# Anne Arundel County Fire Service Retirement Plan

Actuarial Valuation as of January 1, 2018 to Determine the County's Contribution for the Fiscal Year Ending June 30, 2019

Bolton


Submitted by:

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Bolton

May 15, 2018

***PERSONAL & CONFIDENTIAL***

Andrea Rhodes
Personnel Officer
Anne Arundel County Government
P.O. Box 6675
Annapolis, MD 21401

*Re: Fire Service Retirement Plan Valuation*

Dear Andrea:

The following sets forth the actuarial valuation of the Anne Arundel County Fire Service Retirement Plan as of January 1, 2018. 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 many of the terms used in this report. The appendices of the report provide information for financial reporting as well as a ten-year projection of benefit payments.

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**

Thomas Lowman, FSA, EA

Kristopher Seets, FSA, EA

# Section I. Executive Summary

## Background

Bolton Partners, Inc. has prepared the following report that sets forth the actuarial valuation of the Anne Arundel County Fire Service Retirement Plan as of January 1, 2018.

## Actuarially Determined Contributions (ADC)

The actuarially determined contribution (ADC) amount increased as a dollar amount and as a percentage of payroll this year.

| | FY2017 | FY2018 | FY2019 |
|---|---|---|---|
| ADC | $14,327,847 | $15,001,017 | $16,405,994 |
| Percent of Total Payroll | 29.1% | 29.8% | 31.7% |

The above amounts assume the County contribution will be made monthly throughout the fiscal year.

## Changes in Contribution Rate

The following table shows the sources of changes in the County's contribution rate.

| Description | Contribution Rate |
|---|---|
| January 1, 2017 Valuation | 29.8% |
| Investment Performance | 0.6% |
| Pay Increases | 0.2% |
| New Entrants/Change in Normal Cost | 1.7% |
| COLA | (0.5%) |
| Change in Expenses | 0.0% |
| Demographics and Other Changes | (0.1%) |
| January 1, 2018 Valuation | 31.7% |

# Section I. Executive Summary (cont.)

## Funding Measures

| Funding Measures | 1/1/2017 | 1/1/2018 | Percent Change |
|---|---|---|---|
| 1. Actuarial Accrued Liability | | | |
| a. Active | $ 232,210,686 | $ 232,797,997 | 0.3% |
| b. Retirees and Beneficiaries | 358,058,086 | 376,991,732 | 5.3% |
| c. Total | $ 590,268,772 | $ 609,789,729 | 3.3% |
| 2. Actuarial Value of Assets | $ 516,044,681 | $ 534,987,849 | 3.7% |
| 3. Plan Funded Ratio (2. / 1.c.) | 87.4% | 87.7% | |
| 4. Market Value of Assets | $ 485,690,369 | $ 548,210,777 | 12.9% |
| 5. Funded Ratio based on Market Value of Assets (4. / 1.c.) | 82.3% | 89.9% | |

## Risk Measures

The risk that a plan sponsor incurs from a defined benefit plan is 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 three 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 3.

| Risk Measure | CY2015 | CY2016 | CY2017 | Conservative Measures |
|---|---|---|---|---|
| Retiree Liability as a Percent of Total Liability | 58% | 61% | 62% | <50% |
| Assets to Payroll | 9.5 | 9.6 | 10.6 | <5 |
| Liabilities to Payroll | 11.7 | 11.7 | 11.8 | <5 |
| Benefit Payments to Contributions | 1.7 | 1.9 | 1.8 | 1 - 3 |

# Section I. Executive Summary (cont.)

## Experience Analysis

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

- Retiree COLAs effective July 1, 2017 were less than the assumed annual increases.
- Investment returns during CY2017 were about $42.1 million higher than expected. A portion of this gain is reflected in this valuation, with the remaining portions to be reflected in future valuations. This was offset by the continued recognition of prior investment losses. There is a total of $13.2 million in net deferred investment gains as of January 1, 2018 that will be reflected in future valuations.
- Pay for returning employees increased approximately 5.9% over the prior year; higher than what was expected.
- Total participant payroll increased by 2.7% over the prior year; less than the assumption of 3.0% growth per year.

## Changes in Method, Assumptions, and Plan Amendments

There were no method or assumption changes since the prior valuation.

There were no plan amendments adopted that affect benefits since the prior valuation.

## Projection of Expected Benefit Payments

The projection of expected benefit payments for current participants is shown in Appendix 2.

## Sources of Information

The January 1, 2018 participant data and market value of assets were provided by or at the direction of Anne Arundel County. While we have reviewed this data for consistency and completeness, we have not audited this data.

# Section I. Executive Summary (cont.)

## Actuarial Certification

This actuarial valuation sets forth our calculation of an estimate of the liabilities of the Anne Arundel County Fire Service Retirement Plan (the Plan), together with a comparison of these liabilities with the value of the plan assets, as submitted by Anne Arundel 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.

# Section I. Executive Summary (cont.)

## Actuarial Certification (cont.)

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.

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 County is solely responsible for the validity and completeness of this information.

# Section I. Executive Summary (cont.)

## Actuarial Certification (cont.)

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.

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 (cont.)

## 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 Lowman, FSA, EA

Kristopher Seets, FSA, EA

# Section II. Determination of County Contributions

## Derivation of Liabilities

Below is a summary of the actuarial accrued liability of the future benefits expected to be paid from the plan.

| Unfunded Liability | 1/1/2017 | 1/1/2018 |
|---|---|---|
| 1. Participants | | |
| a. Active (excluding DROP) | 792 | 784 |
| b. Active DROP | 45 | 51 |
| c. Retirees and Beneficiaries | 591 | 616 |
| d. Total | 1,428 | 1,451 |
| 2. Active Payroll | $ 50,412,257 | $ 51,766,876 |
| | | |
| 3. Actuarial Accrued Liability | | |
| a. Active Participants | $ 232,210,686 | $ 232,797,997 |
| b. Retirees and Beneficiaries | 358,058,086 | 376,991,732 |
| c. Total | $ 590,268,772 | $ 609,789,729 |
| 4. Actuarial Asset Value | $ 516,044,681 | $ 534,987,849 |
| 5. Unfunded Actuarial Liability (3.c.- 4.) | $ 74,224,091 | $ 74,801,880 |
| 6. Funded Ratio (4. ÷ 3.c.) | 87.4% | 87.7% |

# Section II. Determination of County Contributions (cont.)

## Development of County Contributions

The breakdown of the Actuarially Determined Contribution into normal cost, amortization payment, and expected administrative expenses is illustrated below.

| Actuarially Determined Contribution | | FY2019 |
|---|---|---|
| 1. County Normal Cost | $ | 9,723,466 |
| 2. Amortization Amount | $ | 5,099,924 |
| 3. Expected Expenses | $ | 438,000 |
| 4. County's Contribution (1. + 2. + 3.) | $ | 15,261,390 |
| 5. County's Contribution at Adjusted for Timing of Payment (4. x 1.075) | $ | 16,405,994 |
| 6. County's Contribution as a Percentage of Participant Payroll | | 31.7% |

# Section II. Determination of County Contributions (cont.)

## Schedule of Amortization Bases

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

| Description | Date Established | Remaining Years | Amount to be Amortized | Payment / (Credit) |
|---|---|---|---|---|
| Unfunded Accrued Liability | 1/1/2004 | 16 | $ 16,464,838 | $ 1,390,967 |
| Actuarial (Gain)/Loss | 1/1/2005 | 17 | $ (2,215,036) | $ (179,479) |
| Actuarial (Gain)/Loss | 1/1/2006 | 18 | $ 2,102,403 | $ 163,932 |
| Actuarial (Gain)/Loss | 1/1/2007 | 19 | $ (519,392) | $ (39,087) |
| Assumption Change | 1/1/2008 | 20 | $ (589,977) | $ (42,964) |
| Actuarial (Gain)/Loss | 1/1/2008 | 20 | $ 3,267,099 | $ 237,923 |
| Actuarial (Gain)/Loss | 1/1/2009 | 21 | $ 30,458,219 | $ 2,151,469 |
| Actuarial (Gain)/Loss | 1/1/2010 | 22 | $ (10,447,968) | $ (717,367) |
| Asset Method Change | 1/1/2011 | 23 | $ 25,311,905 | $ 1,692,577 |
| Actuarial (Gain)/Loss | 1/1/2011 | 23 | $ (24,141,464) | $ (1,614,311) |
| Actuarial (Gain)/Loss | 1/1/2012 | 24 | $ 22,236,348 | $ 1,450,640 |
| Assumption Change | 1/1/2013 | 25 | $ (2,565,249) | $ (163,527) |
| Actuarial (Gain)/Loss | 1/1/2013 | 25 | $ 27,053,097 | $ 1,724,557 |
| Assumption Change | 1/1/2014 | 16 | $ 6,461,197 | $ 545,849 |
| Actuarial (Gain)/Loss | 1/1/2014 | 16 | $ (11,381,866) | $ (961,552) |
| Actuarial (Gain)/Loss | 1/1/2015 | 17 | $ (3,165,193) | $ (256,468) |
| Actuarial (Gain)/Loss | 1/1/2016 | 18 | $ (6,272,430) | $ (489,084) |
| Actuarial (Gain)/Loss | 1/1/2017 | 19 | $ 2,435,203 | $ 183,263 |
| Actuarial (Gain)/Loss | 1/1/2018 | 20 | $ 310,146 | $ 22,586 |
| **Totals** | | | **$ 74,801,880** | **$ 5,099,924** |

Bases are amortized as an equal percent of payroll each year with total payroll expected to increase 3.0% annually. Since the January 1, 2018 amortization payment of $5,099,924 is not sufficient to cover the interest on the plan's unfunded liability, the unfunded liability is scheduled to increase for an initial period.

# Section III. Valuation of Assets

## Reconciliation of Assets

Below is a reconciliation of assets (unaudited) from January 1, 2016 through December 31, 2017.

| | CY2016 | CY2017 |
|---|---|---|
| 1. Beginning of Year Assets | $ 466,759,172 | $ 484,238,102 |
| 2. Receipts | | |
| a. Employer Contributions | $ 14,635,256 | $ 14,608,334 |
| b. Employee Contributions | 3,241,063 | 3,433,985 |
| c. Investment Income & Dividends | 9,285,927 | 10,593,628 |
| d. Realized and Unrealized Gain/(Loss) | 25,905,312 | 67,265,030 |
| e. Stock Loan Income | 44,391 | 65,607 |
| f. Other | 1,872,187 | 3,375,541 |
| g. Total Receipts | $ 54,984,136 | $ 99,342,125 |
| 3. Deductions | | |
| a. Benefit Payments | $ 33,868,434 | $ 33,128,506 |
| b. Administrative Expenses | 427,890 | 447,787 |
| c. Investment Expenses | 3,208,882 | 3,308,086 |
| d. Total Disbursements | $ 37,505,206 | $ 36,884,379 |
| 4. Net Increase (2.g. – 3.d.) | $ 17,478,930 | $ 62,457,746 |
| 5. Preliminary Ending Value (1. + 4.) | $ 484,238,102 | $ 546,695,847 |
| 6. Contribution Receivable | $ 1,452,267 | $ 1,514,930 |
| 7. End of Year Assets | $ 485,690,369 | $ 548,210,777 |
| 8. Rate of Return Net of Investment Fees (2I / [A + B – I] Method) | 7.38% | 16.34% |

Please note that some numbers may not add due to rounding.

# Section III. Valuation of Assets (cont.)

## Calculation of Actuarial Asset Value

The actuarial asset value as of January 1, 2018 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.

| | | | | | | 1/1/2018 |
|---|---|---|---|---|---|---|
| 1. | Market Value of Assets | | | | $ | 548,210,777 |
| 2. | Spreading of Investment (Gain)/Loss | | | | | |
| | Calendar Year | | (Gain)/Loss | % Deferred | | Amount Deferred |
| | 2017 | $ | (42,145,115) | 80% | $ | (33,716,092) |
| | 2016 | | 602,208 | 60% | | 361,325 |
| | 2015 | | 43,959,933 | 40% | | 17,583,973 |
| | 2014 | | 12,739,330 | 20% | | 2,547,866 |
| | a. Total Deferred | | | | | (13,222,928) |
| 3. | Actuarial Value of Assets (1. + 2.a.) | | | | $ | 534,987,849 |
| 4. | Rate of Return Net of Investment Fees (2I / [A + B – I] Method) | | | | | 6.8% |

# Section IV. Participant Information

## Participant Summary

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

| | 1/1/2017 | 1/1/2018 |
|---|---|---|
| 1. Actives | | |
| a. Number | 837 | 835 |
| b. Average Age | 38.1 | 38.4 |
| c. Average Service | 11.2 | 11.3 |
| d. Average Salary | $ 60,233 | $ 61,994 |
| 2. Service Retirements and Beneficiaries | | |
| a. Number | 591 | 616 |
| b. Average Age | 62.0 | 62.3 |
| c. Total Annual Benefits | $ 26,222,627 | $ 27,833,735 |

# Section IV. Participant Information (cont.)

## Active Age/Service Distribution Including Compensation

Shown below is the distribution of active participants, excluding those currently enrolled in DROP, based on age and service. The compensation shown is the average rate of pay as of January 1, 2018.

| | Years of Service as of 01/01/2018 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Age** | **Under 1** | **1-4** | **5-9** | **10-14** | **15-19** | **20-24** | **25-29** | **30-34** | **35-39** | **40 & Up** | **Total** |
| Under 25 | 10 | 44 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 54 |
| | 39,419 | 42,270 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 41,742 |
| 25 - 29 | 16 | 117 | 13 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 148 |
| | 39,912 | 43,307 | 55,255 | 57,293 | 0 | 0 | 0 | 0 | 0 | 0 | 44,178 |
| 30 - 34 | 6 | 74 | 24 | 52 | 0 | 0 | 0 | 0 | 0 | 0 | 156 |
| | 40,076 | 43,559 | 57,191 | 62,031 | 0 | 0 | 0 | 0 | 0 | 0 | 51,680 |
| 35 - 39 | 2 | 20 | 23 | 70 | 15 | 0 | 0 | 0 | 0 | 0 | 130 |
| | 41,389 | 43,911 | 55,535 | 62,512 | 73,673 | 0 | 0 | 0 | 0 | 0 | 59,379 |
| 40 - 44 | 0 | 9 | 11 | 52 | 28 | 9 | 0 | 0 | 0 | 0 | 109 |
| | 0 | 43,962 | 56,176 | 62,709 | 75,677 | 84,448 | 0 | 0 | 0 | 0 | 65,628 |
| 45 - 49 | 1 | 7 | 7 | 25 | 21 | 26 | 16 | 0 | 0 | 0 | 103 |
| | 39,419 | 42,765 | 53,205 | 62,894 | 75,569 | 93,565 | 104,693 | 0 | 0 | 0 | 77,459 |
| 50 - 54 | 0 | 5 | 1 | 10 | 11 | 14 | 18 | 4 | 0 | 0 | 63 |
| | 0 | 69,304 | 59,538 | 62,310 | 73,608 | 87,280 | 105,287 | 109,149 | 0 | 0 | 85,596 |
| 55 - 59 | 0 | 0 | 0 | 4 | 2 | 1 | 5 | 2 | 0 | 0 | 14 |
| | 0 | 0 | 0 | 64,901 | 68,409 | 89,131 | 103,223 | 145,974 | 0 | 0 | 92,401 |
| 60 - 64 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 5 |
| | 0 | 0 | 0 | 59,754 | 88,216 | 75,529 | 97,026 | 0 | 86,659 | 0 | 81,437 |
| 65 - 69 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| | 0 | 0 | 0 | 0 | 77,719 | 0 | 0 | 0 | 0 | 0 | 77,719 |
| 70 & Up | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 35 | 276 | 79 | 216 | 80 | 51 | 40 | 6 | 1 | 0 | 784 |
| | 39,870 | 43,732 | 55,925 | 62,462 | 75,015 | 89,790 | 104,585 | 121,424 | 86,659 | 0 | 59,891 |

| **Averages** | |
|---|---|
| Age | 37.3 |
| Service | 10.3 |

# Section IV. Participant Information (cont.)

## Participant Reconciliation

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

| | Active Participants | DROP | Inactive Participants With Deferred Benefits | Inactive Participants Receiving Benefits | Total |
|---|---|---|---|---|---|
| Participants in Last Valuation | 792 | 45 | 0 | 591 | 1,428 |
| Retired | (4) | (19) | 0 | 23 | 0 |
| Entered DROP | (25) | 25 | 0 | 0 | 0 |
| Nonvested Termination | (14) | 0 | 0 | 0 | (14) |
| Disabled | (1) | 0 | 0 | 1 | 0 |
| Deceased | 0 | 0 | 0 | (6) | (6) |
| Beneficiary | 0 | 0 | 0 | 3 | 3 |
| QDRO Put in Pay | 0 | 0 | 0 | 4 | 4 |
| Rehired | 0 | 0 | 0 | 0 | 0 |
| Transfers | 1 | 0 | 0 | 0 | 1 |
| New Hires | 35 | 0 | 0 | 0 | 35 |
| Data Adjustment | 0 | 0 | 0 | 0 | 0 |
| Participants in This Valuation | 784 | 51 | 0 | 616 | 1,451 |

# Section V. Summary of Plan Provisions

## Plan Year

January 1 – December 31.

## Normal Retirement Date or Unreduced Early Retirement Date

20 years of service or age 50 with 5 years of service.

## Normal Form of Benefit

For single participants, monthly life annuity with payments guaranteed for 5 years.

For married participants, unreduced 100% Joint & Survivor Annuity with payments guaranteed for 5 years.

## Post Retirement Cost of Living Increases

### For benefits accrued as of 1/31/1997

Retiree benefits are adjusted each year. The revised benefit amount is the lesser of:

a. Base benefit multiplied by ratio of current 12 month average CPI to 12 month average CPI at retirement.
b. Prior year benefit increased by 4%.

### For benefits accrued after 1/31/1997

Retiree benefits are adjusted each year. The revised benefit amount is the lesser of:

a. Prior year benefit multiplied by 60% of the increase in the current March CPI from March CPI for prior year, or
b. Prior year benefit increased by 2.5%.

## Employee Contibutions

7.25% of compensation for all employees.

# Section V. Summary of Plan Provisions (cont.)

## Compensation

Regular annual rate of pay, exclusive of extra compensation of any kind such as overtime pay, bonuses, and commissions. Some members received a special FY11 increase for pension purposes.

## Final Earnings

The average of the highest 3 years of annual basic pay.

## Benefit Formula

2 ½% of final earnings for each year of service up to 20 years plus 2% of final earnings for each year of service after 20 years (maximum 70% plus 2% times unused disability credit and pre-employment military service credit).

## Termination Prior to Retirement

Return of employee contributions with 3% interest.

## Disability Benefit

Must be totally and permanently disabled (except as the result of activities specified in the County code) regardless of length of service.

### Line of Duty Disability

The greater of the accrued benefit or 66 2/3% of final earnings, payable immediately, unreduced.

### Non-Line of Duty Disability

The greater of the accrued benefit or 20% of final earnings, payable immediately, unreduced.

# Section V. Summary of Plan Provisions (cont.)

## Pre-Retirement Spouse's Benefit

### Line of Duty Death Benefit

Greater of accrued benefit or 66 2/3% of final earnings.

### Non-Line of Duty Death Benefit

Accrued benefit.

## Other Pre-Retirement Death Benefit

Return of employee contributions with 3% interest.

## DROP

Allows accumulation of pension after 20 years of County service. DROP period must be between three and five years. Members may remain in DROP for a sixth year, but no interest shall be credited to the DROP account in the sixth year.

## 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 unfunded actuarial liabilities over a period of years. Amortization payments increase 3.0%.

## Asset Method

Asset smoothing method which spreads the investment gains or losses in excess of the assumed return over a five-year period. Actuarial Value of Assets recognizes adjustments resulting from an audit.

## Interest

7.5% compounded annually, net of investment expenses.

## Post Retirement COLA Increases

Benefits accrued before Bill 88-96 are assumed to increase by 3.0% of the original benefit each year from retirement.

Benefits accrued after Bill 88-96 are assumed to increase by 1.8% of the current benefit each year from retirement.

# Section VI. Actuarial Methods and Assumptions (cont.)

## Salary Increases

The following graded schedule is used:

| Age | Rate |
|---|---|
| 20 | 6.5% |
| 25 | 6.0% |
| 30 | 5.5% |
| 35 | 5.0% |
| 40 | 4.5% |
| 45 | 4.0% |
| 50 | 4.0% |

This assumption has been set based on the long term expected rates, including inflation.

## Mortality

### Healthy

RP-2000 Blue Collar Mortality Table for males and females projected generationally using scale AA. Pre-Termination mortality uses 60% of these rates. Projections to the valuation date represent current mortality and projections using scale AA beyond the valuation date represent future mortality improvement.

### Disabled

RP-2000 Blue Collar Mortality Table for males and females set forward five years and then projected generationally using scale AA. Projections to the valuation date represent current mortality and projections using scale AA beyond the valuation date represent future mortality improvement.

100% of pre-retirement deaths are assumed to be non-duty related.

# Section VI. Actuarial Methods and Assumptions (cont.)

## Disability

Sample rates are:

| Age | Rate |
|---|---|
| 30 | 0.1836% |
| 35 | 0.2716% |
| 40 | 0.5604% |
| 45 | 0.9371% |
| 50 | 1.3790% |
| 55 | 0.0000% |

75% of disablements are assumed to be duty-related.

## Turnover

Sample rates are:

| Age | Rate |
|---|---|
| 20 | 6.11% |
| 25 | 4.73% |
| 30 | 2.87% |
| 35 | 2.21% |
| 40 | 1.69% |
| 45 | 1.21% |
| 50 | 0.00% |

# Section VI. Actuarial Methods and Assumptions (cont.)

## Retirement

Sample rates are:

| | Service | | | | | | |
|---|---|---|---|---|---|---|---|
| **Age** | **20** | **22** | **24** | **27** | **30** | **32** | **34** |
| 40 | 5% | 5% | 20% | 10% | 40% | 40% | 100% |
| 45 | 5% | 5% | 20% | 10% | 40% | 40% | 100% |
| 50 | 10% | 10% | 28% | 25% | 40% | 40% | 100% |
| 55 | 25% | 25% | 25% | 25% | 40% | 40% | 100% |
| 59 | 33% | 33% | 33% | 33% | 40% | 40% | 100% |
| 62 | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

## DROP Load

To reflect the cost of the more valuable benefits provided from the deferred retirement option program the following loads were applied:

| | Service | | | |
|---|---|---|---|---|
| **Age** | **23** | **27** | **30** | **35** |
| 44 | 0.45% | 1.71% | 2.70% | 14.40% |
| 50 | 2.43% | 4.41% | 5.40% | 17.46% |
| 55 | 3.24% | 5.49% | 6.48% | 18.72% |
| 60 | 3.87% | 6.39% | 7.29% | 19.62% |

## Disability Leave

Service credit for benefit formula purposes is increased by 1.75% to account for disability leave which is converted to service credit at retirement.

# Section VI. Actuarial Methods and Assumptions

## Military Service

Active liabilities (which depend on credited service) are loaded by 3.25% to account for future crediting of military service.

## Other Methods and Assumptions

A load for estimated administrative expenses is included in the Actuarially Determined Contribution. The load is equal to the average of actual expenses for the two years preceding the valuation date, rounded to the nearest thousand.

The rationale for the demographic assumptions is based on the results of the December 2012 Experience Study. The economic Assumptions are based on future expectations with an underlying 3.0% inflation assumption.

## Marriage

80% of employees and 70% of current retired and disabled members are assumed married. Males are assumed to be four years older than their spouses.

## CIGNA Benefits

Our calculations reflect that some benefits have already been purchased.

## 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 resent 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 (cont.)

| | |
|---|---|
| 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. |
| Aggregate Cost Method | An actuarial cost method that spreads the cost of all future benefits in excess of plan assets as a level percentage of future salary or service. The actuarial accrued liability is set to the value of assets in this method. |
| 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. |

# Section VII. Glossary (cont.)

| | |
|---|---|
| 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. |
| 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. |

# Section VII. Glossary (cont.)

| | |
|---|---|
| Entry Age Normal (EAN) Cost Method | An actuarial cost method that spreads the cost for each individual's expected benefits over their career, either as a level percentage of pay or service. The actuarial accrued liability is the accumulated value of all past normal cost, and the unfunded accrued liability (surplus) is the excess of the AAL over the value of assets. |
| 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. |
| 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. |

# Section VII. Glossary (cont.)

| | |
|---|---|
| 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. |
| 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. |

# Section VII. Glossary (cont.)

| | |
|---|---|
| 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. |
| Projected Unit Credit (PUC) Funding Method | An actuarial cost method that spreads the employee's benefit over their career, as a level percentage of service. The normal cost is the present value of the portion of the benefit assigned to the current year. The actuarial accrued liability is the accumulated value of all past normal cost, and the unfunded accrued liability (surplus) is the excess of the AAL over the value of assets. |
| 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. |
| 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. |

# Section VII. Glossary (cont.)

**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) |
|---|---|---|---|---|---|---|
| 1/1/2009 | $390,551,359 | $436,520,858 | 89.5% | $45,969,499 | $48,824,352 | 94.2% |
| 1/1/2010 | $418,191,046 | $455,275,809 | 91.9% | $37,084,763 | $49,064,454 | 75.6% |
| 1/1/2011 | $425,830,155 | $464,489,607 | 91.7% | $38,659,452 | $47,840,812 | 80.8% |
| 1/1/2012 | $426,196,539 | $486,095,747 | 87.7% | $59,899,207 | $45,673,006 | 131.1% |
| 1/1/2013 | $426,659,036 | $510,470,652 | 83.6% | $83,811,615 | $43,361,686 | 193.3% |
| 1/1/2014 | $462,235,880 | $542,077,933 | 85.3% | $79,842,053 | $44,950,885 | 177.6% |
| 1/1/2015 | $490,533,983 | $567,754,744 | 86.4% | $77,220,761 | $48,549,950 | 159.1% |
| 1/1/2016 | $503,389,792 | $574,775,821 | 87.6% | $71,386,029 | $49,181,953 | 145.1% |
| 1/1/2017 | $516,044,681 | $590,268,772 | 87.4% | $74,224,091 | $50,412,257 | 147.2% |
| 1/1/2018 | $534,987,849 | $609,789,729 | 87.7% | $74,801,880 | $51,766,876 | 144.5% |

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 Anne Arundel County's progress made in accumulating sufficient assets to pay benefits when due. Generally, the smaller this percentage, the stronger the plan.

# Appendix 1 (cont.)

## Summary of Contributions

| Year Ended December 31 | Actuarially Determined Contribution | Percentage Contributed |
|---|---|---|
| 2014 | $15,898,958 | 100.0% |
| 2015 | $15,121,808 | 100.0% |
| 2016 | $14,591,343 | 100.0% |
| 2017 | $14,664,432 | 100.0% |

The information presented in the required supplementary schedules was determined as part of the actuarial valuations at the dates indicated. Additional information as of the latest actuarial valuation follows.

| | |
|---|---|
| Actuarial cost method | Projected unit credit |
| Amortization Method | Level percentage of payroll (closed) |
| Remaining amortization period | Remaining periods range from 16 to 25 years |
| Asset valuation method | Five-year smoothed method |
| Actuarial assumptions: | |
| Investment rate of return | 7.50% |
| Projected salary increase | Varies by age |
| Post-retirement cost-of-living adjustments | 3.0% for pre 2/97 accruals<br>1.8% for post 2/97 accruals |

# Appendix 2: Benefit Payment Projection

The following table shows the estimated benefit payments from January 1, 2018 through December 31, 2027 based on existing members of the plan.

| Calendar Year | Benefits |
|---|---|
| 2018 | $33,578,000 |
| 2019 | 32,702,000 |
| 2020 | 36,843,000 |
| 2021 | 44,576,000 |
| 2022 | 39,902,000 |
| 2023 | 41,839,000 |
| 2024 | 43,657,000 |
| 2025 | 45,462,000 |
| 2026 | 47,404,000 |
| 2027 | 49,310,000 |

# Appendix 3: 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 10.6 indicates that a 1% asset gain/loss can be related to about 10.6% of the annual payroll. The plan currently amortizes asset gains/losses over a period of 20 years. This would result in a change in the County's contribution of about 0.8% 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 11.8 indicates that a 1% liability gain/loss can be related to about 11.8% of the annual payroll. The plan currently amortizes liability gains/losses over a period of 20 years. This would result in a change in the County's contribution of about 0.9% of payroll for each 1.0% change in AAL. As the plan approaches a 100% funded level, the AVR will converge to the LVR.

| | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|
| **AVR** | 10.6 | 10.1 | 9.5 | 9.6 | 10.6 |
| **LVR** | 11.9 | 11.7 | 11.7 | 11.7 | 11.8 |

# Appendix 4: Summary of Major Legislative Changes

| | |
|---|---|
| County Council Bill No. 48-89 | Effective 9/13/89.<br><br>The previously combined Police and Fire plan was separated into distinct plans for each group.<br><br>The reduction for retirement prior to age 50 was changed to 0.2% per month from 0.3% per month. |
| County Council Bill No. 34-92 | Effective 6/1/92 through 8/31/92.<br><br>Participants over age 50 or with at least 20 years of service could elect to retire with an additional pension equal to 1/12 of 2.5% of final earnings for the first 20 years of service, plus 1/12 of 2% of final earnings for each additional year of service. The additional amount could be taken as a pension increase, a lump sum, or as a temporary supplement to age 62. Appropriate actuarial adjustments apply. |
| State House Bill No. 687 | Effective 7/1/90.<br><br>County employees were given the opportunity to apply for credit under the County's plan for previous service with the State of Maryland (or a political subdivision of the State). |

# Appendix 4: Summary of Major Legislative Changes (cont.)

| | |
|---|---|
| County Council Bill 88-96 | Effective 12/4/96.<br><br>The previous method of calculating cost of living increases will only apply to benefits accrued as of 1/31/97. The cost of living increase for future benefits is a compound increase equal to 60% of the annual change in the CPI, not to exceed 2.5%. Employees hired, or rehired, on or after 12/4/96 will be Tier Two employees and will have different benefits than current employees. |
| Recodification | Effective 2/25/2002.<br><br>Allows a benefit based on disability leave service and pre-plan military service to be paid over the 70% cap. Normal Retirement was changed to the earlier of 20 years of service or age 50 with 5 years of service. Elimination of Tier 2 benefits implemented a Deferred Retirement Option Program (DROP), a voluntary program that provides an alternative way to earn and receive retirement benefits. |
| County Council Bill 74-09 | Effective 12/11/2009.<br><br>For non-represented members, FY2010 annual pay shall be determined by increasing FY2009 annual pay by an assumed 3% for determining the final average basic pay. For represented members, FY2010 annual pay shall be determined by increasing FY2009 annual pay by an assumed 5% for determining the final average basic pay. |

# Appendix 4: Summary of Major Legislative Changes (cont.)

| | |
|---|---|
| County Council Bill 6-10 | Effective 4/18/2010.<br><br>Provides for a disability benefit for those participants who are totally and permanently disabled as a result of qualified military service. |
| County Council Bill 41-10 | Effective 7/1/2010.<br><br>Reduced the DROP interest rate from 8% to 4.25%. Increased the contribution rate for all but Battalion Chief, Division Chief, Deputy Chief and Fire Chief to 7.25%. |
| County Council Bill No. 98-12 | Effective 5/13/2013.<br><br>Changed the definition of “final average basic pay” from highest 3 out of the last 5 years basic pays to highest 3 of all basic pays. |
| County Council Bill No. 30-12 | Effective 2/1/2013<br><br>All participants shall contribute 7.25% of his or her annual basic pay in each calendar year or portion of a calendar year while an active participant is in the plan. |