Fairfax County Police Officers Retirement System

Actuarial Valuation Report
as of June 30, 2019

Produced by Cheiron

October 2019

TABLE OF CONTENTS

October 29, 2019

Board of Trustees
Fairfax County Police Officers Retirement System
12015 Lee Jackson Memorial Highway, Suite 350
Fairfax, Virginia 22033

Re: *Fairfax County Police Officers Retirement System*
**   *Actuarial Valuation as of June 30, 2019***

Dear Members of the Board:

At your request, we have conducted our annual actuarial valuation of the Fairfax County Police Officers Retirement System as of June 30, 2019. The results of the valuation are contained in this report. The purpose of this report is to present the annual actuarial valuation of the Fairfax County Police Officers Retirement System. This report is for the use of the Fairfax County Police Officers Retirement System Board of Trustees and its auditors in preparing financial reports in accordance with applicable law and accounting requirements.

Your attention is called to the Foreword in which we refer to the general approach employed in the preparation of this report. We also comment on the sources and reliability of both the data and the actuarial assumptions on which our findings are based. Those comments are the basis for our certification that this report is complete to the best of our knowledge and belief. The results of this report are only applicable to the County contribution for Fiscal Year 2021 and rely on future plan experience conforming to the underlying assumptions. To the extent that actual plan experience deviates from the underlying assumptions, the results would vary accordingly.

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 assumptions, changes in assumptions, and changes in plan provisions or applicable law.

In preparing our report, we relied on information (some oral and some written) supplied by the Retirement System. This information includes, but is not limited to, plan provisions, employee data, and financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standards of Practice No. 23.

This report was prepared exclusively for the Fairfax County Police Officers Retirement System for the purpose described herein. Other users of this report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to any other users.

Board of Trustees
Fairfax County Police Officers Retirement System
October 29, 2019
Page ii

This report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices and our understanding of the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board as well as applicable laws and regulations. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinions contained in this report. This report does not address any contractual or legal issues. We are not attorneys, and our firm does not provide any legal services or advice.

Sincerely,
Cheiron

Fiona E. Liston, FSA, MAAA, EA
Principal Consulting Actuary

Coralie A. Taylor, FSA, MAAA, EA
Consulting Actuary

FOREWORD

Cheiron has performed the actuarial valuation of the Fairfax County Police Officers Retirement System as of June 30, 2019. The purpose of this report is to:

1) **Measure and disclose**, as of the valuation date, the financial condition of the System,

2) **Indicate trends** in the financial progress of the System,

3) **Determine the contribution rate** to be paid by the County for Fiscal Year 2021, and

4) **Provide specific information** and documentation required for the System's financial reporting.

An actuarial valuation establishes and analyzes system assets and liabilities on a consistent basis and traces the progress of both from one year to the next. It includes measurement of the system's investment performance, as well as an analysis of actuarial liability gains and losses.

Section I presents a summary containing our findings and disclosing important trends experienced by the System in recent years.

Section II presents risk factors to consider in the future outlook of the Plan.

Section III contains details on various asset measures, together with pertinent performance measurements.

Section IV shows similar information on the System's liabilities, measured for actuarial, accounting, and governmental reporting purposes.

Section V develops the County contribution rate, determined using actuarial techniques and compares that to the rate developed using the corridor method of funding.

Section VI includes the required items to be included in the System's Comprehensive Annual Financial Report (CAFR).

The appendices to this report contain a summary of the System's membership at the valuation date, a summary of the major provisions of the System, and the actuarial methods and assumptions used in the valuations.

In preparing our report, we relied on information (some oral and some written) supplied by the System's staff. This information includes, but is not limited to, plan provisions, employee data, and financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standards of Practice No. 23.

FOREWORD

The actuarial assumptions reflect our understanding of the likely future experience of the System, and the assumptions taken individually represent our best estimate for the future experience of the System. The results of this report are dependent upon future experience conforming to these assumptions. To the extent that future experience deviates from the actuarial assumptions, the true cost of the System could vary from our results.

Finally, in preparing this report, we have conformed to generally accepted actuarial principles and practices and our understanding of the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board as well as applicable laws and regulations.

SECTION I - BOARD SUMMARY

General Comments

The employer's annual contribution to this System is determined by using an amortization layer method. Under this funding approach, the employer's contribution rate consists of the normal cost rate plus expense rate plus layered amortization UAL bases. The UAL rates are summarized in Section V. The normal cost rate and actuarial accrued liability will be measured using the entry age funding method. The UAL is amortized over a series of fixed 15-year periods as a level percentage of payroll. Future gains and losses and changes in actuarial assumptions will be amortized in layers over separate 15-year periods.

The employer contribution rate for Fiscal Year (FY) 2021, as calculated under this method, decreased from 41.60% for FY 2020 to 41.11% of payroll. However, the County has adopted a policy to not reduce the contribution rate until such time that the UAL has been exhausted, thus the contribution rate for FY 2021 will remain at a minimum rate of 41.60% first paid for FY 2020.

This valuation contains information reported in the June 30, 2019 Comprehensive Annual Financial Report (CAFR) of the System. Additional information regarding GASB Statement No. 67 can be found in a separate report.

Trends

The System underperformed the investment assumption during the fiscal year ending in 2019, causing an actuarial loss on the asset side of the System. The actual return on a market value basis was 5.03%. On an actuarial value basis, the assets returned 5.95% compared with an assumed rate of return of 7.25%. The actuarial loss recognized for funding purposes was $19 million.

The measurement of liabilities produced a gain this year in the amount of $8.0 million. This gain was due to experience compared to our assumptions about salary increases, retirement behavior, COLA, and death, etc. Specific components of the gain include:

- The average salary increase was 3.5% for active participants who were in both the June 30, 2018 and June 30, 2019 valuations. This produced a gain of $8 million based on the actuarial assumption.

- The valuation assumed a 2.50% cost-of-living adjustment in 2018 for benefits in pay status. The actual CPI-based COLA was 1.60% last year, creating a liability gain of $10 million.

- An annual component of liability loss is the delayed recognition of new hires throughout the year. This does not contribute to an increase in the System's unfunded liability because both the member and employer contribute from the date of hire. However, when we look only at the liability side, they are a component of the annual liability loss, and this year they contributed $0.9 million to that number.

SECTION I - BOARD SUMMARY

- Finally, there was a $9 million liability loss component that is made up of various other causes such as members terminating, retiring, dying, or becoming disabled in a way contrary to the assumption, and on retirees and terminated vested members who were not in the 2018 data in that status in last year's valuation.

The combination of liability and investment experience, together with County plus member contributions over the last year, led to the System's funding ratio (actuarial value of assets over actuarial accrued liability) increasing from 85.2% at June 30, 2018 to 85.4% at June 30, 2019.

It is important to take a step back from the latest results and view them in the context of the System's recent history. On the next three pages, we present a series of charts that display key factors in the valuations over the last 15 years. After the historical review, we present a few projection graphs, showing the possible condition of the System over the next 15 years under various market return scenarios.
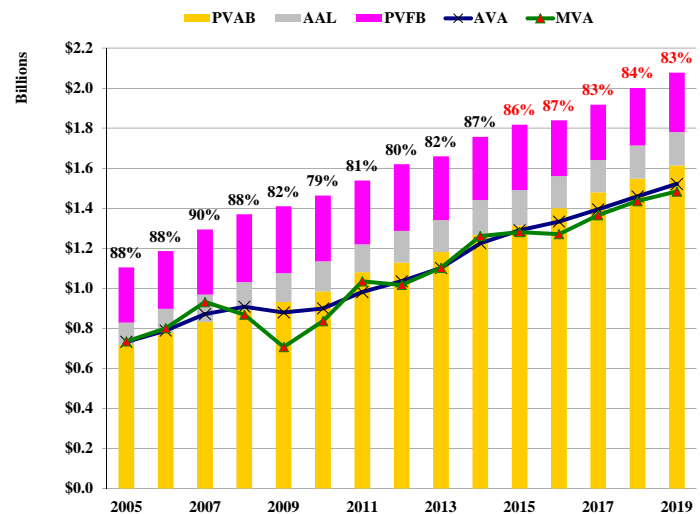
SECTION I - BOARD SUMMARY

Growth in Assets
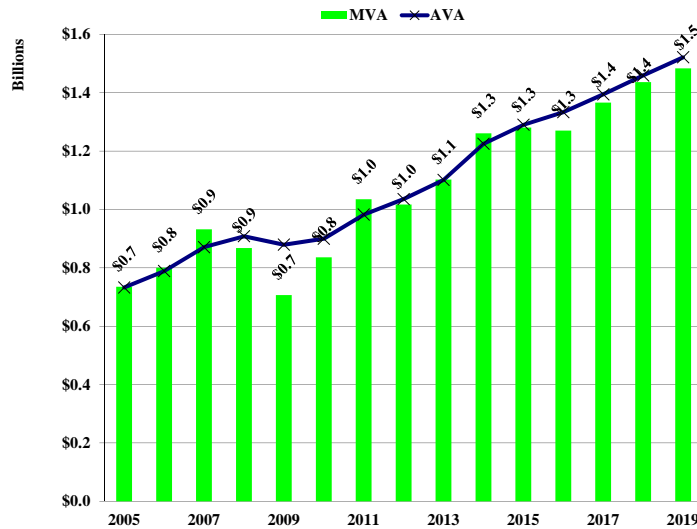
There was an increase in the market value of assets (MVA) (amount in billions shown above bars) over last year due to a return of 5.03%. The actuarial value of assets (AVA) increased due to the continued recognition of recent asset gains. The System has $37.6 million in unrecognized losses that will be phased in over the next few years due to the smaller than expected increase in the MVA.

Over the period July 1, 2005 to June 30, 2019, the System's assets returned approximately 6.54% per year measured at actuarial value, compared to the valuation assumption of 7.25% per year.

Assets and Liabilities

The three colored bars represent the three different measures of liability mentioned in this report. The amount represented by the top of the pink bars, the present value of future benefits (PVFB), is the amount needed to provide all benefits for the current participants and their beneficiaries. If the System had assets equal to the PVFB, no contributions would, in theory, be needed for the current members. For funding purposes, the target amount is represented by the top of the gray bar. Through the 2013 valuation, we compare the actuarial value of assets to this measure of liability in developing the funded percent (black numbers). Starting in 2014, the comparison uses the market value of assets (red numbers). These are the percentages shown in the graph labels.
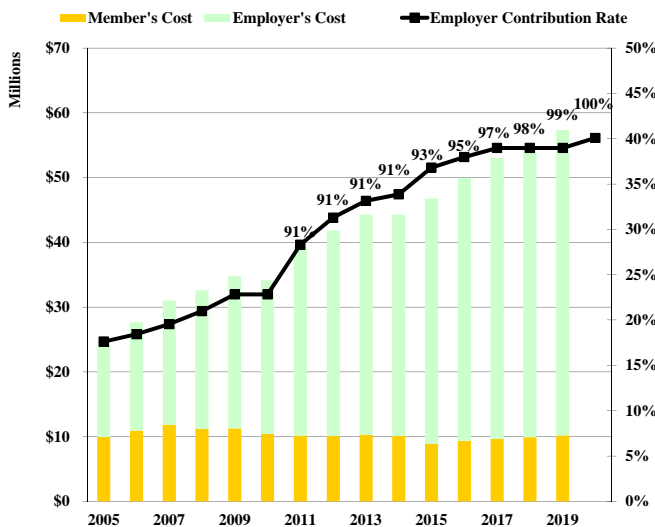

3

SECTION I - BOARD SUMMARY

Contribution Rates

The stacked bars in this graph show the contributions made by both the County and the members (left-hand scale). The black line shows the County contribution rate as a percent of payroll (right-hand scale).

The member contribution rate is set by the County Ordinance. The County contribution rate is set by the actuarial process, as constrained by the corridor method. Note there is a lag in the rate shown. For example, the 2019 value is the rate prepared by the 2017 valuation and implemented for the period June 30, 2018 to June 30, 2019. Starting with FY 2011, the County contribution has been based on a corridor floor greater than 90%. The data labels show the change in this metric.

Participant Trends

As with many systems in this country, there has been a steady growth in the number of retired members as the System has matured. The active-to-inactive ratio has decreased from 1.7 actives to each inactive in 2005 to 1.1 actives for each inactive today. While this would be an alarming trend in a pay-as-you-go system, the pool of invested assets has been established in anticipation of this development.

The chart also shows the number of DROP participants. Neither County nor member contributions are made on their behalf, which leads to a slightly lower growth in effective covered payroll for this system.
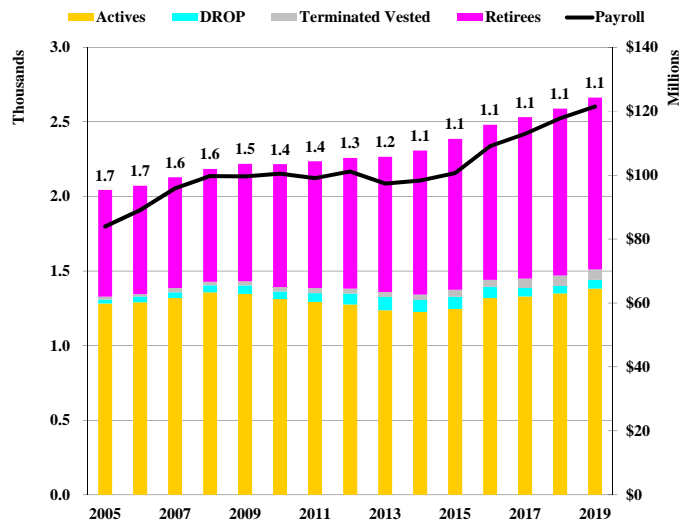
SECTION I - BOARD SUMMARY

Cash Flow

The graph shows the annual cash flows into and out of the System. The graph shows the magnitude of the investment returns on the market value (green bars) compared to the contributions (yellow bars). The net cash flow (line) is comparing the contributions to benefits and expenses (red bar). Negative cash flow is expected for a mature system such as this one. The implications of a system with negative cash flow are that the impact of market fluctuations can be more severe. This is because, as assets are being depleted to pay benefits in down markets, less principal is available to be reinvested during periods of favorable returns.
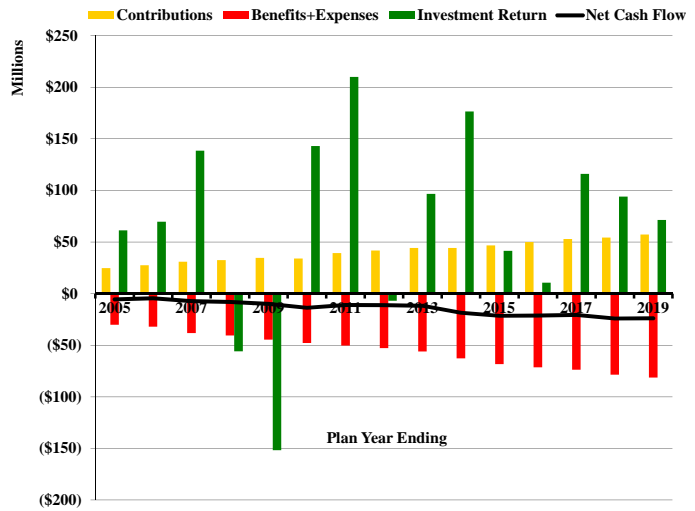
SECTION I - BOARD SUMMARY

Future Outlook

Base-line Projections

The two graphs below show the expected progress of the System over the next 15 years, assuming the System's assets earn 7.25% on their *market value.*

The floor of the County's corridor contribution calculation was increased to 100% for FY 2020, and contributions from FY 2021 forward are calculated using a full actuarial calculation instead of the corridor method. The County does not intend to reduce the contribution rate until the System is 100% funded.

The graph entitled "Plan Funding" illustrates future County and member contribution rates.
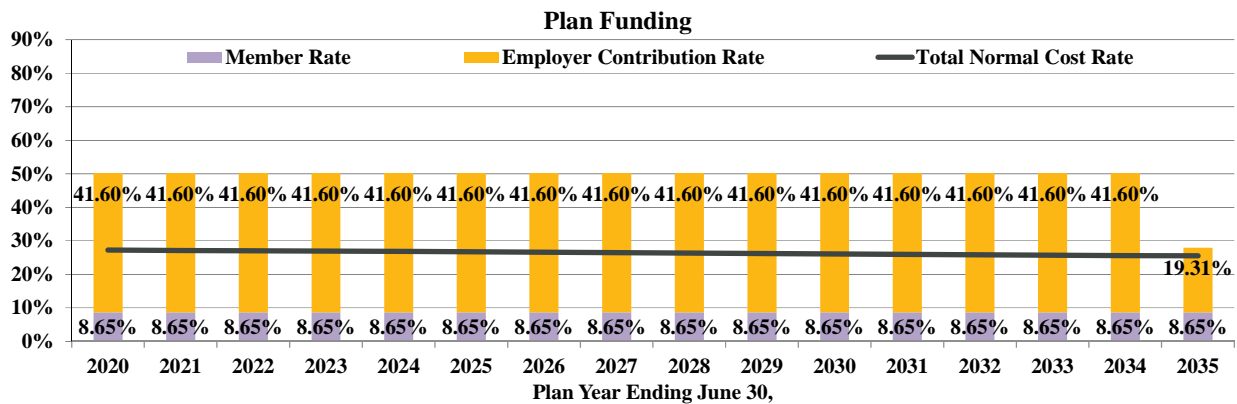
The "Assets and Liabilities" graph shows the projected funding status over the next 15 years. The funded ratio based on the actuarial value of assets gradually increases for the entire projection period ultimately reaching 100% funded as of 2034.
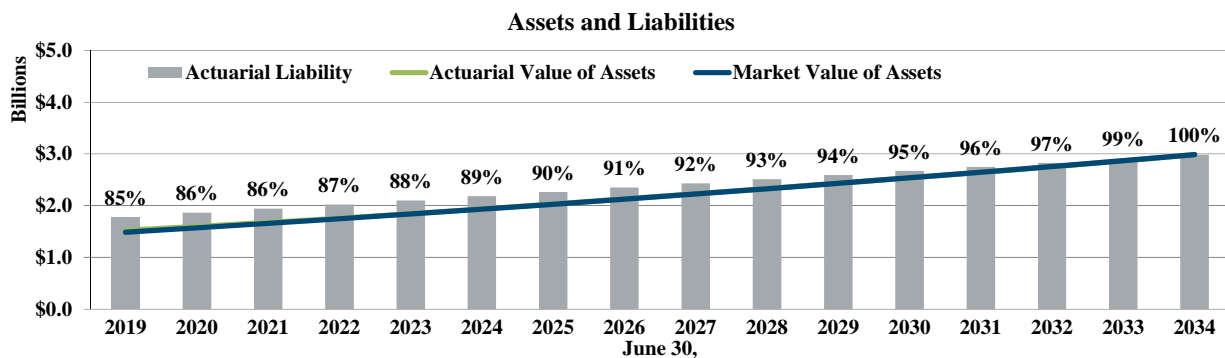
SECTION I - BOARD SUMMARY

The future funding status of this system will be influenced by the investment earnings. The prior projection assumed the System would earn 7.25% each and every year, which is extremely unlikely.

In the projections that follow, we show the risk to the System under volatile markets. The System has averaged a 9.31% return per year since 1980. In the following charts, we show results assuming returns over the next 15 years average 4.75%, 7.25%, and 9.75%. Different patterns of returns will produce different results from those shown here.

Table I-1			
Fiscal Year Ending June 30,	**Average 4.75%**	**Average 7.25%**	**Average 9.75%**
2020	7.42%	2.09%	(6.10)%
2021	6.80	6.92	4.29
2022	1.42	17.47	17.90
2023	2.73	29.76	32.31
2024	4.91	19.17	(9.23)
2025	(0.44)	5.36	10.22
2026	1.23	10.78	15.56
2027	17.34	4.05	(12.69)
2028	9.25	15.35	14.94
2029	9.00	-0.69	14.58
2030	(2.36)	1.80	30.53
2031	(4.00)	(8.62)	24.67
2032	3.95	4.40	3.70
2033	7.02	(0.84)	7.12
2034	8.92	7.58	9.97
Average	**4.75%**	**7.25%**	**9.75%**

SECTION I - BOARD SUMMARY

Alternative Projection – with average return of 4.75% in the period

Under this scenario, the corridor contribution rate increases from 41% to about 75% of payroll. The System's funding drops to as low as 78% on an actuarial value basis, even with the ramping up of contributions.
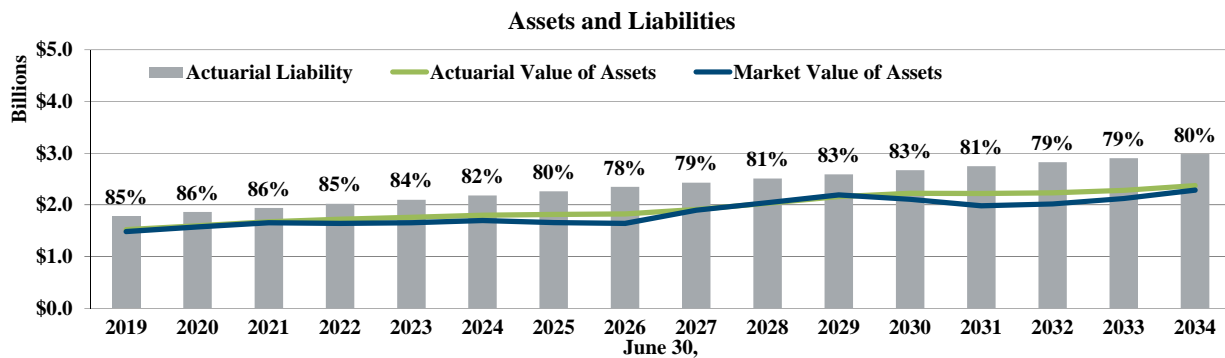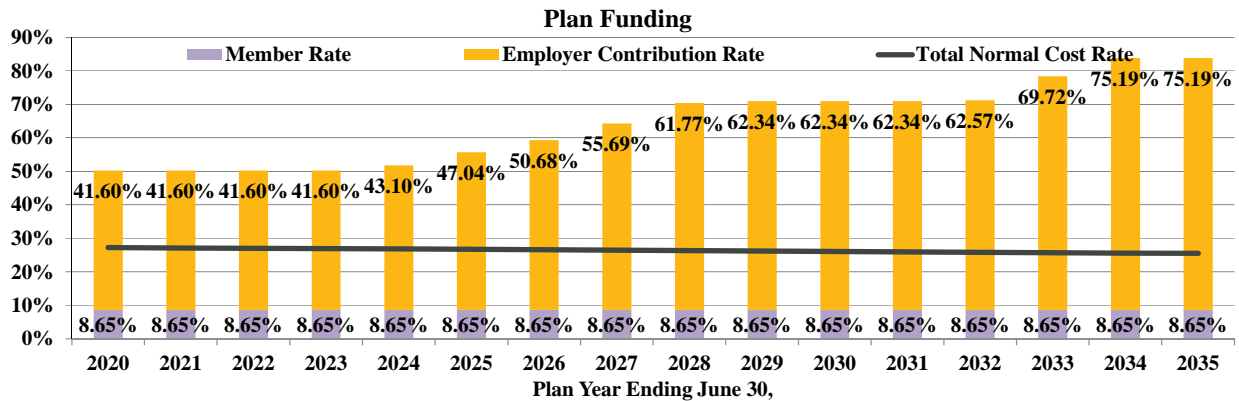
Plan Funding

Legend: ■ Member Rate ■ Employer Contribution Rate — Total Normal Cost Rate

Plan Year Ending June 30,	Employer Contribution Rate	Member Rate
2020	41.60%	8.65%
2021	41.60%	8.65%
2022	41.60%	8.65%
2023	41.60%	8.65%
2024	43.10%	8.65%
2025	47.04%	8.65%
2026	50.68%	8.65%
2027	55.69%	8.65%
2028	61.77%	8.65%
2029	62.34%	8.65%
2030	62.34%	8.65%
2031	62.34%	8.65%
2032	62.57%	8.65%
2033	69.72%	8.65%
2034	75.19%	8.65%
2035	75.19%	8.65%

Assets and Liabilities

Legend: ■ Actuarial Liability — Actuarial Value of Assets — Market Value of Assets

June 30,	Funded %
2019	85%
2020	86%
2021	86%
2022	85%
2023	84%
2024	82%
2025	80%
2026	78%
2027	79%
2028	81%
2029	83%
2030	83%
2031	81%
2032	79%
2033	79%
2034	80%

SECTION I - BOARD SUMMARY

Alternative Projection – with average return of 7.25% in the period

Under this scenario, in which the System is assumed to experience lower than expected returns for the first two years followed by higher than average returns in the next few years, the corridor contribution rate increases over the next few years as the asset losses are phased in and the funding ratio remains below 100%. After that time, the contribution drops dramatically as returns continue to push the funded percent over the 120% top of the corridor. County contributions in this system can never drop below the member's contribution rate.
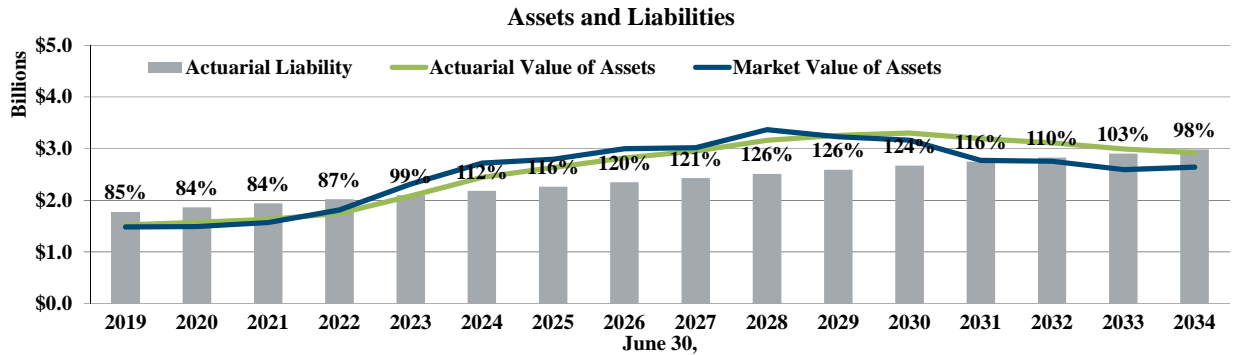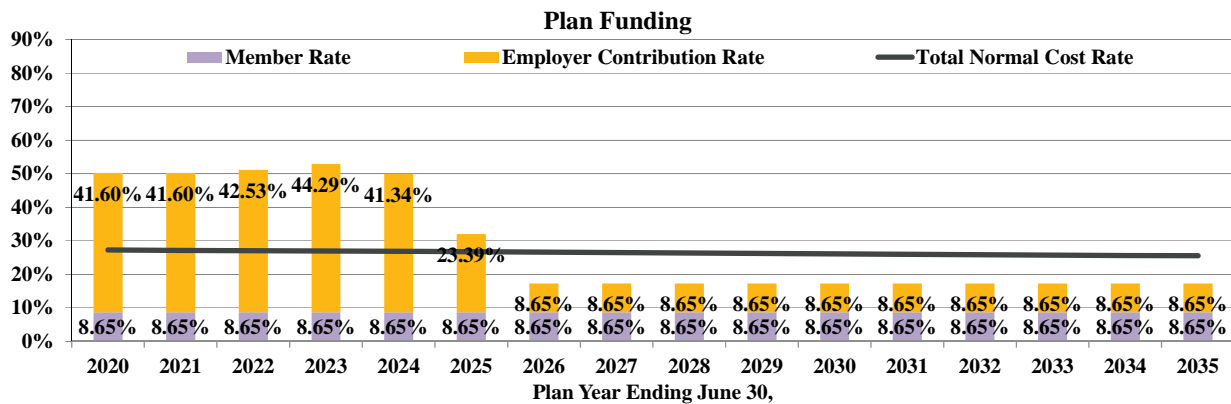
Plan Funding

Assets and Liabilities

SECTION I - BOARD SUMMARY

Alternative Projection – with average return of 9.75% in the period

Under this scenario, in which returns for the first two years are less than 7.25% but subsequent returns are much higher, the corridor contribution rate increases to 50.71% where it remains until the System reaches 100% funding on an actuarial value basis. By the end of the projection period, the County rate is down to the System's minimum of 8.65%, equal to the member contribution rate.
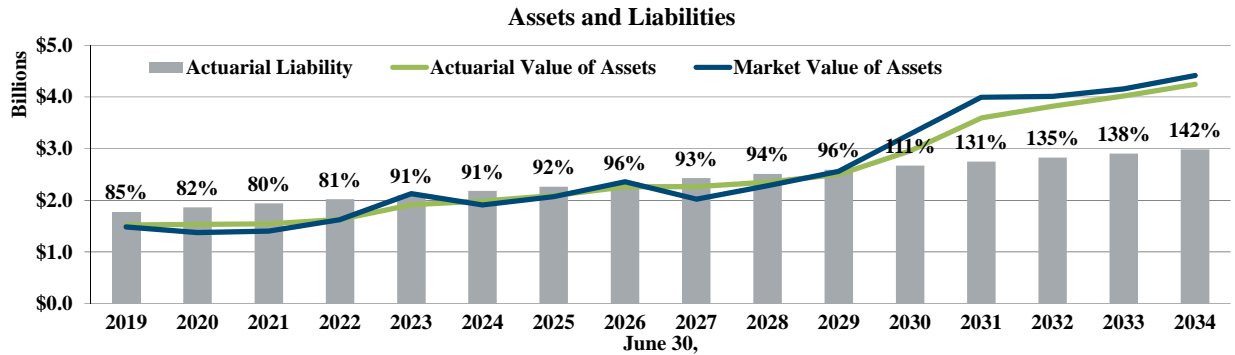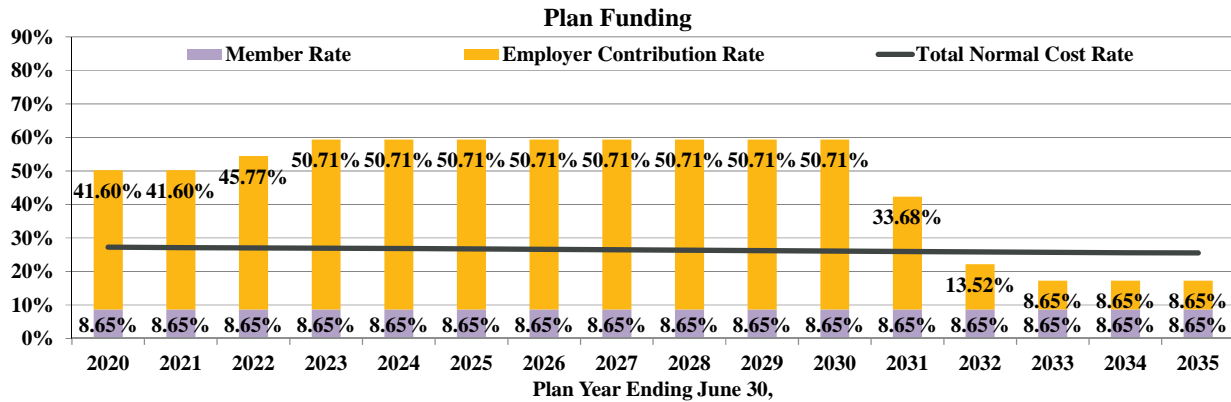
Plan Funding

Assets and Liabilities

SECTION I - BOARD SUMMARY

Table I-2 Summary of Prinicpal Plan Results			
Valuation as of:	**June 30, 2018**	**June 30, 2019**	**% Chg.**
Participant Counts			
Actives (excluding DROP)	1,350	1,382	2.4%
DROPs	50	59	18.0%
Terminated Vesteds	70	69	(1.4)%
In Pay Status	1,119	1,153	3.0%
Total	2,589	2,663	2.9%
Annual Salaries of Active Members	$ 117,785,703	$ 121,441,720	3.1%
Annual Retirement Allowances			
for Retired Members and Beneficiaries	$ 72,247,518	$ 75,739,705	4.8%
Assets and Liabilities			
Actuarial Accrued Liability (AAL)	$ 1,713,294,651	$ 1,780,416,321	3.9%
Assets for Valuation Purposes (AVA)	1,458,935,865	1,521,246,708	4.3%
Unfunded Actuarial Liability	$ 254,358,786	$ 259,169,613	1.9%
Actuarial Value Funding Ratio (AVA / AAL)	85.2%	85.4%	
Market Value Funding Ratio (MVA / AAL)	83.8%	83.3%	
Present Value of Accrued Benefits	$ 1,548,414,371	$ 1,613,896,915	4.2%
Market Value of Assets	1,435,923,023	1,483,674,321	3.3%
Unfunded Accrued Liability			
(not less than $0)	$ 112,491,348	$ 130,222,594	15.8%
Accrued Benefit Funding Ratio	92.7%	91.9%	
Contributions as a Percentage of Payroll	**Fiscal Year 2020**	**Fiscal Year 2021**	
Employer Normal Cost	18.52%	18.55%	
UAL Amortization	22.68%	22.15%	
Administrative Expense	0.40%	0.40%	
County Rate	41.60%	41.11% [1]	

[1] The County has a policy of not paying any less than the existing rate until such a time as the UAL has been exhausted. The FY 2021 rate will be held at the 41.60% rate in effect for FY 2020.

SECTION II - IDENTIFICATION AND ASSESSMENT OF RISK

Actuarial valuations are based on a set of assumptions about future economic and demographic experience. These assumptions represent a reasonable estimate of future experience, but actual future experience will undoubtedly be different and may be significantly different. This section of the report is intended to identify the primary risks to the Plan, provide some background information about those risks, and provide an assessment of those risks.

Identification of Risks

The fundamental risk to a pension plan is that the contributions needed to pay the benefits become unaffordable. While we believe it is unlikely that the Plan by itself would become unaffordable, the contributions needed to support the Plan may differ significantly from expectations. While there are a number of factors that could lead to contribution amounts deviating from expectations, we believe the primary sources are:

- Investment risk,
- Interest rate risk,
- Longevity and other demographic risks,
- Contribution risk, and
- Assumption change risk.

Other risks that we have not identified may also turn out to be important.

SECTION II - IDENTIFICATION AND ASSESSMENT OF RISK

Investment Risk is the potential for investment returns to be different than expected. Lower investment returns than anticipated will increase the Unfunded Actuarial Liability necessitating higher contributions in the future unless there are other gains that offset these investment losses. The potential volatility of future investment returns is determined by the Plan's asset allocation, and the affordability of the investment risk is determined by the amount of assets invested relative to the size of the plan sponsor or other contribution base.
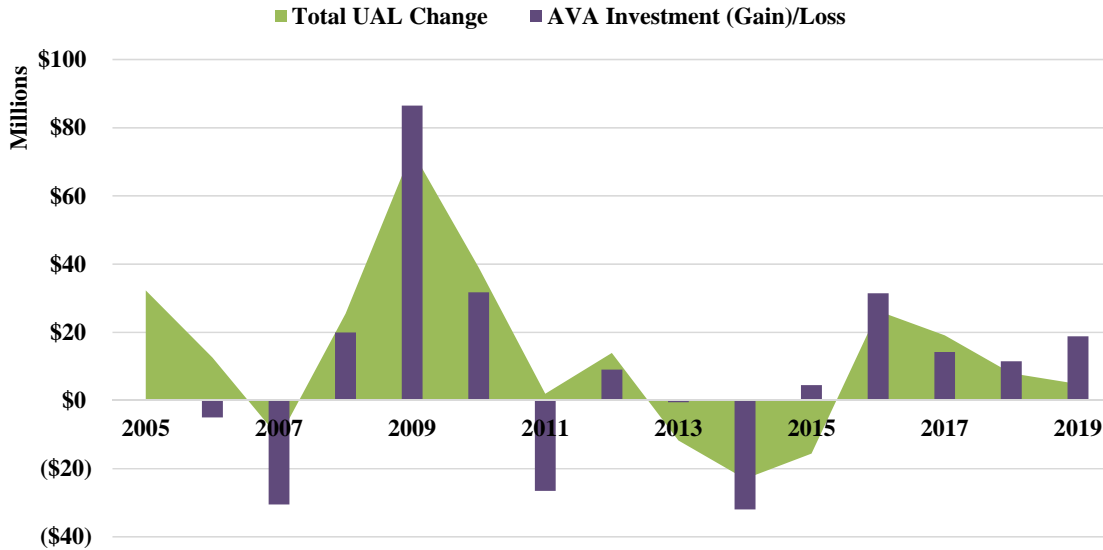
The graph above shows the impact of investment gains and losses on the smoothed Actuarial Value of Assets over the last 15 years compared to the Plan's total change in UAL.

SECTION II - IDENTIFICATION AND ASSESSMENT OF RISK

Interest rate risk is the potential for interest rates to be different than expected. For public plans, short-term fluctuations in interest rates have little or no effect as the plan's liability is usually measured based on the expected return on assets. Longer-term trends in interest rates, however, can have a powerful effect. The chart below shows the yield on a 10-year Treasury security compared to the Plan's assumed rate of return. The difference is a simple measure of the amount of investment risk taken. As interest rates have declined, plans faced a choice: maintain the same level of risk and reduce the expected rate of return, maintain the same expected rate of return and take on more investment risk, or some combination of the two strategies.
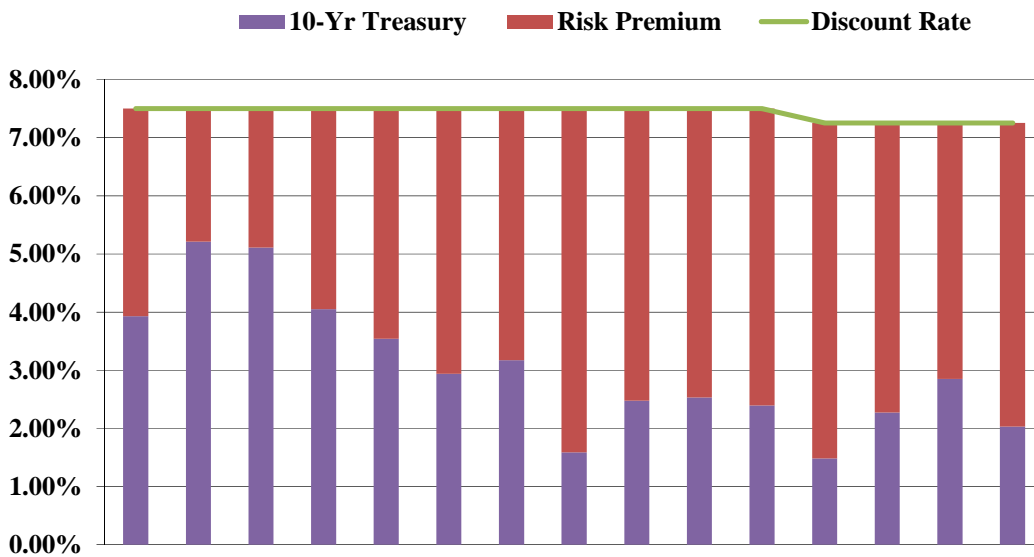
SECTION II - IDENTIFICATION AND ASSESSMENT OF RISK

Longevity and other demographic risks are the potential for mortality or other demographic experience to be different than expected. Generally, longevity and other demographic risks emerge slowly over time and are often dwarfed by other changes, particularly those due to investment returns. The following graph shows the demographic gains and losses over the last 15 years compared to the total change in the UAL for each year.
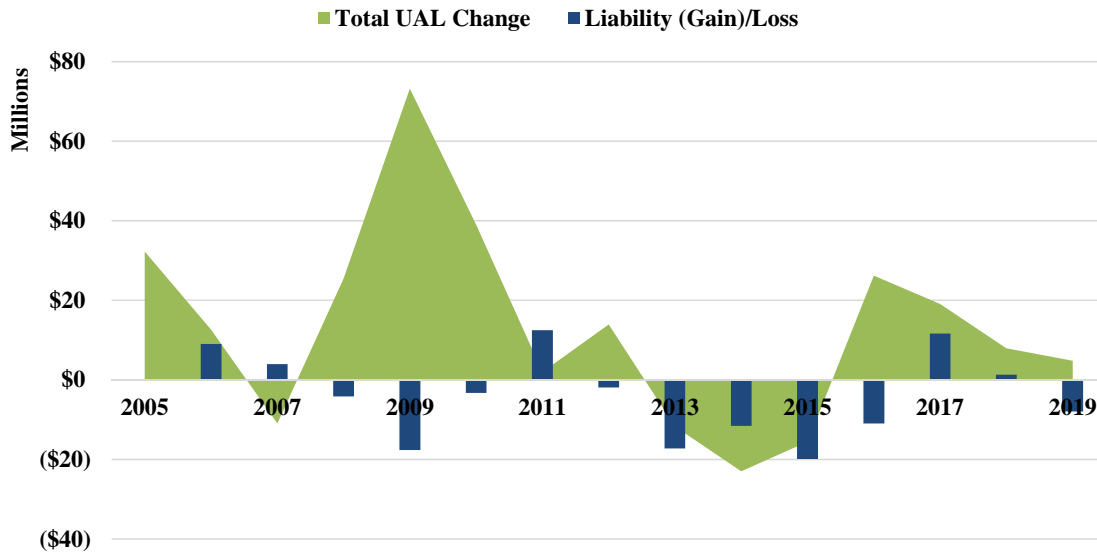
Contribution risk is the potential for actual future contributions to deviate from expected future contributions. There are different sources of contribution risk ranging from the sponsor choosing to not make contributions in accordance with the funding policy to material changes in the contribution base (e.g., covered employees, covered payroll, sponsor revenue) that affect the amount of contributions the plan can collect. Historically, the Plan has made contributions in accordance with their funding policy.

SECTION II - IDENTIFICATION AND ASSESSMENT OF RISK

Assumption change risk is the potential for the environment to change such that future valuation assumptions are different than the current assumptions. Increases in UAL from assumption changes were related to experience studies in which demographic and economic assumptions were adjusted. Assumption change risk is an extension of the other risks identified, but rather than capturing the risk as it is experienced, it captures the cost of recognizing a change in environment when the current assumption is no longer reasonable.
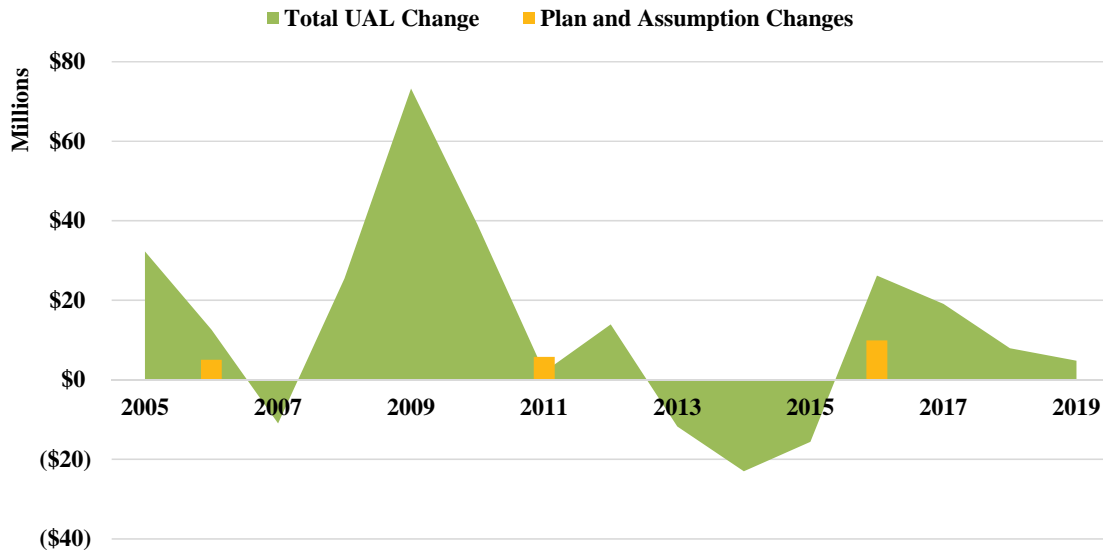
Plan Maturity Measures

The future financial condition of a mature pension plan is more sensitive to each of the risks identified above than a less mature plan. Before assessing each of these risks, it is important to understand the maturity of this system compared to other plans and how the maturity has changed over time.

Plan maturity can be measured in a variety of ways, but they all get at one basic dynamic – the larger the plan is compared to the contribution or revenue base that supports it, the more sensitive the plan will be to risk. The measures below have been selected as the most important in understanding the primary risks identified for this system.

SECTION II - IDENTIFICATION AND ASSESSMENT OF RISK

Inactives per Active (Support Ratio)

One simple measure of plan maturity is the ratio of the number of inactive members (those receiving benefits or entitled to a deferred benefit) to the number of active members. The revenue base supporting the plan is usually proportional to the number of active members, so a relatively high number of inactives compared to actives indicates a larger plan relative to its revenue base as well.
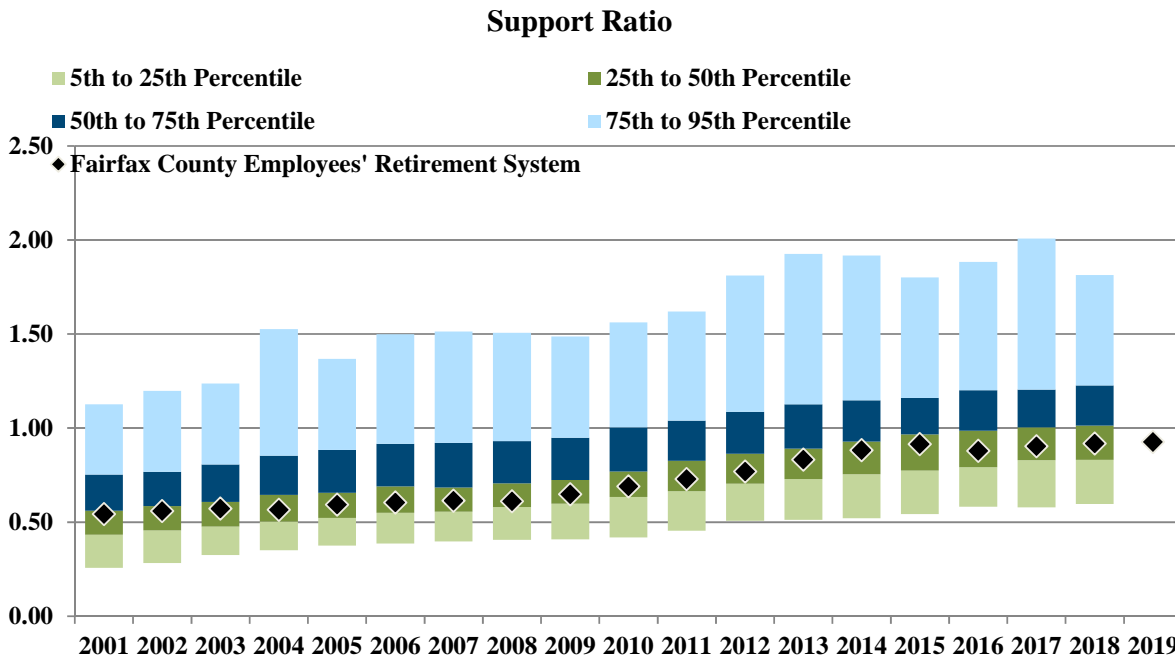
Support Ratio

Survey Data from Public Plans Database as of 9/24/2019

The graph above shows the distribution from the 5th to 95th percentile of support ratios for the plans in the Public Plans Database. The black diamond shows how the Retirement System compares to the other plans.

Whereas the support ratios for the plans as a whole have increased over the period as they mature, PORS's support ratio has increased over the period and is among the 25th to 50th percentile of the Public Plans Database.

17

SECTION II - IDENTIFICATION AND ASSESSMENT OF RISK

Leverage Ratios

Leverage or volatility ratios measure the size of the plan compared to its revenue base more directly. An asset leverage ratio of 5.0, for example, means that if the System experiences a 10% loss on assets compared to the expected return, the loss would be equivalent to 50% of payroll.

The same investment loss for a system with an asset leverage ratio of 10.0 would be equivalent to 100% of payroll. As the Plan becomes better funded, the asset leverage ratio will increase, and if it was 100% funded, the leverage ratio would equal the Actuarial Liability (AL) leverage ratio.

MVA Leverage Ratio

Survey Data from Public Plans Database as of 9/24/2019
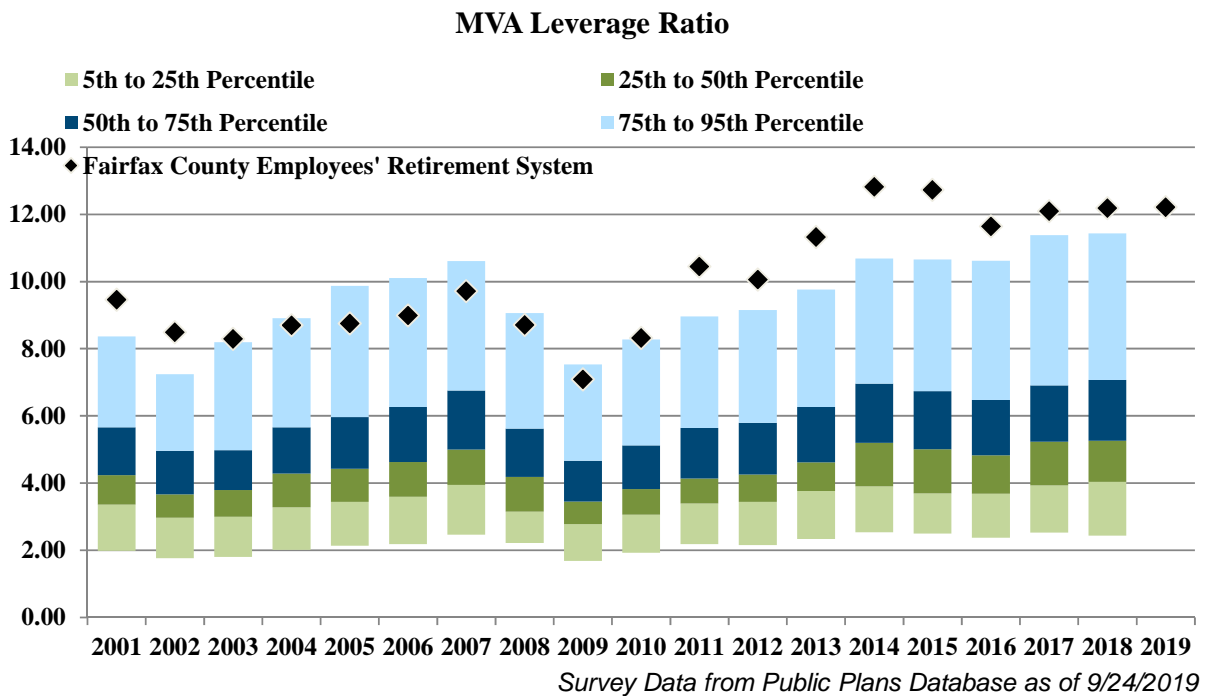
The chart above shows the distribution from the 5th to 95th percentile of asset leverage ratios for the plans in the Public Plans Database. The black diamond shows how the Plan compares.

The Plan's asset leverage ratio has historically been in the 75th to 95th percentile compared to other plans but in recent years has moved above the 95th percentile. This increase in the asset leverage ratio will continue as the Plan approaches 100% funded.

SECTION II - IDENTIFICATION AND ASSESSMENT OF RISK

The actuarial liability leverage ratio of 5.0 means that if the System experiences a 10% loss on assets compared to the expected return, the liability loss would be equivalent to 50% of payroll.

AL Leverage Ratio

Survey Data from Public Plans Database as of 9/24/2019
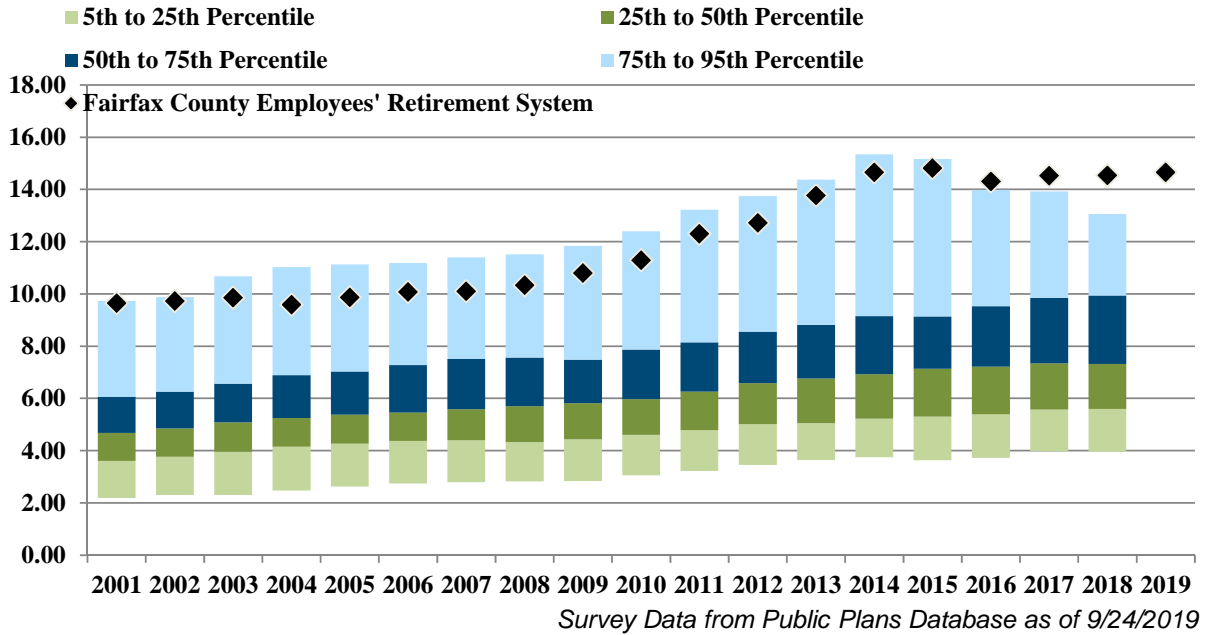
The chart above shows the distribution from the 5th to 95th percentile of Actuarial Liability leverage ratios for the plans in the Public Plans Database. The black diamond shows how the Plan compares.

The Plan's Actuarial Liability leverage ratio has historically been in the 75th to 95th percentile compared to other plans. But as the Plan matures and more of the liability is due to inactive members, this ratio continues to increase. The ratio has been over 9.5 over the period with the ratio currently around 14.7 in 2019.

SECTION III - ASSETS

Pension system assets play a key role in the financial operation of the System and in the decisions the Trustees may make with respect to future deployment of those assets. The level of assets, the allocation of assets among asset classes, and the methodology used to measure assets will likely impact benefit levels, County contributions, and the ultimate security of participants' benefits.

In this section, we present detailed information on the System's assets including:

- **Disclosure** of the System's assets at June 30, 2018 and June 30, 2019,
- Statement of the **changes** in market values during the year,
- Development of the **actuarial value of assets**,
- An assessment of **investment performance**, and
- A projection of the System's expected **cash flows** for the next 10 years.

Disclosure

The market value of assets represents "snap-shot or cash-out" values, which provide the principal basis for measuring financial performance from one year to the next. Market values, however, can fluctuate widely with corresponding swings in the marketplace. As a result, market values are usually not suitable for long-range planning.

The actuarial values are market values that have been smoothed; they are used for evaluating the System's ongoing liability to meet its obligations.

Current methods employed by this system set the actuarial value equal to the expected value plus 33⅓% of the difference between the expected value of assets and the actual market value, where the expected value is equal to the prior year's actuarial value, rolled forward with actual contributions, benefit payments, and administrative expenses plus interest imputed at the prior year investment return assumption of 7.25%.

SECTION III - ASSETS

Table III-1 Statement of Assets at Market Value		
	June 30, 2018	**June 30, 2019**
Assets		
Equity in County's Pooled Cash, Contributions Receivable and Other Assets	$ 5,142,158	$ 5,118,163
Accrued Interest and Dividends Receivable	2,279,382	2,041,438
Receivable from Sale of Investments	7,149,824	6,698,867
Capital Assets	11,439	10,512
US Government Obligations	49,053,811	47,811,358
Asset-Backed Securities	55,865,898	50,353,187
Other Bonds and Notes	62,280,528	46,233,412
Common and Preferred Stock	135,060,345	184,205,033
Pooled and Mutual Funds	1,034,431,404	1,068,793,388
Short-Term Investments	94,308,269	80,557,263
Cash Collateral Received Under Securities Lending Agreements	9,607,296	12,860,224
Total Assets	$ 1,455,190,354	$ 1,504,682,845
Liabilities		
Payable for Collateral Received Under Securities Lending Agreements	$ 9,607,296	$ 12,860,224
Payable for Purchase of Investments	5,886,321	4,902,772
Accounts Payable and Accrued Expenses	3,773,714	3,245,528
Total Liabilities	$ 19,267,331	$ 21,008,524
Net Assets Available for Benefits	**$ 1,435,923,023**	**$ 1,483,674,321**

SECTION III - ASSETS

Table III-2 Changes in Market Values		
Value of Assets – June 30, 2018		$ 1,435,923,023
Additions		
Contributions:		
County Contributions	$ 47,182,840	
Employee Contributions	10,176,811	
Total Contributions		$ 57,359,651
Investment Income:		
Net Appreciation (Depreciation) in		
Fair Value of Investments	$ 71,898,600	
Interest	10,218,071	
Dividends	3,590,390	
Total Investment Income	$ 85,707,061	
Investment Activity Expenses:		
Management Fees	$ (13,597,676)	
Custodian Fees	(72,364)	
Consulting Expense	(13,771)	
Allocated Administrative Expenses	(535,828)	
Total Investment Activity Expenses	$ (14,219,639)	
From Securities Lending Activities:		
Securities Lending Income	$ 510,261	
Securities Lending Expenses		
Borrowers Rebates	0	
Management Fees	(419,194)	
Net Income from Securities Lending		
Activities	$ 91,067	
Net Investment Income		$ 71,578,489
Total Additions		$ 128,938,140
Deductions		
Annuity Benefits	$ (74,086,887)	
Disability Benefits	(1,453,029)	
Survivor Benefits	(4,576,517)	
Refunds and Other Expenses	(459,698)	
Administrative Expenses	(610,711)	
Total Deductions		$ (81,186,842)
Total		
Net Increase (Decrease)		$ 47,751,298
Value of Assets – June 30, 2019		**$ 1,483,674,321**

SECTION III - ASSETS

Actuarial Value of Assets

The actuarial value of assets represents a "smoothed" value developed by the actuary to reduce or eliminate erratic results which could develop from short-term fluctuations in the market value of assets. For this system, the actuarial value has been calculated by adding 33⅓% of the difference between market value and expected value to the expected value. The following table illustrates the calculation of the actuarial value of assets for the June 30, 2019 valuation.

	Table III-3 Development of Actuarial Value of Assets as of June 30, 2019	
1.	Actuarial Value of Assets at June 30, 2018	**$ 1,458,935,865**
2.	Amount in (1) with Interest to June 30, 2019	1,564,708,715
3.	County and Member Contributions for the Plan Year Ended June 30, 2019	57,359,651
4.	Interest on Contributions Assuming Received Uniformly Throughout the Year to June 30, 2019	2,042,907
5.	Disbursements from Trust Except Investment Expenses, July 1, 2018 Through June 30, 2019	(81,186,842)
6.	Interest on Disbursements Assuming Payments Made Uniformly Throughout the Year to June 30, 2019	(2,891,532)
7.	Expected Value of Assets at June 30, 2019 = (2) + (3) + (4) + (5) + (6)	1,540,032,899
8.	Market Value of Assets at June 30, 2019	1,483,674,321
9.	Excess of (8) Over (7)	$ (56,358,578)
10.	Actuarial Value of Assets at June 30, 2019 = (7) + 33-1/3% of (9)	**$ 1,521,246,706**

SECTION III - ASSETS

Investment Performance

The market value of assets (MVA) returned 5.03% during 2019, which is less than the assumed 7.25% return. A return of 5.95% on the actuarial value of assets (AVA) is primarily the result of the asset smoothing method being utilized for the calculation of the actuarial value of assets. Since only 33⅓% of the gain or loss from the performance of the System is recognized in a given year, in periods of very good performance, the AVA can lag significantly behind the MVA. In a period of negative returns, the AVA does not decline as rapidly as the MVA.

Table III-4 Annual Rates of Return				
Year Ending June 30,	**Market Value**	**Actuarial Value**	**Total Return Standard & Poor's 500 Index**	**Barclays Global Aggregate Index[1]**
1995	14.6%	10.5%	26.1%	12.8%
1996	16.1%	19.2% [2]	26.0%	4.7% [3]
1997	21.4%	15.1%	34.7%	8.2%
1998	17.3%	8.1%	30.2%	10.5%
1999	8.1%	15.9%	22.8%	3.1%
2000	7.7%	12.7%	7.2%	4.6%
2001	(3.1)%	7.0%	(14.8)%	11.2%
2002	(5.1)%	3.0%	(18.0)%	8.6%
2003	4.1%	3.3%	0.3%	10.4%
2004	15.5%	7.0%	19.1%	0.3%
2005	9.1%	7.7%	6.3%	6.8%
2006	9.5%	8.3%	8.6%	(0.8)%
2007	17.4%	11.4%	20.6%	6.1%
2008	(6.0)%	5.2%	(13.1)%	7.1%
2009	(17.6)%	(2.1)%	(26.2)%	5.5%
2010	20.5%	3.9%	14.4%	9.5%
2011	25.3%	10.5%	30.8%	3.9%
2012	(0.7)%	6.6%	5.4%	7.5%
2013	9.6%	7.6%	20.6%	(0.1)%
2014	16.2%	10.3%	24.6%	4.4%
2015	3.3%	7.1%	7.4%	1.8%
2016	0.9%	3.5%	4.0%	6.0%
2017	9.2%	6.2%	17.9%	(0.3)%
2018	7.0%	6.4%	12.2%	0.8%
2019	5.0%	6.0%	10.4%	7.9%

[1] Figures shown prior to 1987 are Salomon Brothers Long Term Bond Index.

[2] Figures shown prior to 1997 are Shearson Lehman Government/Corporate Bond Index.

[3] The actuarial return in 1996 reflects the adjustment to a revised actuarial valuation method.

SECTION III - ASSETS

Expected benefit payments are projected for the closed group valued at June 30, 2019. Projecting any further than 10 years using a closed group would not yield reliable predictions due to the omission of new hires.

Expected employer contributions are projected based on the current County contribution rate of 41.60% for FY 2020 and thereafter. This projection assumes no further gains or losses and a 2.75% annual increase in the total covered payroll and models the anticipated impact of new hires coming in with altered plan provisions.

Table III-5		
Projection of System's Benefit Payments and Employer Contributions		
Year Beginning July 1,	**Expected Benefit Payments**	**Expected County Contributions**
2019	$ 80,484,000	$ 50,520,000
2020	88,626,000	51,909,000
2021	96,349,000	53,337,000
2022	100,780,000	54,803,000
2023	105,093,000	56,310,000
2024	110,532,000	57,859,000
2025	117,185,000	59,450,000
2026	125,084,000	61,085,000
2027	133,338,000	62,765,000
2028	140,779,000	64,491,000

SECTION IV - LIABILITIES

In this section, we present detailed information on System liabilities including:

- **Disclosure** of System liabilities at June 30, 2018 and June 30, 2019,
- Statement of **changes** in these liabilities during the year, and
- A **projection** of future liabilities.

Disclosure

Several types of liabilities are calculated and presented in this report. Each type is distinguished by the people ultimately using the figures and the purpose for which they are using them.

- **Present Value of Benefits:** Used for analyzing the financial outlook of the System, this represents the amount of money needed today to fund all future benefits of the System, assuming participants continue to accrue benefits and all assumptions are met.

- **Actuarial Accrued Liability:** Used for funding calculations and GASB disclosures, this liability is calculated taking the present value of benefits above and subtracting the present value of future member contributions and future employer normal costs under an acceptable actuarial funding method. This method is referred to as the **Entry Age Normal** funding method.

- **Present Value of Accrued Liabilities:** Used for communicating the current level of liabilities, this liability represents the total amount of money needed today to fully fund the current accrued obligations of the System, assuming no future accruals of benefits and that all assumptions are met, including the 7.25% investment return. These liabilities are also used to assess whether the System can meet its current benefit commitments.

None of the liability figures disclosed in this report is meant to be a measure of the System's settlement liability.

The following table discloses each of these liabilities for the current and prior valuations. With respect to each disclosure, a subtraction of the appropriate value of the System's assets yields, for each respective type, a **net surplus** or an **unfunded liability**.

SECTION IV - LIABILITIES

Table IV-1 Liabilities/Net (Surplus)/Unfunded	June 30, 2018	June 30, 2019
Present Value of Future Benefits		
Active Participant Benefits (excluding DROP)	$ 933,022,260	$ 957,720,426
DROP Participant Benefits	77,469,448	89,092,029
Retiree Benefits	978,583,985	1,018,213,310
Terminated Vested and Inactive Members	11,427,858	12,109,179
Present Value of Benefits (PVB)	$ 2,000,503,551	$ 2,077,134,944
Market Value of Assets (MVA)	$ 1,435,923,023	$ 1,483,674,321
Future Employee Contributions	90,695,927	93,822,766
Future County Contributions	473,884,601	499,637,857
Total Resources	$ 2,000,503,551	$ 2,077,134,944
Actuarial Accrued Liability		
Present Value of Benefits (PVB)	$ 2,000,503,551	$ 2,077,134,944
Present Value of Future Normal Costs (PVFNC)		
County Portion	196,512,973	202,895,857
Employee Portion	90,695,927	93,822,766
Actuarial Accrued Liability	$ 1,713,294,651	$ 1,780,416,321
(AAL = PVB - PVFNC)		
Actuarial Value of Assets (AVA)	1,458,935,865	1,521,246,708
Net (Surplus)/Unfunded (AAL – AVA)	$ 254,358,786	$ 259,169,613
Present Value of Accrued Benefits		
Present Value of Benefits (PVB)	$ 2,000,503,551	$ 2,077,134,944
Present Value of Future Benefit Accruals (PVFBA)	452,089,180	463,238,029
Present Value of Accrued Benefits	$ 1,548,414,371	$ 1,613,896,915
(PVAB = PVB – PVFBA)		
Market Value of Assets (MVA)	$ 1,435,923,023	$ 1,483,674,321
Net Unfunded, not less than $0 (PVAB – MVA)	$ 112,491,348	$ 130,222,594

SECTION IV - LIABILITIES

Changes in Liabilities

Each of the liabilities disclosed in the prior table are expected to change at each valuation. The components of that change, depending upon which liability is analyzed, can include:

- New hires since the last valuation
- Benefits accrued since the last valuation
- Plan amendments increasing benefits
- Passage of time which adds interest to the prior liability
- Benefits paid to retirees since the last valuation
- Participants retiring, terminating, or dying at rates different than expected
- A change in actuarial or investment assumptions
- A change in the actuarial funding method

Unfunded liabilities will change because of all of the above and due to changes in System assets resulting from the following:

- County contributions less than the full actuarial contribution
- Investment earnings different than expected
- A change in the method used to measure System assets

In each valuation, we report on those elements of change that are of particular significance, potentially affecting the long-term financial outlook of the System. Below we present key changes in liabilities since the last valuation.

Table IV-2	Present Value of Benefits	Actuarial Accrued Liability	Present Value of Accrued Benefits
Liabilities June 30, 2018	$ 2,000,503,551	$ 1,713,294,651	$ 1,548,414,371
Liabilities June 30, 2019	2,077,134,944	1,780,416,321	1,613,896,915
Liability Increase (Decrease)	$ 76,631,393	$ 67,121,670	$ 65,482,544
Change Due to:			
Plan Amendment	$ 0	$ 0	$ 0
Actuarial (Gain)/Loss	*Not Calculated*	(7,959,491)	*Not Calculated*
Method and Assumption Changes	0	0	0
Benefits Accumulated and Other Sources	76,631,393	75,081,161	65,482,544

SECTION V - CONTRIBUTIONS

In the process of evaluating the financial condition of any pension system, the actuary analyzes the assets and liabilities to determine what level (if any) of contributions is needed to properly maintain the funding status of the system. Typically, the actuarial process will use a funding technique that will result in a pattern of contributions that is both stable and predictable.

For this system, the funding method employed is the **Entry Age Actuarial Cost Method**. Under this method, there are three components to the total contribution: the **normal cost rate**, the **unfunded actuarial liability rate** (UAL rate), and the **administrative expense rate**. The normal cost rate is determined in the following steps. First, an individual normal cost rate is determined by taking the value, as of entry age into the System, of each member's projected future benefits. This value is then divided by the value, also at entry age, of the member's expected future salary. Second, the normal cost rate is multiplied by current salary and added together to obtain the total rate. Finally, the total normal cost rate is reduced by the average member contribution rate to produce the County's normal cost rate.

Development of County Contribution Rate

The employer's total contribution rate is equal to the normal cost rate plus rate changes due to amendments passed or assumption changes adopted since July 1, 2001 plus a 15-year amortization of the UAL that existed on June 30, 2018. In the future, additional amortization bases will be created each year. Finally, the rate includes an expense rate. Please see Table V-3 for details.

The contribution method was changed between the 2018 and 2019 valuations. Please refer to the 2018 report for a description of the corridor method that was previously in place. This section contains a comparison of the County contribution rates for FY 2020 and 2021 in Table V-1. Table V-2 shows the development of the FY 2020 rate under the previously used corridor method. Tables V-3 and V-4 show the calculations of the FY 2021 rate using a closed 15-year layered amortization approach.

SECTION V - CONTRIBUTIONS

The table below presents and compares the budgeted rate for the System for this valuation and the prior one.

The UAL rate is the level percent of member payroll which, when applied to each year's payroll, will be sufficient to amortize the various layers of unfunded actuarial liability over their respective 15-year periods.

Table V-1		
Actuarially Determined Rate (for Corridor Contribution)		
Valuation Date	**June 30, 2018**	**June 30, 2019**
Fiscal Year	**2020**	**2021**
Normal Cost Rate	18.52%	18.55%
UAL Rate	22.68%	22.15%
Expense Rate	0.40%	0.40%
Total County Rate	41.60%	41.11% [1]

[1] The County has a policy of not paying any less than the existing rate until such a time as the UAL has been exhausted. FY 2021 will be held at the 41.60% rate in effect for FY 2020.

SECTION V - CONTRIBUTIONS

Table V-2	
Development of Corridor Contribution Rate	
	June 30, 2018 (for FY 2020)
1. Present Value of Future Benefits	
a. Active Employees	$ 933,022,260
b. DROP	77,469,448
c. Retired Members	978,583,985
d. Vested Terminated and Inactive Members	11,427,858
e. Total Present Value	$ 2,000,503,551
2. Present Value of Future Normal Costs	
a. County Portion	$ 196,512,973
b. Employee Portion	90,695,927
c. Total Present Value	$ 287,208,900
3. Actuarial Accrued Liability (1) – (2)	$ 1,713,294,651
4. Actuarial Value of Assets for Corridor Purposes	
a. Actuarial Assets	$ 1,458,935,865
b. Outstanding Balance of Plan and Assumption Changes	37,518,480
c. Adjusted Assets (a) + (b)	$ 1,496,454,345
5. Funding Ratio for Corridor Test	87.3%
6. Liability to be Amortized if outside Corridor	
a. [100%] x (3) - (4)(c)	$ 216,840,306
b. (4)(c) - 120%x(3)	0
7. Active Member Payroll	$ 117,785,703
8. Unfunded Liability Amortization Factor	11.0842
9. Amortization as a % of Payroll (6)/(7)/(8)	16.62%
10. County Contribution Results	
a. Normal Cost Rate	18.52%
b. Administrative Expense Rate	0.40%
c. Plan Change Amortizations	6.06%
d. Amortization Outside Corridor (9)	16.62%
e. Total County Contribution Rate June 30	41.60%

SECTION V - CONTRIBUTIONS

Table V-3 Development of UAL Amortization Layer	June 30, 2019 (for FY 2021)
1. Present Value of Future Benefits	
a. Active Employees	$ 957,720,426
b. DROP	89,092,029
c. Retired Members	1,018,213,310
d. Vested Terminated and Inactive Members	12,109,179
e. Total Present Value	$ 2,077,134,944
2. Present Value of Future Normal Costs	
a. County Portion	$ 202,895,857
b. Employee Portion	93,822,766
c. Total Present Value	$ 296,718,623
3. Actuarial Accrued Liability (1) – (2)	$ 1,780,416,321
4. Actuarial Value of Assets	$ 1,521,246,708
5. Unfunded Accrued Liability (UAL)	$ 259,169,613
6. Oustanding Prior Bases (see Table V-4)	244,717,456
7. New Base at July 1, 2019	14,452,157
8. Expected Employer Contribution FY 2020 **(41.60% * $121,441,720)**	50,519,756
9. Employer Normal Cost Payments	(22,533,328)
10. Expense Payments (using 0.25% assumption)	(485,767)
11. Net Contriution to apply to UAL	27,500,660
12. FY 2020 Amortization of prior bases (from Table V-4)	27,075,517
13. Excess UAL Payment (11 - 12)	$ 425,143
14. Remaining 2019 base as of July 1, 2020 (7 plus interest - 13)	$ 15,059,653
15. 14-year Amortization Factor	10.3847
16. New UAL Amortization Layer (14 / 15)	$ 1,450,182
17. FY 2021 Payment on Prior Bases (from Table V-4)	26,190,637
18. Total UAL Payments (16 + 17)	$ 27,640,819
19. Estimated FY 2021 Payroll	$ 124,781,367
20. UAL as a % of Payroll (18/19)	22.15%

SECTION V - CONTRIBUTIONS

Table V-4						
Schedule of Amortization Bases						
		June 30, 2019	**FY 2020**	**June 30, 2020**		**July 1, 2020**
	Date	**Outstanding**	**Amortization**	**Outstanding**	**Amortization**	**Amortization**
Type of Base	**Established**	**Amount**	**Payment**	**Amount[1]**	**Years**	**Payment**
1. Ad-hoc COLA	7/1/2004	$ 546,048	$ 565,495	$ 0	1	$ 0
2. Assumption Changes	7/1/2005	985,259	1,020,351	0	1	0
3. Ad-hoc COLA	7/1/2005	1,046,020	553,244	548,908	2	568,458
4. Ad-hoc COLA	7/1/2005	1,536,401	553,264	1,074,821	3	568,479
5. Remove 30 year service cap on be	7/1/2006	238,995	86,063	167,194	3	88,430
6. Ad-hoc COLA	7/1/2007	2,229,210	614,773	1,754,159	4	631,679
7. Assumption Changes	7/1/2007	3,814,598	639,442	3,428,940	7	657,027
8. Assumption Changes	7/1/2008	13,023,854	1,623,384	12,286,881	10	1,668,027
9. Assumption Changes	7/1/2010	9,310,501	1,006,079	8,943,601	12	1,033,746
10. Unfunded Base	7/1/2018	211,986,570	20,413,422	206,215,135	14	20,974,791
Total		**$ 244,717,456**	**$ 27,075,517**	**$ 234,419,639**		**$ 26,190,637**

[1] Outstanding amount includes a full year of interest on prior year balance and half year on the amortization payment

SECTION VI - ACCOUNTING STATEMENT INFORMATION

ASC Topic 960 of the Financial Accounting Standards Board (FASB) describes certain disclosures regarding a plan's funded status.

The FASB ASC Topic 960 disclosures provide a quasi "snap shot" view of how the System's assets compare to its liabilities if contributions stopped and accrued benefit claims had to be satisfied. However, due to potential legal requirements and the possibility that alternative interest rates would have to be used to determine the liabilities, these values may not be a good indication of the amount of money it would take to buy the benefits for all members if the System were to terminate.

FASB ASC Topic 960 specifies that a comparison of the present value of accrued (accumulated) benefits with the market value of the assets as of the valuation date must be provided. The relevant amounts as of June 30, 2018 and June 30, 2019 are exhibited in Table VI-1, which also includes a reconciliation of liabilities determined as of the prior valuation, June 30, 2018 to the liabilities as of June 30, 2019.

Table VI-2 is a history of gains and losses in Accrued Liability, and Table VI-3 is the Schedule of Funded Liabilities by Type, which shows the portion of Accrued Liability covered by Assets. See our report dated October 29, 2019 for the required disclosures under GASB Statement No. 67.

SECTION VI - ACCOUNTING STATEMENT INFORMATION

			June 30, 2018		June 30, 2019
A.	**FASB ASC Topic 960 Basis**				
	1.	Present Value of Benefits Accrued and Vested to Date			
		a. Members Currently Receiving Payments	$ 978,583,985	$	1,018,213,310
		b. Vested Terminated and Inactive Members	11,427,858		12,109,179
		c. DROP	77,469,448		89,092,029
		d. Active Members	468,815,222		480,439,514
		e. Total PVVB	$ 1,536,296,513	$	1,599,854,032
	2.	Present Value of Non-Vested Accrued Benefits for Active Members	12,117,858		14,042,883
	3.	Total Present Value of Accrued Benefits	$ 1,548,414,371	$	1,613,896,915
	4.	Assets at Market Value	1,435,923,023		1,483,674,321
	5.	Unfunded Present Value of Accrued Benefits, But Not Less Than Zero	$ 112,491,348	$	130,222,594
	6.	Ratio of Assets to Value of Benefits (4) / (3)	92.7%		91.9%

<table>
<thead>
<tr><th colspan="2" style="text-align:center">Table VI-1
Accounting Statement Information</th></tr>
</thead>
</table>

B. Statement of Changes in Present Value of Accrued Benefits

Actuarial Present Value of Accrued Benefits as of June 30, 2018	$ 1,548,414,371
Increase (Decrease) During Year Attributable to:	
Passage of Time	$ 109,339,157
Benefit Paid – FY 2019	(80,576,131)
Assumption Changes	0
Plan Amendment	0
Benefits Accrued, Other Gains/Losses	36,719,518
Net Increase (Decrease)	$ 65,482,544
Actuarial Present Value of Accrued Benefits as of June 30, 2019	$ 1,613,896,915

SECTION VI - ACCOUNTING STATEMENT INFORMATION

Table VI-2
Analysis of Financial Experience
Gains and Losses in Accrued Liability During Years Ended June 30
Resulting from Differences Between Assumed Experience and Actual Experience

				Gain (or Loss) for Year ending June 30,		
Type of Activity	2014	2015	2016	2017	2018	2019
Investment Income	$ 31,937,393	$ (4,528,707)	$ (31,414,324)	$ (14,213,085)	$ (11,506,421)	$ (18,786,193)
Combined Liability Experience	11,575,441	19,857,201	10,963,818	(11,638,382)	(1,315,247)	7,959,491
Gain (or Loss) During Year from Financial Experience	$ 43,512,834	$ 15,328,494	$ (20,450,506)	$ (25,851,467)	$ (12,821,668)	$ (10,826,702)
Non-Recurring Items	(3,202,649)	0	(9,895,400)	0	0	0
Composite Gain (or Loss) During Year	**$ 40,310,185**	**$ 15,328,494**	**$ (30,345,906)**	**$ (25,851,467)**	**$ (12,821,668)**	**$ (10,826,702)**

Table VI-3
Schedule of Funded Liabilities by Type
Aggregate Accrued Liabilities For

Valuation Date June 30,	(1) Active Member Contributions	(2) Retirees Vested Terms, Beneficiaries & DROP	(3) Active Members (Employer Financed Portion)	Reported Assets*	Portion of Accrued Liabilities by Reported Assets		
					(1)	(2)	(3)
2014	$ 106,872,811	$ 913,113,803	$ 421,557,979	$ 1,224,882,430	100%	100%	49%
2015	105,765,035	961,692,517	423,602,482	1,289,972,504	100%	100%	53%
2016	110,961,165	995,104,603	454,451,944	1,333,218,360	100%	100%	50%
2017	114,966,811	1,022,229,636	503,472,954	1,394,270,429	100%	100%	51%
2018	116,981,031	1,067,481,291	528,832,329	1,458,935,865	100%	100%	52%
2019	118,210,189	1,119,414,518	542,791,614	1,521,246,708	100%	100%	52%

*Reported assets are the actuarial value of assets in this demonstration.

APPENDIX A - MEMBERSHIP INFORMATION

The data for this valuation was provided electronically by the Fairfax County Retirement System staff. Cheiron did not perform a formal audit on the data. However, we did perform checks of the data for reasonableness and consistency in accordance with Actuarial Standards of Practice No. 23 – Data Quality. The data was collected as of December 31, 2018.

Data reported in this Appendix is as of the December 31, 2018 data collection date. Covered payroll and benefits in pay status reported elsewhere in this report have been adjusted to approximate the June 30, 2019 values.

For inactive participants given with a Joint and Survivor form of benefit and no continuation percentage provided, a survivor percentage of 100% is assumed.

APPENDIX A - MEMBERSHIP INFORMATION

Summary of Membership Data as of December 31, 2018

Active Members *			
	Count	**Annual Salary Rates**	**Average Annual Salary**
Employed Prior to July 1, 1981	3	$ 463,738	$ 154,579
Employed on or After July 1, 1981	928	84,653,317	91,221
Employed on or After January 1, 2013	451	29,949,053	66,406
Total	1,382	$ 115,066,108	$ 83,261
Average Age	38.5		
Average Service	12.6		

* Excludes DROP Participants

Inactive Members and DROP Participants			
	Count	**Total Annual Benefit**	**Average Monthly Benefit**
Service Retirement	978	$ 68,814,829	$ 5,864
Service–Connected Disability	28	1,339,639	3,987
Ordinary Disability	7	157,209	1,872
Beneficiaries	140	4,229,598	2,518
Total/Average in Payment Status	1,153	$ 74,541,274	$ 5,387
DROP	59	$ 4,948,029	$ 6,989
Vested Former Members	69	$ 1,429,172	$ 1,726

APPENDIX A - MEMBERSHIP INFORMATION

	Active	DROP	Terminated Vested	Retired	Service-Connected Disability	Ordinary Disability	Widow	Beneficiary	Child	Total
Data Reconciliation from June 30, 2018 to June 30, 2019										
Participant count as of June 30, 2018	**1,350**	**50**	**70**	952	28	6	98	25	10	**2,589**
New Hires / Re-hires	102		(1)							**101**
Terminated Vested	(6)		6							**0**
DROP	(28)	28								**0**
Retired	(16)	(19)	(2)	37						**0**
Deceased with beneficiary				(8)			8			**0**
Deceased without beneficiary				(3)			(1)			**(4)**
Benefits Expired										**0**
Ordinary Disability	(1)					1				**0**
Service-Connected Disability										**0**
Return of Contributions	(19)		(4)							**(23)**
Corrections										**-**
Change	32	9	(1)	26	0	1	7	0	0	**74**
Participant count as of June 30, 2019	**1,382**	**59**	**69**	**978**	**28**	**7**	**105**	**25**	**10**	**2,663**

APPENDIX A - MEMBERSHIP INFORMATION

Distribution of Active Participants - - Total

COUNTS BY AGE/SERVICE

Age	Service								Total
	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 & Up	
Under 25	53	47	0	0	0	0	0	0	100
25 to 29	26	162	27	2	0	0	0	0	217
30 to 34	12	74	55	68	3	0	0	0	212
35 to 39	3	18	22	101	76	0	0	0	220
40 to 44	2	3	13	31	130	67	2	0	248
45 to 49	0	5	4	17	82	91	36	2	237
50 to 54	2	0	2	8	31	35	24	2	104
55 to 59	1	1	1	6	5	11	5	7	37
60 to 64	0	1	0	0	0	3	0	2	6
65 & up	0	0	0	0	0	1	0	0	1
Total	99	311	124	233	327	208	67	13	1,382

TOTAL SALARY BY AGE/SERVICE

Age	Service								Total
	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 & Up	
Under 25	$ 2,955,327	$ 2,843,992	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 5,799,319
25 to 29	1,444,441	10,887,893	1,954,791	149,772	0	0	0	0	14,436,897
30 to 34	692,147	5,365,762	4,276,204	5,564,154	266,581	0	0	0	16,164,848
35 to 39	173,053	1,358,141	1,732,778	8,487,775	6,761,754	0	0	0	18,513,501
40 to 44	144,201	245,578	983,287	2,639,007	11,978,585	6,682,468	206,002	0	22,879,128
45 to 49	0	371,101	325,309	1,369,493	7,330,306	9,063,267	4,029,545	331,951	22,820,972
50 to 54	143,712	0	160,320	665,565	2,743,847	3,428,274	2,696,459	256,980	10,095,157
55 to 59	57,642	83,898	87,373	498,834	437,838	1,030,262	502,768	787,739	3,486,354
60 to 64	0	84,511	0	0	0	310,703	0	386,908	782,122
65 & up	0	0	0	0	0	87,810	0	0	87,810
Total	$ 5,610,523	$ 21,240,876	$ 9,520,062	$ 19,374,600	$ 29,518,911	$ 20,602,784	$ 7,434,774	$ 1,763,578	$ 115,066,108

APPENDIX B - ACTUARIAL ASSUMPTIONS AND METHODS

A. Long-Term Assumptions Used to Determine System Costs and Liabilities

1. **Demographic Assumptions**

   a. **Healthy Mortality**

Annual Deaths Per 10,000 Members Mortality Projected to 2019		
Age	Male	Female
20	4	2
25	5	2
30	5	2
35	6	3
40	7	4
45	11	7
50	45	27
55	63	36
60	85	54
65	123	83
70	189	132
75	305	216
80	514	365
85	896	646
90	1,591	1,167
95	2,521	1,935
100	3,578	2,870

110% and 100% of the RP-2014 Healthy Annuitant Mortality Table for males and females, respectively, backed down to 2006 then projected using the RPEC-2015 model, with an ultimate rate of 0.65% for ages 20-85 grading down to an ultimate rate of 0% for ages 115-120 and convergence to the ultimate rate in the year 2015. The valuation uses fully generational projection of mortality improvements. Sample rates shown are those projected through the valuation date.

20% of pre-retirement deaths are assumed to be service-connected.

APPENDIX B - ACTUARIAL ASSUMPTIONS AND METHODS

b. Disabled Mortality

Annual Deaths Per 10,000 Members Mortality Projected to 2019		
Age	Male	Female
45	172	104
50	206	134
55	233	168
60	265	203
65	321	247
70	412	333
75	561	487
80	801	735

100% and 115% of the RP-2014 Disabled Annuitant Mortality Table for males and females, respectively, backed down to 2006 then projected using the RPEC-2015 model, with an ultimate rate of 0.65% for ages 20-85 grading down to an ultimate rate of 0% for ages 115-120 and convergence to the ultimate rate in the year 2015. The valuation uses fully generational projection of mortality improvements. Sample rates shown are projected through the valuation date.

APPENDIX B - ACTUARIAL ASSUMPTIONS AND METHODS

c. **Termination of Employment (Prior to Normal Retirement Eligibility)**

Annual Terminations Per 1,000 Members	
Years of Service	**Terminations**
0	70
1	50
2	40
3	33
4	28
5	23
6	20
7	15
8	14
9	11
10	8
11	7
12	6
13	6
14	5
15	5
16	4
17	4
18	3
19	3
20	2
21	2
22	1
23	1
24	1
25 or more	0

It is assumed that members who terminated before normal or early retirement age elect to receive a refund of contributions instead of vested benefits.

APPENDIX B - ACTUARIAL ASSUMPTIONS AND METHODS

d. Disability

Annual Disabilities Per 1,000 Members*	
Age	**Male and Female**
20	1
25	1
30	1
35	1
40	2
45	3
50	5
55	8
60	8

* 70% of disabilities are assumed to be service-connected. Of these, 100% are assumed to receive Workers' Compensation benefits.

e. Retirement/DROP

Years of Service	Retirement/DROP*
5-24	5%
25	40
26	40
27	40
28	40
29	40
30	40
31	40
32	40
33	40
34	40
35+	100

* 70% of those who leave under this decrement are assumed to DROP, with the other 30% taking immediate retirement.

APPENDIX B - ACTUARIAL ASSUMPTIONS AND METHODS

f. Merit/Seniority Salary Increase (in addition to General Wage Increases)

Years of Service*	Merit/Seniority Increase
0	7.00%
1	6.00
2	5.00
3	4.00
4	3.00
5	2.00
6+	1.00

g. Family Composition

For purposes of valuing the pre-retirement death benefit, an assumption concerning how many employees are married is needed. The assumption used in this valuation is that 80% of active employees are married at death and that the female spouse is five years younger than the male spouse. In addition, each married employee is assumed to have two children, 22 and 24 years younger than the employee.

h. Sick Leave Credit

Unused sick leave balances as reported for each active member are used as of the valuation date. Future sick leave accruals are assumed to accrue at 100% of each participant's annual average but are capped at 124 hours per year.

2. Economic Assumptions

a. Rate of Investment Return: 7.25%
b. Rate of General Wage Increase: 2.75%
c. Rate of Increase in Cost of Living: 2.50% *
d. Rate of Increase in Total Payroll
    (for Amortization):   2.75%
e. Administrative Expenses as a
    Percentage of Payroll: 0.40%

*   Benefit increases are limited to 4% per year.

3. Rationale for Assumptions

The actuarial assumptions were adopted by the Board of Trustees upon the recommendation of the actuary, based on an experience study performed in 2016. The results of this study were presented in a report dated June 2016 and are incorporated into this report by reference.

4. Changes Since Last Valuation

None

APPENDIX B - ACTUARIAL ASSUMPTIONS AND METHODS

B. Actuarial Methods

1. Funding Method

The Entry Age Normal Cost method is used to determine costs. Under this method, the employer contribution has three components: the normal cost, the payment toward the unfunded actuarial liability, and the expense rate.

The normal cost is a level percent of pay cost, which, along with the member contributions, will pay for projected benefits at retirement for each plan participant.

The actuarial liability is that portion of the present value of projected benefits that will not be paid by future employer normal costs or member contributions. The difference between this liability and funds accumulated as of the same date is referred to as the unfunded actuarial liability.

The expense rate is added to cover the System's administrative expenses.

The employer's total contribution rate is equal to the normal cost rate plus rate changes due to amendments passed or assumption changes adopted since July 1, 2001 plus a 15-year level percent of pay amortization of the UAL that existed on June 30, 2018. In the future, additional amortization bases will be created each year. Finally, the rate includes an expense rate.

2. Actuarial Value of Assets

For purposes of determining the County contribution to the System, we use an actuarial value of assets. The asset adjustment method dampens the volatility in asset values that could occur because of fluctuations in market conditions. Use of an asset smoothing method is consistent with the long-term nature of the actuarial valuation process.

In determining the actuarial value of assets, we calculate an expected actuarial value based on cash flow for the year and imputed returns at the actuarial assumption. This expected value is compared to the market value and one-third of the difference is added to the preliminary actuarial value to arrive at the final actuarial value.

3. Valuation Timing

All participant data is collected as of the December 31 prior to the valuation date. Initial valuation runs are performed as of December 31, and the resulting liabilities are then adjusted for six months to the June 30 valuation date. The adjustment takes into account the actual July 1 cost-of-living increase and any other changes that are known to have occurred in that six-month period.

APPENDIX B - ACTUARIAL ASSUMPTIONS AND METHODS

4. Changes Since Last Valuation

Annual 15-year closed amortization bases are now being established to calculate the contribution rate.

APPENDIX C - SUMMARY OF PLAN PROVISIONS

1. Membership

The plan covers Police Officers who are not covered by the Fairfax County Employees' Retirement System, the Uniformed Retirement System, or the VRS. In addition, former Park Police Officers who elected, effective January 22, 1983, to transfer to this System from the Uniformed Retirement System are eligible for membership.

Members hired prior to January 1, 2013 joined Plan A, those hired on or after January 1, 2013 and prior to July 1, 2019 joined Plan B. Members hired on or after July 1, 2019 will join Plan C.

2. Member Contributions

8.65% of compensation. Starting on January 1, 1984, the contributions are made through an "employer pick-up" arrangement, which results in deferral of taxes on the contributions.

Interest is credited at the rate of 5% per year.

3. Credited Service

All service as a member, including the period a member is on service-connected disability retirement plus certain purchased prior service for re-employed officers, is credited. In addition, credit is allowed at the rate of one month for 172 hours of accrued unused sick leave. For those hired on or after January 1, 2013, the amount of unused sick leave that may be used is capped at 2,080 hours.

4. Average Final Compensation

Compensation includes salary including pick-up contributions, roll call, and holiday pay. Average final compensation is the average over the high 36 consecutive months (or shorter period of total service) including the period covered by unused sick leave.

5. Normal Retirement

Eligibility

For members employed before July 1, 1981, age 55 or completion of 20 years of service. For members employed after July 1, 1981, age 55 or completion of 25 years of service.

Benefit

Plan A and B Benefits: 2.8% of average final compensation for each year of service. The benefit is then increased by 3%.

Plan C Benefits: 2.8% of average final compensation for each year of service.

APPENDIX C - SUMMARY OF PLAN PROVISIONS

6. Early Retirement

Eligibility

20 years of service (does not apply if hired before July 1, 1981)

Benefit

Plan A and B: Normal retirement benefit calculated using average final compensation and service at early retirement, actuarially reduced. The resulting benefit is then increased by 3%.

Plan C: Normal retirement benefit calculated using average final compensation and service at early retirement, actuarially reduced.

7. DROP (Deferred Retirement Option Program)

Eligibility

All members are eligible for DROP participation upon attaining eligibility for normal service retirement. Members can only participate in DROP once, and their election is irrevocable.

Benefit

The benefit scheduled to begin at normal retirement will be credited to a separate DROP account within the Retirement System, accumulating with interest while the member continues to work for a period of 36 months. Upon completion of the three-year period, DROP participation ends, and participants must terminate employment. At that time, the participant will receive payment of the accumulated DROP benefits and begin receiving his or her monthly retirement benefit (in the same amount as determined at commencement of DROP participation, plus annual cost-of-living increases).

The DROP account will be credited with interest at an annual rate of 5%, compounded monthly.

Death or Disability during DROP

Non Service-Connected: The effective date of the death or disability will be treated as the end of the DROP participation.

Service-Connected Disability: The member may elect either (1) to receive the service-connected disability benefits to which he or she would otherwise be entitled (forfeiture of DROP balance) or (2) the normal retirement benefit plus the DROP account balance.

Service-Connected Death: The beneficiary will receive payment of the accumulated DROP benefits and the regular service-connected benefit.

APPENDIX C - SUMMARY OF PLAN PROVISIONS

8. Service-Connected Disability

<u>Eligibility</u>

No age or service requirement

<u>Benefit</u>

For total disability, 66-2/3% of compensation as of the date of disability less 100% of Virginia Workers' Compensation benefit, payable to 25 years of service at which time the benefit converts to 60% of the current compensation for the position from which the member retired.

9. Ordinary Disability

<u>Eligibility</u>

No age or service requirement

<u>Benefit</u>

Plan A and B: If not eligible for normal or early retirement benefit, greater of (i) 10% of average final compensation or (ii) amount determined under normal retirement benefit formula, based on average final compensation and credited service as of disability date. The resulting benefit is then increased by 3%.

Plan C: If not eligible for normal or early retirement benefit, greater of (i) 10% of average final compensation or (ii) amount determined under normal retirement benefit formula, based on average final compensation and credited service as of disability date.

10. Service-Connected Death

<u>Eligibility</u>

No age or service requirement

<u>Benefit</u>

Plan A and B: Spouse may elect a benefit of 66-2/3% of member's current salary in lieu of ordinary death benefit. The resulting benefit is then increased by 3%.

Plan C: Spouse may elect a benefit of 66-2/3% of member's current salary in lieu of ordinary death benefit.

APPENDIX C - SUMMARY OF PLAN PROVISIONS

11. Ordinary Death

Eligibility

No age or service requirement (covers death while active or after normal, early, or service-connected disability benefits)

Benefit

Surviving spouse receives $1,000 per month payable for the life of the spouse but ceasing upon remarriage. Surviving children under 18, or under age 23 if full-time students, receive $400 per month. The maximum combination of benefits is $2,000 per month. This benefit will be increased by cost-of-living adjustments in the future. The monthly benefits for the year beginning July 1, 2019 are $2,388.48, $955.39, and $4,776.95, respectively.

12. Vesting

Eligibility

Five years of service

Benefit

Normal retirement benefit based on average final compensation and service at date of termination. Benefit is payable in full at age 55 or actuarially reduced and payable at early retirement age.

A member may withdraw his contributions at termination, in which case no deferred vested benefit is payable.

13. Withdrawal

Eligibility

Not eligible for other benefits

Benefit

Member contribution account balance

APPENDIX C - SUMMARY OF PLAN PROVISIONS

14. Form of Payment

The normal form of payment is a life annuity with a guarantee that at least the amount of member contributions will be paid to the retiree or beneficiaries.

A member who is entitled to a normal or early retirement benefit may elect an actuarially equivalent Joint and Survivor pop-up benefit.

15. Cost-of-Living Adjustment

Each July 1, benefits are increased by the lesser of 4% or the increase in the cost-of-living index. The increase is prorated for those who have not been retired for a full year.

Cost-of-living adjustments do not apply to deferred vested benefits prior to benefit commencement. Service connected disability benefits, commencing prior to July 1, 1981, are increased by the salary index used in the actuarial valuation instead of by the cost-of-living index.

In addition to automatic adjustments, benefits may be further increased on an ad hoc basis, if actuarial experience has been favorable.

16. Changes Since Last Valuation

None