Employees' Retirement System of the City of Baltimore

Actuarial Valuation Report as of June 30, 2018

Produced by Cheiron

October 2018

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October 26, 2018

Board of Trustees
Employees' Retirement System
of the City of Baltimore
7 East Redwood Street, 12th Floor
Baltimore, Maryland 21202-3470

Dear Members of the Board:

We are pleased to submit the June 30, 2018 actuarial valuation of the Employees' Retirement System of the City of Baltimore (the System). This report contains information on the System's assets and liabilities, as well as discloses employer contribution levels. Financial disclosures are provided in a separate Governmental Accounting Standards Board (GASB) Statement Nos. 67 and 68 reports.

The purpose of this report is to present the annual actuarial valuation of the Employees' Retirement System of the City of Baltimore. This report is for the use of the Employees' Retirement System's Retirement Board and its auditors in preparing financial reports in accordance with applicable law and accounting requirements.

To the best of our knowledge, this report and its contents have been prepared in accordance with accepted actuarial principles and practices which 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 Employees' Retirement System of the City of Baltimore for the purposes described 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

Kenneth A. Kent, FSA, FCA, MAAA, EA
Principal Consulting Actuary

Anu Patel, FSA, MAAA, EA
Principal Consulting Actuary

FOREWORD

Cheiron is pleased to provide the annual actuarial valuation report of the **Employees' Retirement System of the City of Baltimore** as of June 30, 2018. 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,

3) **determine** the recommended contributions for FYE 2020, and

4) **provide specific information** and documentation to support the City's funding obligation and information required by the auditors of the System.

An actuarial valuation establishes and analyzes the 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 presents an analysis of the experience gains and losses over the past year and the source of changes to the unfunded actuarial accrued liability.

Section IV develops the City contribution rate.

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 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, 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 Standard of Practice No. 23 Data Quality.

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 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.

FOREWORD

The employers' annual contributions to this System are determined as the sum of the net normal cost, reflecting a provision for administrative 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 actuarial gains and losses on either the assets or the liabilities of the System. This report was prepared using census data and financial information as of June 30, 2018 as provided to us by the System and does not reflect any subsequent changes in the membership or assets.

This year's valuation does not reflect any changes in the regular interest rate based on the direction of the Board that the change applies to the following fiscal year and will be reflected in next year's valuation.

SECTION I – SUMMARY

The key results of the June 30, 2018 actuarial valuation are as follows:

- Investments earned 8.71% on a market value basis. The expected rate of return is defined by the definition of *Regular Interest* in the City Code, which for the year ending June 30, 2018 is 6.50% for participant liability in pay status and 7.50% for all other liabilities. For comparing the actual return, we determined a liability weighted expected return (taking the regular interest times a ratio of the respective present value of benefits for active and deferred vested participants versus participants in pay status over the total present value of benefits of the System) which results in a blended expected discount rate this year of 6.93%.

- Due to smoothing of the prior investment gains and losses, the actuarial asset value return was 7.23%, producing a net loss of $7.9 million to the System this year when measured against the expected asset return of 7.50%.

- The unfunded actuarial liability (Actuarial Liability minus Actuarial Assets) decreased from $644.11 million on June 30, 2017 to $625.26 million on June 30, 2018. This decrease is primarily attributable to contributions being paid into the System to pay down the unfunded liability. Details of the gains and losses are presented in detail in Section III of this report.

- The System's funded ratio, which is the ratio of actuarial asset value to actuarial liability, increased from 72.7% last year to 74.1% this year.

- The total recommended contribution decreased from $89,866,171 for FYE 2019 to $86,953,791 for FYE 2020. This represents a decrease in cost as a percent of payroll from 22.98% to 21.55% for FYE 2020. The expected employee contribution rate for active Plan C and Plan D members used to offset the City's cost is 5% of pay.

- The funding policy adopted by the Board provides for the unfunded actuarial liability to be amortized over a fixed period of 20 years targeting 100% funding by the fiscal year ending 2032. As of the current valuation, the remaining amortization period is 13 years.

- Employees hired or rehired after July 1, 2014 are covered under the Class D membership if they elect the "hybrid" plan option at time of employment. As of June 30, 2018 there are 1,321 Class D members out of total active membership of 8,013, representing 16.5% of the total active members in the System.

- Under the plan provisions for Hybrid Class D members if the funded status of this Class of members falls below 85% then up to half the City contributions to the Retirement Savings Plan (which would be an additional 1.5% of pay) will be diverted to this Plan. This report includes in Section IV the current Plan D funded status which is 95.2%.

SECTION I – SUMMARY

The tables below provide details on the development of the FYE 2020 contribution results, unfunded actuarial liabilities, and statistics on Plan membership. The total lump sum costs determined as payable at the beginning of the fiscal year reflect the offset of expected member contributions.

Table I-1
Valuation Summary

	2017 Valuation Applies to FYE 2019 Amount	2017 Valuation % of Pay	2018 Valuation Applies to FYE 2020 Amount	2018 Valuation % of Pay
1 Contributions				
Total Normal Cost (with expenses)	$ 28,939,927	7.40%	$ 29,335,489	7.27%
Expected Employee Contributions FYE 2019/2020[1]	(16,267,021)	-4.16%	(17,058,147)	-4.23%
Employer Normal Cost	$ 12,672,906	3.24%	$ 12,277,342	3.04%
Allocation from 6/30/2000 excess earnings to pay Ordinance 01-189 normal cost	$ (3,436,917)	-0.88%	$ (3,574,394)	-0.89%
Amortization of unfunded actuarial liability	$ 70,580,886	18.05%	$ 71,578,490	17.74%
Interest to beginning of next FY	$ 6,607,307	1.69%	$ 6,672,353	1.65%
Plan cost before adjustment	$ 86,424,182	22.10%	$ 86,953,791	21.55%
Excess/(Shortfall) contribution adjustment with interest	$ 3,441,989	0.88%	$ 0	0.00%
Total lump sum cost	$ 89,866,171	22.98%	$ 86,953,791	21.55%
Total covered payroll	$ 391,121,606		$ 403,454,892	
2 Unfunded Liabilities				
Actuarial Liability				
Active	$ 857,663,648		$ 874,104,305	
Retirees and dependents	1,449,436,246		1,484,169,320	
Terminated vested	52,505,622		52,340,433	
Total	$ 2,359,605,516		$ 2,410,614,058	
Less: Actuarial value of assets	$ 1,715,495,626		$ 1,785,356,033	
Unfunded actuarial liability	$ 644,109,890		$ 625,258,025	
Funded Ratio based on Actuarial Value of Assets	72.7%		74.1%	
Funded Ratio based on Market Value of Assets	69.0%		71.1%	

[1] Expected Employee Contributions are 5% of pay for Plan C and Plan D members

SECTION I – SUMMARY

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

Table I-2
Active Membership Summary

	Active Members			Payroll		%
	2017	2018	% Increase	2017	2018	Increase
Class A	13	12	-7.69%	$ 571,873	$ 539,850	-5.60%
Class C	7,223	6,680	-7.52%	353,419,425	340,542,004	-3.64%
Class D	807	1,321	63.69%	37,130,308	62,373,038	67.98%
Total	8,043	8,013	-0.37%	$ 391,121,606	$ 403,454,892	3.15%
Average				$ 48,629	$ 50,350	3.54%

Table I-3
Inactive Membership Summary

	Number of Retirees			Average Annual Benefit Amount		
	2017	2018	% Increase	2017	2018	% Increase
Receiving Benefits						
Normal Service Retirement	5,902	5,974	1.2%	$ 17,816	$ 18,303	2.7%
Discontinued Service	870	848	-2.5%	21,595	22,199	2.8%
Ordinary Disability	823	830	0.9%	9,636	9,873	2.5%
Accidental Disability	58	58	0.0%	22,704	23,429	3.2%
Social Security Equalization	9	9	0.0%	6,142	6,266	2.0%
Beneficiaries of Above	1,381	1,356	-1.8%	8,261	8,420	1.9%
Ordinary Death	100	117	17.0%	12,968	13,237	2.1%
Special Death	1	11	1000.0%	10,912	18,194	66.7%
Total	**9,144**	**9,203**	**0.6%**	**$ 15,962**	**$ 16,402**	**2.8%**
Deferred Benefits						
Terminated Vested*	1,045	1,030	-1.4%	$ 8,729	$ 8,882	1.7%

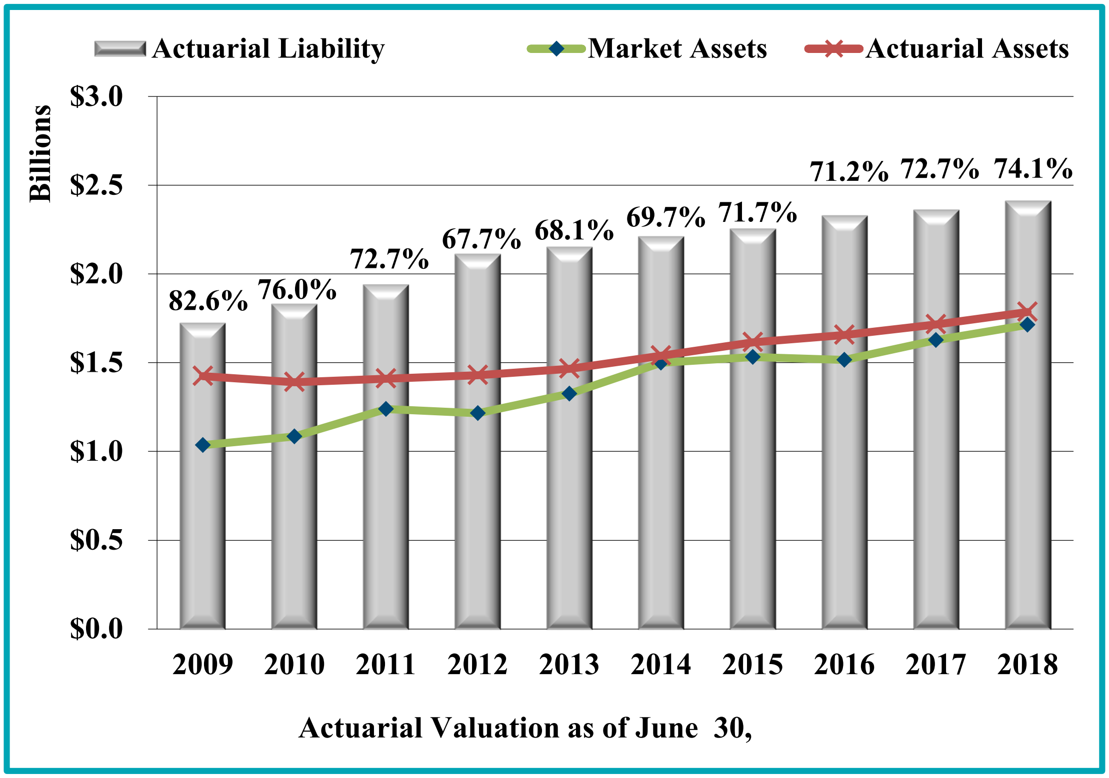
*Benefit amounts for 16 vested participants were not provided; we assumed a monthly benefit of $700.

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 which display key factors in the valuations of the last 10 years.

<u>Assets and Liabilities</u>

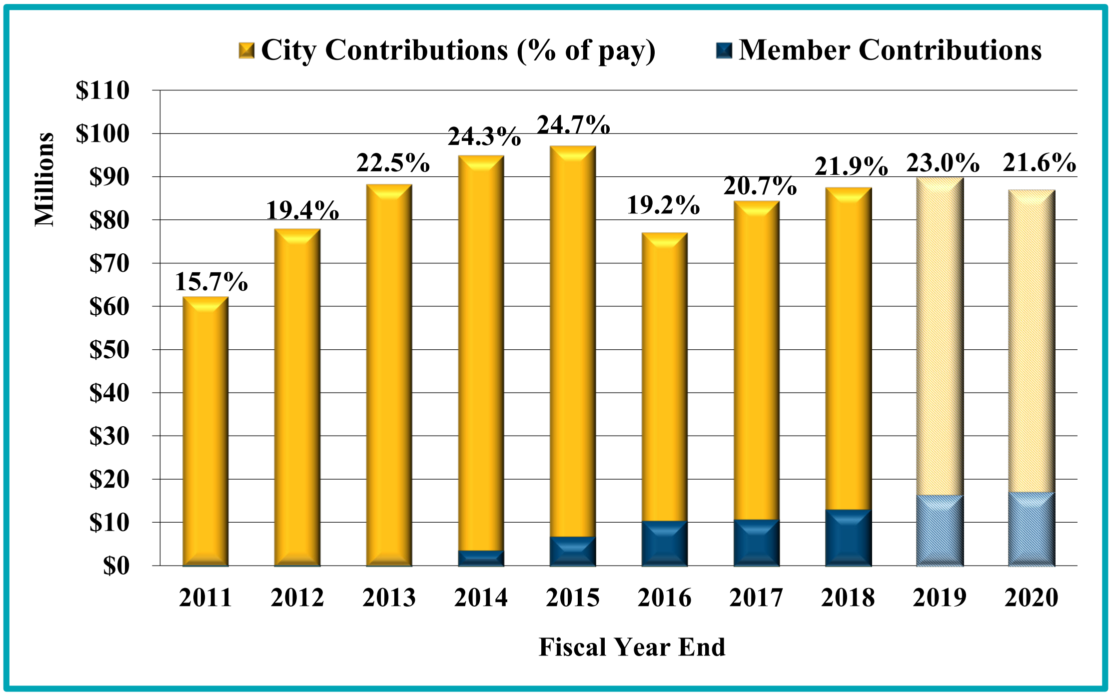


The chart above shows historical trends since 2009 for the market and actuarial value of assets compared to the actuarial liability. The actuarial asset value reflects the market value plus one-fifth of the aggregate investment earnings above or below the expected return. We also show the progress of the Retirement System's funded ratios (ratio of actuarial assets over actuarial liabilities) provided along the top of each bar. The System had its highest funded percentage during this decade (83%) on June 30, 2009. After the impact of the market decline in 2008, the System experienced marked lower funded ratios. The deferred investment losses are partially recognized and further offset by investment gains resulting in the actuarial assets being almost equal to the market assets in 2014. The increase in liability as of June 30, 2012 was mainly due to the change to the Entry Age Normal Cost funding method. In 2018, though the funded ratio decreased due to asset losses and liability, it increased due to contributions being paid into the System to pay down the unfunded liability resulting in a net increase in funded ratio from 72.7% to 74.1%.

SECTION I – SUMMARY

Contribution Rates

This graph shows the historical trends for the actuarially calculated contributions (including City and member contributions) and net City contribution rate as a percent of payroll, shown above each bar. Because there is a one-year lag in the determination of the City contributions, we show the actual contributions made through FYE 2018 and estimated amounts for FYE 2019 and FYE 2020.



The increasing costs from 2011 to 2015 are a reflection of an increasing unfunded actuarial liability in part due to investment losses. The percentages above the bars show the City contribution rate net of member contributions as a percent of pay. The City contribution rate drops for FYE 2016 mainly due to the one-time credit applied for contributions already made by the City in excess of the required amounts due to the member contribution offset. Member contributions offset the City's cost. Beginning with FYE 2014 member contributions started at 1% of pay increasing by 1% each year, if salary also increased 2% in each of those years. During FYE 2017 because the 2% salary did not occur, member contributions remained at 3% instead of the scheduled increase to 4%. This results in a one year delay with, expected member contributions at 4% of pay during FYE 2018 and ultimately reaching 5% of pay starting with FYE 2019 and thereafter.

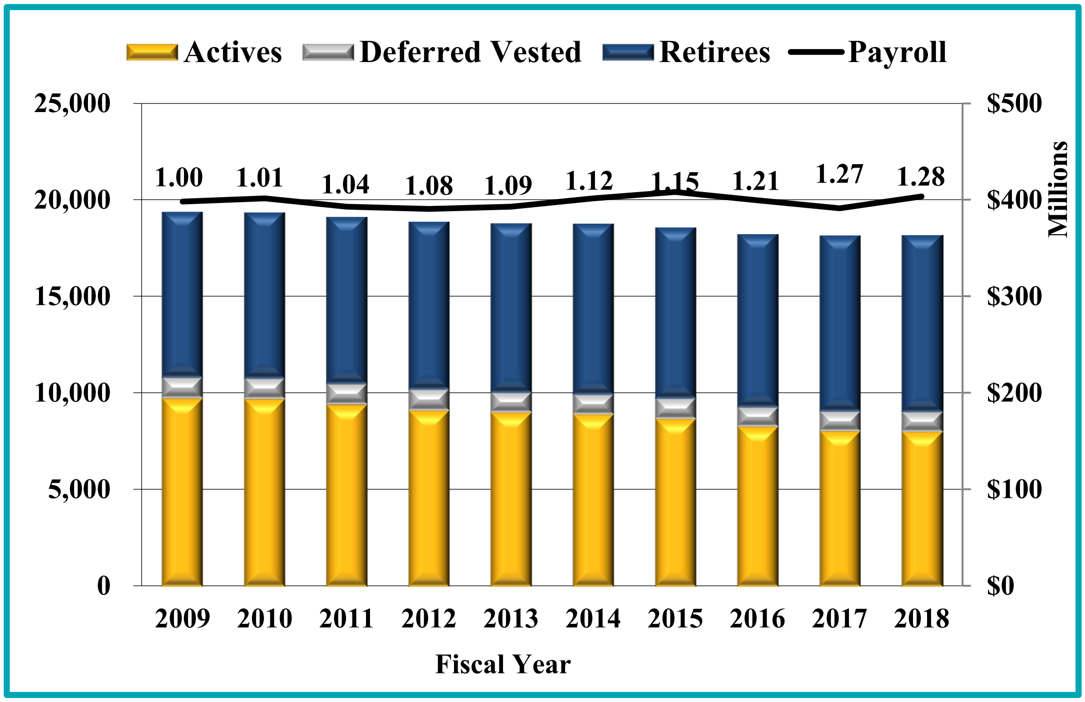
SECTION I – SUMMARY

Participant 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 inactive per each active has been steadily increasing since 2009 representing the System's maturity.

The black line represents the total covered payroll over the period, and it corresponds with the scale on the right. Payroll has remained fairly level from 2009 to 2015, declined from 2016-2017, and increased in 2018. This is in line with the decline in active members resulting from the new Plan D which had a one year wait period for membership and an option to opt out of the Hybrid Plan D to participate in a defined contribution plan.

The ratio of inactive to active participants as of the current valuation is 1.28. The implications of this ratio are that the unfunded liability, which represents the System overall, is funded as a percent of active participant payroll. Therefore the costs as a percent of payroll will be more volatile for a plan with a ratio of inactive to active participants greater than 1.



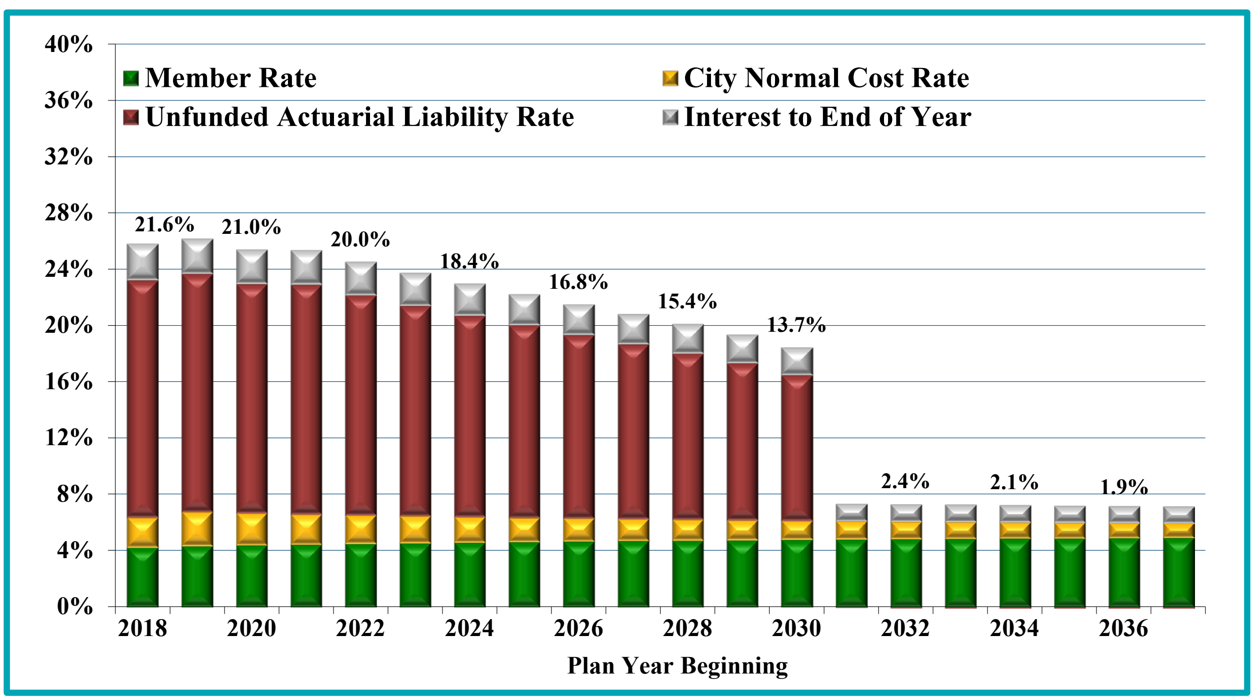
SECTION I – SUMMARY

Base Line Projections

The following chart shows the expected progress of the System's funded status over the next 20 years measured in terms of the City's contribution rate and the funded ratio assuming the long-term return rate of 7.50% for FYE 2019 and 7.00% thereafter. This projection reflects the changes in plan membership. All new members participate at a lower benefit formula and contribute at 5.0% of pay under Class D membership.

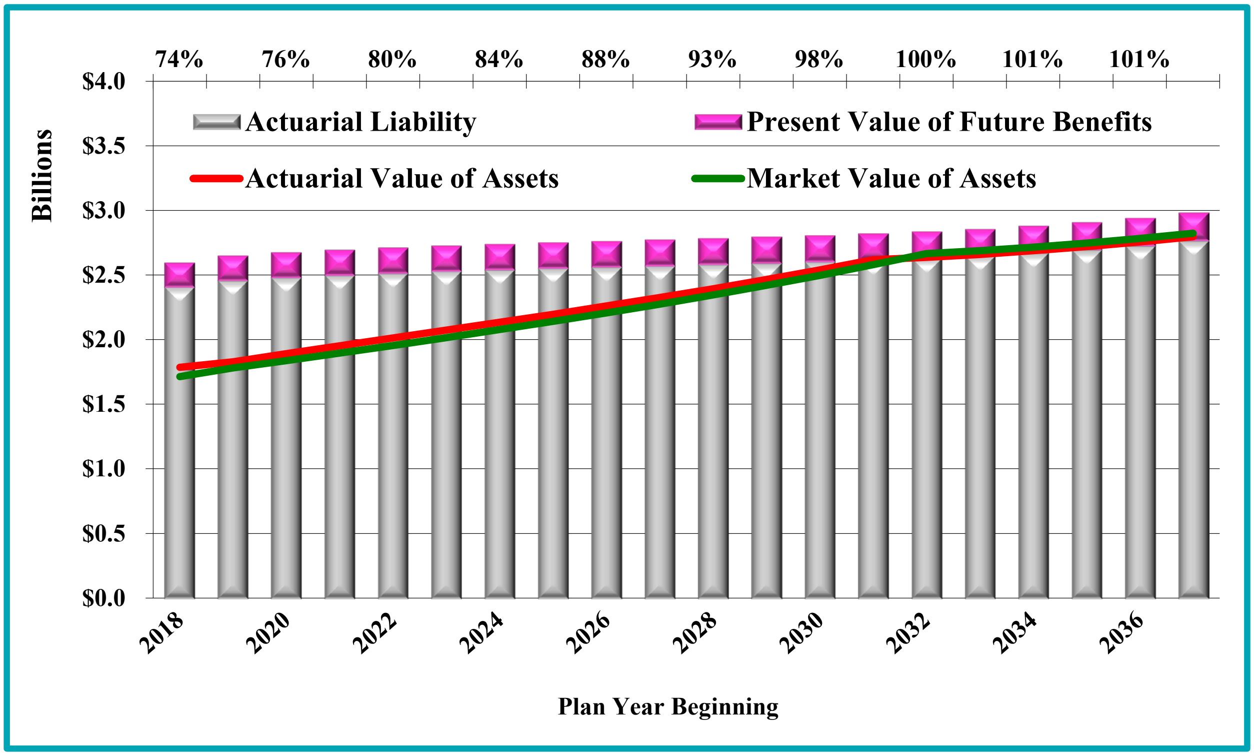
The projections assume there will be no future gains or losses on the liability. These projections are also based on assuming all of the valuation assumptions are exactly met, including the long-term rate of return and covered payroll increasing by the inflation assumption of 3.50% per year.

The chart shows the expected member contribution rate, the normal cost rate, the rate of pay amortization of the unfunded actuarial liability (UAL) rate, and the net City's total contribution rate (numbers on the top of the bars). The City's total cost as a percent of payroll is projected to decrease steadily over the projection period as a function of the funding policy which pays the unfunded liability over a fixed period resulting in level dollar amortization payments along with an increasing proportion of Plan D active membership with a lower normal cost rate. The cost eventually drops to around 2.4% when the unfunded liability is fully paid off and the majority of remaining active members are expected to be covered as Class D members. The 5.0% contribution rate for Class D members is expected to cover most of the normal cost rate, the cost of the annual benefit accrual with the balance of the cost to cover the cost of administrative expenses. Therefore the City's net cost will trend toward 1.9% as Class C members retire. The cost between year 2020 and 2021 is flat due to the ending of the Ordinance 01-189 normal cost adjustment.



SECTION I – SUMMARY

The next chart compares Assets and Liabilities and shows that if all actuarial assumptions are exactly met, the Plan's funded ratio shown along the top of the graph (actuarial asset value as a ratio of actuarial liability) is projected to improve gradually from the current level of 74% to 100% funding in 13 years by 2031.

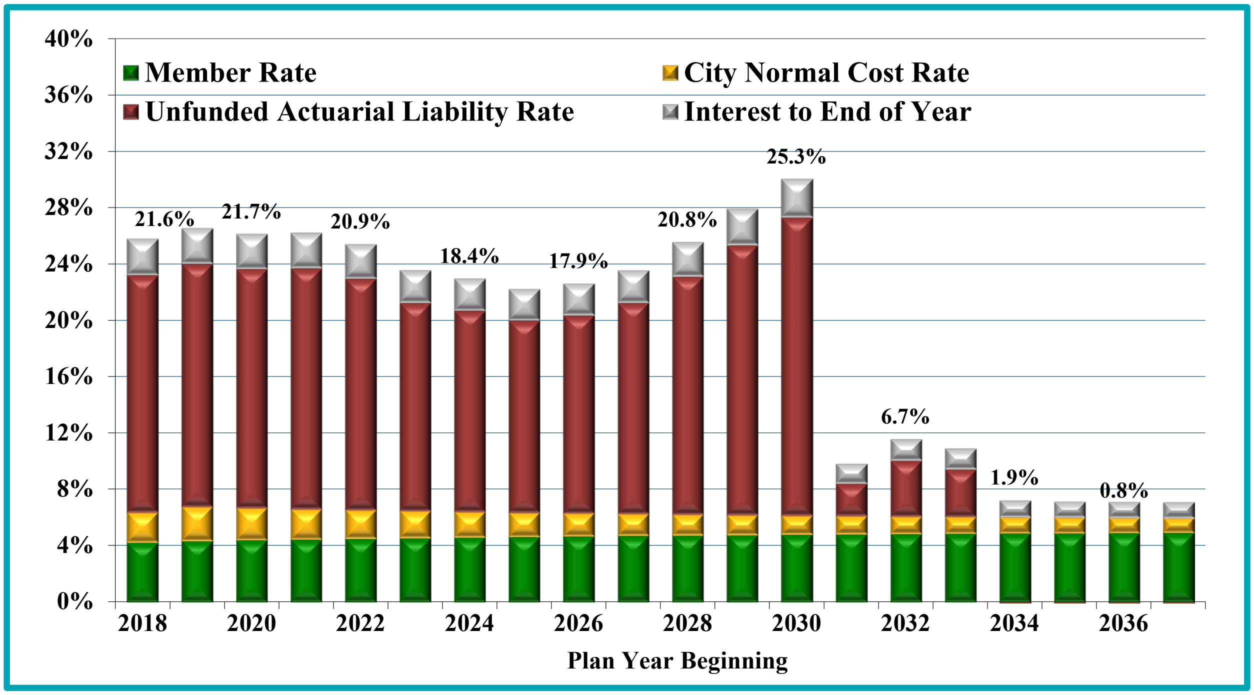


SECTION I – SUMMARY

This pattern of funded status improvement is a function of the funding policy to amortize the UAL over a fixed 20-year period from 2011. The financial experience of the System 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. The next two graphs show the same information as above but reflect the fact that the 7.00% investment return is not likely to actually occur each year but represents an average of more volatile returns. They are based on projected returns that while volatile produce the same average 7.02% (7.50% for one year and 7.00% thereafter) return based on the following table.

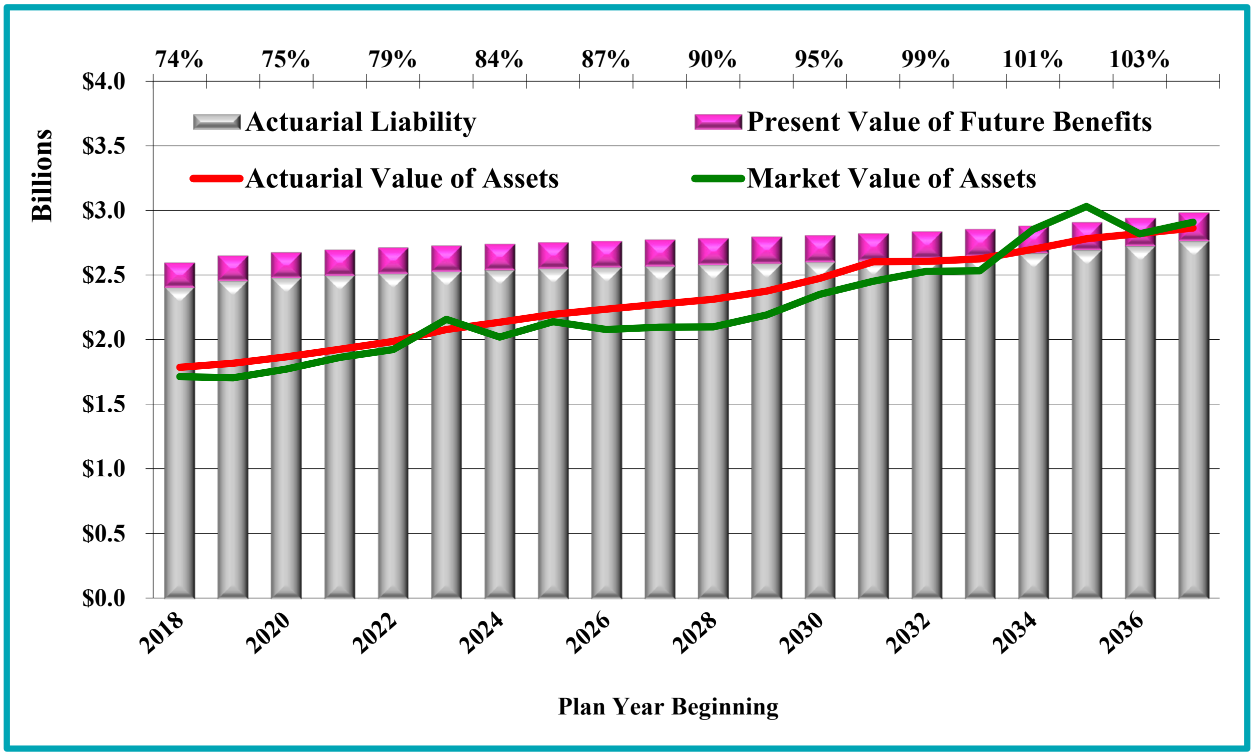
2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
3.00%	8.00%	9.00%	7.00%	16.00%	-3.00%	10.00%	1.00%	5.00%	4.00%

2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
8.00%	10.00%	6.00%	4.00%	6.00%	18.00%	11.00%	-2.00%	9.00%	13.00%



This graph above shows the nature of the fixed amortization period and the potential for cost volatility as the Plan gets closer to the target date for full funding. In the year 2031, almost all of the unfunded actuarial liability is being recognized in the one-year period remaining of the total amortization period. It is anticipated that as that date gets closer and based on plan experience additional measures may be considered to address cost volatility. However for the balance of the years leading up to 2031, the costs are relatively stable given the return volatility illustrated. This is a function of the asset smoothing.

SECTION I – SUMMARY



This presents a realistic view of the potential volatility of the System and highlights the long-term implications of the funding and funded status risks from market volatility.

SECTION II – ASSETS

The assets below are based on unaudited financial data furnished by the Retirement System's Office. The change in market value of assets during the valuation year ending June 30, 2018 is summarized below.

Table II-1
Assets of the Plan as of June 30, 2018

	Total Market Value
Fund Balance on June 30, 2017	$ 1,627,026,498
Contributions	
Member	$ 12,942,622
City/State	$ 87,541,882
Net Investment Income	
Interest, dividends, securities lending income and realized capital gains	$ 174,324,830
Unrealized gains (losses)	(26,172,737)
Expenses	(8,639,822)
Total Investment Income	$ 139,512,271
Administrative expenses	$ (3,616,054)
Payments of benefit & refunds	$ (149,154,499)
Fund Balance on June 30, 2018	$ 1,714,252,720

SECTION II – ASSETS

The chart below shows the calculation of investment gains and losses. On a market value basis, the Plan earned an 8.71% return amounting to total investment income of $139,512,271 during FY 2017-2018. Because the liabilities (Present Value of Future Benefits shown as PVFB in the table below) are valued using different discount rates for actives and terminated vested participants versus retirees, we allocate this return over the actuarial liabilities of active and inactive participants separately. The investment gain on a market basis related to the inactive liabilities using the expected return rate of 6.50% was $35.4 million. The investment gain on a market basis related to the active liabilities using the expected return rate of 7.50% was $19.4 million. Combining these two gains in relation to the portion of funds in each group, results in a net System asset gain over the assumptions on a market value basis of $28.5 million.

Table II-2
Development of Investment Gain / (Loss)

1. Market Value of assets as of June 30, 2017	$	1,627,026,498
2. Market Value of assets as of June 30, 2018	$	1,714,252,720
3. Earnings during June 30, 2017 to June 30, 2018 (including investment expenses)	$	139,512,271
4. Mean Assets [Half of ((1.) + (2.) - (3.))]	$	1,600,883,474
5. Investment return 2017-2018 [(3.) ÷ (4.)]		8.71%
6. Investment gain / (loss)		
a. Relative to 6.50%: [(5.) - 6.50%] x (4.)	$	35,379,525
b. Relative to 7.50%: [(5.) - 7.50%] x (4.)	$	19,370,690
7. Funds as a portion of market value of assets		
a. Retired PVFB/Total PVFB		0.57040
b. (Total PVFB - Retired PVFB)/Total PVFB		0.42960
c. Total: (a) + (b)		1.00000
8. Total investment gain / (loss)		
a. Retired: (6a.) x (7a.)	$	20,180,458
b. Active: (6b.) x (7b.)	$	8,321,661
c. Total Investment Gain / (Loss): (a) + (b)	**$**	**28,502,119**

The investment gains for FYE 2018 are taken together with past experience to determine an actuarial asset value for determining the City's contribution obligations.

SECTION II – ASSETS

The table below shows the development of the unallocated earnings which represent the earnings above and below the valuation interest assumption. The excess earnings are calculated by the "asset averaging method" from Article 22(7) (b) of the Baltimore City Code. This method uses one-fifth of the excess earnings for the year to adjust the unfunded actuarial liability in the current year. The other four-fifths of the excess earnings are used to smooth investment experience. The unrecognized deferred earnings increased from an excess of $2,926,680 to an excess of 25,143,039 a change in net unallocated accumulated earnings of $22,216,359 as of June 30, 2018. This net excess is gradually recognized in the future actuarial value of assets and impacts future contributions to the System. However, future investment gains/(losses) may ameliorate/(exacerbate) this recognition.

Table II-3
Development of Unallocated Earnings

The development of current unallocated excess/(deficit) earnings over the most recent two years is as follows:

	Valuation Date	
	6/30/2017	**6/30/2018**
1. Remaining net excess earnings from prior valuation	$ (56,232,856)	$ 2,926,680
2. New investment gain/(loss)	59,891,206	28,502,119
3. Current net excess earnings (1) + (2)	$ 3,658,350	$ 31,428,799
4. One-fifth (credit) charge (3) /(5)	(731,670)	(6,285,760)
5. Net unallocated excess/(deficit) earnings (3) + (4) = (5)	$ 2,926,680	$ 25,143,039

SECTION II – ASSETS

The table below shows the calculation of the actuarial value of assets. The assets are smoothed using the unallocated earnings calculation. Additionally, the actuarial value of assets is offset by the Normal Cost Reserve from Plan Change.

Table II-4
Actuarial Value of Assets

The actuarial value of assets used to calculate the unfunded actuarial liability is developed as follows:

1. Assets in the Fund on June 30, 2018			$	1,714,252,720	
2. Net deferred recognition of unallocated excess/(deficit) earnings			$	25,143,039	
3. Normal Cost Reserve from plan change			$	(9,886,840)	*
4. Present value of prior year's contributions not yet paid			$	106,133,192	
5. Preliminary actuarial value of assets on June 30, 2018 (1) - (2) + (3) + (4)			$	1,785,356,033	**
6. Corridor testing: 80% of market value assets	$	1,371,402,176			
120% of market value assets	$	2,057,103,264			
7. Final actuarial value of assets on June 30, 2018			$	1,785,356,033	
8. Ratio of actuarial asset value to adjusted market asset value				98.6%	

* A reserve from the 6/30/2000 accumulated net excess earnings was established to pay the assumed increase in normal cost due to the Ordinance 01-189 improvements.

** The actuarial value of assets represents 104.1% of the market value which is down from the same measurement last year of 105.4%.

On actuarial asset value, due to the continued gradual recognition of prior year's investment losses, the rate of return is below expectation with an asset rate of return for the year of 7.23%, which is compared to the expected investment return of 7.50% for the prior year. As of June 30, 2018, previous investment losses are partially being recognized and further offset by investment gains which are being deferred for recognition in the future.

SECTION II – ASSETS

The table below shows the schedule of the Normal Cost Reserve from Plan Changes. This schedule was established during the 2001 valuation year as a means of funding a benefit enhancement by reserving the full amount of the cost at a time when the actuarial asset value exceeded the liabilities. The Normal Cost Reserve, which reflects the unamortized balance, is taken out of the actuarial value of assets until valuation year 2020, at which time, the Plan changes will be fully amortized.

Table II-5
Normal Cost Reserve from Plan Change

June 30,	Additional Normal Cost	Normal Cost Reserve
2001	$ 1,835,000	$ 26,256,000
2002	1,908,400	26,374,680
2003	1,984,736	26,423,582
2004	2,064,125	26,393,954
2005	2,146,690	26,276,215
2006	2,232,558	26,059,887
2007	2,321,860	25,733,515
2008	2,414,734	25,284,587
2009	2,511,323	24,699,441
2010	2,611,776	23,963,167
2011	2,716,247	23,059,502
2012	2,824,896	21,919,857
2013	2,937,892	20,574,820
2014	3,055,408	19,003,790
2015	3,177,624	17,184,382
2016	3,304,728	15,057,265
2017	3,436,917	12,633,977
2018	3,574,394	9,886,840
2019	3,717,370	6,785,879
2020	3,298,647	3,298,647

SECTION III – LIABILITIES AND EXPERIENCE GAINS/(LOSSES)

The tables below present the actuarial liabilities by membership status, employer, and then allocates the assets in proportion to each employer's liabilities, to produce the unfunded actuarial liability by employer. These liabilities are for funding purposes and are not appropriate for measuring the cost of settling Plan liabilities by purchasing annuities or paying lump sums. On the following page, this unfunded liability is amortized over the remaining years, and that amount is then added to the Net Normal Cost (cost to cover the upcoming year's expected accruals less member contributions) with the administrative expenses to produce the recommended employer contributions.

Table III-1
Liability By Employee Group

	As of June 30, 2018			
	Dept. of Education	Detention Services	All Others	Total
Number of Participants				
Active	1,398	3	6,612	8,013
Service retired				6,830
Disabled				889
Terminated vested				1,030
Dependents				1,484
Total Participants				18,246
Annual compensation of active participants	$ 66,527,741	$ 170,923	$ 336,756,228	$ 403,454,892
Average Age	51.21	58.67	50.43	50.57
Average Service	13.77	32.10	14.24	14.16
Development of Unfunded Actuarial Liability				
Actuarial Liability				
Active	$ 123,379,112	$ 936,198	$ 749,788,995	$ 874,104,305
Retirees and dependents				1,484,169,320
Terminated vested				52,340,433
Total liabilities				$ 2,410,614,058
Actuarial value of assets				
Active	$ 35,124,450	$ 266,524	$ 213,455,306	$ 248,846,280
Retirees and dependents				1,484,169,320
Terminated vested				52,340,433
Total assets				1,785,356,033
Unfunded actuarial liability *	$ 88,254,662	$ 669,674	$ 536,333,689	$ 625,258,025

* Unfunded actuarial liability was allocated in proportion to each employee group's actuarial liability for active participants.

SECTION III – LIABILITIES AND EXPERIENCE GAINS/(LOSSES)

This next table presents the change in actuarial liabilities, actuarial assets and unfunded liability 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 change in the UAL which are of particular significance, potentially affecting the long-term financial outlook of the System. Below, we present key changes in liabilities and assets since the last valuation.

Table III-2
Development of 2018 Experience (Gain)/Loss

		Actuarial Liability		Actuarial Value of Assets		Unfunded Actuarial Liability
1. Value as of June 30, 2017	$	2,359,605,516	$	1,715,495,626	$	644,109,890
a.) Actives and Term Vested at 7.50%	$	910,169,270				
b.) Inactives at 6.50%	$	1,449,436,246				
2. Additions						
a.) Normal Cost	$	28,939,927	$	0	$	28,939,927
b.) Actual Employer Contributions	$	0	$	87,541,882	$	(87,541,882)
c.) Actual Member Contributions	$	0	$	12,942,622	$	(12,942,622)
3. Decreases						
a.) Benefit Payments	$	(149,154,499)	$	(149,154,499)	$	0
b.) Admin Expenses	$	0	$	(3,616,054)	$	3,616,054
4. Expected Interest						
a.) On 1 for one year	$	162,476,051	$	128,662,172	$	33,813,879
b.) On 2a for one year	$	2,170,495	$	0	$	2,170,495
c.) On 2b for one year*	$	0	$	6,565,641	$	(6,565,641)
d.) On 2c for 1/2 year	$	0	$	476,574	$	(476,574)
e.) On 3a and 3b for 1/2 year	$	(4,771,210)	$	(5,625,328)	$	854,118
5. Expected Value June 30, 2018: (sum 1-4)	$	2,399,266,280	$	1,793,288,636	$	605,977,644
6. Change in methods/assumptions	$	0	$	0	$	0
7. Change in benefits	$	0	$	0	$	0
8. Expected value after changes: (sum 5-7)	$	2,399,266,280	$	1,793,288,636	$	605,977,644
9. Actual Value as of June 30, 2018	$	2,410,614,058	$	1,785,356,033	$	625,258,025
10. Actuarial (Gain)/Loss: (9-8)	$	11,347,778	$	7,932,603	$	19,280,381

* Assumes contributions made at year end.

.

SECTION III – LIABILITIES AND EXPERIENCE GAINS/(LOSSES)

Table III-3
Development of 2018 Experience Gain/(Loss)

1. Unfunded Actuarial Liability at June 30, 2017	$	644,109,890
2. Additions (normal cost, expenses and contributions)		(67,928,523)
3. Interest accrued*		29,796,277
4. Actuarial Assumption Change		0
5. Expected Unfunded Actuarial Liability at June 30, 2018 (1) + (2) + (3) + (4)	$	605,977,644
6. Actual Unfunded Actuarial Liability at June 30, 2018		625,258,025
7. Total Gain/(Loss) at June 30, 2018 (5) - (6)	$	(19,280,381)

* Interest rate depends on active versus inactive.

Table III-4
Elements of Actuarial Assets - Gain/(Loss)

1. Change in unallocated earnings	$	(22,216,359)
2. Change in Normal Cost Reserve		2,747,137
3. Asset Return		11,536,619
4. Total Actuarial Assets - Gain/(Loss) (1) + (2) + (3)	$	(7,932,603)

Table III-5
Elements of Actuarial Liability - Gain/(Loss)

1. Age and Service Retirements	$	(3,075,729)
2. Disability Retirements		(3,661,969)
3. Death in Service Benefits		(3,749,303)
4. Withdrawal from Employment		795,204
5. Pay Increases		(7,289,225)
6. Death after Retirement		827,893
7. New Entrants		959,967
8. Other		3,845,384
9. Total Actuarial Liability - Gain/(Loss) (sum 1-8)	$	(11,347,778)
10. Assumption Changes - Gain/(Loss)		0
11. Plan Changes - Gain/(Loss)		0
12. Total Actuarial Liability Changes (sum 9-11)	$	(11,347,778)

SECTION IV – CONTRIBUTIONS

This table presents the components that make up the costs by employer including the normal cost reflective of the value of the benefits earned during the year, employee contributions for members under Class A, Class C, and Class D membership, the proportional shares of the amortization cost to pay off the unfunded actuarial liability, and the special credit normal cost defined in Ordinance 01-189, all brought forward with interest for the one-year delay in funding to the next fiscal year beginning. Under the current funding policy, the unfunded actuarial liability is amortized over a fixed period of 20 years starting from fiscal year beginning 2011. As of the current valuation, the remaining amortization period is 13 years.

Table IV-1
Contribution Summary by Group

	As of June 30, 2018				
	Dept. of Education	Detention Services	All Others	Total	% of Pay
Total Normal Cost (including expenses)	$ 5,008,778	$ 11,403	$ 24,315,308	$ 29,335,489	7.27%
Expected Employee Contributions	(241,570)	0	(16,816,577)	(17,058,147)	-4.23%
Net Normal Cost	$ 4,767,208	$ 11,403	$ 7,498,731	$ 12,277,342	3.04%
13-year amortization of Unfunded Actuarial Liability	$ 10,103,246	$ 76,663	$ 61,398,581	$ 71,578,490	17.74%
Allocation from 6/30/2000 excess earnings to pay Ordinance 01-189 normal cost	(504,523)	(3,828)	$ (3,066,043)	(3,574,394)	-0.89%
Net plan cost at 7/1/2018	$ 14,365,931	$ 84,238	$ 65,831,269	$ 80,281,438	19.90%
Interest to 7/1/2019	1,086,667	6,318	5,579,368	6,672,353	1.65%
Net plan cost at 7/1/2019	$ 15,452,598	$ 90,556	$ 71,410,637	$ 86,953,791	21.55%

SECTION IV – CONTRIBUTIONS

In accordance with Section 5.3 (C) of Article 22 of the City Code, the City's contribution rate to the Retirement Savings Plan (Savings Plan) is 3% for Hybrid Plan D members. However, if the Class D funded status falls below 85%, half of the 3.0% (or 1.5%) of the City contributions to the Savings Plan will be diverted to funding the Retirement System.

In the table below we track and provide the funded status for Class D members. The funded ratio is defined as the ratio of the adjusted market value basis of assets attributable to Class D members of the June 30th preceding the actuarial valuation over the Employees Retirement System liabilities attributable to Class D members on that date. To determine this value in time for the implementation of the appropriate City contribution rate, before the beginning of the fiscal year, we roll forward the liabilities for Class D members and the estimated adjusted asset value from the beginning of the prior year to provide a June 30, 2018 measurement.

Table IV - 2
Development of 2018 Expected Funded Status for Plan D

	Actuarial Liability	Actuarial Value of Assets	Unfunded Actuarial Liability
1. Value as of June 30, 2017	$ 2,236,132	$ 2,076,610	$ 159,522
a.) Actives and Term Vested at 7.50%	$ 2,236,132		
b.) Inactives at 6.50%	$ 0		
2. Additions			
a.) Normal Cost	$ 2,405,424	$ 0	$ 2,405,424
b.) Expected Employer Contributions	$ 0	$ 679,747	$ (679,747)
c.) Expected Member Contributions	$ 0	$ 1,856,515	$ (1,856,515)
3. Decreases			
a.) Expected Benefit Payments	$ (224,184)	$ (224,184)	$ 0
b.) Expected Admin Expenses	$ 0	$ (159,346)	$ 159,346
4. Interest			
a.) On 1 for one year	$ 167,710	$ 180,873	$ (13,163)
b.) On 2a for one year	$ 180,407	$ 0	$ 180,407
c.) On 2b for one year*	$ 0	$ 59,206	$ (59,206)
d.) On 2c for 1/2 year	$ 0	$ 79,163	$ (79,163)
e.) On 3a and 3b for 1/2 year	$ (7,171)	$ (16,354)	$ 9,183
5. Expected Value June 30, 2018: (sum 1-4)	$ 4,758,318	$ 4,532,230	$ 226,088
6. Funded Status			95.2%

APPENDIX A – PLAN MEMBERSHIP

The data for this valuation was provided electronically in Excel by the Retirement System Office. Cheiron did not audit any of the data; however the data was reviewed to ensure that it complies with generally accepted actuarial standards. The data for active and inactive participants is as of June 30, 2018. Where data elements may be missing such as dates of hire, dates of birth, and benefit accrual level, we make assumptions to fill-in the blanks. The assumed values (if applicable) are included in Appendix B.

The following pages contain a summary of the data provided.

- Reconciliation of participants as of June 30, 2018
- Active members split by plan and group
- Age/service and age/salary/service distribution for active members as of June 30, 2018
- Counts and average benefit amount by age for retirees, beneficiaries and disabled members as of June 30, 2018

APPENDIX A – PLAN MEMBERSHIP

PARTICIPANT RECONCILIATION FROM JUNE 30, 2017 TO JUNE 30, 2018

	Actives	Term. Vested	Disabled	Retired	Survivor	Total
1. June 30, 2017 valuation	**8,043**	**1,045**	**883**	**6,779**	**1,482**	**18,232**
2. Additions						
a. New entrants / pickups	609					**609**
b. Returned to work	22					**22**
c. Transferred						
Total	**631**					**631**
3. Reductions						
a. Terminated - not vested	(255)					**(255)**
b. Non-Participating						
c. Lump sum	(1)	(6)				**(7)**
d. Benefits Expired				(2)	(11)	**(13)**
e. Deaths without beneficiary	(25)	(6)	(33)	(215)	(93)	**(372)**
Total	**(281)**	**(12)**	**(33)**	**(217)**	**(104)**	**(647)**
4. Changes in status						
a. Terminated - vested	(85)	85				
b. Returned to work	11	(7)		(4)		
c. Retired	(265)	(79)		344		
d. Disabled	(36)	(4)	40			
e. Died with beneficiary	(5)		(9)	(73)	87	
f. Data corrections		2	8	1	19	**30**
Total	**(380)**	**(3)**	**39**	**268**	**106**	**30**
5. June 30, 2018 valuation	**8,013**	**1,030**	**889**	**6,830**	**1,484**	**18,246**

ACTIVE MEMBERSHIP AS OF JUNE 30, 2018 BY PLAN AND GROUP

	Dept. of Education	Detention Services	All Others	Total Actives	% of Total
Class A active members	4	0	8	12	0.1%
Class C active members	1,269	3	5,408	6,680	83.4%
Class D active members	125	0	1,196	1,321	16.5%
Total	**1,398**	**3**	**6,612**	**8,013**	**100.0%**

APPENDIX A – PLAN MEMBERSHIP

AGE/SERVICE DISTRIBUTION OF ACTIVE PARTICIPANTS
ACTIVE PARTICIPANTS AS OF JUNE 30, 2018

	COMPLETED YEARS OF CREDITED SERVICE									
AGE	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Up	Total
Under 25	45	0	0	0	0	0	0	0	0	45
25-29	250	30	0	0	0	0	0	0	0	280
30-34	315	166	80	1	0	0	0	0	0	562
35-39	309	231	183	42	0	0	0	0	0	765
40-44	220	198	229	139	39	0	0	0	0	825
45-49	219	178	217	186	115	47	2	0	0	964
50-54	178	181	266	199	155	114	100	2	0	1,195
55-59	151	151	251	200	180	156	192	80	3	1,364
60-64	99	108	187	170	166	138	178	142	44	1,232
65-69	29	61	87	84	61	48	70	46	53	539
70 & Up	18	19	38	24	31	23	25	22	42	242
Total	1,833	1,323	1,538	1,045	747	526	567	292	142	**8,013**

Average Age = 50.57 Average Service = 14.16

APPENDIX A – PLAN MEMBERSHIP

AGE/SERVICE DISTRIBUTION OF ACTIVE PARTICIPANTS
ACTIVE PARTICIPANTS AS OF JUNE 30, 2018

AVERAGE EARNINGS

AGE	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Up	Total
Under 25	$ 31,399	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 31,399
25-29	42,551	40,669	0	0	0	0	0	0	0	42,349
30-34	48,785	48,215	42,162	74,566	0	0	0	0	0	47,720
35-39	52,146	54,100	49,714	44,233	0	0	0	0	0	51,720
40-44	50,806	57,534	51,513	55,486	51,196	0	0	0	0	53,424
45-49	48,632	53,482	48,099	48,952	54,512	57,374	68,717	0	0	50,639
50-54	48,873	51,136	44,817	48,111	53,774	56,054	55,685	43,919	0	50,069
55-59	47,682	47,486	46,291	41,485	49,060	54,094	59,609	59,057	72,475	49,812
60-64	53,423	45,658	44,508	44,672	49,087	52,211	57,190	57,924	59,006	50,724
65-69	52,986	53,891	44,030	49,694	52,417	54,470	59,553	65,201	68,994	54,667
70 & Up	30,662	59,178	31,184	43,428	49,647	51,086	52,497	47,349	52,508	46,186
Total	$ 48,355	$ 51,702	$ 46,543	$ 47,303	$ 51,293	$ 54,221	$ 57,869	$ 58,488	$ 61,097	$ 50,350

Total Earnings = $ 403,454,892 Average Earnings = $ 50,350

APPENDIX A – PLAN MEMBERSHIP

SCHEDULE OF BENEFIT RECIPIENTS BY ATTAINED AGE AND TYPE OF RETIREMENT
JUNE 30, 2018 - PRIMARY MEMBERS

	TYPE OF RETIREMENT					
AGE	NR	ER	DS	ODis	ADis	Total
Under 20	0	0	0	0	0	0
20-24	0	0	0	0	0	0
25-29	0	0	0	0	0	0
30-34	0	0	0	2	0	2
35-39	0	0	0	5	0	5
40-44	0	0	0	12	1	13
45-49	1	0	2	27	0	30
50-54	23	0	14	63	3	103
55-59	124	138	58	149	6	475
60-64	354	371	145	231	11	1,112
65-69	954	489	194	153	8	1,798
70-74	873	349	159	77	8	1,466
75-79	609	292	115	54	8	1,078
80-84	405	251	86	35	7	784
85 & Up	497	253	75	22	6	853
Total	3,840	2,143	848	830	58	**7,719**
Average Annual Benefit	$ 24,319	$ 7,471	$ 22,198	$ 9,872	$ 23,429	$ 17,848

NR - Service Retirement
ER - Early Retirement
DS - Discontinued Service
ODis - Ordinary Disability
ADis - Accidental Disability

APPENDIX A – PLAN MEMBERSHIP

SCHEDULE OF BENEFIT RECIPIENTS BY ATTAINED AGE AND TYPE OF RETIREMENT JUNE 30, 2018 - BENEFICIARIES

	TYPE OF RETIREMENT							
AGE	NR	ER	DS	ODis	ADis	ODth	ADth	Total
Under 20	3	2	1	2	0	1	3	12
20-24	1	0	1	2	0	0	0	4
25-29	1	0	0	0	0	0	0	1
30-34	0	0	0	1	0	0	0	1
35-39	0	0	0	0	0	0	0	0
40-44	1	0	0	0	0	0	0	1
45-49	0	0	1	5	0	3	0	9
50-54	4	4	2	8	1	2	0	21
55-59	21	15	2	19	0	10	0	67
60-64	49	17	10	27	1	24	0	128
65-69	85	36	11	54	0	18	0	204
70-74	93	38	22	34	3	11	0	201
75-79	111	48	24	35	3	17	3	241
80-84	119	50	13	30	2	10	1	225
85 & Up	213	70	28	25	8	21	4	369
Total	701	280	115	242	18	117	11	**1,484**
Average Annual Benefit	$ 10,556	$ 4,427	$ 11,036	$ 5,426	$ 10,815	$ 13,237	$ 18,193	$ 8,871

NR - Service Retirement
ER - Early Retirement
DS - Discontinued Service
ODis - Ordinary Disability
ADis - Accidental Disability
ODth - Ordinary Death
ADth - Accidental Death

Entry Age Normal Method

Liabilities and contributions shown in this report are computed using the Entry Age Normal method of funding. Under this method, the normal cost is computed as the level annual percentage of pay required to fund the retirement benefits between each member's date of hire and assumed retirement.

A description of the calculation follows:

The normal cost is based upon the normal cost rate determined by taking the value, as of entry age into the plan, of each member's projected future benefits. This value is then divided by the value, also at entry age, of each member's expected future salary producing a normal cost rate that should remain relatively constant over a participant's career. The normal cost rate is multiplied by current salary to determine each member's normal cost. Finally, the normal cost is reduced by the member contribution to produce the employer normal cost.

The actuarial liability is the difference between the present value of future benefits and the present value of future normal costs. The unfunded actuarial liability is the difference between the actuarial liability and the actuarial value of assets.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

Actuarial Assumptions and Methods

Method of Funding: The Entry Age Normal Funding Method was approved by the Board of Trustees effective 7/1/2012.

The current unfunded actuarial liability is amortized as a level dollar over 20 years. The 20-year period decreases each year from 2011 until 2031, at which time the unfunded liability will be fully paid.

Asset Valuation: The actuarial value of assets is equal to the market value, adjusted for 20% of the five-year aggregate investment surpluses and deficits. This calculation is done in the following steps:

1. The investment gain or loss for the current year is calculated; this equals the actual investment earnings during the year minus the expected earnings. Expected earnings are calculated using a weighted average of the pre- and post-retirement interest rate assumptions multiplied by the mean market value of assets during the year.

2. The current net excess earnings are computed by adding the investment gain or loss for the current year to the remaining excess earnings for the prior valuation. One-fifth of the excess earnings are recognized in the actuarial value as of the current valuation and four-fifths are deferred to future years.

3. The net assets are then adjusted to account for the Normal Cost Reserve held for the plan changes made during 2001.

4. The present value of the prior year's City contributions is added to the net assets to account for the one-year lag between required contributions and when the contributions are actually received.

5. The actuarial value of assets will not be greater than 120% nor less than 80% of the market value of assets as of the valuation date.

All actuarial assumptions are subject to Board of Trustees approval with changes typically addressed following each five-year experience study and following the recommendation of the actuary. The last experience study was performed in 2015 based on 2010 through 2014 experience analysis. The rationale for these assumptions can be found in the experience study report.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

Discount Rate: A liability weighted discount rate is expected on the basis that a 7.50% rate is applied in measuring active and terminated vested participant liabilities, and a 6.50% rate is applied for measuring retiree participant liabilities. The weighted discount rate this year is 6.93%.

Investment Return: The investment return assumption is 7.50% net of investment expenses effective June 30, 2016 valuation. This assumption is defined by City Code based on the definition of *Regular Interest*, which has been amended from time to time based on the advice of the actuary and investment consultant and recommendation of the Board of Trustees in the form of an amendment to the City Code from time to time.

Social Security Wage Base: 3.00% per year compounded annually

Inflation: 2.65% (effective 6/30/2015)

Salary Increases: Salary increases are assumed to vary with age. Sample rates are as follows:

Age	Salary
20	0.063
25	0.058
30	0.053
35	0.047
40	0.041
45	0.037
50	0.035
55	0.035
60	0.035
65	0.035
69	0.035

Cost-of-Living Adjustment Assumption: 1.5% for inactives in pay status under age 65 and 2.0% over age 65

Percent Married: Males 90%, females 80%

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

Remarriage Rates: None

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

Expenses: Administrative expenses are expected to be equal to the prior years' actual expenses rounded up to the next hundred thousand dollars and added as part of the annual normal cost for the year. For June 30, 2018 the assumed administrative expenses were $3,700,000.

Investment expenses are assumed to be paid out of investment earnings.

Job Elimination Benefit: A liability load of 1.75% is applied to active retirement benefits to account for the value of this benefit.

New Entrant Assumption: A liability load of 0.5% is applied to active benefits to account for future new entrants who may have previous years of service restored or transferred into the System (effective 6/30/2015).

Withdrawal:

Service	Rate
0	14.50%
1	13.50
2	11.50
3	9.00
4	8.00
5	8.00
6	7.00
7	6.00
8	4.00
9	4.00
10	4.00
11	4.00
12	4.00
13	3.00
14	3.00
15+	3.00

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

Disability:

Age	Non-Line-of-Duty Disability	Line-of-Duty Disability (Classes A&B)	Line-of-Duty Disability (Class C)
25	0.00050	0.00004	0.00008
30	0.00059	0.00004	0.00008
35	0.00073	0.00005	0.00010
40	0.00190	0.00006	0.00013
45	0.00332	0.00009	0.00018
50	0.00394	0.00012	0.00023
55	0.00567	0.00013	0.00025
60	0.00715	0.00034	0.00068
65	0.00130	0.00038	0.00076
69	0.00078	0.00039	0.00078

Workers' compensation offset is included in the above rates

Pre-Retirement Mortality:

1. Non-line-of-Duty – RP 2000 Healthy Mortality with projections using 50% of the AA scale projected 15 years with a three-year set forward for both males and females (effective 6/30/2015).

2. Line-of-Duty - 0.005% at all ages (effective 6/30/1999).

Age	Non-Line-of-Duty Death* Male	Non-Line-of-Duty Death* Female	Line-of-Duty Death*
25	0.000365	0.000211	0.000050
30	0.000608	0.000365	0.000050
35	0.000928	0.000551	0.000050
40	0.001223	0.000837	0.000050
45	0.001687	0.001271	0.000050
50	0.002546	0.001942	0.000050
55	0.004570	0.003694	0.000050
60	0.008876	0.007366	0.000050
65	0.016084	0.012950	0.000050
69	0.024553	0.019903	0.000050

* Rates for individuals who are the age shown as of June 30, 2018

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

Post-Retirement Mortality:

1. Retirees and Beneficiaries - RP 2000 Healthy Mortality with projections using 50% of the AA scale projected 15 years with a two-year set forward for both males and females. Given the requirement for experience studies performance every five years, these projections are sufficient until the next measurement period.

2. Disabled members - RP 2000 Disabled Mortality with generational projections using 50% of the AA scale projected 15 years with a four-year set forward for both males and females.

Sample rates (rates first effective 6/30/2015).

	Retirees and Beneficiaries*		Disabled Members	
Age	Male	Female	Male	Female
55	0.004067	0.003275	0.035243	0.019556
60	0.007763	0.006412	0.042824	0.02562
65	0.014467	0.011715	0.053651	0.034033
70	0.024368	0.019903	0.069235	0.047093
75	0.042215	0.032115	0.093052	0.063837
80	0.074656	0.053410	0.125150	0.088989

* Rates for individuals who are the age shown as of June 30, 2018

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

Service Retirement:

Early Retirement prior to the later of age 60 and eligibility for Normal Retirement (earlier of age 65 with five years of service and 30 years of service).

	Rates of Retirement		
Age	Less than	30 yos	More than
45 -49	0.00	0.10	0.00
50-54	0.00	0.10	0.05
55	0.03	0.10	0.05
56-57	0.04	0.10	0.05
58	0.05	0.10	0.05
59	0.05	0.10	0.10
60	0.05	0.10	0.10
61	0.07	0.20	0.15
62	0.15	0.20	0.25
63	0.11	0.20	0.20
64	0.14	0.20	0.17
65	0.20	0.30	0.25
66	0.20	0.20	0.25
67	0.17	0.20	0.20
68	0.15	0.20	0.20
69	0.20	0.20	0.20
70	1.00	1.00	1.00

Normal Retirement is assumed on or after the later of age 60 and eligibility for Normal Retirement (earlier of age 65 with five years of service and 30 years of service).

Terminated vested participants are assumed to retire at age 65.

Joint and Survivor Forms of Payment:

The 40% Joint & Survivor form of payment is assumed for all benefits. All benefits with Joint & Survivor Forms of Payment for retirees had their survivor benefits increased by 4% to account for children's benefits.

Data Assumptions:

For participants with a Joint and Survivor benefit who were missing spouse dates of birth, we assumed that the male is four-years older than the female.

For terminated vested participants who were not provided benefit amounts, we assumed a monthly benefit of $700. This was the prior year average benefit for terminated vested participants, rounded to the nearest hundred.

Justification for

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

Assumptions: The actuarial assumptions were adopted by the Retirement Board, based upon the alternatives presented in the 2014 experience study report conducted on the System's experience from the 2010-2014 valuations. The results of this study were presented in August 2015 and are incorporated into this report by reference.

Changes Since Last Valuation: The administrative expense assumption was changed from $3.6 million to $3.7 million to reflect actual experience.

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APPENDIX C – SUMMARY OF PLAN PROVISIONS

Effective Date

The System was effective January 1, 1926 and has been periodically amended.

Eligibility

Any regular and permanent officer, agent, or employee of the City with the exception of those required to join the Maryland State or any other Retirement System shall become a Class D member of the Employees' Retirement System upon completion of one year of service. The Board of Estimates may authorize prospective membership for any class of part-time employees. There are four classes of members as follows:

1. Class A – Members who were hired before July 1, 1979, and entered membership on or after January 1, 1954, or who elected, prior to April 1, 1954, to contribute at the higher Class A rate. Any Class B member may elect to become a Class A member by bringing his accumulated contributions and interest up to what they would be if he had elected Class A membership on January 1, 1954.

2. Class B – Members as of January 1, 1954 who did not elect Class A membership – there are no remaining active Class B participants as of June 30, 2011.

3. Class C – Members who were hired on or after July 1, 1979 and before July 1, 2014, or any other members who may have elected to transfer during various open transfer periods.

4. Class D – Members who were hired or rehired on or after July 1, 2014. Class D Members have the option to participate in both the Employees' Retirement System and the new Retirement Savings Plan (RSP) as hybrid members or opt out of the System and participate only in the RSP as non-hybrid members. The City contributes 3% of pay to RSP for hybrid members and 4% of pay for non-hybrid members. Members also have the option to make voluntary deferrals to the City's Deferred Compensation Plan, with the City matching 50% of the first 2% of compensation deferred by the member.

Member Contributions

Class A and Class B members currently contribute at the rate of 4% of earnable compensation, and contributions are not required upon attaining age 60 and completing 35 years of service. Class C members (except participants of Detention Services and Department of Education) began making contributions at 1.0% of compensation starting July 1, 2013 increasing 1.0% each year until they reach 5.0% of compensation. As of June 30, 2018, Class C and Class D members make contributions at 5.0% of pay from date of participation. Interest is credited on contributions at a rate of 5.25% per annum for Class A and B members and 3.00% for Class C and Class D members.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

Compensation

Earnable compensation is the annual salary authorized for the member, not including overtime, differential pay, environmental pay, hazardous duty pay, pay for conversion of leave or other fringe benefits, or any additional payment. Average Final Compensation is the average of the member's annual earnable compensation on January 1 for the three successive years of service when the member's earnable compensation is the highest or, if the member is in service on January 1 for less than three successive years, than the average during total service.

Covered Compensation

The covered compensation (for Class C only) is the average of the FICA wage base for the 35-year period ending with the calendar year which ends immediately prior to the earlier of: (1) January 1, employment, or (2) January 1, of the calendar year in which the member attains age 65.

Military Service Credit

A. Military Service Prior to Employment:
   1. Classes A and B
      A maximum of three- years' service credit is granted provided the member has acquired 10 years of service and has reached the age of 60 or has acquired 20 years of service, regardless of age.

   2. Classes C and D
      A maximum of three-years' service credit is granted provided the member has acquired 10 years of service and has reached the age of 62 or has acquired 20 years of service, regardless of age.

B. Military Service Within Employment:
   1. Classes A and B
      Upon retirement or death, any member who, because of military duty, had a break in employment shall receive service credit for the period of absence as provided by the Veterans' Reemployment Rights Act.

Retirement Eligibility

A. Service Retirement:
   1. Classes A and B – Age 60 with five years of service or 30 years of membership service.

   2. Classes C and D – Age 65 with five years of service or 30 years of service, regardless of age. Early retirement allowed at age 55 with five years of service payable at age 65 or reduced for payment before 65.

B. Non-Line-of-Duty Disability Retirement:
Five years of membership service and determined by a hearing examiner to be mentally or physically incapacitated for the performance of duty and that incapacity is likely to be permanent.

C. Line-of-Duty Disability Retirement:
Totally and permanently incapacitated for duty as the result of an accident while in performance of duty and certified by a hearing examiner as mentally or physically incapacitated for the performance of duty and that such incapacity is likely to be permanent.

D. Dismemberment Disability Retirement:
   1. Classes C and D – Loss of any two or more of hands, feet, sight of eye(s) as a direct result of bodily injury from an accident while in actual performance of duty as determined by a hearing examiner.

Termination of Employment

1. Classes A and B
   a. Eligible for Termination Retirement Allowance, deferred to age 60, upon completion of (1) 15 years of membership service, or (2) five years of service, if removed from a position without fault.
   b. Eligible for a Termination Retirement Allowance, payable immediately, upon completing 20 years of service, if removed from a position without fault.
   c. Eligible for a refund of accumulated contributions if not eligible for any other benefits.

2. Classes C and D
   a. Eligible for a Termination Retirement Allowance, deferred to age 65, upon completion of (1) 10 years of service, or (2) five years of service, if removed from a position without fault.
   b. Eligible for an immediate benefit if removed without fault after 20 years of service.

Retirement Allowances

A. Service Retirement:
   1. Classes A and B
      The sum of:
      a. An annuity of the actuarial equivalent of a member's accumulated contributions; and
      b. A pension, which together with the annuity shall equal 1.935% (Class A) or 1.785% (Class B) of Average Final Compensation times years of service.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

2. Class C
   A pension of (1) 1.60% of Average Final Compensation, times years of service up to 30 years, plus (2) 0.25% of Average Final Compensation in excess of Covered Compensation, times years of service up to 30 years, plus (3) 1.85% of Average Final Compensation, times years of service in excess of 30 years.

3. Class D
   A pension of 1.00% of Average Final Compensation, times years of service. If the member retires at or after age 62 with at least 20 years of service, the member receives an enhanced benefit of 1.10% of Average Final Compensation times years of service.

B. Early Retirement:
   1. Classes C and D
      If a member is age 55 with five years of service, the member may retire at any time, with a benefit reduced for early commencement. The reduction factor is 1/180 for each of the first 60 months prior to age 65 and 1/360 for each additional month preceding age 65. If the member has 30 years of service at retirement, then there is no reduction factor applied to the benefit.

C. Non-Line-of-Duty Disability Retirement:
   1. Classes A and B
      A benefit equal to the service retirement benefit if age 60; otherwise, an annuity of the actuarial equivalent of a member's accumulated contributions plus a pension which, together with the annuity, shall equal 1.90% (Class A) or 1.75% (Class B) of Average Final Compensation times years of service.

      The member will receive the benefit as calculated above, if the benefit exceeds 25% of the member's Average Final Compensation. Otherwise, the member shall receive 25% of the member's Average Final Compensation.

      This benefit is offset by:
      a. Workers' compensation (excluding amounts paid to third parties);
      b. Earnings in excess of base amount (current earnable compensation in same job grade and step adjusted for longevity) with a $1.00 reduction for each $2.00 of the first $5,000 of excess and a $2.00 reduction for each $5.00 of additional excess earnings.

   2. Classes C and D
      The ordinary disability pension shall be equal to the greater of:
      a. The member's accrued service retirement benefit; or
      b. 15% of the member's average final compensation.

      This benefit is offset by:
      a. Workers' compensation (excluding amounts paid to third parties);
      b. Unemployment compensation.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

D. Line-of-Duty Disability Retirement:
An annuity of the actuarial equivalent of a member's accumulated contributions, plus a pension equal to 66-2/3% of Average Final Compensation.

This benefit is offset by:
Same offsets are applied as for non-line of duty disability.

E. Dismemberment Disability Retirement:
1. Classes C and D
A pension, equal to 100% of Average Final Compensation. Same offsets as for Class C Line-of-Duty Disability benefits.

F. Termination Retirement Allowance (Deferred Payment):
Determined the same as for Service Retirement, but based on membership service and Average Final Compensation at the time of termination.

G. Termination Retirement Allowance (Immediate Payment):
Determined the same as if the member had retired with a non-line-of-duty retirement allowance.

H. Job Removal Retirement Benefit (Immediate Payment):
Unreduced retirement benefit based on actual years of service credit is provided to any member who is removed from a permanent position without fault, provided they had 20 years of service.

Option Methods of Receiving Benefit Payments

A. Maximum Service Retirement:
Joint & Survivor form of payment to unmarried spouse or dependent children until the last marries, dies or attains age 18 (age 22 if a full-time student). The percent continued to the spouse is 40%.

B. Cash refund to retiree's beneficiary 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

These options are available for service, termination, non-line-of-duty disability and line-of-duty disability retirement. Any option and/or beneficiary may be changed by the retired member within 30 days after retirement.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

Non-Line-of-Duty-Death Benefits

1. Classes A and B
   - The member's accumulated contributions will be returned; plus, if one or more years of membership service, 50% of the greater of Average Final Compensation or current annual earnable compensation, or
   - If (1) eligible for service retirement, or (2) would have become eligible for service retirement within 90 days, or (3) if retired on account of service, non-line-of-duty disability, or line-of-duty disability and dies within 30 days of retirement, or (4) entitled to a deferred allowance at age 60; and the member's designated beneficiary or his partner(s) is his spouse with whom he has been living for at least five years, such beneficiary may elect an allowance equal to the greater of 40% of the participant's accrued benefit or the amount that would have been paid under the Joint and 100% Contingent Option.

   This benefit is offset by workers' compensation (excluding amounts paid to third parties). If no beneficiary and if intestate without heirs, then contributions shall remain part of the System.

2. Classes C and D
   - If (1) eligible for service retirement, or (2) would have become eligible for service retirement within 90 days, or (3) if retired on account of service, ordinary disability, or accidental disability and dies within 30 days of retirement, or (4) entitled to a deferred allowance at age 65, or (5) has 20 years of service and dies anytime between effective retirement date at age 65 and no later than 30 days following the attainment of age 65; the member's designated beneficiary shall receive an allowance equal to the greater of 40% of the participant's accrued benefit or the amount that would have been paid under the Joint and 100% Contingent Option, or
   - If (1) not eligible under paragraph (1) above, and (2) if one or more years of service, 50% of the greater of Average Final Compensation or current annual earnable compensation, shall be paid as a lump sum.

Line-of-Duty Death Benefits

If a member's death was the result of injuries in the line of duty, a refund of contributions shall be payable, if applicable. In addition, an annual pension of 100% of current earnable compensation (not less than $10,000 on June 30, 1994) shall be payable to:

A. The spouse, provided there is no voluntary separation agreement renouncing rights of inheritance during her widowhood;
B. If no eligible spouse, or if the spouse dies or remarries, the child or children equally until age 18 (age 22 if full-time student(s));

APPENDIX C – SUMMARY OF PLAN PROVISIONS

C. If no eligible spouse or child surviving, then to the deceased's father and / or mother equally, or to the survivor;
D. For Classes A and B, any member who retires and dies within 30 days after the effective date of line-of-duty disability retirement shall receive the above benefits if death is the result of injuries in the line of duty.

This benefit is offset by workers' compensation (excluding amounts paid to third parties). If no beneficiary and if intestate without heirs, then contributions shall remain part of the System.

Post-Retirement Benefit Increases

Annual post-retirement benefit increases of a fixed 1.5% for participants in pay status under age 65 and 2.0% for participants in pay status age 65 and over.

Hybrid Employer Contributions

Section 5.3 (C) of Article 22 of the City Code identifies a provision that would impact the City's contribution rate to the Retirement Savings Plan (Savings Plan) of 3% for hybrid members of Plan D. If the Class D funded status falls below 85% half of the 3.0% or 1.5% of the City contributions to the Savings Plan will be diverted to funding the Retirement System. As a result in this report we track and provide specific information of the funded status for Class D members.

The funded ratio is defined as the ratio of the adjusted market value basis of assets attributable to Class D members of the June 30th preceding the actuarial valuation over the Employees Retirement System liabilities attributable to Class D members on that date. To determine this value in time for appropriate implementation of the appropriate City contribution rate before the beginning of the fiscal year we roll forward the liabilities for Class D members and the estimated adjusted asset value. This calculation is summarized in Section IV of this report.