



# **Fire and Police Employees' Retirement System of the City of Baltimore**

## **Actuarial Valuation Report as of June 30, 2016**

**Produced by Cheiron**

**October 2016**

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October 18, 2016

Board of Trustees  
Fire and Police Employees' Retirement System  
of the City of Baltimore  
7 East Redwood Street, 18<sup>th</sup> Floor  
Baltimore, Maryland 21202-3470

Dear Members of the Board:


We are pleased to submit the June 30, 2016 actuarial valuation report of the Fire and Police Employees' Retirement System of the City of Baltimore (System). This report contains information on System assets, liabilities, and contributions and discloses required employer contribution levels. Financial disclosures are provided in a separate Governmental Accounting Standards Board (GASB) Statement Nos. 67/68 report.

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, member data, and financial information. The actuarial assumptions reflect our understanding of the likely future experience of the System and represent our best estimate, in cooperation with the Board's views, for the future experience of the System. The required contribution developed in this report is only applicable to the employer contributions for Fiscal Year 2018 and relies on future System experience conforming to the underlying assumptions. To the extent that actual System experience deviates from the underlying assumptions, the results will vary accordingly.


To the best of our knowledge, this report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices that are consistent with the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion 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.

This report was prepared solely for the Fire and Police Employees' Retirement System of the City of Baltimore for the purposes described herein, except that the System auditor may rely on this report solely for the purpose of completing an audit related to the matters herein. This valuation report is not intended to benefit any third party, and Cheiron assumes no duty or liability to any such party.

Sincerely,  
Cheiron



Fiona E. Liston, FSA, EA  
Principal Consulting Actuary



Elizabeth Wiley, FSA, EA  
Consulting Actuary

## FOREWORD

Cheiron is pleased to provide the annual actuarial valuation report of the **Fire and Police Employees' Retirement System of the City of Baltimore (System)** as of June 30, 2016. The purpose of this report is to:

- 1) **measure and disclose**, as of the valuation date, the financial condition of the System,
- 2) **report** on past and expected financial trends, and
- 3) **determine** the recommended employer contributions for Fiscal Year 2018.

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. This valuation report is organized as follows:

**Section I** presents a summary of the valuation and compares this year's results to last year's results.

**Section II** contains exhibits relating to the valuation of assets.

**Section III** shows the various measures of liabilities and required contributions and presents an analysis of the experience gains and losses over the past year and the source of changes to the unfunded actuarial liability.

**Section IV** develops the City of Baltimore (City) and State of Maryland (State) contribution rates.

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 developing the valuation.

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, the plan provisions, employee data, and financial information.

The actuarial assumptions reflect our understanding of the likely future experience of the System, and the assumptions as a whole 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.

## SECTION I SUMMARY

### General Comments

This is the fifth actuarial valuation report prepared for the System by Cheiron. The results prior to June 30, 2011 in the historic trend charts are those produced by the System's former actuary.

The employers' annual contributions to this System are determined as the sum of the net normal cost rate, reflecting a provision for expenses, and an amortization of the System's unfunded actuarial liability. The employer contribution rate will change when benefits are modified or assumptions are changed. The rate also changes in response to gains and losses on either the assets or the liabilities of the System.

The key results of the June 30, 2016 actuarial valuation are as follows:

- The total recommended employer contribution for FY 2018 is \$137,715,266, increased from \$129,645,547 for FY 2017 as a reflection of the prior years' experience. The City's portion of the total employer contribution for FY 2018 is \$136,832,361 compared to \$128,806,072 for FY 2017.
- Investments earned 0.12%, on a market value basis, for the period ending June 30, 2016, resulting in an investment loss on the market value of assets of \$179 million. The actuarial value of assets return was 4.69%, producing a net loss of \$76 million to the System on that basis. Both returns are measured against the prior year's 7.50% expected return.
- The unfunded actuarial liability increased from \$961 million on June 30, 2015 to \$1,040 million on June 30, 2016 due to the actuarial investment loss discussed above and a liability loss of \$11 million. The liability loss is primarily due to salary increases being higher than expected. The System's funded ratio on actuarial value of assets basis decreased from 72.8% as of June 30, 2015 to 71.5% as of June 30, 2016.

FIRE AND POLICE EMPLOYEES' RETIREMENT SYSTEM OF THE CITY OF BALTIMORE  
ACTUARIAL VALUATION AS OF JUNE 30, 2016

**SECTION I  
SUMMARY**

**Summary Tables**

The tables below provide details on the development of the City's contribution, together with the corresponding figures from the June 30, 2015 report. Details of this development, along with the State contribution calculations, are provided in Section IV.

Table I-1 Valuation Summary of City Only Costs				
	2015 Valuation Applies to FY 2017		2016 Valuation Applies to FY 2018	
	Amount	% of Pay	Amount	% of Pay
<b>1. Contributions</b>				
Total Normal Cost	\$ 71,142,029	23.87%	\$ 71,354,809	23.74%
Expense Load	4,470,722	1.50%	4,509,327	1.50%
Expected Member Contributions for FY	<u>(29,804,814)</u>	<u>(10.00%)</u>	<u>(30,062,181)</u>	<u>(10.00%)</u>
Net Normal Cost	\$ 45,807,937	15.37%	\$ 45,801,955	15.24%
Interest to Valuation Date + One Year	\$ 1,374,238	0.46%	\$ 1,374,059	0.46%
Amortization of Unfunded Actuarial Liability	<u>\$ 81,235,759</u>	27.26%	<u>\$ 89,244,023</u>	29.69%
Net Plan Cost at Valuation Date + One Year	\$ 128,417,934	43.09%	\$ 136,420,037	45.39%
Adjustment to Payment Date*	<u>\$ 388,138</u>	0.13%	<u>\$ 412,324</u>	0.13%
Net Plan Cost at Valuation Date + One Year (with adjustment)	\$ 128,806,072	43.22%	\$ 136,832,361	45.52%
<b>2. Unfunded Liabilities</b>				
Actuarial Liability				
Actives	\$ 1,161,657,269		\$ 1,199,552,973	
Retirees and Dependents	2,340,312,254		2,408,100,284	
Terminated Vesteds	<u>658,073</u>		<u>711,151</u>	
Total	\$ 3,502,627,596		\$ 3,608,364,408	
Allocated Actuarial Value of Assets	\$ 2,550,644,388		\$ 2,578,227,585	
Unfunded Actuarial Liability	\$ 951,983,208		\$ 1,030,136,823	

\* FYE 2017 and 2018 contributions are assumed to be 49.85% at July 1 and 50.15% at August 1.

FIRE AND POLICE EMPLOYEES' RETIREMENT SYSTEM OF THE CITY OF BALTIMORE  
ACTUARIAL VALUATION AS OF JUNE 30, 2016

**SECTION I  
SUMMARY**

The following tables summarize changes in System membership over the past year.

Table I-2 Active Membership Summary			
Active Members (City & State)			
	2015	2016	%
			Increase
Active members	4,248	4,094	(3.63%)
Total payroll	\$ 298,354,900	\$ 300,855,075	0.84%
Average salary	\$ 70,234	\$ 73,487	4.63%
			<b>Absolute Difference</b>
Average age	40.24	40.69	0.45
Average service	13.62	13.98	0.36

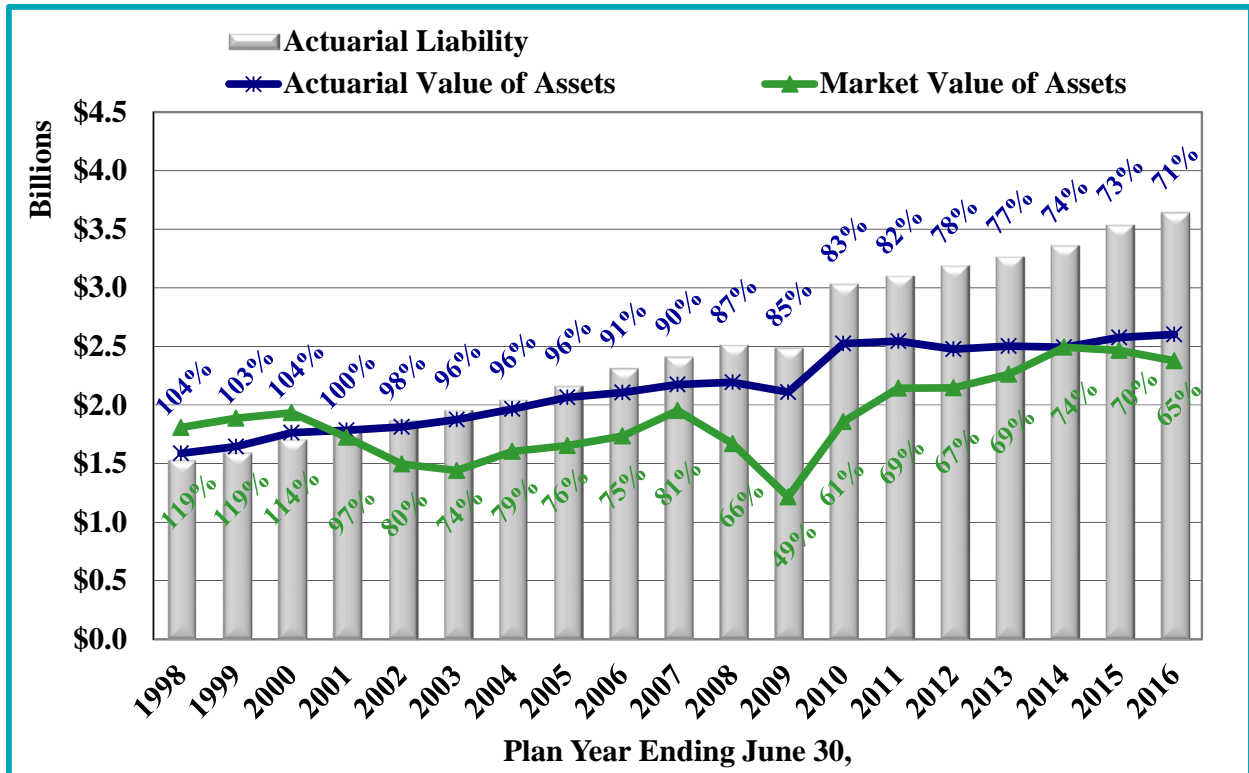
Table 1-3 Inactive Membership Summary						
	Number of Retirees			Average Annual Benefit Amount		
	2015	2016	%	2015	2016	%
			Increase			Increase
Normal Service Retirement	3,771	3,787	0.4%	\$ 40,330	\$ 41,604	3.2%
Early Retirement	2	4	100.0%	25,706	27,157	5.6%
Discontinued Service	13	13	0.0%	31,379	31,545	0.5%
Non-Line-of-Duty Disability	255	248	(2.7%)	19,313	19,382	0.4%
Line-of-Duty Disability	734	735	0.1%	35,767	36,411	1.8%
Beneficiaries of Above	1,299	1,314	1.2%	17,743	18,011	1.5%
Non-Line-of-Duty Death	132	128	(3.0%)	24,098	24,670	2.4%
<u>Line-of-Duty Death</u>	<u>62</u>	<u>62</u>	<u>0.0%</u>	<u>45,411</u>	<u>46,213</u>	<u>1.8%</u>
<b>Total</b>	<b>6,268</b>	<b>6,291</b>	<b>0.4%</b>	<b>\$ 33,945</b>	<b>\$ 34,864</b>	<b>2.7%</b>

**SECTION I  
 SUMMARY**

**Historical Trends**

It is important to take a step back from these latest results and view them in the context of the System's recent history. Below we present a series of charts displaying key factors in the valuations of the last 19 years.

**Assets and Liabilities**



The bars represent the actuarial liability as measured for funding purposes in the valuations. We compared this liability measure to the actuarial value of assets in each report to develop the actuarial value of assets funded ratios for each year; these are the blue percentages shown in the graph along the top of each bar. We also compare these liability measures to the market value of assets in each report to develop the market value of assets funded ratios for each year; these are the green percentages shown in the graph in the middle of each bar.

As shown, the System had its highest funded ratio in the late 90's, when the ratio, based on both market value of assets and actuarial value of assets, was over 100%. The two market declines in 2000 – 2002 and in 2007 – 2009 caused declines in the funded ratio. Both the liability and assets shown in 2010 and later include the former BIF, ERF, and MSF funds, as well as their liabilities, but the actuarial assets reflect a gradual recognition of these balances through 2014, at which point they were fully recognized. This recognition is largely responsible for the decline in the



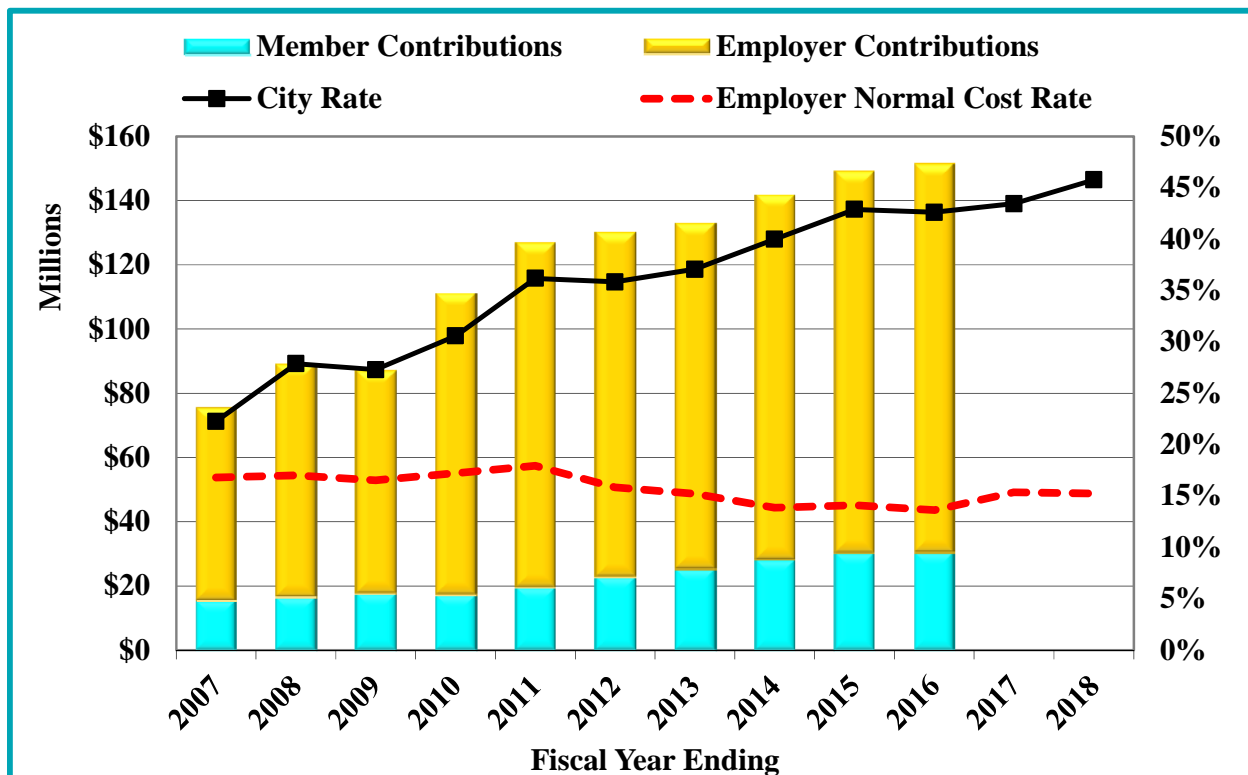
**SECTION I  
 SUMMARY**

funded ratio based on the actuarial value of assets leading up to the full recognition of these funds in 2014. The actuarial value of assets was set equal to the market value in 2014, with smoothing to develop the actuarial value of assets begun again in 2015. In 2015, the funded ratio decreased primarily due to investment losses and changes to the actuarial assumptions. In 2016, the funded ratio decreased primarily due to investment losses.

**Contribution Rates**

The stacked bars in the graph below show the contributions made by the employers and members and are read using the left-hand scale, in millions of dollars. The black line shows the employer contribution rate for the City-only as a percent of payroll and is read using the right-hand scale. There are two more years of contribution rates shown than contribution dollar amounts, since we already know the rates in effect for Fiscal Years 2017 and 2018. We will not know the actual dollar amounts contributed by the City and State until the close of those years.

The red line shows the portion of the total normal cost rate that is paid by the employers rather than by the members. The normal cost measures the value of benefits to be accrued in the coming year taking into consideration future salary increases. The employer-paid portion of the total normal cost rate decreases over the period FY 2011 through FY 2014 as member contributions increased. The employer normal cost rate increased in FY 2017 due to the changes in both assumptions and funding method.

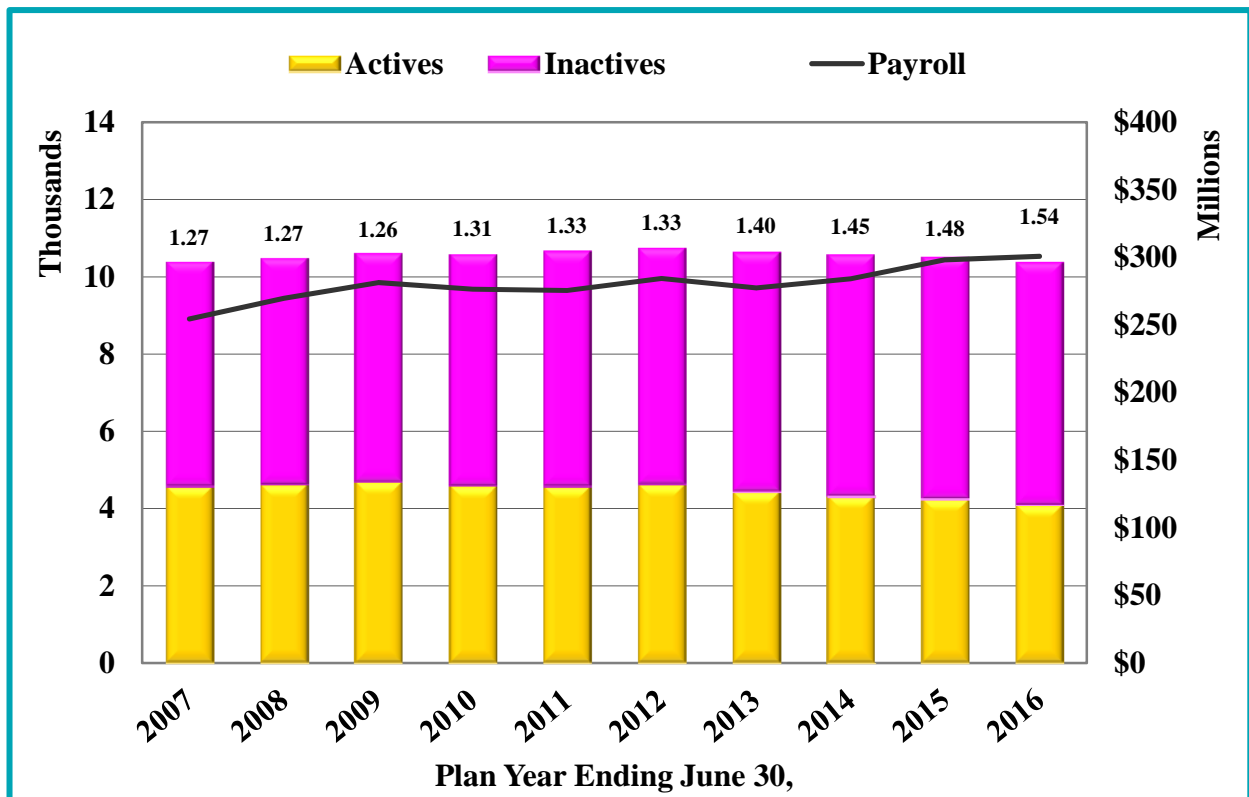


**SECTION I  
 SUMMARY**

**Member Trends**

The chart below shows the membership counts of the System at successive valuations. The numbers which appear above each bar represent the ratio of the number of inactive members to active members at each valuation date. The number of inactives per each active has been steadily increasing since 2007.

The black line in the chart below shows the total covered payroll over the period and is read using the right-hand scale. Contributions are made as a percent of payroll, so changes in this key statistic have an impact on the System's funding status.



**SECTION I  
SUMMARY**

**Projections**

The charts in this section show the expected progress of the System's funding status over the next 25 years, measured in terms of the funded ratio, the expected employer contribution rates, and the total dollar amounts of contributions, assuming that the Plan is ongoing.

It is important to note that the experience will not conform exactly to the assumptions every year. As a result, in addition to the baseline projection, we provided additional stress testing based on varying returns in the future. For each projection set, we assume three different future investment return scenarios: baseline returns of 7.50%, optimistic returns of 9.50%, and pessimistic returns of 5.50%.

For purposes of these projections, a gain or loss will assume the layered approach once the amortization period reaches 15 years, and each gain or loss will be amortized over its own 15-year period in addition to the remaining years of the initial closed layer.

Finally, the projections assume there will be no future gains or losses on the liability. These projections are also based on assuming all of the valuation assumptions are exactly met, including the long-term rate of return assumed for each scenario and covered payroll increasing by the inflation assumption, 3.00% per year in all three scenarios.

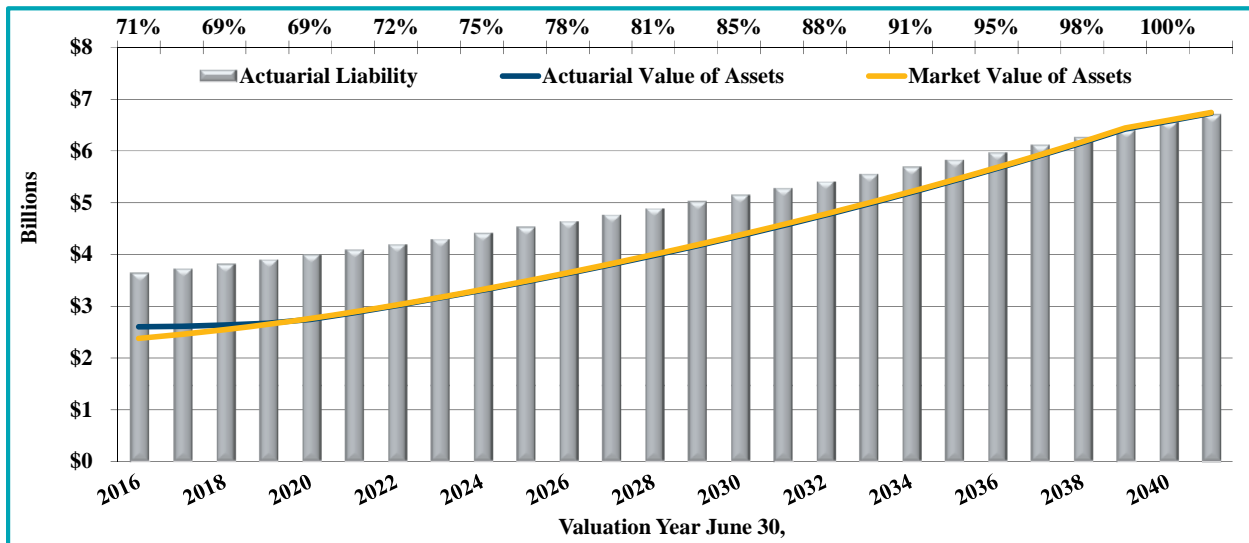
**SECTION I  
 SUMMARY**

**1. Asset and Liability Projections**

This first set of projection charts compares the market value of assets (gold line) and the actuarial or smoothed value of assets (blue line) to the Plan's actuarial liabilities (gray bars). In addition, at the top of each chart, we show the Plan's funded ratio on an actuarial value of assets basis (ratio of actuarial value of assets to actuarial liabilities). The years shown in the chart signify the valuation date as of July 1 of the labelled year.

**Baseline Returns of 7.50%**

The first chart below shows that if all actuarial assumptions, including the rate of return assumption, are exactly met, the System's funded ratio on an actuarial value of assets basis, shown along the top of the graph, is projected to improve from the current level of 71% to 100% by the 2039 valuation.

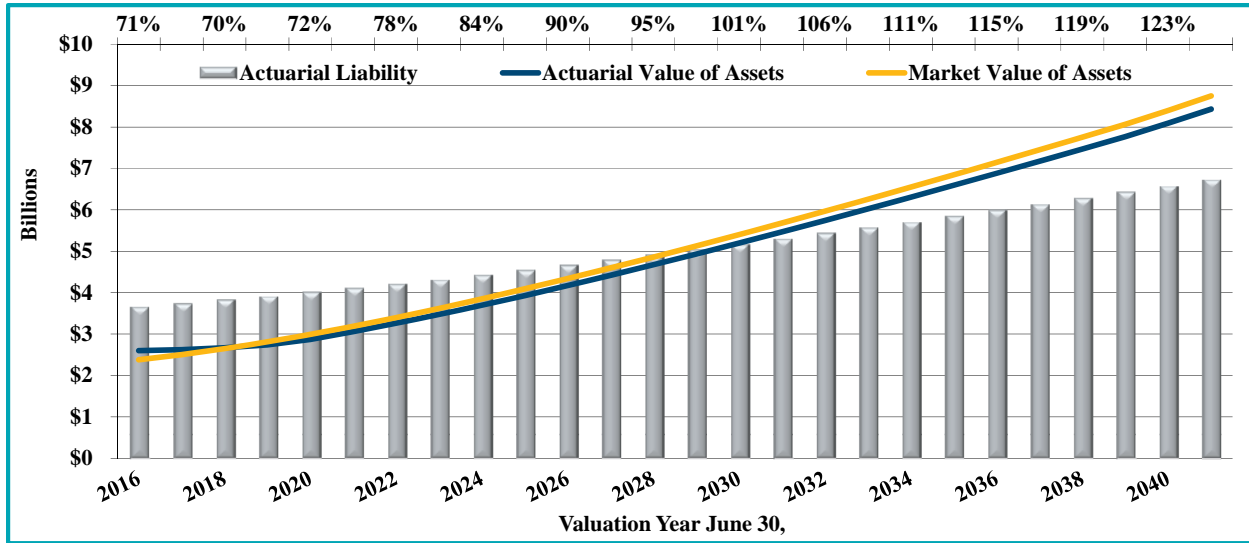


The charts on the next page show the projection if the rate of return assumption is +/- 2.00% than the assumed 7.50% rate of return in each year of the projection.

**SECTION I  
 SUMMARY**

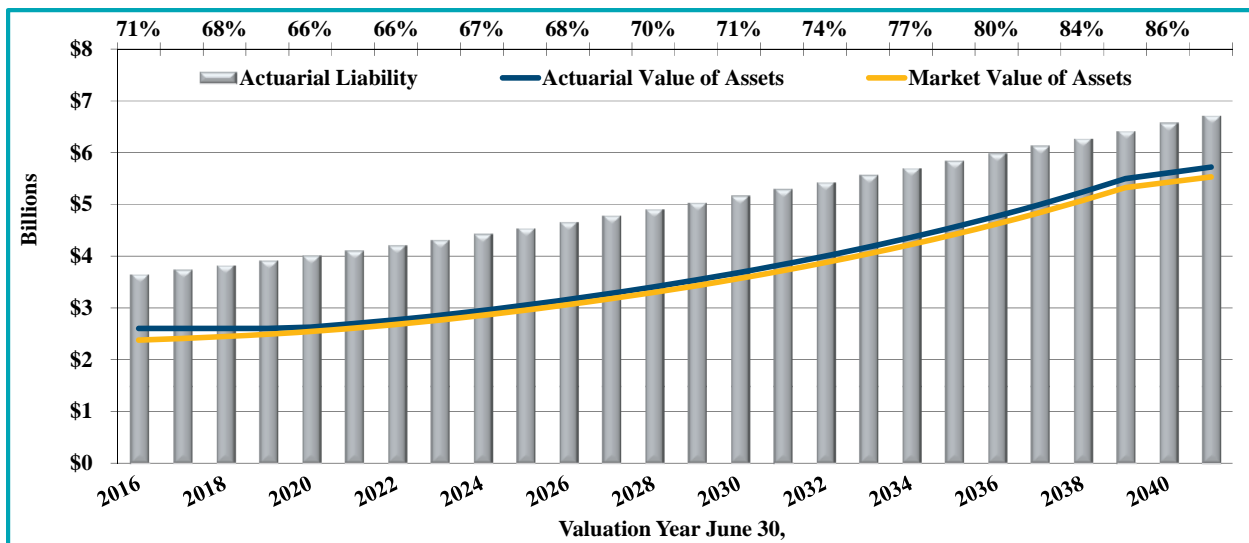
**Optimistic Returns of 9.50%**

If the System earns 2.00% greater than the assumed rate of return in each year of the projection, with all other assumptions being exactly met, the funded ratio is projected to increase to 100% by the 2030 valuation, nine years earlier than in the baseline projection.



**Pessimistic Returns of 5.50%**

If the System earns 2.00% less than the assumed rate of return in each year of the projection, with all other assumptions being exactly met, the funded ratio is projected to increase to only 86% by 2039, when 100% is reached in the baseline projection.



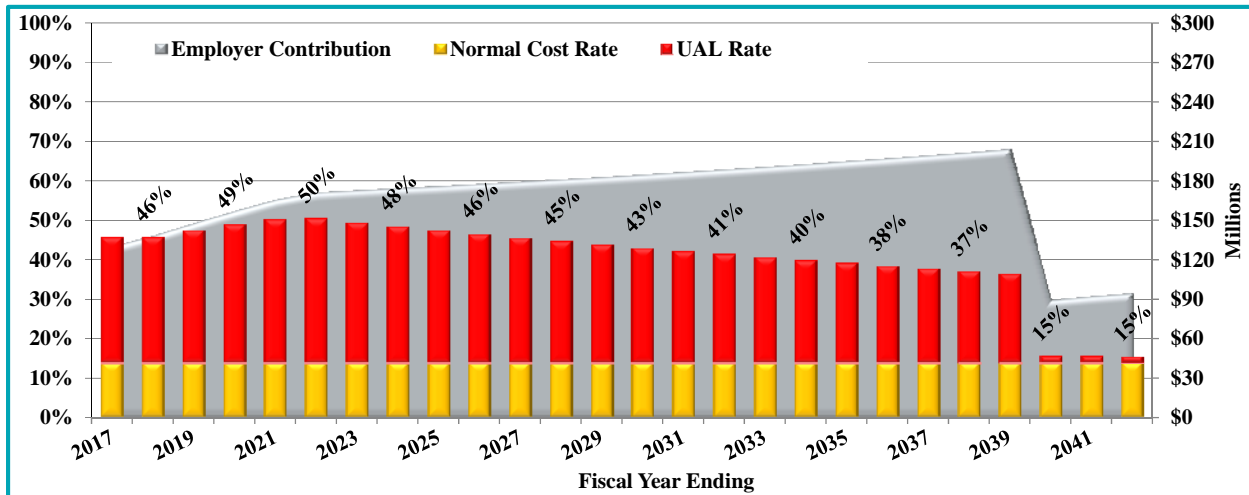
**SECTION I  
 SUMMARY**

**2. Contribution Rate Projections**

The next set of charts shows projection of the System's projected employer contribution rates (red/gold bars) and the projected dollar amount of employer contributions (the gray shaded area) over the 25-year period shown, based on three different rate of return levels with all other valuation assumptions being exactly met. The contribution rates are read using the left-hand axis, and the dollars are read using the right-hand axis.

**Baseline Returns of 7.50%**

The first chart below shows that the employer contribution rate is projected to increase to 50% as a percent of payroll by FY 2022 as the deferred investment losses continue to be recognized. Afterward, the employer contribution rate is projected to decrease as the unfunded actuarial liability (UAL) is paid down under the baseline scenario where the rate of return assumption is exactly met. The expected decrease in the UAL rate is due to the level dollar amortization being expressed as a percent of an increasing payroll. In this projection, the initial closed layer UAL is fully paid off with the FY 2039 payment.

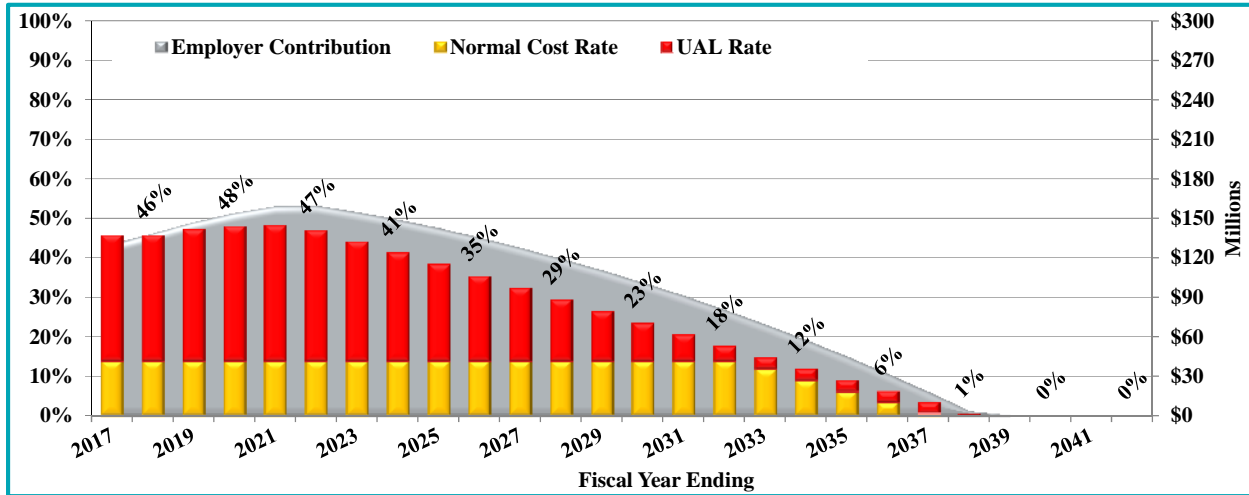


The charts on the next page show the projection if the rate of return assumption is +/- 2.00% than the assumed 7.50% rate of return in each year of the projection.

**SECTION I  
 SUMMARY**

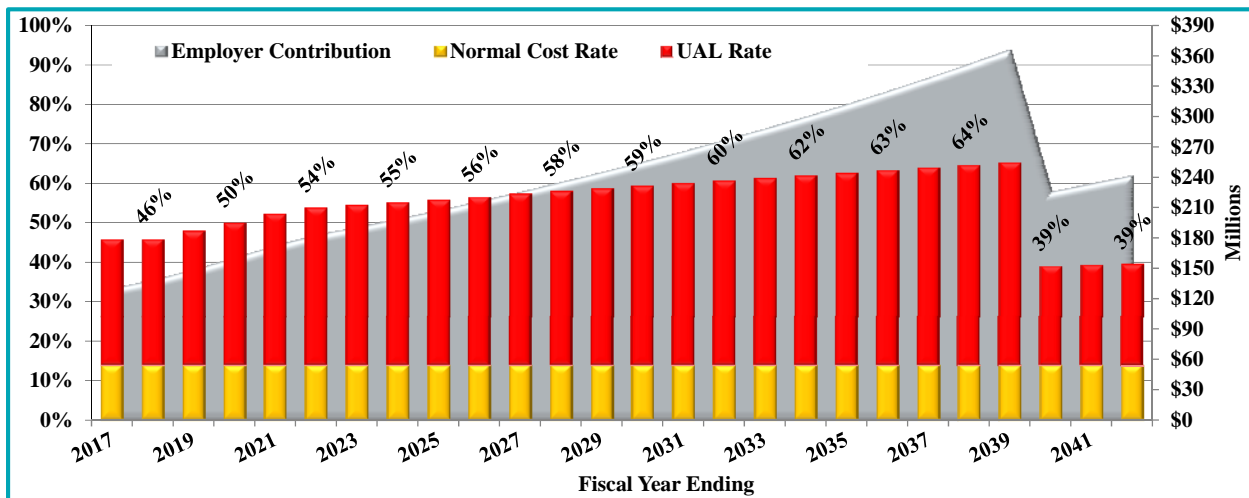
**Optimistic Returns of 9.50%**

If the System earns 2.00% greater than the assumed rate in each year of the projection, the employer contribution rate will begin to rapidly decrease and eventually reach 0.0% in FY 2039. In FY 2039, and all future years, the investment gains would cover all the employer normal costs (including administrative expenses).



**Pessimistic Returns of 5.50%**

If the System earns 2.00% less than the assumed rate in each year of the projection, the employer contribution rate will steadily increase to about 65% by FY 2039 in the final year of the initial 25-year closed period. In FY 2040, the initial closed layer UAL is fully paid off, and the entirety of the UAL rate shown is due to the funding of asset losses from the 15-year layered approach during the projection period.



## SECTION II ASSETS

Assets play a key role in the financial operation of the System and in the decisions that the Board of 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 upon benefit levels, employer contributions, and the ultimate security of members' benefits.

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

- Disclosure of System assets as of June 30, 2016,
- Statement of the changes in market values during the year,
- Development of the actuarial value of assets, and
- A comparison of the year's investment performance to the return assumption.

### **Disclosure**

The market values of assets represent "snap-shot" or "cash-out" values, which provide the principal basis for measuring financial performance from one year to the next. However, market values can fluctuate widely with corresponding swings in the marketplace. As a result, market values are usually not suitable for budgeting annual contributions.

The actuarial values of assets are market values that have been smoothed; they are used for evaluating the System's ongoing ability to meet its obligations. Current methods employed by this System set the actuarial value equal to the market value, adjusted for a five-year phase-in of experience gains and losses. This method was implemented beginning in 2015 following the actuarial value of assets being set equal to the market value of assets for the June 30, 2014 valuation.



FIRE AND POLICE EMPLOYEES' RETIREMENT SYSTEM OF THE CITY OF BALTIMORE  
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**SECTION II  
ASSETS**

The assets below are based upon unaudited financial data furnished by the System's staff. The change in market value of assets for the six funds during the valuation year ending June 30, 2016 is summarized below.

Table II-1 System Market Value of Assets as of June 30, 2016					
	Annuity Savings Fund	Annuity Reserve Fund	Pension Accumulation Fund	Pension Reserve Fund	Paid Up Benefit Fund
Fund Balance on 6/30/2015	\$ 300,379,071	\$ 322,212,792	\$ 75,579,439	\$ 1,783,076,480	\$ (15,700,445)
Ordinance Transfers	\$ 0	\$ 0	\$ 0	\$ (14,671,080)	\$ 15,700,445
Actuarial Transfers	\$ 0	\$ 25,746,968	\$ (280,955,444)	\$ 255,208,476	\$ 0
Adjusted Fund Balance on 6/30/2015	\$ 300,379,071	\$ 347,959,760	\$ (205,376,005)	\$ 2,023,613,876	\$ 0
Contributions					
Member	\$ 30,549,801	\$ 0	\$ 0	\$ 0	\$ 0
Employer (City/State)	\$ 0	\$ 0	\$ 121,115,085	\$ 0	\$ 0
Net Investment Income					
Interest, Dividends, and Realized Capital Gains	\$ 9,722,993	\$ 0	\$ 51,687,384	\$ 0	\$ 90,480,300
Unrealized Gains (Losses)	\$ 0	\$ 0	\$ (57,760,463)	\$ 0	\$ (80,440,834)
Expenses	\$ 0	\$ 0	\$ (9,872,020)	\$ 0	\$ (150,515)
<b>Total Investment Income</b>	<b>\$ 9,722,993</b>	<b>\$ 0</b>	<b>\$ (15,945,099)</b>	<b>\$ 0</b>	<b>\$ 9,888,951</b>
Net ERS Fund Transfers	\$ (21,020,133)	\$ 21,088,764	\$ (68,631)	\$ 0	\$ 0
Payments of Benefit & Refunds	\$ (5,626,338)	\$ (31,497,271)	\$ (15,162,952)	\$ (156,181,902)	\$ (30,374,050)
Administrative Expenses	\$ 0	\$ 0	\$ (4,407,296)	\$ 0	\$ 0
Fund Balance on 6/30/2016	\$ 314,005,394	\$ 337,551,253	\$ (119,844,898)	\$ 1,867,431,974	\$ (20,485,099)
Ordinance Transfers	\$ 0	\$ 0	\$ 0	\$ (21,149,218)	\$ 20,485,099
Actuarial Transfers	\$ 0	\$ 27,286,471	\$ (255,943,680)	\$ 228,657,209	\$ 0
Adjusted Fund Balance on 6/30/2016	\$ 314,005,394	\$ 364,837,724	\$ (375,788,578)	\$ 2,074,939,965	\$ 0

**SECTION II  
ASSETS**

The chart below shows the calculation of the investment gain/loss. On a market value basis, the System earned a 0.12% return, a total investment income of \$3.0 million during FY 2016, resulting in a net System asset loss, on a market value of assets basis, of \$178.6 million.

Table II-2 Development of Investment Gain/(Loss)		
1.	Market Value of Assets as of 6/30/2015	\$ 2,466,576,702
2.	Market Value of Assets as of 6/30/2016	\$ 2,377,994,505
3.	Earnings During 7/1/2015 to 6/30/2016 (Net of Investment Expenses)	\$ 3,002,726
4.	Mean Assets [ (1. + 2. - 3.) ÷ 2]	\$ 2,420,784,241
5.	Investment Return for FY 2016 [3. ÷ 4.]	0.1240%
6.	Investment Gain/(Loss) for FY 2016 [5. - 7.50%] x 4.	\$ (178,557,046)

The next table shows how the actuarial value of assets is developed. The actuarial value of assets represents a “smoothed” value developed by the actuary to reduce, or eliminate, erratic results that could develop from short-term fluctuations in the market value of assets.

The actuarial value of assets for the System was set equal to the market value of assets as of June 30, 2014. Beginning with the plan year ending June 30, 2015, the actuarial value of assets is the current market value of assets, adjusted by a five-year smoothing of gains and losses on a market value basis. However, if the actuarial value of assets is less than 80% or more than 120% of the market value, an adjustment is made to the actuarial value to bring the value within this corridor. Additional details regarding this actuarial methodology are included in Appendix C of the report.

Table II-3 Development of Actuarial Value of Assets			
1.	Market Value of Assets at of 6/30/2016		\$ 2,377,994,505
	<b>Plan Year End</b>	<b>Gain/(Loss)</b>	<b>Percent Not Recognized</b>
	6/30/2015	\$ (136,173,779)	60%
	6/30/2016	(178,557,046)	80%
			\$ (142,845,637)
2.	Total Delayed Recognition		\$ (224,549,904)
3.	Preliminary Actuarial Value of Assets [2. - 1.]		\$ 2,602,544,409
4.	Corridor for Actuarial Assets		
	80% of Market Value		\$ 1,902,395,604
	120% of Market Value		\$ 2,853,593,406
5.	Actuarial Value of Assets as of 6/30/2016		\$ 2,602,544,409

FIRE AND POLICE EMPLOYEES' RETIREMENT SYSTEM OF THE CITY OF BALTIMORE  
ACTUARIAL VALUATION AS OF JUNE 30, 2016

**SECTION III  
LIABILITIES AND EXPERIENCE GAINS/(LOSSES)**

The table below presents the actuarial liabilities by membership status and employer then allocates the assets in proportion to each employer's liabilities to produce the unfunded actuarial liabilities by employer. In the next section, these unfunded actuarial liabilities are amortized over a 25-year closed period beginning July 1, 2014, and those amounts are then added to the net normal costs (cost to cover the upcoming year's expected benefit accruals less member contributions) and the expense load to produce the recommended employer contributions for Fiscal Year 2018 as determined by this June 30, 2016 actuarial valuation. This table also shows the System's funded ratio using both the market value of assets and the actuarial value of assets, for informational purposes.

The liability amounts are not appropriate for measuring a settlement of the System's liabilities either by purchase of annuities or payment of lump sums.

**Table III-1  
Liability by Employer**

	As of June 30, 2016		
	State	City	Total
<b>Number of Members</b>			
Actives	3	4,091	4,094
Service Retirees	59	3,745	3,804
Disableds	7	976	983
Beneficiaries	12	1,492	1,504
Total Members	81	10,304	10,385
Total Payroll of Active Members	\$ 233,264	\$ 300,621,811	\$ 300,855,075
Projected Total Payroll for Plan Year 2017	\$ 240,262	\$ 309,640,465	\$ 309,880,727
Average Age	56.68	40.68	40.69
Average Service	30.19	13.97	13.98
<b>Development of Unfunded Actuarial Liability (UAL)</b>			
Actuarial Liability (AL)			
Actives	\$ 2,355,262	\$ 1,199,552,973	\$ 1,201,908,235
Service Retirees	28,105,161	1,796,310,428	1,824,415,589
Disableds	1,828,736	364,112,856	365,941,592
Beneficiaries	1,743,508	247,677,000	249,420,508
Terminated Vesteds	0	711,151	711,151
Total Liabilities	\$ 34,032,667	\$ 3,608,364,408	\$ 3,642,397,075
Actuarial Value of Assets (AVA)	\$ 24,316,824	\$ 2,578,227,585	\$ 2,602,544,409
Unfunded Actuarial Liability*(UAL)	\$ 9,715,843	\$ 1,030,136,823	\$ 1,039,852,666
Funded Ratio using AVA	71.5%	71.5%	71.5%
Market Value of Assets (MVA)	\$ 22,218,746	\$ 2,355,775,759	\$ 2,377,994,505
Funded Ratio using MVA	65.3%	65.3%	65.3%

\* Actuarial value of assets has been allocated in proportion to each employer's actuarial liability.

FIRE AND POLICE EMPLOYEES' RETIREMENT SYSTEM OF THE CITY OF BALTIMORE  
ACTUARIAL VALUATION AS OF JUNE 30, 2016

**SECTION III  
LIABILITIES AND EXPERIENCE GAINS/(LOSSES)**

The table below presents the changes in actuarial liabilities and assets during the plan year. In general, the unfunded actuarial liability (UAL) of any retirement system is expected to change at each subsequent valuation for a variety of reasons. In each valuation, we report on those elements of the change in the UAL that are of particular significance, potentially affecting the long-term financial outlook of the System. Below we present key changes in the actuarial liabilities and actuarial value of assets since the last valuation.

<b>Table III-2 Development of 2016 Experience Gain/(Loss)</b>				
		<b>Actuarial Liability</b>	<b>Actuarial Value of Assets</b>	<b>Unfunded Actuarial Liability</b>
1.	Value as of 6/30/2015	\$ 3,536,781,722	\$ 2,575,515,725	\$ 961,265,997
2.	Additions			
	a. Total Normal Cost with Expense Load	\$ 75,696,090		\$ 75,696,090
	b. Expected Employer Contributions		\$ 121,115,085	\$ (121,115,085)
	c. Expected Member Contributions		\$ 30,549,801	\$ (30,549,801)
3.	Decreases			
	a. Actual Benefit Payments	\$ (238,842,513)	\$ (238,842,513)	\$ 0
	b. Actual Administrative Expenses	\$ (4,407,296)	\$ (4,407,296)	\$ 0
4.	Expected Interest			
	a. On 1 for one year	\$ 265,258,629	\$ 193,163,679	\$ 72,094,950
	b. On 2a for one year	\$ 5,677,207		\$ 5,677,207
	c. On 2b for one year*		\$ 9,083,631	\$ (9,083,631)
	d. On 2c for 1/2 year		\$ 1,145,618	\$ (1,145,618)
	e. On 3a for 1/2 year	\$ (8,956,594)	\$ (8,956,594)	\$ 0
	f. On 3b for 1/2 year	\$ (165,274)	\$ (165,274)	\$ 0
5.	Expected Value 6/30/2016 [sum 1. - 4.]	\$ 3,631,041,971	\$ 2,678,201,862	\$ 952,840,109
6.	Excess Contributions	\$ 0	\$ 0	\$ 0
7.	Due to Change in Actuarial Assumptions and Methodologies	\$ 0	\$ 0	\$ 0
8.	Benefit Changes	\$ 0	\$ 0	\$ 0
9.	Expected Value After Changes	\$ 3,631,041,971	\$ 2,678,201,862	\$ 952,840,109
10.	Actual Value as of 6/30/2016	\$ 3,642,397,075	\$ 2,602,544,409	\$ 1,039,852,666
11.	Actuarial Gain/(Loss)	\$ (11,355,104)	\$ (75,657,453)	\$ (87,012,557)
12.	Total Gain/(Loss)	\$ (11,355,104)	\$ (75,657,453)	\$ (87,012,557)

\* Assumes employer contributions made at beginning of year.

**SECTION III**  
**LIABILITIES AND EXPERIENCE GAINS/(LOSSES)**

The table below provides the components of the liability gain developed in the previous table.

<b>Table III-3</b>		
<b>Elements of Actuarial Liability -- Gain/(Loss)</b>		
1.	Age and Service Retirements - Gain/(Loss)	\$ 3,968,188
2.	Disability Retirements - Gain/(Loss)	5,802,908
3.	Deaths in Service - Gain/(Loss)	732,606
4.	Withdrawals from Employment - Gain/(Loss)	3,235,471
5.	Pay Increases - Gain/(Loss)	(13,560,572)
6.	Deaths After Retirement - Gain/(Loss)	(2,133,031)
7.	New Entrants - Gain/(Loss)	(600,068)
8.	Continuing Inactives - Gain/(Loss)	(3,750,928)
9.	Other - Gain/(Loss)*	(5,049,678)
10.	Total Actuarial Liability - Gain/(Loss) [sum [1. to 10.]]	<u>\$ (11,355,104)</u>

\* Includes the addition of terminated vested liability, gain/(loss) on administrative expenses, and data corrections.

## SECTION IV CONTRIBUTIONS

In the process of evaluating the financial condition of any pension plan, the actuary analyzes the assets and liabilities to determine the level of contributions needed based on the funding policy. Typically, the primary goal in setting contributions is to maintain a pattern of contributions that is both stable and predictable over time.

Under the current funding policy, there are three components to the total contribution: the net normal cost, a provision for anticipated administrative expenses, and an amortization of the unfunded actuarial liability (UAL).

For this System, the funding methodology employed is the entry age normal actuarial funding method. The total normal cost is determined for each active member in accordance with the method described in Appendix C of this report. The total anticipated member contributions for the year are then subtracted from the sum of the total normal costs to arrive at the employer, or net normal cost. Expenses designed to approximate the administrative expenses for the coming year are then added to this number, as well as the calculated amortization of the UAL to develop the total contribution.

The UAL amount is developed in Section III of this report. In this section, we develop the contribution amounts by amortizing the UAL over the remaining portion of the 25-year closed period beginning July 1, 2014, using a level dollar amortization approach. Additional information about this methodology is provided in Appendix C.

<b>Table IV-1 UAL Amortization Over Closed 22-Year Period</b>			
	<b>State</b>	<b>City</b>	<b>Total</b>
a. 7/1/2016 Unfunded Actuarial Liability	\$ 9,715,843	\$ 1,030,136,823	\$ 1,039,852,666
b. Expected Employer Contribution at 7/1/2016	\$ 839,475	\$ 128,417,934	\$ 129,257,409
c. Employer Normal Cost Payment	(38,191)	(41,292,628)	(41,330,819)
d. Administrative Expense Payment	(3,499)	(4,509,327)	(4,512,826)
f. Net Contribution to Apply to UAL (b + c + d)	\$ 797,785	\$ 82,615,979	\$ 83,413,764
g. Interest to 7/1/2017	\$ 668,854	\$ 71,064,063	\$ 71,732,917
h. 7/1/2017 Expected Unfunded Actuarial Liability	\$ 9,586,912	\$ 1,018,584,907	\$ 1,028,171,819
i. 7/1/2017 Amortize Over 22 Years	\$ 839,964	\$ 89,244,023	\$ 90,083,987

Since contributions are payable a year after they are developed, the UAL is amortized over 22 years on July 1, 2017 recognizing that a payment will be made on July 1, 2017 and August 1, 2017.

FIRE AND POLICE EMPLOYEES' RETIREMENT SYSTEM OF THE CITY OF BALTIMORE  
ACTUARIAL VALUATION AS OF JUNE 30, 2016

**SECTION IV  
CONTRIBUTIONS**

The table below develops the State and City contributions to be paid in Fiscal Year 2018 based on this June 30, 2016 valuation.

Table IV-2 FY 2018 Contribution Summary				
	State	City	Total	% of Payroll
Total Normal Cost	\$ 61,517	\$ 71,354,809	\$ 71,416,326	23.74%
Expense Load	3,499	4,509,327	4,512,826	1.50%
Expected Member Contributions for FY 2017	<u>(23,326)</u>	<u>(30,062,181)</u>	<u>(30,085,507)</u>	<u>(10.00%)</u>
Net Normal Cost at 7/1/2016	\$ 41,690	\$ 45,801,955	\$ 45,843,645	15.24%
Interest to 7/1/2017 <sup>1</sup>	\$ 1,251	\$ 1,374,059	\$ 1,375,310	0.46%
7/1/2017 Amortization of Unfunded Actuarial Liability <sup>2</sup>	<u>839,964</u>	<u>89,244,023</u>	<u>90,083,987</u>	<u>29.94%</u>
Net Plan Cost at 7/1/2017	\$ 882,905	\$ 136,420,037	\$ 137,302,942	45.64%
Adjustment to Payment Date <sup>3</sup>	<u>0</u>	<u>412,324</u>	<u>412,324</u>	<u>0.13%</u>
Net Plan Cost at 7/1/2017 (with adjustment)	\$ 882,905	\$ 136,832,361	\$ 137,715,266	45.77%

<sup>1</sup> Interest increases the Net Normal Cost by the assumed 3% payroll growth.

<sup>2</sup> See Table IV-1 for development.

<sup>3</sup> City contribution assumed to be 49.85% at July 1 and 50.15% at August 1. Adjustment increases half of the Net Plan Cost (City) to August 1 by the assumed 7.50% interest rate.

**APPENDIX A**  
**SYSTEM MEMBERSHIP**

The data for this valuation was provided electronically in Excel and text formats by the System office. Cheiron did not audit any of the data, but we did perform an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice No. 23. The data for active and inactive members is as of June 30, 2016.

The following pages contain a summary of the data provided:

- Reconciliation of active and DROP members as of June 30, 2016
- Reconciliation of retirees and beneficiaries as of June 30, 2016
- Age/service and age/salary/service distribution for active members as of June 30, 2016
- Counts and average benefit amount by age for retirees, beneficiaries, and disabled members as of June 30, 2016



FIRE AND POLICE EMPLOYEES' RETIREMENT SYSTEM OF THE CITY OF BALTIMORE  
ACTUARIAL VALUATION AS OF JUNE 30, 2016

**APPENDIX A  
SYSTEM MEMBERSHIP**

Table A-1 Reconciliation of Active System Members					
		Active	DROP	DROP2	Total
<b>A.</b>	<b>Active Members as of June 30, 2015</b>	<b>3,336</b>	<b>412</b>	<b>500</b>	<b>4,248</b>
<b>B.</b>	<b>Exits:</b>				
1.	Terminations: Non-vested	152	0	0	152
2.	Transfers: Out	5	0	0	5
3.	Leaves: Other	1	0	0	1
4.	Prior Incorrect Inclusions	0	0	0	0
5.	Deaths: Line-of-Duty	1	1	1	3
	Non-Line-of-Duty w/ Survivor	0	0	0	0
	Non-Line-of-Duty w/out Survivor	2	1	1	4
6.	DROPs: DROP	1	0	0	1
	DROP2	85	0	0	85
7.	Retirements: Service	25	74	37	136
8.	Disablements: Line-of-Duty	7	1	0	8
	Line-of-Duty - 100%	0	0	0	0
	Non-Line-of-Duty	1	0	0	1
9.	Other Exits: Hired & Terminated During Year	0	0	0	0
10.	Subtotal (All Exits)	280	77	39	396
11.	Military Leaves	13	0	0	13
12.	Pending Disablement	32	1	3	36
<b>C.</b>	<b>Remaining Active Members [A. - B.10]</b>	<b>3,056</b>	<b>335</b>	<b>461</b>	<b>3,852</b>
<b>D.</b>	<b>Entrances:</b>				
1.	New Entrants	143	0	0	143
2.	New DROPs	0	1	85	86
3.	Prior Omissions	2	0	0	2
4.	Transfers In	0	0	0	0
5.	Restorations: Pending	0	0	0	0
	Leave	0	0	0	0
	Retirement	2	0	0	2
	Disability - Non-Line-of-Duty	0	0	0	0
	Disability - Line-of-Duty	0	0	0	0
	Other Termination	9	0	0	9
6.	Subtotal (All Entrances)	156	1	85	242
<b>E.</b>	<b>Active Members as of June 30, 2016 [C. + D.6]</b>	<b>3,212</b>	<b>336</b>	<b>546</b>	<b>4,094</b>

FIRE AND POLICE EMPLOYEES' RETIREMENT SYSTEM OF THE CITY OF BALTIMORE  
ACTUARIAL VALUATION AS OF JUNE 30, 2016

**APPENDIX A  
SYSTEM MEMBERSHIP**

Table A-2 Reconciliation of Inactive System Members						
	Retirees		Disableds		Total	
	Primary	Beneficiary	Primary	Beneficiary		
<b>A. Members as of June 30, 2015</b>	<b>3,786</b>	<b>1,065</b>	<b>989</b>	<b>428</b>	<b>6,268</b>	
<b>B. Exits:</b>						
1. Payments Ceased	0	2	0	0	2	
2. Returned to Active Membership	2	0	0	0	2	
3. Prior Incorrect Inclusion	0	1	0	0	1	
4. Deaths:						
Primary with no Survivor	50	0	14	0	64	
Beneficiary	0	48	0	24	72	
Primary with Survivor	65	0	5	0	70	
5. Subtotal (All Exits)	<u>117</u>	<u>51</u>	<u>19</u>	<u>24</u>	<u>211</u>	
<b>C. Remaining Active [A. - B.5]</b>	<b>3,669</b>	<b>1,014</b>	<b>970</b>	<b>404</b>	<b>6,057</b>	
Adjustments	-1	0	1	0	0	
<b>Adjusted Remaining Members</b>	<u><b>3,668</b></u>	<u><b>1,014</b></u>	<u><b>971</b></u>	<u><b>404</b></u>	<u><b>6,057</b></u>	
<b>D. Entrances:</b>						
1. New Retirements: Primary	136	0	9	0	145	
2. Active Death: Beneficiary	0	3	0	0	3	
3. Beneficiary Assumes Payments	0	65	0	5	70	
4. Prior Omissions	0	0	3	0	3	
5. Ex-Spouse Receiving Payments (QDRO)	0	12	0	1	13	
6. Subtotal (All Exits)	<u>136</u>	<u>80</u>	<u>12</u>	<u>6</u>	<u>234</u>	
<b>E. Members as of June 30, 2016 [C. + D.6]</b>	<b>3,804</b>	<b>1,094</b>	<b>983</b>	<b>410</b>	<b>6,291</b>	

FIRE AND POLICE EMPLOYEES' RETIREMENT SYSTEM OF THE CITY OF BALTIMORE  
 ACTUARIAL VALUATION AS OF JUNE 30, 2016

**APPENDIX A**  
**SYSTEM MEMBERSHIP**

Table A-3  
 Age/Service Distribution of Active Members  
 Active Members as of June 30, 2016

Age	Completed Years of Credited Service									Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Up	
Under 25	96	0	0	0	0	0	0	0	0	96
25-29	319	206	10	0	0	0	0	0	0	535
30-34	134	360	137	2	0	0	0	0	0	633
35-39	48	123	255	136	2	0	0	0	0	564
40-44	23	86	165	274	138	2	0	0	0	688
45-49	13	47	105	185	336	101	2	0	0	789
50-54	3	21	49	69	122	138	46	3	0	451
55-59	1	8	15	16	40	50	57	33	0	220
60-64	3	3	6	5	11	19	12	25	12	96
65-69	0	0	0	1	1	3	5	2	6	18
70 & Up	0	0	0	0	0	0	0	0	4	4
<b>Total</b>	<b>640</b>	<b>854</b>	<b>742</b>	<b>688</b>	<b>650</b>	<b>313</b>	<b>122</b>	<b>63</b>	<b>22</b>	<b>4,094</b>
			Average Age = 40.69			Average Service = 13.98				

FIRE AND POLICE EMPLOYEES' RETIREMENT SYSTEM OF THE CITY OF BALTIMORE  
 ACTUARIAL VALUATION AS OF JUNE 30, 2016

**APPENDIX A**  
**SYSTEM MEMBERSHIP**

**Table A-4**  
**Age/Service Distribution of Active Members**  
**Active Members as of June 30, 2016**

Age	Average Payroll									Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Up	
Under 25	\$ 47,739	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 47,739
25-29	50,243	66,004	67,622	0	0	0	0	0	0	56,636
30-34	49,506	67,441	71,338	71,375	0	0	0	0	0	64,500
35-39	51,565	68,488	72,318	80,072	89,581	0	0	0	0	71,647
40-44	51,106	68,813	72,180	81,391	88,093	126,105	0	0	0	78,071
45-49	66,187	68,405	72,121	79,915	86,779	91,544	83,881	0	0	82,388
50-54	98,163	68,415	72,824	78,822	81,937	88,764	90,220	94,096	0	82,963
55-59	69,373	68,322	74,458	75,237	81,006	83,670	86,888	96,938	0	84,145
60-64	106,877	70,424	70,164	75,017	77,921	81,085	93,258	87,667	97,190	85,446
65-69	0	0	0	79,689	82,091	82,648	97,951	86,322	81,666	86,784
70 & Up	0	0	0	0	0	0	0	0	80,833	80,833
Total	\$ 50,687	\$ 67,479	\$ 72,074	\$ 80,255	\$ 85,646	\$ 88,561	\$ 89,175	\$ 92,787	\$ 89,982	\$ 73,487
Total Payroll = \$ 300,855,075					Average Payroll = \$ 73,487					

FIRE AND POLICE EMPLOYEES' RETIREMENT SYSTEM OF THE CITY OF BALTIMORE  
 ACTUARIAL VALUATION AS OF JUNE 30, 2016

**APPENDIX A**  
**SYSTEM MEMBERSHIP**

Table A-5 Schedule of Benefit Recipients by Attained Age and Type of Retirement June 30, 2016 - Primary Members							
Age	Type of Retirement						Total
	NR	ER	DS	NLOD Dis	LOD Dis	LOD 100	
Under 20	0	0	0	0	0	0	0
20-24	0	0	0	0	0	0	0
25-29	0	0	0	0	0	0	0
30-34	0	0	0	2	18	0	20
35-39	1	0	0	7	43	0	51
40-44	45	1	0	15	74	0	135
45-49	241	1	1	26	108	0	377
50-54	361	0	9	30	111	1	512
55-59	498	1	1	22	59	1	582
60-64	587	1	1	17	56	0	662
65-69	768	0	1	20	63	0	852
70-74	526	0	0	31	57	0	614
75-79	351	0	0	26	58	1	436
80-84	244	0	0	24	43	1	312
85-89	116	0	0	19	30	0	165
90 & Up	49	0	0	9	11	0	69
<b>Total</b>	<b>3,787</b>	<b>4</b>	<b>13</b>	<b>248</b>	<b>731</b>	<b>4</b>	<b>4,787</b>
Average Annual Benefit	\$ 41,604	\$ 27,157	\$ 31,545	\$ 19,382	\$ 36,267	\$ 62,639	\$ 39,616

NR – Normal Service Retirement  
 ER – Early Retirement  
 DS – Discontinued Service  
 NLOD Dis – Non-Line-of-Duty Disability  
 LOD Dis – Line-of-Duty Disability  
 LOD 100 – Line-of-Duty Disability 100% of Compensation

FIRE AND POLICE EMPLOYEES' RETIREMENT SYSTEM OF THE CITY OF BALTIMORE  
ACTUARIAL VALUATION AS OF JUNE 30, 2016

**APPENDIX A**  
**SYSTEM MEMBERSHIP**

**Table A-6**  
**Schedule of Benefit Recipients by Attained Age and Type of Retirement**  
**June 30, 2016 - Beneficiaries**

Age	Type of Retirement								Total
	NR	DS	NLOD Dis	LOD Dis	LOD 100	NLOD DR	NLOD Dth	LOD Dth	
Under 20	2	0	2	3	0	0	5	3	15
20-24	1	0	0	0	0	0	0	1	2
25-29	0	0	0	0	0	0	0	1	1
30-34	0	0	0	1	0	0	1	0	2
35-39	1	0	0	1	0	0	0	1	3
40-44	5	0	0	0	0	0	4	3	12
45-49	17	0	1	2	0	3	1	4	28
50-54	47	0	6	7	0	2	5	3	70
55-59	68	0	2	12	0	6	3	3	94
60-64	85	0	10	12	0	12	3	5	127
65-69	117	1	10	17	0	13	12	11	181
70-74	119	0	19	25	0	7	8	7	185
75-79	128	0	28	46	1	11	5	6	225
80-84	135	0	39	50	0	12	3	4	243
85-89	114	0	28	58	0	7	0	7	214
90 & Up	64	0	11	19	0	3	2	3	102
<b>Total</b>	<b>903</b>	<b>1</b>	<b>156</b>	<b>253</b>	<b>1</b>	<b>76</b>	<b>52</b>	<b>62</b>	<b>1,504</b>
Average Annual Benefit	\$ 18,673	\$ 12,741	\$ 14,574	\$ 17,705	\$ 38,813	\$ 29,853	\$ 17,096	\$ 46,213	\$ 19,741

NR – Normal Service Retirement

DS – Discontinued Service

NLOD Dis – Non-Line-of-Duty Disability

LOD Dis – Line-of-Duty Disability

LOD 100 – Line-of-Duty Disability 100% of Compensation

NLOD DR – Non-Line-of-Duty Death Member Eligible for Service Retirement

NLOD Dth – Non-Line-of-Duty Death with 25% of Compensation

LOD Dth – Line-of-Duty Death

**APPENDIX B**  
**SUMMARY OF PLAN PROVISIONS**

**1. Effective Date:**

The System was effective July 1, 1962 and has periodically been amended. This valuation incorporates the provisions as last amended by Ordinance 15-436.

**2. Eligibility:**

Any officer or employee of the Police Department or the Fire Department and certain Department of Aviation employees shall become a member as a condition of employment. Any officer or employee for whom the City makes contributions to Social Security shall be excluded.

**3. Grandfathering:**

Effective July 1, 2010, members who have either met retirement eligibility (see item 7.A.i.) or have attained 15 years of service prior to July 1, 2010 are considered "Grandfathered" for retirement as well as DROP2 eligibility. All other members are "Non-Grandfathered." Members have until December 31, 2010 to purchase service to satisfy the 15-year "Grandfathering" requirement.

**4. Member Contributions:**

Members contribute at the rate of 6% of regular compensation for their entire period of service. Effective July 1, 2010, members contribute at the rate of 7% of regular compensation. This percentage increased to 8% starting July 1, 2011, 9% starting July 1, 2012 and 10% starting July 1, 2013. Contributions are treated as made by the employer and are made to the System pre-tax according to Section 414(h)(2) of the Internal Revenue Code. Members of the ERS who transferred to this system after July 1, 1967, and did not make up the contributions which would have been made from July 1, 1962, are to have their retirement allowance reduced by the actuarial equivalent of the deficient contributions with interest. Effective July 1, 2010, interest is credited on contributions at a rate of 3.0% per annum. Previously, interest was credited at 5.5% per annum. Members' contributions were reduced in several years by a specific ordinance for each year. For purposes of calculating benefits that depend on the amount of member contributions (e.g., DROP accounts), members are deemed to have contributed the full amount.

**5. Compensation:**

Earnable compensation is all usual including lodging, subsistence, etc. When compensation is not paid in money, the Board of Trustees shall fix the value of that part of compensation. This definition excludes overtime.

**APPENDIX B**  
**SUMMARY OF PLAN PROVISIONS**

For grandfathered members, Average Final Compensation is the average annual compensation during any 18 consecutive month period of service during which earnable compensation was highest or, if less than 18 months, the average during total service.

For non-grandfathered members, Average Final Compensation is the average annual compensation during any 36 consecutive month period of service during which earnable compensation was highest or, if less than 36 months, the average during total service.

**6. Military Service Credit:**

- A. Military Service Prior to Employment: A maximum of three years of service credit is granted provided the member has acquired 10 years of service and attained age 50 or has acquired 20 years of service regardless of age.
- B. Military Service within Employment: Upon retirement or death, any member who, because of military duty, had a break in employment shall receive credit for the period of absence as provided by the Veterans Reemployment Rights Act.

**7. Retirement Allowance Eligibility:**

- A. Service Retirement:
  - 1) Grandfathered:
    - a. Membership commencing prior to July 1, 2003: Age 50 or 20 years of service
    - b. Membership commencing on or after July 1, 2003: Age 50 with 10 years of service as a contributing member or 20 years of service with 10 years of service as a contributing member
  - 2) Non-grandfathered – the earlier of:
    - a. Age 55 with 15 years of service or
    - b. 25 years of service, regardless of age, with 15 years of service as a contributing member
- B. Early Retirement (only non-grandfathered members):
  - 1) Membership commencing prior to July 1, 2003: Age 50 or 20 years of service
  - 2) Membership commencing on or after July 1, 2003: Age 50 with 10 years of service as a contributing member or 20 years of service with 10 years of service as a contributing member
  - 3) The normal retirement benefit is reduced by 6.5% per year for the first five years, 4.5% per year for the next five years, 3.0% for the next five years, and 2% per year thereafter, from the date the member would have been eligible for normal retirement assuming continued service.
- C. Non-Line-of-Duty Disability Retirement: Five years of service and certified by a member of the Panel of Hearing Examiners to be mentally or physically incapacitated for the performance of duty and that incapacity is likely to be permanent.



**APPENDIX B**  
**SUMMARY OF PLAN PROVISIONS**

D. Line-of-Duty Disability Retirement: No service or age constraints apply. The benefit is awarded when a member becomes totally and permanently incapacitated for duty as the result of an injury while in performance of duty and certified by a Hearing Examiner as incapacitated for the performance of duty where such incapacity is likely to be permanent. Should such disability further result in extensive brain damage causing total incapacity or in the loss of use of both hands or both arms or both feet or both legs or both eyes or any two thereof, an additional pension will be payable.

**8. Termination of Employment:**

A. Eligible for a Termination Retirement Allowance payable immediately upon completion of 15 years of service if removed from a position without fault. Presently, this benefit is not reflected in the valuation.

B. Eligible for a refund of accumulated contributions if not eligible for any other benefits.

**9. Retirement Allowances:**

A. Service Retirement: The retirement allowance shall be the sum of:

- 1) An annuity equal to the actuarial equivalent of a member's accumulated contributions.
- 2) A pension, which together with the annuity in 1), equals 2.5% of Average Final Compensation times the first 20 years of service, plus 2.0% of Average Final Compensation times service in excess of 20 years.

**DROP Benefits**

Members with more than 20 years of service on or before December 31, 2009 can elect to participate in DROP at any time. A member's DROP participation period can be for one, two, or three years. During that time, the member will accrue no additional service. A member who continues employment at the end of his/her DROP participation period shall begin to earn additional service credit.

If a member retires during his/her DROP participation period or immediately at the end of this period, he/she shall be entitled to a Basic DROP Retirement Benefit. This shall equal:

- 1) The retirement benefit that would have been paid had the member retired at the time he/she began his/her DROP participation, plus

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- 2) A lump sum equal to the member's DROP account. This equals the accumulation of the annuity payments the member would have received had he/she retired at the time his/her DROP participation began receiving benefits, plus the member contributions paid during his/her DROP participation period, plus interest at 8.25%.

If a member retires later than the end of the three-year DROP period, but less than 18 months after the conclusion of his/her DROP participation period, he/she is entitled to an Intermediate DROP Retirement Benefit. This shall equal:

- 1) The retirement benefit that would have been paid had the member retired at the time he/she began his/her DROP participation, plus
- 2) Benefit accrual of 2% plus an extra 1.5% per year (not to exceed 18 months) for service after the DROP participation period.
- 3) A lump sum equal to the DROP account. No additions (other than interest) are added after the conclusion of the DROP participation period.

If a member retires more than 18 months after the conclusion of his/her DROP participation period, he/she is entitled to a Full DROP Retirement Benefit. This shall equal:

- 1) The retirement benefit based on current average final compensation and all service excluding service while a member is in DROP.
- 2) Benefit accrual includes an extra 1.5% per year (not to exceed four years) for service after the DROP participation period.
- 3) A lump sum equal to the DROP account. No additions (other than interest) are added after the conclusion of the DROP participation period.

**DROP2 Benefits**

Members with more than 20 years of service on or after January 1, 2010, but not before December 31, 2009, can elect to participate in DROP2. Effective July 1, 2010, the 20-year requirement was moved to 25 years for non-grandfathered members. A member's DROP2 participation period can be for one, two, or three years. The member must remain in DROP2 for at least one year. Those members who retire prior to the end of the first year are not entitled to receive any amounts accumulated in the DROP2 account. No additional service is accrued during DROP2 participation. A member who continues employment at the end of the DROP2 participation period shall begin to earn additional service credit.

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If a member retires during the DROP2 participation period or immediately at the end of this period, the member is entitled to an Early DROP2 Retirement Benefit. This is equal to:

- 1) The retirement benefit that would have been paid had the member retired at the time he/she began his/her DROP2 participation, plus
- 2) A lump sum equal to the member's DROP2 account. This equals the accumulation of the annuity payments the member would have received had he/she retired at the time his/her DROP2 participation began, plus the member contributions paid during his/her DROP2 participation period, plus interest at 5.5% for grandfathered members and 3.0% for non-grandfathered members.

If a member retires later than the end of the three-year DROP2 period but less than 3.5 years for police employees or five years for fire employees after the conclusion of his/her DROP2 participation period, he/she is entitled to a Mid DROP2 Retirement Benefit. This is equal to:

- 1) The retirement benefit that would have been paid had the member retired at the time he/she began his/her DROP2 participation, plus
- 2) Benefit accrual of 2% for service after the DROP2 participation period began.
- 3) An additional benefit accrual of 1.5% per year (not to exceed four years) for service after the DROP2 participation period for fire employees only. Police employees do not receive an additional benefit accrual.
- 4) A lump sum equal to the DROP2 account. No additions (other than interest) are added after the conclusion of the DROP2 participation period.

If a member retires more than 3.5 years for police employees or five years for fire employees after the conclusion of his/her DROP2 participation period, he/she is entitled to a Complete DROP2 Retirement Benefit. This shall equal:

- 1) The retirement benefit based on current average final compensation and all service excluding service while a member is in DROP2.
- 2) Benefit accrual includes an extra 1.5% per year (not to exceed four years) for service after the DROP2 participation period for fire employees only. Police employees do not receive an additional benefit accrual.
- 3) A lump sum equal to the DROP2 account. No additions (other than interest) are added after the conclusion of the DROP2 participation period.

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- B. Non-Line-of Duty Disability Retirement: A member shall receive an annuity equal to the actuarial equivalent of a member's accumulated contributions plus a pension, which together with the annuity, shall equal 2.5% of his/her Average Final Compensation times service up to 20 years, plus 2.0% of his/her Average Final Compensation times service in excess of 20 years, but in no event less than 25% of Average Final Compensation.

NOTE: This allowance is offset by workers' compensation, if the member entered the system after July 1, 1970.

- C. Line-of-Duty Disability Retirement: An annuity equal to the actuarial equivalent of a member's accumulated contributions, plus a pension equal to 66-2/3% of Average Final Compensation. An additional pension is paid for certain disabilities so that the retirement allowance is equal to 100% of compensation at the time of retirement.

NOTE: The same offsets apply as in Non-Line-of-Duty Disability.

- D. Termination Retirement Allowance: Determined the same as if the member had retired on a Non-Line-of-Duty Disability Allowance.

**10. Optional Methods of Receiving Benefit Payments:**

These options are available for Service, Non-Line-of-Duty Disability, and Line-of-Duty Disability Retirement. The option and/or beneficiary may be changed within 30 days after retirement. For purposes of determining the amount of an optional retirement benefit, a benefit of equivalent value is determined using 5% per annum compounded annually and the UP-84 mortality table set forward one year, except that in the case of disability retirements, the table is set forward seven years.

- A. Joint and 50% to un-remarried spouse or dependent children until the last marries, dies, or attains age 18 (age 22 if a full-time student) (this is known as the maximum service of allowance)
- B. Cash refund to designated beneficiary with refund based on present value of allowance at retirement less payments made
- C. Joint and 100% to Contingent beneficiary
- D. Joint and 50% to Contingent beneficiary
- E. Some other periodic benefit subject to the approval of the Board of Trustees

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**11. Non-Line-of-Duty-Death Benefits:**

Upon the non-duty related death of a member in service, benefits are payable as follows:

- A. The member's accumulated contributions shall be payable to the member's designated beneficiary or estate.
- B. If a member had one or more years of service, 50% of the greater of his/her current annual compensation or Average Final Compensation will be payable as a lump sum.
- C. In lieu of A and B above, if the member had at least two years of continuous service, the benefit is an annual sum equal to 25% of the member's regular gross compensation, plus 1.5% of regular gross compensation times years of service in excess of two years, up to a maximum benefit of 50% of regular gross compensation. The death benefit shall be payable to:
  - 1) the widow(er), if the beneficiary so elects, during widowhood only, or
  - 2) if no eligible widow(er), the child or children until the last marries, dies, or attains age 18 (age 22 if a full-time student).
- D. If the member was eligible for a service retirement or, if retired on account of service or non-line-of duty disability and dies within 30 days of retirement, and the member's designated beneficiary is the member's spouse with whom the member had been living for at least one year or the member's surviving parent(s), such beneficiary may elect, in lieu of (A) and (B) above, an allowance equal to the amount that would have been paid under the Joint and 100% Contingent Option.
- E. If a member dies during or following the DROP participation period, the beneficiary will receive the non-line-of-duty death benefit according to the DROP provisions. The member's DROP account is payable according to the form of the non-line-of-duty death benefit as follows:
  - 1) Lump sum benefit: The beneficiary of a deceased DROP member will receive the balance of the deceased member's DROP account in a lump sum payment.
  - 2) 25% plus benefit: The beneficiary can elect to receive the balance of the deceased member's DROP account in a lump sum payment or in periodic payments.
  - 3) 100% survivorship benefit: The beneficiary can elect to receive the balance of the deceased member's DROP account in a lump sum payment or in periodic payments.
- F. If a member dies after a minimum of one year of DROP2 participation or following the DROP2 participation period, the beneficiary will receive the non-line-of-duty death

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benefit according to the DROP2 provisions. The member's DROP2 account is payable according to the form of the non-line-of-duty death benefit as follows:

- 1) Lump sum benefit: The beneficiary of a deceased DROP2 member will receive the balance of the deceased member's DROP2 account in a lump sum payment.
- 2) 25% plus benefit: The beneficiary can elect to receive the balance of the deceased member's DROP2 account in a lump sum payment or periodic payments.
- 3) 100% survivorship benefit: The beneficiary can elect to receive the balance of the deceased member's DROP2 account in a lump sum payment or in periodic payments.

If a member dies within the first year of the DROP2 participation period, the benefit will be calculated as though the member has never participated in DROP2.

These benefits are offset by workers' compensation, if the member entered the system after July 1, 1970. If no beneficiary and if intestate without heirs, then the benefit shall remain part of the System.

**12. Line-of-Duty Death Benefits:**

If a member's death arose out of and in the performance of duty as certified by a Hearing Examiner, or if the member dies within five years as a result of the last injury which resulted in a Line-of-Duty Disability Retirement, a refund of accumulated contributions shall be paid, plus a pension of 100% of current compensation (not less than \$15,000) shall be payable to:

- A. the surviving spouse, or
- B. if no eligible spouse or if the spouse dies, any children, equally, until age 18 (or age 22 if full-time students), or
- C. if no eligible spouse or children, any dependent father or dependent mother for their lifetime.

This benefit is offset by worker's compensation, if the member entered the system after July 1, 1970. If no beneficiary and if intestate without heirs, then the benefit shall remain part of the System.

**13. Minimum Benefits:**

Effective July 1, 2010 for current and future beneficiaries of "pre-DROP" retirees (members who retired prior to August 1, 1996 with 20 or more years of service), the minimum annual benefit is \$16,000. Benefits will increase based on the applicable COLA. However, for future beneficiaries of the current pre-DROP retirees, the \$16,000 minimum will not be adjusted

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while the primary annuitant (retiree) is still alive. Once payments to the beneficiaries commence, benefits will increase with the applicable COLA regardless of whether the minimum applies.

Effective January 1, 2012 for current and future beneficiaries of members who retired on account of line-of-duty disability prior to August 1, 1996 with less than 20 years of service, the minimum annual benefit is \$16,000. Benefits will increase based on the applicable COLA.

**14. Post-Retirement Benefit Increase:**

Post-retirement benefit increases (Cost-of-Living Adjustments of COLAs) are automatically provided to all current and future retirees and beneficiaries according to the following schedule:

- i. Under age 55 – No COLA
- ii. Age 55 to age 65 – 1% annual COLA
- iii. After age 65 – 2% annual COLA

For current and future members receiving a 100% line-of-duty disability benefit as well as their beneficiaries, the 2% annual COLA will apply regardless of age.

Only retirees and beneficiaries who have been receiving periodic benefit payments for two or more years as of the June 30 determination date are eligible for the increase. For a member who retires during or at the end of the DROP participation period, the member's DROP participation period counts toward the eligibility requirement for post-retirement benefit increases. The 2% COLA is first effective January 1, 2011, and the 1% COLA is first effective January 1, 2012.

Prior to June 30, 2010, investment return based increases were provided to retirees and beneficiaries.

**15. Changes Since Last Valuation:**

None

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**ACTUARIAL ASSUMPTIONS AND METHODS**

**A. Actuarial Assumptions**

**1. Rate of Investment Return:**

7.50% compounded annually

**2. Rates of Salary Increase:**

Salary increases are split into a static inflation assumption of 3.0% and a merit scale based on department and service, shown below.

Police	
Service	Merit Scale
0-1	0.25%
2	1.50%
3	18.25%
4	6.25%
5	5.50%
6	1.00%
7	4.00%
8 – 14	1.00%
15	3.75%
16 – 20	1.00%
21+	0.75%

Fire	
Service	Merit Scale
0	0.25%
1	4.00%
2 – 3	15.00%
4	2.00%
5	3.00%
6 – 13	0.75%
14 – 15	2.50%
16 – 20	0.50%
21+	0.50%

**3. System Expenses:**

All expenses are paid from the fund. Administrative expenses are added to the contribution in the amount of 1.5% of covered payroll.



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**ACTUARIAL ASSUMPTIONS AND METHODS**

**4. Pre-Retirement Mortality and Disability:**

Age	Non-Line-of-Duty Disability <sup>1</sup>	Line-of-Duty Disability <sup>1</sup>	Non-Line-of-Duty Death <sup>2,3</sup>		Line-of-Duty Death <sup>2,3</sup>	
			Male	Female	Male	Female
20	0.0012	0.0048	0.000534	0.000206	0.000133	0.000051
25	0.0012	0.0048	0.000637	0.000219	0.000159	0.000055
30	0.0012	0.0048	0.000595	0.000277	0.000149	0.000069
35	0.0013	0.0052	0.000688	0.000364	0.000172	0.000091
40	0.0015	0.0060	0.000825	0.000503	0.000206	0.000126
45	0.0016	0.0064	0.001280	0.000835	0.000320	0.000209
50	0.0017	0.0068	0.002216	0.001401	0.000554	0.000350
55	0.0017	0.0068	0.003665	0.002127	0.000916	0.000532
60	0.0017	0.0068	0.006163	0.003103	0.001541	0.000776
64	0.0017	0.0068	0.009698	0.004308	0.002425	0.001077

<sup>1</sup> Assumes 80%/20% of total rates split between Line of Duty Disability and Non-Line of Duty Disability, respectively.

<sup>2</sup> Assumes 20%/80% of total rates split between Line of Duty Death and Non-Line of Duty Death, respectively.

<sup>3</sup> 114% and 130% of the RP-2014 Blue Collar Mortality Table for males and females, respectively, projected using the RPEC\_2014 model, with an ultimate rate of 0.85% for ages 20-95, an ultimate rate of 0.00% for ages 95-120, convergence to the ultimate rate in year 2017, and using the committee selected weighing assumption.

**5. Post-Retirement Mortality:**

Retirees and Beneficiaries: 114% and 130% of the RP-2014 Blue Collar Mortality Table for males and females, respectively, projected using the RPEC\_2014 model, with an ultimate rate of 0.85% for ages 20-95, an ultimate rate of 0.00% for ages 95-120, convergence to the ultimate rate in year 2017, and using the committee selected weighting assumption.

Disabled members: RP-2014 Disabled Retiree Mortality blended 50%/50% with the healthy annuitant's table projected using the healthy annuitant's RPEC\_2014 model.

Age	Retirees and Beneficiaries		Disabled Members	
	Male	Female	Male	Female
55	0.006839	0.005233	0.015104	0.009856
60	0.009640	0.007456	0.018122	0.012227
65	0.014381	0.011343	0.023033	0.016101
70	0.022443	0.018156	0.031395	0.023179
75	0.035918	0.029862	0.045102	0.035454
80	0.059119	0.049613	0.067868	0.055325
85	0.098987	0.084514	0.106145	0.087467
90	0.166907	0.145425	0.169956	0.139038

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**ACTUARIAL ASSUMPTIONS AND METHODS**

**6. Withdrawal:**

Years of Service	Withdrawal <sup>1</sup>
0	11.00%
1	9.00%
2	7.00%
3	5.00%
4	4.00%
5	3.25%
6	2.75%
7	2.35%
8	1.95%
9	1.60%
10	1.30%
11	0.85%
12	0.50%
13 – 19	0.35%
20+	0.00%

<sup>1</sup> Withdrawal decrements are reduced to zero when member is eligible to retire.

**7. Service Retirement:**

The valuation uses retirement rates that vary according to member plan (police or firefighter) and whether a member is eligible for DROP, grandfathered DROP2, or non-grandfathered DROP2.

Members with 20 or more years of service on or before December 31, 2009 are eligible for DROP.

Members who had less than 20 years of service on December 31, 2009, but had either 15 or more years of service on June 30, 2010 or were age 50 or older as of June 30, 2010, can elect to participate in grandfathered DROP2 when they have 20 or more years of service.

Members who were not age 50 or older as of June 30, 2010, and also had less than 15 years of service on June 30, 2010, can participate in non-grandfathered DROP2 when they have 25 or more years of service.

Non-grandfathered members, who are not eligible for DROP or grandfathered DROP2, can take early retirement, with a reduced benefit. Prior to reaching normal retirement eligibility, these non-grandfathered members are assumed to take early retirement according to the following table.

FIRE AND POLICE EMPLOYEES' RETIREMENT SYSTEM OF THE CITY OF BALTIMORE  
ACTUARIAL VALUATION AS OF JUNE 30, 2016

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ACTUARIAL ASSUMPTIONS AND METHODS**

Non-Grandfathered Early Retirement Rates for Police and Fire														
Age	Service													
	<10	10	11	12	13	14	15	16	17	18	19	20	21-24	25+
<45	<b>Members Not Yet Eligible for Early Retirement</b>											5.00%	5.00%	
45												5.00%	5.00%	
46												5.00%	5.00%	
47												5.00%	5.00%	
48												5.00%	5.00%	
49	5.00%	5.00%												
50	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%
51	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%
52	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%
53	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
54	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
55	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	<b>Members Eligible for Unreduced Benefits</b>					
56	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%							
57	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%							
58	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%							
59	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%							
60	18.00%	18.00%	18.00%	18.00%	18.00%	18.00%	18.00%							
61	18.00%	18.00%	18.00%	18.00%	18.00%	18.00%	18.00%							
62	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%							
63	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%							
64	35.00%	35.00%	35.00%	35.00%	35.00%	35.00%	35.00%							
65	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%							

Once members reach eligibility for normal retirement, they are expected to follow one of two paths: they either enter the DROP/DROP2 program and follow the appropriate post-DROP or post-DROP2 retirement assumptions for their group, or they never enter the DROP/DROP2 program and follow the appropriate non-DROP or non-DROP2 retirement assumptions for their group. Active members, who are beyond their applicable DROP or DROP2 program eligibility as of the valuation date, are assumed to have already made this decision and so are valued only with the applicable DROP/ DROP2 or non-DROP/non-DROP2 retirement assumptions. Those who are not yet normal retirement eligible are valued under both options, and the resulting liabilities are blended according to the following probabilities table.

Police and Fire	
<b><i>DROP Members</i></b>	
DROP	80%
Non-DROP	20%
<b><i>Grandfathered DROP2 Members</i></b>	
Grandfathered DROP2	80%
Grandfathered Non-DROP2	20%
<b><i>Non-Grandfathered DROP2 Members</i></b>	
Non-Grandfathered DROP2	80%
Non-Grandfathered Non-DROP2	20%

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**Non-DROP/Grandfathered Non-DROP2 Retirement Probabilities**

Members who do not join DROP or grandfathered DROP2 are assumed to have retirement rates that vary by service until age 50. After age 50, the rates are assumed to vary solely by age.

Ages Less Than 50		Ages 50 and Higher	
Years of Service	Probability of Retirement	Age	Probability of Retirement
20	40%	50	10.00%
21+	20%	51	8.00%
		52	8.00%
		53	5.00%
		54	4.00%
		55	4.00%
		56	4.00%
		57	3.00%
		58	6.00%
		59	12.00%
		60	18.00%
		61	18.00%
		62	25.00%
		63	25.00%
		64	35.00%
		65	100.00%

**Non-Grandfathered Non-DROP2 Retirement Probabilities**

Assumptions vary between the rate applicable in the first year of eligibility for unreduced retirement and those for subsequent years for those who do not join non-grandfathered DROP2.

Age	Police and Fire	
	First Eligible	Subsequent
Less than 65	50.0%	30.0%
65 and up	100.0%	100.0%

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**ACTUARIAL ASSUMPTIONS AND METHODS**

**DROP and Grandfathered/Non-Grandfathered DROP2 Retirement Probabilities**

<b>DROP and DROP2 Exit Rates</b>		
<b>Years After Electing DROP</b>	<b>Police</b>	<b>Fire</b>
1	12.00%	3.00%
2	12.00%	7.00%
3	15.00%	10.00%
4	16.00%	10.00%
5	17.00%	10.00%
6	20.00%	10.00%
7	23.00%	25.00%
8	25.00%	15.00%
9	10.00%	10.00%
10	13.00%	10.00%
11	16.00%	10.00%
12	19.00%	14.00%
13	20.00%	16.00%
14	20.00%	16.00%
15+	20.00%	20.00%

NOTE: In all cases once the member reaches age 65, there is 100% probability of leaving DROP to commence benefit receipt.

**8. Line-of-Duty Disability:**

**Benefit Types:** 1% of line-of-duty disability retirements are assumed to receive a pension equal to 100% of compensation at the time of retirement. The rest are assumed to receive a pension equal to 66 2/3% of Average Final Compensation.

**Form of Payment:** All future withdrawal benefits are assumed to be paid in the form of a lump sum refund of member contributions.

All future retirement benefits are assumed to be paid in the form of a 50% Joint and Survivor Annuity. In addition, members participating in DROP are assumed to receive their DROP account balance in the form of a lump sum upon retirement.

Future non-line-of-duty disability retirement benefits for current active members with fewer than five years of service (i.e., eligible only for the refund of member contributions) are assumed to be paid in the form of a lump sum. All other disability retirement

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**ACTUARIAL ASSUMPTIONS AND METHODS**

benefits are assumed to be paid in the form of a 50% Joint and Survivor Annuity. In addition, members participating in DROP are assumed to receive their DROP account in the form of a lump sum upon disability retirement.

Future death benefits for current active members who have not reached service retirement eligibility are assumed to be paid in the form of a lump sum. Certain line of duty death benefits for refund of member contributions are assumed to be paid in the form of a lump sum. All other death benefits are assumed to be paid in the form of a single life annuity equal to the member's accrued benefit. Beneficiaries of members participating in DROP are assumed to additionally receive the member's DROP account in the form of a lump sum.

**9. Cost-of-Living Adjustment Assumption:**

Assumed to follow System provisions – 0%, 1%, or 2% depending on age and type of retirement

**10. Percent Married:** Males 70%, Females 70%

**11. Spouse Age:** A husband is assumed to be four years older than his wife.

**12. Remarriage Rates:** None

**13. Children:**

All benefits with Joint & Survivor Forms of Payments for retirees had their survivor benefits increased by 2.0% to account for children's benefits.

**14. Benefit Loads:**

Benefits to certain types of future beneficiaries receiving Line-of-Duty death benefits were increased by 7.0% to allow for contingent beneficiaries.

Benefits to certain types of future members receiving Line-of-Duty disability benefits were increased by 1.5% to allow for possible conversion to Line-of-Duty death benefits.

Benefits payable in the form of a Joint and Survivor 100% Pop-Up or Joint and Survivor 50% Pop-Up were valued, respectively, as 100% Joint and Survivor with a 2.70% load and 50% Joint and Survivor with a 1.50% load to account for the additional value of the Pop-Up form of benefit in the absence of data on the amount to which the benefit would increase.

**APPENDIX C**  
**ACTUARIAL ASSUMPTIONS AND METHODS**

All future retirement benefits were increased by 1% to account for possible child beneficiaries.

**15. Funding Policy:**

The City's funding policy is to contribute the amount equal to the net normal cost, a provision for anticipated administrative expenses, plus the accrued liability contribution or less the amortization of the excess assets, as the case may be. However, the aggregate payment by the City must be sufficient, when combined with the amount in the Fund, to provide the pensions and other benefits payable out of the Fund during the then-current year.

**16. Changes Since Last Valuation:**

None

**17. Rationale for Assumptions:**

The actuarial assumptions were chosen by the Board of Trustees, upon the recommendation of the actuaries, based on an experience study conducted on the System's experience from the 2011-2014 valuations. The results of this study were presented in September 2015 and went into effect starting with the June 30, 2015 valuation.

**APPENDIX C**  
**ACTUARIAL ASSUMPTIONS AND METHODS**

**B. Actuarial Methods**

**1. Funding Method:**

Liabilities and contributions shown in this report are computed using the entry age normal method of funding. Under this funding method, a normal cost rate is determined as a level percentage of pay for each active member. The normal cost rate times payroll equals the total normal cost for each member. The normal cost plus member contributions will pay for projected benefits at retirement for each active System member.

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

The portion of the actuarial liability in excess of System assets, the UAL, is amortized to develop an additional cost or savings that is added to each year's employer normal cost. Under this cost method, actuarial gains and losses are directly reflected in the size of the unfunded actuarial liability. The amortization method is described as item 3 below.

**2. Asset Valuation Method:**

Effective June 30, 2014, the actuarial value of assets was set to equal the market value of assets. The deferral of investment gains and losses only applies after June 30, 2014.

The actuarial value has been calculated by taking the market value of assets less 80% of the investment gain (loss) during the preceding year, less 60% of the investment gain (loss) during the second preceding year, less 40% of the investment gain (loss) during the third preceding year, and less 20% of the investment gain (loss) in the fourth preceding year.

The investment gain (loss) is calculated by taking the difference between the expected value of assets based on an investment return assumption and the actual value of assets. If the actuarial value of assets is less than 80% or more than 120% of the market value, an adjustment is made to the actuarial value to bring the value within this corridor.

**3. Amortization Method:**

The current unfunded actuarial liability is amortized as a level dollar figure over a closed 25-year period beginning on July 1, 2014.

**4. Changes Since Last Valuation:**

None