713,802
7.	Actuarial Value of Assets (1. + 6.)					$	378,013,335
8.	Rate of Return on Actuarial Value of Assets						6.0%

Section IV. Participant Information

Participant Summary

The following table summarizes the counts, ages and benefit information for plan participants used in this valuation.

	7/1/2016	7/1/2017
1. Actives		
a. Number	1,760	1,803
b. Average Age	47.24	47.00
c. Average Service	10.97	10.79
d. Average Salary	$ 62,854	$ 65,303
2. Service Retirements and Beneficiaries		
a. Number	660	731
b. Average Age	68.41	68.77
c. Total Annual Benefits	$ 13,587,383	$ 15,169,278
3. Vested Terminations[4]		
a. Number	198	191
b. Average Age	50.64	50.78
c. Total Annual Benefits	$ 1,599,425	$ 1,559,618
4. Disabled		
a. Number	18	17
b. Average Age	60.32	60.28
c. Total Annual Benefits	$ 403,362	$ 405,468

[4] In addition, in 2016 there are 64 participants who are non-vested and due a refund of employee contributions. The refund amount as of 7/1/2016 is $158,655. In 2017, there are 68 participants who are non-vested and due a refund of employee contributions. The refund amount as of 7/1/2017 is $183,262.

Section IV. Participant Information

(continued)

Active Age/Service Distribution Including Compensation

Shown below is the distribution of active participants based on age and service. The compensation shown is the average rate of pay as of July 1, 2017.

	Years of Service as of 07/01/2017								
Age	**Under 1**	**1-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-29**	**30 & up**	**Total**
Under 25	23	26	2	0	0	0	0	0	51
	$36,544	$39,437	$39,520	0	0	0	0	0	$38,136
25 - 29	44	91	13	1	0	0	0	0	149
	$40,018	$45,252	$46,529	$42,474	0	0	0	0	$43,799
30 - 34	31	78	56	35	3	0	0	0	203
	$49,984	$52,771	$52,486	$57,029	$51,778	0	0	0	$52,986
35 - 39	21	60	35	45	13	0	0	0	174
	$51,161	$60,382	$64,152	$64,966	$59,683	0	0	0	$61,161
40 - 44	14	47	37	38	42	4	0	0	182
	$44,422	$67,738	$67,995	$71,323	$72,529	$59,001	0	0	$67,659
45 - 49	13	54	50	39	32	17	9	0	214
	$61,578	$62,646	$67,108	$71,206	$75,575	$80,551	$76,061	0	$69,103
50 - 54	13	50	48	53	39	18	22	10	253
	$53,993	$65,713	$64,614	$67,829	$76,257	$75,554	$78,904	$74,977	$69,184
55 - 59	12	49	41	45	36	25	25	41	274
	$67,900	$78,022	$64,324	$65,431	$68,835	$87,500	$80,124	$86,636	$74,599
60 - 64	6	29	34	43	18	20	22	33	205
	$73,918	$75,676	$64,524	$63,982	$71,235	$84,360	$77,131	$86,519	$73,681
65 & Up	3	10	11	20	18	5	12	19	98
	$58,969	$76,869	$81,943	$69,733	$70,065	$66,091	$82,566	$99,899	$78,797
Totals	180	494	327	319	201	89	90	103	1,803
	$48,804	$59,759	$62,916	$66,252	$71,598	$80,567	$79,013	$87,913	$65,303

Averages	
Age	47.00
Service	10.79

Section IV. Participant Information

(continued)

Participant Reconciliation

Shown below is the reconciliation of participants between the prior and current valuation date.

		Inactive Participants			
	Active Participants	Terminated Vested[5]	Retirees & Beneficiaries	Disabled	Total
Participants in Last Valuation	1,760	198	660	18	2,636
Retired	(58)	(16)	74	0	0
Vested Termination	(24)	24	0	0	0
Nonvested Termination/Paid Lump Sum	(57)	(13)	0	0	(70)
Disabled	(1)	0	0	1	0
Deceased/ Payments Expired	(2)	0	(9)	(2)	(13)
New Beneficiary	0	0	5	0	5
Rehire	4	(2)	(1)	0	1
Transfer from Police/Fire	0	0	0	0	0
New Hires	181	0	0	0	181
New QDRO	0	0	2	0	2
Data Adjustment	0	0	0	0	0
Participants in This Valuation	1,803	191	731	17	2,742

[5] Participants on LOA are classified as Terminated Vested. In addition, in 2016 there are 64 participants who are non-vested and due a refund of employee contributions. In 2017 there are 68 participants who are non-vested and due a refund of employee contributions.

Section V. Summary of Plan Provisions

Effective Date

July 1, 1995.

Plan Year

July 1 – June 30.

Eligibility Requirements

All Covered Individuals (as defined in the County code) are eligible for plan participation on the first day that an hour of service is performed. Those hired before July 1, 1995 may elect to remain in the state plans and not be covered by this plan. Elected officials on or after July 1, 1995 may elect not to participate in the plan.

Normal Form

Life Annuity.

Normal Retirement Date

Corrections Employees

First of the month coincident with or immediately following the earlier of:

(a) The completion of 20 years of Eligibility Service.
(b) The date as of which all of the following have occurred.
  (i) Attainment of age 62
  (ii) Completion of at least two years of Eligibility Service
  (iii) Sum of attained age in whole years and years of Eligibility Service equals at least 67.

Section V. Summary of Plan Provisions

(continued)

Normal Retirement Date (cont.)

All Other Employees

First of the month coincident with or immediately following the earlier of:

(a) The completion of 30 years of Eligibility Service.
(b) The date as of which all of the following have occurred.
 (i) Attainment of age 62
 (ii) Completion of at least two years of Eligibility Service
 (iii) Sum of attained age in whole years and years of Eligibility Service equals at least 67.

Normal Retirement Benefit

Corrections Employees

2.50% of Average Compensation multiplied by years of Creditable Service (up to 20 years), plus 1% of Average Compensation multiplied by service greater than 20 years but less than 30 years (excluding sick leave). Sick leave is always credited at 1% of Average Compensation (The provisions for retirement on or after June 30, 2005 are effective October 1, 2001).

AFSCME Local 3085 Employees

1.66% of Average Compensation multiplied by Creditable Service. (effective July 1, 2011).

All Other Employees

1.55% of Average Compensation multiplied by Creditable Service earned through June 30, 2012, plus 1.66% of Average Compensation multiplied by Creditable Service earned on and after July 1, 2012.

Section V. Summary of Plan Provisions

(continued)

Average Compensation

Average compensation for the 36 consecutive full months which produce the highest average.

Compensation is base salary including longevity payments and performance awards (during 1998 only), but excluding overtime, etc.

For part-time employees, full-time compensation is used, except in the determination of disability benefits.

Early Retirement Date

A participant may elect to retire and begin receiving benefits on the first day of any month prior to Normal Retirement, following the attainment of either:

(a) Age 55 and completion of 15 years of Eligibility Service, or
(b) 25 years of Eligibility Service (Section (b) applies to participants who terminate after August 31, 2002).

Early Retirement Benefit

The accrued benefit is reduced by 0.50% for each month that benefit commencement precedes the first day of the month coincident with or next following the earlier of:

(a) Date the participant attains age 62
(b) Date the participant would earn 30 years of Eligibility Service if the participant continued in employment with the County as a covered individual. (Section (b) applies to participants who terminate after August 31, 2002).

Deferred Retirement

A participant who defers retirement until after Normal Retirement Date will receive a benefit determined on the basis of Average Compensation and Creditable Service as of his actual retirement date.

Section V. Summary of Plan Provisions

(continued)

Disability Retirement

A participant who becomes totally and permanently disabled may retire prior to Normal Retirement and receive a benefit. The amount of the benefit payable until recalculation depends upon the cause of disability.

Disability benefits are recalculated using the benefit formula for Normal Retirement benefits at the later of age 65 or five years after they commence. The period of disability is included as Creditable Service in the calculation of the Normal Retirement Benefit.

Ordinary Disability

The lesser of:
(a) 50% of Average Compensation at the time the disability is incurred less any Social Security disability benefits;
(b) 33-1/3% of Average Compensation.

Surviving spouse benefits payable when the joint and survivor or pop-up election are selected cannot be less than 50% of 33-1/3% of Average Compensation reduced by the optional form of payment factor. Participants who became disabled prior to July 1, 2003 have grandfathered surviving spouse benefits.

The participant must have five years of Eligibility Service to be eligible for Ordinary Disability benefits.

Line of Duty Disability

The lesser of:
(a) 75% of Average Compensation at the time the disability is incurred less any Social Security disability benefits;
(b) 66-2/3% of Average Compensation.

To be eligible for Line of Duty Disability, the disability must be ruled compensable under Workers' Compensation.

Section V. Summary of Plan Provisions

(continued)

Pre-Retirement Death Benefit

General Benefit

Return of employee contributions with interest plus, if the participant had at least one year of Eligibility Service, a lump sum equal to the participant's compensation.

Surviving Spouse Annuity

Monthly survivor annuity for the spouse equal to the actuarial equivalent of the benefit the spouse would have received if the participant had retired with a 100% Joint and Survivor annuity without a reduction for Early Retirement. The benefit is payable only if:

- The participant is married at death
- The death occurs before the participant's termination date
- The spouse is the participant's only primary beneficiary
- The participant had attained age 62 or was eligible for retirement benefits under the plan
- The spouse does not elect the General Benefit described above.

Termination Benefit

Participants who have completed at least 5 years of Eligibility Service are entitled to a benefit beginning at Normal Retirement Date which is equal to the accrued benefit at termination.

Employee Contibutions

Upon leaving employment for any reason, accumulated contributions are returned if not eligible for plan benefits. Furthermore, plan benefits must be at least equal to the actuarial equivalent of accumulated contributions. Accumulated contributions are credited with interest of 5% per annum. Contributions during a plan year are credited with 2.5% interest for the year of contribution. Transferred contributions are credited with 0.42% interest per month for the remainder of the year of transfer.

Section V. Summary of Plan Provisions

(continued)

Employee Contibutions (cont.)

Corrections Employees

8.5% of Compensation (pre-tax pick-up).

AFSCME Local 3085 Employees

3.0% of Compensation (pre-tax pick-up) (effective July 1, 2011).

All Other Employees

3% of Compensation (pre-tax pick-up) effective January 1, 2014; 2% of Compensation (pre-tax pick-up) prior to January 1, 2014

Partially Benefited Employees (as defined in the County code) do not contribute to the plan.

Cost of Living Adjustment

Effective each July 1, the level of retirement benefits paid to retirees who retired at least 12 months earlier is increased according to the CPI-U for the Washington-Baltimore area, but in no event shall the benefit be more than it would have been if increases had been 3% per year since the member retired.

Actuarial Equivalence

Mortality: Blended GAM 1983 (50% Male, 50% Female)
Interest: 8%
COLA: 3% compounded annually.

Creditable Service

The sum of (a), (b), (c), and (d).

(a) One month for each month the participant is classified as a full-time Fully Benefited employee during the entire month.
(b) Additional months of service are granted for calendar months during which a Fully Benefited employee is not employed on a full-time basis for any portion of the month based on actual hours divided by 1,820, multiplying the result by 12 months and rounding up.

Section V. Summary of Plan Provisions

(continued)

Creditable Service (cont.)

(c) Service transferred from another Government Employer.
(d) One-month credit is given for each 22 days of unused sick leave. An additional month is credited if unused sick leave remaining after full months have been credited is at least 11 days.

Eligibility Service

The sum of (a), (b), and (c).

(a) One year for every full plan year the participant completes 900 hours and is classified as a Fully Benefited employee.
(b) Additional months of service are granted during year of hire and year of termination for each calendar month during which the participant is a Fully Benefited employee for the entire month.
(c) Service transferred from another Government Employer.

Partially Benefited employees do not receive any service credit (other than credit transferred from the State systems on June 30, 1995) while classified as such.

Optional Forms

50% or 100% Joint & Survivor

50% or 100% Pop-Up (similar to joint and survivor except that the participant's benefit returns to the unreduced amount if the spouse dies first or if the participant and spouse divorce)

Life only

Lump sum (for return of employee contributions only)

Guaranteed return of accrued benefit

Guaranteed return of employee contributions

Special option

Changes Since Prior Valuation

None.

Section VI. Actuarial Methods and Assumptions

Funding Method

Projected Unit Credit Actuarial Cost Method. The contribution equals the sum of the normal cost and the amount necessary to amortize the frozen unfunded actuarial liabilities and any actuarial gains or losses over a period of years. Amortization payments increase 2.75% annually. The contribution rate as a percentage of payroll developed in this report is applied to the actual payroll in the fiscal year the contribution is paid.

Asset Method

Asset smoothing method. Spreading the market value investment gains or losses in excess of the assumed return over a 5-year period. Actuarial value of assets can be no less than 50% of market value of assets and no more than 150% of market value of assets.

Interest

7.50% compounded annually, net of investment expenses.

Post Retirement COLA Increases

Benefits are assumed to increase by 2.75% of the current benefit each year.

Salary Increases

The following graded schedule is used:

Years of Service	Corrections	All Other
0 – 4	6.25%/yr	6.55%/yr
5 – 9	6.75%/yr	5.75%/yr
10 – 14	6.75%/yr	5.50%/yr
15 – 19	6.75%/yr	4.85%/yr
20+	4.25%/yr	4.00%/yr

These rates include an inflation component of 2.75% compounded annually.

Section VI. Actuarial Methods and Assumptions

(continued)

Mortality

Pre-Retirement Healthy

70% of the Generational RP-2000 Combined Mortality Table for males and females projected using scale AA. Projections to the valuation date represent current mortality and projections using scale AA beyond the valuation date represent future mortality improvement.

Post Retirement Healthy

Generational RP-2000 Combined Mortality Table for males and females projected using scale AA. Projections to the valuation date represent current mortality and projections using scale AA beyond the valuation date represent future mortality improvement.

Disabled

2014 ERISA 4044 mortality – eligible for Social Security for General, not eligible for Social Security for Corrections.

Termination of Employment

Termination rates are based on service only. Rates are as follows:

Years of Service	Corrections	All Others
0	17.00%	11.80%
1	3.00%	11.70%
2	3.00%	7.00%
3	3.00%	7.00%
4 – 9	5.00%	4.30%
10 – 14	5.00%	3.50%
15 – 19	0.00%	3.50%
20+	0.00%	1.00%

Section VI. Actuarial Methods and Assumptions

(continued)

Retirement Rates

Retirement rates are based on age and retirement eligibility.

Corrections Employees

Age/Retirement Eligibility	Rate
Early retirement	
First eligibility	30%
Early retirement after first eligibility	5%
Normal retirement eligible, age < 62	
First eligible for normal	55%
After first eligible for normal, age <= 49 and service < 25	1%
All other age/service groups	16%
Normal retirement eligible and age 62+	70%
Age 70 and over	100%

All Other Employees

Age/Retirement Eligibility	Rate
Early retirement	5%
First eligible for normal retirement	
Before age 60	20%
Age 60 and over	22%
After first eligible for normal, by age group	
Under age 50	1%
50 – 59	6%
60 – 74	22%
Age 75 and over	100%

Section VI. Actuarial Methods and Assumptions

(continued)

Disability Rates

Corrections Employees

Sample rates are as follows:

Age	Annual Percentage of Disablements
25	0.0500%
35	0.0646%
45	0.1768%
55	0.5696%

66.67% of the disabilities are assumed to occur in the line of duty.

We assumed that 100% of all participating Correctional Employees who become disabled will not collect Social Security disability benefits.

All Other Employees

Age	Annual Percentage of Disablement
25	0.0240%
35	0.0310%
45	0.0530%
55	0.1709%

10% of the disabilities are assumed to occur in the line of duty.

We have assumed that 80% of all participants who become disabled will collect Social Security disability benefits and 20% will not collect Social Security disability benefits when calculating the benefit amount.

For participants who are assumed to be married and receiving Social Security disability benefits, we assumed that they would elect the 50% Joint & Survivor option. If the participant dies before the spouse, the spouse's benefit increases to 50% of the benefit based on 33-1/3% or 66-2/3% of Average Compensation depending if the disability was ordinary or line-of-duty.

Section VI. Actuarial Methods and Assumptions

(continued)

Social Security Assumption

(a) Rate of Wage Base and National Average Earnings Increase: 3.25%
(b) Rate of Consumer Price Index Increase: 2.75%

Marital Status

70% are assumed to be married with wife 3 years younger than husband.

Sick Leave

The service credit for unused sick leave is assumed to be 1.5% of creditable service from all other sources.

Non-Investment Expenses

Average of prior two years' non-investment expenses increased with assumed inflation and rounded to the nearest $1,000. This equals $353,000 (= average of $336,066 x 1.0275 and $341,734 x 1.0275 x 1.0275).

Prior Employer Service Credit

A 1% load is applied to total normal cost to estimate the annual cost associated with new employees who transfer into the plan with service credit from other jurisdictions.

Liability for Terminated Non-Vested Participants

Beginning in the 2016 valuation, the Vested Terminated liability includes a liability for terminated non-vested participants who are due a refund of their contributions. The liability is equal to the refund amount as of the valuation date.

Rationale for assumptions

The key assumptions were based on the most recent Experience Study dated June 26, 2014.

Changes Since Prior Valuation

None.

Section VII. Glossary

Actuarial Accrued Liability (AAL)	The difference between the Actuarial Present Value of Future Benefits and the Actuarial Present Value of Future Normal Costs or the portion of the present value of future benefits allocated to service before the valuation date in accordance with the actuarial cost method. Represents the present value of benefits expected to be paid from the plan in the future allocated to service prior to the date of the measurement.
Actuarial Asset Valuation Method	The method of determining the value of the assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets or a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the actuarially determined contribution (ADC).
Actuarial Cost Method	A procedure for allocating the Actuarial Present Value of Future Benefits and the Actuarial Present Value of Future Normal costs and the Actuarial Accrued Liability. Also known as the “funding method”. Examples of actuarial cost methods include Aggregate, Entry Age Normal, Projected Unit Credit, and Pay-as-you-go.

Section VII. Glossary

(continued)

Actuarial Present Value of Future Benefits (APVFB)	The Actuarial Present Value of amounts which are expected to be paid at various future times to active members, retired members, beneficiaries receiving benefits, and inactive, nonretired members entitled to either a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.
Annual Determined Contributions of the Employer(s) (ADC)	The employer's periodic determined contributions to a pension plan, calculated in accordance with the assumptions and methods used by the plan actuary. The ADC replaced the actuarially required contribution (ARC), with the replacement of GASB 27 with GASB 68.
Cost-of-Living Adjustment (COLA)	An annual increase in the amount of a retired participant's benefit intended to adjust the benefit for inflation.
Covered Group	Plan members included in actuarial valuation.
Deferred Retirement Option Program (DROP)	A program allowing a participant eligible to retire to continue working for a fixed period of time, while accumulating the benefit payments he would have received if he had retired on his entry to DROP.

Section VII. Glossary

(continued)

Demographic Assumption	Assumptions regarding the future population of pension participants, including retirement, termination, disability and mortality assumptions.
Economic Assumption	Assumptions regarding future economic factors, including COLA, salary improvement, change in average wages, changes in Social Security benefits and investment returns.
Employer's Contributions	Contributions made in relation to the actuarially determined contributions of the employer (ADC). An employer has made a contribution in relation to the ADC if the employer has (a) made payments of benefits directly to or on behalf of a retiree or beneficiary, (b) made premium payments to an insurer, or (c) irrevocably transferred assets to a trust, or an equivalent arrangement, in which plan assets are dedicated to providing benefits to retirees and their beneficiaries in accordance with the terms of the plan and are legally protected from creditors of the employer(s) or plan administrator.
Expenses	Plan expenses paid by the plan are divided into administrative and investment related expenses.
Funded Ratio	The actuarial value of assets expressed as a percentage of the plan's actuarial accrued liability.

Section VII. Glossary

(continued)

GASB

Government Accounting Standards Board.

GASB No. 25 and GASB No. 27

These are the government accounting standards that set the accounting rules for public retirement systems and the employers that sponsor or contribute to them. Statement No. 27 sets the accounting rules for the employers that sponsor or contribute to public retirement systems while Statement No. 25 sets the rules for the systems themselves.

GASB No. 67 and GASB No. 68

These are the government standards that replace GASB 25 and 27 They are effective for plan years beginning after June 14, 2013 and employer fiscal years beginning after June 14, 2014.

Investment Return Assumption or Investment Rate of Return (Discount Rate)

The rate used to adjust a series of future payments to reflect the time value of money.

Level Percentage of Projected Payroll Amortization Method

Amortization payments are calculated so that they are a constant percentage of the projected payroll of active plan members over a given number of years. The dollar amount of the payments generally will increase over time as payroll increases due to inflation; in dollars adjusted for inflation, the payments can be expected to remain level.

Normal Cost or Normal Actuarial Cost

That portion of the Actuarial Present Value of pension plan benefits and expenses which is allocated to a valuation year by the Actuarial Cost Method.

Section VII. Glossary

(continued)

Pay-as-you-go (PAYG)
A method of financing a benefits plan under which the contributions to the plan are generally made at about the same time and in about the same amount as benefit payments and expenses becoming due.

Payroll Growth Rate
An actuarial assumption with respect to future increases in total covered payroll attributable to inflation; used in applying the level percentage of projected payroll amortization method.

Plan Liabilities
Obligations payable by the plan at the reporting date, including, primarily, benefits and refunds due and payable to plan members and beneficiaries, and accrued investment and administrative expenses. Plan liabilities do not include actuarial accrued liabilities for benefits that are not due and payable at the reporting date.

Plan Members
The individuals covered by the terms of a Pension or OPEB plan. The plan membership generally includes employees in active service, terminated employees who have accumulated benefits but are not yet receiving them, and retired employees and beneficiaries currently receiving benefits.

Post-Employment
The period between termination of employment and retirement as well as the period after retirement.

Salary Improvement
An actuarial assumption regarding the increase in employees' salaries, reflecting cost-of-living, merit and longevity increases.

Section VII. Glossary

(continued)

Select and Ultimate Rates

Actuarial assumptions that contemplate different rates for successive years. Instead of a single assumed rate with respect to, for example, the investment return assumption, the actuary may apply different rates for the early years of a projection and a single rate for all subsequent years. For example, if an actuary applies an assumed investment return of 8 percent for year 2000, 7.5 percent for 2001, and 7 percent for 2002 and thereafter, then 8 percent and 7.5 percent are select rates, and 7 percent is the ultimate rate.

Unfunded Actuarial Accrued Liabilities

The excess of the present value of prospective pension benefits, as of the date of a pension plan valuation, over the sum of (1) the actuarial value of the assets of the plan and (2) the present value of future normal costs determined by any of several actuarial cost methods. For plans that define an accrued liability, this amount equals the excess of the accrued liability over plan assets.

Vested Plan Benefits

All benefits to which current participants have a vested right based on pay and service through the valuation date. A participant has a vested right to a benefit if he/she would still be eligible to receive that benefit if employment terminated on the valuation date.

Appendix 1

Summary of Funding Progress

Valuation Date	(1) Actuarial Value of Assets	(2) Actuarial Accrued Liability	(3) Percentage Funded (1) / (2)	(4) Unfunded Actuarial Accrued Liability (2) - (1)	(5) Annual Covered Payroll	(6) Unfunded Actuarial Accrued Liability as a Percentage of Covered Payroll (4) / (5)
7/1/2007	192,985,856	199,722,676	96.6%	6,736,820	72,454,154	9.3%
7/1/2008	217,212,899	225,594,376	96.3%	8,381,477	81,475,327	10.3%
7/1/2009	228,132,672	245,225,658	93.0%	17,092,986	85,231,182	20.1%
7/1/2010	237,414,529	253,782,682	93.6%	16,368,153	84,845,897	19.3%
7/1/2011	253,098,813	273,668,860	92.5%	20,570,047	86,499,656	23.8%
7/1/2012	261,984,721	293,343,118	89.3%	31,358,397	89,896,923	34.9%
7/1/2013	281,249,974	326,087,487	86.2%	44,837,513	91,812,274	48.8%
7/1/2014	318,453,044	351,632,413	90.6%	33,179,369	97,076,479	34.2%
7/1/2015	353,643,683	377,130,985	93.8%	23,487,302	101,084,710	23.2%
7/1/2016	378,013,335	400,511,707	94.4%	22,498,372	108,629,633	20.7%
7/1/2017	410,364,203	430,966,335	95.2%	20,602,132	112,610,325	18.3%

Analysis of the dollar amounts of net assets available for benefits, actuarial accrued liability, and unfunded actuarial accrued liability in isolation can be misleading. Expressing the net assets available for benefits as a percentage of the actuarial accrued liability provides one indication of funding status on a going-concern basis. Analysis of this percentage over time indicates whether the plan is becoming financially stronger or weaker. Generally, the greater this percentage, the stronger the plan. Trends in unfunded actuarial accrued liability and annual covered payroll are both affected by inflation. Expressing the unfunded actuarial accrued liability as a percentage of annual covered payroll approximately adjusts for the effects of inflation and aids analysis of Howard County's progress made in accumulating sufficient assets to pay benefits when due. Generally, the smaller this percentage, the stronger the plan.

Appendix 2

Risk Metrics

The County contributions will vary over time based on the experience of the plan's investments and participants. As the value of the plan's assets and liabilities increase relative to the participant payroll, there is a greater risk of large changes to the County's contribution expressed as a percentage of participant payroll.

The Asset Volatility Ratio (AVR) is equal to the market value of assets (MVA) divided by payroll. A higher AVR implies that the plan is exposed to greater contribution volatility. The current AVR of 3.5 indicates that a 1% asset gain/loss can be related to about 3.5% of the annual payroll. The plan currently amortizes asset gains/losses over a period of 15 years. This would result in a change in the County's contribution of about 0.3% of payroll for each 1.0% change in market assets.

The Liability Volatility Ratio (LVR) is equal to the Actuarial Accrued Liability (AAL) divided by payroll. A higher LVR implies that the plan is exposed to greater contribution volatility due to changes in liability measurements. The current LVR of 3.7 indicates that a 1% liability gain/loss can be related to about 3.7% of the annual payroll. The plan currently amortizes liability gains/losses over a period of 15 years. This would result in a change in the County's contribution of about 0.3% of payroll for each 1.0% change in AAL. As the plan approaches a 100% funded level, the AVR will converge to the LVR.

	2013	2014	2015	2016	2017
AVR	3.1	3.4	3.4	3.3	3.5
LVR	3.5	3.5	3.6	3.6	3.7