



District of Columbia Retirement Board Teachers' Retirement Plan and Police Officers and Firefighters' Retirement Plan

Actuarial Valuations as of October 1, 2019 to Determine
the District's Contribution for the Fiscal Year Ending
September 30, 2021

Bolton

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Employee Benefits, Actuarial & Investment Consulting

December 19, 2019

The Board of Trustees
District of Columbia Retirement Board
900 7th Street, NW, 2nd Floor
Washington, DC 20001

Re: *District of Columbia Teachers' Retirement Plan and District of Columbia Police Officers and Firefighters' Retirement Plan Actuarial Valuations*

Dear Trustees:

The following sets forth the actuarial valuations of the District of Columbia Teachers' Retirement Plan and the District of Columbia Police Officers and Firefighters' Retirement Plan as of October 1, 2019. Section I of the report provides a summary while Sections II through VI contain the development of the District's contribution for the 2021 fiscal year along with a summary of the census and asset data, plan provisions, assumptions and actuarial methods. Section VII provides a glossary of many of the terms used in this report. The appendices of the report provide information on plan funding, solvency, a discussion of risk, adjustments to the actuarially determined contribution, and gain and loss from experience.

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

Respectfully submitted,

Thomas Vicente, FSA, EA

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Section I. Executive Summary

Background

Bolton Partners, Inc. has prepared the following report that sets forth the actuarial valuation of the District of Columbia Teachers' Retirement Plan (Teachers) and District of Columbia Police Officers and Firefighters' Retirement Plan (Police and Fire) as of October 1, 2019. Information for October 1, 2018 and earlier was taken from the valuation report prepared by Cavanaugh Macdonald Consulting, LLC, dated December 17, 2018. Unless stated otherwise, the calculations reflected in this report are solely for the District-provided benefit and do not include the Federal portion of the benefit.

Actuarially Determined Contributions (ADC)

The actuarially determined contribution (ADC) amount for both Plans increased as a dollar amount and as a percentage of payroll this year. Separately, the contribution for Police increased while the contribution for Fire decreased.

Teachers, Police, and Fire	FY2019	FY2020	FY2021
ADC (before §1-907.02(c) adjustment)	\$ 148,937	\$ 149,318	\$ 172,338
Total Payroll	\$ 927,478	\$ 964,269	\$ 1,055,446
Percent of Total Payroll	16.06%	15.49%	16.33%
ADC (after §1-907.02(c) adjustment)	\$ 144,627	\$ 151,949	\$ 180,411

Teachers	FY2019	FY2020	FY2021
ADC (before §1-907.02(c) adjustment)	\$ 51,767	\$ 57,271	\$ 66,327
Total Payroll	\$ 466,792	\$ 490,756	\$ 538,565
Percent of Total Payroll	11.09%	11.67%	12.32%
ADC (after §1-907.02(c) adjustment)	\$ 53,343	\$ 58,888	\$ 70,478

Police and Fire Combined	FY2019	FY2020	FY2021
ADC (before §1-907.02(c) adjustment)	\$ 97,170	\$ 92,047	\$ 106,011
Total Payroll	\$ 460,686	\$ 473,513	\$ 516,881
Percent of Total Payroll	21.09%	19.44%	20.51%
ADC (after §1-907.02(c) adjustment)	\$ 91,284	\$ 93,061	\$ 109,933

Police	FY2019	FY2020	FY2021
ADC (before §1-907.02(c) adjustment)	\$ 59,486	\$ 48,285	\$ 64,066
Total Payroll	\$ 312,265	\$ 309,918	\$ 341,662
Percent of Total Payroll	19.05%	15.58%	18.75%
ADC (after §1-907.02(c) adjustment)	\$ 54,522	\$ 45,421	\$ 61,796

Fire	FY2019	FY2020	FY2021
ADC (before §1-907.02(c) adjustment)	\$ 37,684	\$ 43,762	\$ 41,945
Total Payroll	\$ 148,421	\$ 163,595	\$ 175,219
Percent of Total Payroll	25.39%	26.75%	23.94%
ADC (after §1-907.02(c) adjustment)	\$ 36,762	\$ 47,640	\$ 48,137

(\$ in Thousands)



Section I. Executive Summary

Funding Measures - Teachers

Teachers	10/1/2018	10/1/2019	Percent Change
1. Actuarial Accrued Liability			
a. Active	\$ 1,066,518	\$ 1,230,678	15.39%
b. Retirees and Beneficiaries	1,054,091	1,107,126	5.03%
c. Inactive with Deferred Benefits	180,705	156,487	(13.40%)
d. Total	\$ 2,301,314	\$ 2,494,291	8.39%
2. Actuarial Value of Assets	\$ 2,139,911	\$ 2,271,160	6.13%
3. Plan Funded Ratio (2. / 1.d.)	92.99%	91.05%	
4. Market Value of Assets	\$ 2,193,598	\$ 2,264,428	3.23%
5. Funded Ratio based on Market Value of Assets (4. / 1.d.)	95.32%	90.78%	

(\$ in Thousands)

Funding Measures – Police and Fire

Police and Fire	10/1/2018	10/1/2019	Percent Change
1. Actuarial Accrued Liability			
a. Active	\$ 2,965,066	\$ 3,057,435	3.12%
b. Retirees and Beneficiaries	2,170,287	2,497,165	15.06%
c. Inactive with Deferred Benefits	88,409	49,973	(43.47%)
d. Total	\$ 5,223,761	\$ 5,604,573	7.29%
2. Actuarial Value of Assets	\$ 5,848,576	\$ 6,269,628	7.20%
3. Plan Funded Ratio (2. / 1.d.)	111.96%	111.87%	
4. Market Value of Assets	\$ 6,015,953	\$ 6,256,213	3.99%
5. Funded Ratio based on Market Value of Assets (4. / 1.d.)	115.17%	111.63%	

(\$ in Thousands)



Section I. Executive Summary

Funding Measures – Police

Police	10/1/2018	10/1/2019	Percent Change
1. Actuarial Accrued Liability			
a. Active	n/a	\$ 1,965,788	n/a
b. Retirees and Beneficiaries	n/a	1,895,162	n/a
c. Inactive with Deferred Benefits	n/a	37,037	n/a
d. Total	\$ 3,592,965	\$ 3,897,987	8.49%
2. Actuarial Value of Assets	\$ 4,083,671	\$ 4,359,508	6.75%
3. Plan Funded Ratio (2. / 1.d.)	113.66%	111.84%	
4. Market Value of Assets	\$ 4,199,797	\$ 4,350,405	3.59%
5. Funded Ratio based on Market Value of Assets (4. / 1.d.)	116.89%	111.61%	

(\$ in Thousands)

Funding Measures – Fire

Fire	10/1/2018	10/1/2019	Percent Change
1. Actuarial Accrued Liability			
a. Active	n/a	\$ 1,091,647	n/a
b. Retirees and Beneficiaries	n/a	602,003	n/a
c. Inactive with Deferred Benefits	n/a	12,936	n/a
d. Total	\$ 1,630,796	\$ 1,706,586	4.65%
2. Actuarial Value of Assets	\$ 1,764,905	\$ 1,910,120	8.23%
3. Plan Funded Ratio (2. / 1.d.)	108.22%	111.93%	
4. Market Value of Assets	\$ 1,816,156	\$ 1,905,808	4.94%
5. Funded Ratio based on Market Value of Assets (4. / 1.d.)	111.37%	111.67%	

(\$ in Thousands)



Section I. Executive Summary

Risk Measures

A new Actuarial Standard of Practice concerning pension plan risk is now in effect. Appendix 3 contains important information about various risks common to most public pension plans. Because the information is too lengthy to include in this summary, we strongly recommend reviewing the Appendix and considering whether further risk assessments are necessary.

Generally, the risk that a plan sponsor incurs from a defined benefit plan is primarily the risk of substantial increases in annual contributions. These increases occur most frequently due to variation in the investment returns. This valuation reflects the smoothing of asset returns, which reduces the risk of wide year-by-year contribution changes but does not ultimately reduce the risk inherent in a defined benefit plan. The following table shows four commonly used measures of the relative riskiness of a pension plan, relative to the plan sponsor and the employee group covered by the plan. Additional information is shown in Appendix 3.

Teachers				Conservative
Risk Measure	10/1/2017	10/1/2018	10/1/2019	Measures
Retiree Liability as a Percent of Total Liability	46%	37%	44%	<50%
Assets to Payroll (Asset Volatility Ratio)	4.6	4.7	4.4	<5
Liabilities to Payroll (Liability Volatility Ratio)	4.8	4.9	4.8	<5
Benefit Payments to Contributions	0.9	0.9	0.9	1-3

Police and Fire				Conservative
Risk Measure	10/1/2017	10/1/2018	10/1/2019	Measures
Retiree Liability as a Percent of Total Liability	39%	30%	45%	<50%
Assets to Payroll (Asset Volatility Ratio)	12.7	13.3	12.6	<5
Liabilities to Payroll (Liability Volatility Ratio)	11.0	11.5	11.3	<5
Benefit Payments to Contributions	0.5	0.8	0.8	1-3



Section I. Executive Summary

Experience Analysis

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

- Retiree COLAs in 2019 were less than the assumed annual increases.
- Investment returns during FY2019 were about \$55.7 million lower than expected for Teachers and \$156.2 million lower than expected for Police and Fire. A portion of this loss is reflected in this valuation, with the remaining portions to be reflected in future valuations. This was offset by the continued recognition of prior investment gains and losses. There is a total of \$6.7 million in net deferred investment losses for Teachers and \$13.4 million in net deferred investments losses for Police and Fire as of October 1, 2019 that will be reflected in future valuations.
- Pay for returning employees for Police and Fire increased approximately 10.6% over the prior year; higher than what was expected.
- Total participant payroll increased by 9.7% for Teachers and 9.2% for Police and Fire over the prior year; higher than the assumption of 4.25% growth per year

Changes in Method, Assumptions, and Plan Amendments

There were no changes in valuation methods, assumptions or plan provisions since the prior valuation other than a modification of the "roll-forward" method. This method projects the unfunded liability one year past the valuation date to determine the contribution rate for fiscal year ending September 30, 2021.

Sources of Information

Membership data as of July 1, 2019 and market value of assets as of October 1, 2019 were provided by or at the direction of the District of Columbia Retirement Board. While we have reviewed this data for consistency and completeness, we have not audited this data. For valuation purposes, members were treated as if remaining in the System as of October 1, 2019.

Actuarial Certification

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

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



Section I. Executive Summary

Actuarial Certification

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

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

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

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

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

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

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



Section I. Executive Summary

Actuarial Certification

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

The Board is solely responsible for selecting the Plans' investment policies, asset allocations and individual investments. Bolton Partners, Inc. has not provided any investment advice to the District.

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

The only purpose of this report is to provide the recommended employer contribution for the 2021 fiscal year. This report may not be used for any other purpose; Bolton Partners, Inc. is not responsible for the consequences of any unauthorized use.

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

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

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

The report is conditioned on the assumption of ongoing plans and is not meant to present the actuarial position of the Plans in the case of plan termination. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions, changes in economic or demographic assumptions, increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status), and changes in plan provisions or applicable law.



Section I. Executive Summary

Actuarial Certification

The Board should notify Bolton Partners, Inc. promptly after receipt of this report if the Board disagrees with anything contained in the report or is aware of any information that would affect the results of the report that has not been communicated to Bolton Partners, Inc. or incorporated therein. The report will be deemed final and acceptable to the Board unless the Board promptly provides such notice to Bolton Partners, Inc.

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

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

Thomas Vicente, FSA, EA

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Ann M. Sturner, FSA, EA

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Section II. Determination of District Contributions

Derivation of Liabilities - Teachers

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

Teachers	10/1/2018	10/1/2019
1. Participants		
a. Active	5,066	5,226
b. Retirees and Beneficiaries	3,990	4,059
i. Service Retirements	3,709	3,767
ii. Disability Retirements	106	110
iii. Survivors	175	182
c. Inactive with Deferred Benefits	1,429	1,446
d. Total	10,485	10,731
2. Active Payroll	\$ 470,749	\$ 516,609
3. Actuarial Accrued Liability		
a. Active Participants	\$ 1,066,518	\$ 1,230,678
b. Retirees and Beneficiaries	\$ 1,054,091	\$ 1,107,126
i. Service Retirements	\$ 1,012,187	\$ 1,055,141
ii. Disability Retirements	\$ 29,782	\$ 30,620
iii. Survivors	\$ 17,902	\$ 21,364
c. Inactive with Deferred Benefits	\$ 180,705	\$ 156,487
d. Total	\$ 2,301,314	\$ 2,494,291
4. Actuarial Value of Assets	\$ 2,139,911	\$ 2,271,160
5. Unfunded Actuarial Liability (3.d.- 4.)	\$ 161,403	\$ 223,131
6. Funded Ratio (4. ÷ 3.d.)	92.99%	91.05%

(\$ in Thousands)



Section II. Determination of District Contributions

Derivation of Liabilities – Police and Fire

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

Police and Fire	10/1/2018	10/1/2019
1. Participants		
a. Active	5,349	5,406
b. Retirees and Beneficiaries	3,441	3,699
i. Service Retirements	2,517	2,752
ii. Disability Retirements	402	420
iii. Survivors	522	527
c. Inactive with Deferred Benefits	315	261
d. Total	9,105	9,366
2. Active Payroll	\$ 454,209	\$ 495,809
3. Actuarial Accrued Liability		
a. Active Participants	\$ 2,965,066	\$ 3,057,435
b. Retirees and Beneficiaries	\$ 2,170,287	\$ 2,497,165
i. Service Retirements	\$ 1,834,729	\$ 2,146,289
ii. Disability Retirements	\$ 221,289	\$ 192,788
iii. Survivors	\$ 138,497	\$ 158,088
c. Inactive with Deferred Benefits	\$ 88,409	\$ 49,973
d. Total	\$ 5,223,761	\$ 5,604,573
4. Actuarial Value of Assets	\$ 5,848,576	\$ 6,269,628
5. Unfunded Actuarial Liability (3.d.- 4.)	\$ (624,815)	\$ (665,055)
6. Funded Ratio (4. ÷ 3.d.)	111.96%	111.87%

(\$ in Thousands)



Section II. Determination of District Contributions

Derivation of Liabilities – Police

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

Police	10/1/2018	10/1/2019
1. Participants		
a. Active	3,567	3,566
b. Retirees and Beneficiaries	2,593	2,799
i. Service Retirements	1,894	2,079
ii. Disability Retirements	311	326
iii. Survivors	388	394
c. Inactive with Deferred Benefits	222	179
d. Total	6,382	6,544
2. Active Payroll	\$ 297,283	\$ 327,734
3. Actuarial Accrued Liability		
a. Active Participants	n/a	\$ 1,965,788
b. Retirees and Beneficiaries	n/a	\$ 1,895,162
i. Service Retirements	n/a	\$ 1,634,182
ii. Disability Retirements	n/a	\$ 150,005
iii. Survivors	n/a	\$ 110,975
c. Inactive with Deferred Benefits	n/a	\$ 37,037
d. Total	\$ 3,592,965	\$ 3,897,987
4. Actuarial Value of Assets	\$ 4,083,671	\$ 4,359,508
5. Unfunded Actuarial Liability (3.d.- 4.)	\$ (490,706)	\$ (461,521)
6. Funded Ratio (4. ÷ 3.d.)	113.66%	111.84%

(\$ in Thousands)



Section II. Determination of District Contributions

Derivation of Liabilities – Fire

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

Fire	10/1/2018	10/1/2019
1. Participants		
a. Active	1,782	1,840
b. Retirees and Beneficiaries	848	900
i. Service Retirements	623	673
ii. Disability Retirements	91	94
iii. Survivors	134	133
c. Inactive with Deferred Benefits	93	82
d. Total	2,723	2,822
2. Active Payroll	\$ 156,926	\$ 168,076
3. Actuarial Accrued Liability		
a. Active Participants	n/a	\$ 1,091,647
b. Retirees and Beneficiaries	n/a	\$ 602,003
i. Service Retirements	n/a	\$ 512,106
ii. Disability Retirements	n/a	\$ 42,784
iii. Survivors	n/a	\$ 47,113
c. Inactive with Deferred Benefits	n/a	\$ 12,936
d. Total	\$ 1,630,796	\$ 1,706,586
4. Actuarial Value of Assets	\$ 1,764,905	\$ 1,910,120
5. Unfunded Actuarial Liability (3.d.- 4.)	\$ (134,109)	\$ (203,534)
6. Funded Ratio (4. ÷ 3.d.)	108.22%	111.93%

(\$ in Thousands)



Section II. Determination of District Contributions

Experience Gain/(Loss) and Projection of Unfunded Liability - Teachers

The experience gain/(loss) from October 1, 2018 to October 1, 2019 and projection of the unfunded actuarial liability from October 1, 2019 to October 1, 2020, the beginning of the fiscal year, is shown below. Please see Appendix 5 for a detailed breakdown of gain/(loss) sources.

Experience Gain/(Loss) - Teachers		10/1/2019
1. Unfunded Liability as of 10/1/2018	\$	161,403
2. Total Normal Cost		69,060
3. Expected Expenses		3,436
4. Total Actual Contributions		93,775
5. Interest		12,090
6. Expected Unfunded Liability as of 10/1/2019	\$	152,215
7. Change due to Plan Amendments		-
8. Change due to Assumptions and/or Methods		-
9. Expected Unfunded Liability as of 10/1/2019	\$	152,215
10. Actual Unfunded Liability as of 10/1/2019	\$	223,131
11. Gain/(Loss)	\$	(70,917)
12. Actuarial Accrued Liability at 10/1/2018	\$	2,301,314
13. Gain/(Loss) as a percent of Actuarial Accrued Liability		(3.08%)

Projected Unfunded Liability - Teachers		
1. Actual Unfunded Liability as of 10/1/2019	\$	223,131
2. Total Normal Cost FY2020		75,344
3. Expected City and Employee Contributions FY2020		99,700
4. Expected Expenses FY2020		6,199
5. Interest		16,410
6. Projected Unfunded Liability as of 10/1/2020	\$	221,385

(\$ in Thousands)



Section II. Determination of District Contributions

Experience Gain/(Loss) and Projection of Unfunded Liability - Police

The experience gain/(loss) from October 1, 2018 to October 1, 2019 and projection of the unfunded actuarial liability from October 1, 2019 to October 1, 2020, the beginning of the fiscal year, is shown below. Please see Appendix 5 for a detailed breakdown of gain/(loss) sources.

Experience Gain/(Loss) - Police		10/1/2019
1. Unfunded Liability as of 10/1/2018	\$	(490,706)
2. Total Normal Cost		114,959
3. Expected Expenses		6,613
4. Total Actual Contributions		79,552
5. Interest		(26,757)
6. Expected Unfunded Liability as of 10/1/2019	\$	(475,442)
7. Change due to Plan Amendments		-
8. Change due to Assumptions and/or Methods		-
9. Expected Unfunded Liability as of 10/1/2019	\$	(475,442)
10. Actual Unfunded Liability as of 10/1/2019	\$	(461,521)
11. Gain/(Loss)	\$	(13,921)
12. Actuarial Accrued Liability at 10/1/2018	\$	3,592,965
13. Gain/(Loss) as a percent of Actuarial Accrued Liability		(0.39%)

Projected Unfunded Liability - Police		
1. Actual Unfunded Liability as of 10/1/2019	\$	(461,521)
2. Total Normal Cost FY2020		127,093
3. Expected City and Employee Contributions FY2020		71,312
4. Expected Expenses FY2020		6,882
5. Interest		(23,799)
6. Projected Unfunded Liability as of 10/1/2020	\$	(422,657)

(\$ in Thousands)



Section II. Determination of District Contributions

Experience Gain/(Loss) and Projection of Unfunded Liability - Fire

The experience gain/(loss) from October 1, 2018 to October 1, 2019 and projection of the unfunded actuarial liability from October 1, 2019 to October 1, 2020, the beginning of the fiscal year, is shown below. Please see Appendix 5 for a detailed breakdown of gain/(loss) sources.

Experience Gain/(Loss) - Fire		10/1/2019
1. Unfunded Liability as of 10/1/2018	\$	(134,109)
2. Total Normal Cost		64,230
3. Expected Expenses		2,897
4. Total Actual Contributions		49,975
5. Interest		(6,048)
6. Expected Unfunded Liability as of 10/1/2019	\$	(123,005)
7. Change due to Plan Amendments		-
8. Change due to Assumptions and/or Methods		-
9. Expected Unfunded Liability as of 10/1/2019	\$	(123,005)
10. Actual Unfunded Liability as of 10/1/2019	\$	(203,534)
11. Gain/(Loss)	\$	80,529
12. Actuarial Accrued Liability at 10/1/2018	\$	1,630,796
13. Gain/(Loss) as a percent of Actuarial Accrued Liability		4.94%

Projected Unfunded Liability - Fire		
1. Actual Unfunded Liability as of 10/1/2019	\$	(203,534)
2. Total Normal Cost FY2020		69,538
3. Expected City and Employee Contributions FY2020		60,918
4. Expected Expenses FY2020		3,530
5. Interest		(10,546)
6. Projected Unfunded Liability as of 10/1/2020	\$	(201,930)

(\$ in Thousands)



Section II. Determination of District Contributions

Development of District Contributions - Teachers

The breakdown of the Actuarially Determined Contribution into normal cost, amortization payment, expected administrative expenses, and D.C. Code §1-907.02(c) Adjustment is illustrated below. The calculation of the D.C. Code §1-907.02(c) Adjustment is detailed in Appendix 4.

Teachers Actuarially Determined Contribution (ADC)	FY2021	Percentage of FY2021 Payroll
1. Total Normal Cost as of October 1, 2019	\$ 75,344	N/A
2. Projected Total Normal Cost as of October 1, 2020 (1. x 1.0425)	\$ 78,523	14.58%
3. Expected Member Contributions	42,547	7.90%
4. Employer Normal Cost (2. - 3.)	\$ 35,976	6.68%
5. Expenses	6,463	1.20%
6. Amortization Payment	23,888	4.44%
7. Actuarially Determined Contribution (ADC) (4. + 5. + 6.)	\$ 66,327	12.32%
8. D.C. Code §1-907.02(c) Adjustment to FY2021 Payment	4,151	N/A
9. Fiscal Year District Payment	\$ 70,478	N/A

Projected Payroll		
1. Active Member June 30, 2019 Payroll	\$	480,033
2. Expected FY2020 Payroll (1. increased with one year of salary scale)	\$	516,609
3. Projected FY2021 Payroll (2. x 1.0425)	\$	538,565

(\$ in Thousands)



Section II. Determination of District Contributions

Development of District Contributions – Police and Fire

The breakdown of the Actuarially Determined Contribution into normal cost, amortization payment, expected administrative expenses, and D.C. Code §1-907.02(c) Adjustment is illustrated below. The calculation of the D.C. Code §1-907.02(c) Adjustment is detailed in Appendix 4.

Police and Fire Actuarially Determined Contribution (ADC)	FY2021	Percentage of FY2021 Payroll
1. Total Normal Cost as of October 1, 2019	\$ 196,630	N/A
2. Projected Total Normal Cost as of October 1, 2020 (1. x 1.0425)	\$ 204,985	39.66%
3. Expected Member Contributions	40,833	7.90%
4. Employer Normal Cost (2. - 3.)	\$ 164,151	31.76%
5. Expenses	10,855	2.10%
6. Amortization Payment	(68,995)	(13.35%)
7. Actuarially Determined Contribution (ADC) (4. + 5. + 6.)	\$ 106,011	20.51%
8. D.C. Code §1-907.02(c) Adjustment to FY2021 Payment	3,922	N/A
9. Fiscal Year District Payment	\$ 109,933	N/A

Projected Payroll		
1. Active Member June 30, 2019 Payroll	\$	463,894
2. Expected FY2020 Payroll (1. increased with one year of salary scale)	\$	495,809
3. Projected FY2021 Payroll (2. x 1.0425)	\$	516,881

(\$ in Thousands)



Section II. Determination of District Contributions

Development of District Contributions – Police

The breakdown of the Actuarially Determined Contribution into normal cost, amortization payment, expected administrative expenses, and D.C. Code §1-907.02(c) Adjustment is illustrated below. The calculation of the D.C. Code §1-907.02(c) Adjustment is detailed in Appendix 4.

Police Actuarially Determined Contribution (ADC)		FY2021	Percentage of FY2021 Payroll
1.	Total Normal Cost as of October 1, 2019	\$ 127,093	N/A
2.	Projected Total Normal Cost as of October 1, 2020 (1. x 1.0425)	\$ 132,497	38.78%
3.	Expected Member Contributions	26,991	7.90%
4.	Employer Normal Cost (2. - 3.)	\$ 105,505	30.88%
5.	Expenses	7,175	2.10%
6.	Amortization Payment	(48,614)	(14.23%)
7.	Actuarially Determined Contribution (ADC) (4. + 5. + 6.)	\$ 64,066	18.75%
8.	D.C. Code §1-907.02(c) Adjustment to FY2021 Payment	(2,270)	N/A
9.	Fiscal Year District Payment	\$ 61,796	N/A

Projected Payroll			
1.	Active Member June 30, 2019 Payroll	\$	306,628
2.	Expected FY2020 Payroll (1. increased with one year of salary scale)	\$	327,734
3.	Projected FY2021 Payroll (2. x 1.0425)	\$	341,662

(\$ in Thousands)



Section II. Determination of District Contributions

Development of District Contributions – Fire

The breakdown of the Actuarially Determined Contribution into normal cost, amortization payment, expected administrative expenses, and D.C. Code §1-907.02(c) Adjustment is illustrated below. The calculation of the D.C. Code §1-907.02(c) Adjustment is detailed in Appendix 4.

Fire Actuarially Determined Contribution (ADC)	FY2021	Percentage of FY2021 Payroll
1. Total Normal Cost as of October 1, 2019	\$ 69,538	N/A
2. Projected Total Normal Cost as of October 1, 2020 (1. x 1.0425)	\$ 72,488	41.37%
3. Expected Member Contributions	13,842	7.90%
4. Employer Normal Cost (2. - 3.)	\$ 58,646	33.47%
5. Expenses	3,680	2.10%
6. Amortization Payment	(20,381)	(11.63%)
7. Actuarially Determined Contribution (ADC) (4. + 5. + 6.)	\$ 41,945	23.94%
8. D.C. Code §1-907.02(c) Adjustment to FY2021 Payment	6,192	N/A
9. Fiscal Year District Payment	\$ 48,137	N/A

Projected Payroll		
1. Active Member June 30, 2019 Payroll	\$	157,267
2. Expected FY2020 Payroll (1. increased with one year of salary scale)	\$	168,076
3. Projected FY2021 Payroll (2. x 1.0425)	\$	175,219

(\$ in Thousands)



Section II. Determination of District Contributions

Schedule of Amortization Bases

Below is a schedule of the amortization bases as of October 1, 2020.

Teachers Description	Date Established	Remaining Years	Amount to be Amortized	Payment / (Credit)
Legacy Unfunded	10/1/2017	12	\$ 144,002	\$ 17,103
Actuarial (Gain)/Loss and Assumption and Method Changes	10/1/2017	17	\$ (13,111)	\$ (1,257)
Actuarial (Gain)/Loss	10/1/2018	18	\$ 16,797	\$ 1,560
Actuarial (Gain)/Loss	10/1/2020	20	\$ 73,697	\$ 6,481
Totals			\$ 221,385	\$ 23,888

Police Description	Date Established	Remaining Years	Amount to be Amortized	Payment / (Credit)
Legacy Unfunded	10/1/2017	12	\$ (358,270)	\$ (42,551)
Actuarial (Gain)/Loss and Assumption and Method Changes	10/1/2017	17	\$ 34,442	\$ 3,301
Actuarial (Gain)/Loss	10/1/2018	18	\$ (136,056)	\$ (12,637)
Actuarial (Gain)/Loss	10/1/2020	20	\$ 37,228	\$ 3,274
Totals			\$ (422,657)	\$ (48,614)

Fire Description	Date Established	Remaining Years	Amount to be Amortized	Payment / (Credit)
Legacy Unfunded	10/1/2017	12	\$ (70,852)	\$ (8,415)
Actuarial (Gain)/Loss and Assumption and Method Changes	10/1/2017	17	\$ (61,823)	\$ (5,925)
Actuarial (Gain)/Loss	10/1/2018	18	\$ 10,152	\$ 943
Actuarial (Gain)/Loss	10/1/2020	20	\$ (79,407)	\$ (6,983)
Totals			\$ (201,930)	\$ (20,381)

(\$ in Thousands)

Bases are amortized on a level dollar basis.

The unfunded liability at 10/1/2019 is projected to 10/1/2020 for the amortization of the actuarial (gain)/loss. Therefore, no amortization base is created at 10/1/2019.



Section III. Valuation of Assets

Reconciliation of Assets – Teachers

Below is a reconciliation of assets (unaudited) from October 1, 2018 through September 30, 2019. An adjustment has been included to account for the difference in market value of assets between the prior year's valuation report and the audited September 30, 2018 value.

Teachers	FY18	FY19
1. Beginning of Year Assets	\$ 2,051,006,000	\$ 2,193,598,000
2. Adjustments	\$ -	\$ (17,494,000)
3. Beginning of Year Assets after Adjustments	\$ 2,051,006,000	\$ 2,176,104,000
2. Receipts		
a. Employer Contributions	\$ 59,046,000	\$ 53,343,000
b. Employee Contributions	\$ 40,324,000	\$ 40,432,000
c. Net Investment Income	\$ 132,152,000	\$ 85,874,000
d. Total Receipts	\$ 231,522,000	\$ 179,649,000
3. Deductions		
a. Benefit Payments	\$ (84,556,000)	\$ (87,889,000)
b. Administrative Expenses	\$ (4,374,000)	\$ (3,436,000)
c. Total Deductions	\$ (88,930,000)	\$ (91,325,000)
4. Net Increase	\$ 142,592,000	\$ 88,324,000
5. End of Year Assets	\$ 2,193,598,000	\$ 2,264,428,000
6. Rate of Return ($2I / [A + B - I]$ Method)	6.43%	3.94%



Section III. Valuation of Assets

Reconciliation of Assets – Police and Fire

Below is a reconciliation of assets (unaudited) from October 1, 2018 through September 30, 2019. An adjustment has been included to account for the difference in market value of assets between the prior year's valuation report and the audited September 30, 2018 value.

Police and Fire	FY18	FY19
1. Beginning of Year Assets	\$ 5,629,911,000	\$ 6,015,953,000
2. Adjustments	\$ -	\$ 7,817,000
3. Beginning of Year Assets after Adjustments	\$ 5,629,911,000	\$ 6,023,770,000
2. Receipts		
a. Employer Contributions	\$ 105,596,000	\$ 91,284,000
b. Employee Contributions	\$ 34,478,000	\$ 38,243,000
c. Net Investment Income	\$ 366,350,000	\$ 235,301,000
d. Total Receipts	\$ 506,424,000	\$ 364,828,000
3. Deductions		
a. Benefit Payments	\$ (108,374,000)	\$ (122,875,000)
b. Administrative Expenses	\$ (12,008,000)	\$ (9,510,000)
c. Total Deductions	\$ (120,382,000)	\$ (132,385,000)
4. Net Increase	\$ 386,042,000	\$ 232,443,000
5. End of Year Assets	\$ 6,015,953,000	\$ 6,256,213,000
6. Rate of Return ($2I / [A + B - I]$ Method)	6.50%	3.91%



Section III. Valuation of Assets

Reconciliation of Assets – Police

Below is a reconciliation of assets (unaudited) from October 1, 2018 through September 30, 2019. An adjustment has been included to account for the difference in market value of assets between the prior year's valuation report and the allocation of the audited September 30, 2018 value to the Police.

Police	FY18	FY19
1. Beginning of Year Assets	\$ 3,949,044,772	\$ 4,199,796,949
2. Adjustments	\$ -	\$ 5,457,126
3. Beginning of Year Assets after Adjustments	\$ 3,949,044,772	\$ 4,205,254,075
2. Receipts		
a. Employer Contributions	\$ 59,952,000	\$ 54,522,000
b. Employee Contributions	\$ 23,369,188	\$ 25,030,044
c. Net Investment Income	\$ 256,205,727	\$ 163,937,939
d. Total Receipts	\$ 339,526,915	\$ 243,489,982
3. Deductions		
a. Benefit Payments	\$ (80,391,833)	\$ (91,726,188)
b. Administrative Expenses	\$ (8,382,905)	\$ (6,613,012)
c. Total Deductions	\$ (88,774,738)	\$ (98,339,199)
4. Net Increase	\$ 250,752,177	\$ 145,150,783
5. End of Year Assets	\$ 4,199,796,949	\$ 4,350,404,858
6. Rate of Return (2I / [A + B - I] Method)	6.50%	3.91%



Section III. Valuation of Assets

Reconciliation of Assets – Fire

Below is a reconciliation of assets (unaudited) from October 1, 2018 through September 30, 2019. An adjustment has been included to account for the difference in market value of assets between the prior year's valuation report and the allocation of the audited September 30, 2018 value to the Fire.

Fire	FY18	FY19
1. Beginning of Year Assets	\$ 1,680,866,228	\$ 1,816,156,051
2. Adjustments	\$ -	\$ 2,359,874
3. Beginning of Year Assets after Adjustments	\$ 1,680,866,228	\$ 1,818,515,925
2. Receipts		
a. Employer Contributions	\$ 45,644,000	\$ 36,762,000
b. Employee Contributions	\$ 11,108,812	\$ 13,212,957
c. Net Investment Income	\$ 110,144,273	\$ 71,363,061
d. Total Receipts	\$ 166,897,085	\$ 121,338,018
3. Deductions		
a. Benefit Payments	\$ (27,982,167)	\$ (31,148,813)
b. Administrative Expenses	\$ (3,625,095)	\$ (2,896,988)
c. Total Deductions	\$ (31,607,262)	\$ (34,045,801)
4. Net Increase	\$ 135,289,823	\$ 87,292,217
5. End of Year Assets	\$ 1,816,156,051	\$ 1,905,808,142
6. Rate of Return ($2I / [A + B - I]$ Method)	6.50%	3.91%



Section III. Valuation of Assets

Calculation of Actuarial Asset Value – Teachers

The actuarial asset value as of October 1, 2019 is determined by spreading the asset gain or loss for each year over a five-year period. The asset gain or loss is the amount by which the actual asset return differs from the expected asset return.

Teachers		10/1/2019	
1. MVA EOY		\$	2,264,428,000
2. Net investment income		\$	85,874,000
3. Valuation interest rate			6.50%
4. Expected investment income		\$	141,526,385
5. Gain/(Loss)		\$	(55,652,385)
Spreading of investment gain/(loss)			
Year	Original or restructured base	% Deferred	Deferred
FY2019	\$ (55,652,385)	80%	\$ (44,521,908)
FY2018	\$ (1,502,690)	60%	\$ (901,614)
FY2017	\$ 101,977,795	40%	\$ 40,791,118
FY2016	\$ (10,495,880)	20%	\$ (2,099,176)
FY2015	\$ (10,495,880)	0%	\$ 0
		Total deferred	\$ (6,731,580)
6. Preliminary AVA		\$	2,271,159,580
7. Lower Corridor		\$	1,811,542,400
8. Upper Corridor		\$	2,717,313,600
9. Final AVA		\$	2,271,159,580
Rate of Return			6.02%



Section III. Valuation of Assets

Calculation of Actuarial Asset Value – Police and Fire

The actuarial asset value as of October 1, 2019 is determined by spreading the asset gain or loss for each year over a five-year period. The asset gain or loss is the amount by which the actual asset return differs from the expected asset return.

Police and Fire		10/1/2019	
1. MVA EOY		\$	6,256,213,000
2. Net investment income		\$	235,301,000
3. Valuation interest rate			6.50%
4. Expected investment income		\$	391,452,165
5. Gain/(Loss)		\$	(156,151,165)
Spreading of investment gain/(loss)			
Year	Original or restructured base	% Deferred	Deferred
FY2019	\$ (156,151,165)	80%	\$ (124,920,932)
FY2018	\$ (234,205)	60%	\$ (140,523)
FY2017	\$ 278,958,425	40%	\$ 111,583,370
FY2016	\$ 314,875	20%	\$ 62,975
FY2015	\$ 314,875	0%	\$ 0
		Total deferred	\$ (13,415,110)
6. Preliminary AVA		\$	6,269,628,110
7. Lower Corridor		\$	5,004,970,400
8. Upper Corridor		\$	7,507,455,600
9. Final AVA		\$	6,269,628,110
Rate of Return			7.25%



Section III. Valuation of Assets

Calculation of Actuarial Asset Value – Police

The actuarial asset value as of October 1, 2019 is determined by spreading the asset gain or loss for each year over a five-year period. The asset gain or loss is the amount by which the actual asset return differs from the expected asset return.

Police		10/1/2019	
1.	MVA EOY	\$	4,350,404,858
2.	Net investment income	\$	163,937,939
3.	Valuation interest rate		6.50%
4.	Expected investment income	\$	272,730,932
5.	Gain/(Loss)	\$	(108,792,993)
Spreading of investment gain/(loss)			
Year	Original or restructured base	% Deferred	Deferred
FY2019	\$ (108,792,993)	80%	\$ (87,034,394)
FY2018	\$ (304,943)	60%	\$ (182,966)
FY2017	\$ 196,620,900	40%	\$ 78,648,360
FY2016	\$ (2,671,515)	20%	\$ (534,303)
FY2015	\$ (2,671,515)	0%	\$ 0
Total deferred			\$ (9,103,303)
6.	Preliminary AVA	\$	4,359,508,161
7.	Lower Corridor	\$	3,480,323,886
8.	Upper Corridor	\$	5,220,485,830
9.	Final AVA	\$	4,359,508,161
Rate of Return			7.23%



Section III. Valuation of Assets

Calculation of Actuarial Asset Value – Fire

The actuarial asset value as of October 1, 2019 is determined by spreading the asset gain or loss for each year over a five-year period. The asset gain or loss is the amount by which the actual asset return differs from the expected asset return.

Fire		10/1/2019	
1.	MVA EOY	\$	1,905,808,142
2.	Net investment income	\$	71,363,061
3.	Valuation interest rate		6.50%
4.	Expected investment income	\$	118,721,233
5.	Gain/(Loss)	\$	(47,358,172)
Spreading of investment gain/(loss)			
Year	Original or restructured base	% Deferred	Deferred
FY2019	\$ (47,358,172)	80%	\$ (37,886,538)
FY2018	\$ 70,738	60%	\$ 42,443
FY2017	\$ 82,337,530	40%	\$ 32,935,012
FY2016	\$ 2,986,390	20%	\$ 597,278
FY2015	\$ 2,986,390	0%	\$ 0
Total deferred			\$ (4,311,805)
6.	Preliminary AVA	\$	1,910,119,947
7.	Lower Corridor	\$	1,524,646,514
8.	Upper Corridor	\$	2,286,969,770
9.	Final AVA	\$	1,910,119,947
Rate of Return			7.29%



Section IV. Participant Information

Participant Summary

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

	Teachers	Police Officers	Firefighters	Total
1. Active				
a. Number	5,226	3,566	1,840	10,632
b. Average Age	41.3	39.9	40.0	40.62
c. Average Service	8.59	12.93	14.2	11.02
d. Average Salary¹	\$ 98,854	\$ 91,904	\$ 91,345	\$ 61,566
2. Vested Terminations				
a. Number	1,446	179	82	1,707
b. Average Age	48.4	44.3	42.2	47.7
c. Total Annual Benefits	\$ 19,522,579	\$ 2,976,415	\$ 1,155,237	\$ 23,654,232
3. Service Retired, Disabled and Beneficiaries (District Only)				
a. Number	4,059	2,799	900	7,758
b. Average Age	72.5	59.2	60.8	66.3
c. Total Annual Benefits	\$ 81,839,576	\$ 96,643,391	\$ 32,270,491	\$ 210,753,459
4. Service Retired, Disabled and Beneficiaries (District Plus Federal)				
a. Number	5,923	6,359	2,045	14,327
b. Average Age	76.4	68.4	71.0	72.1
c. Total Annual Benefits	\$ 275,295,221	\$ 347,414,198	\$ 124,700,275	\$ 2,966,603

¹ The salary used in this calculation is estimated FY2020 pay (pay rate provided as of June 30, 2019 increased with salary scale for one year).



Section IV. Participant Information

Active Age/Service Distribution Including Compensation - Teachers

Shown below is the distribution of active participants based on age and service. The compensation shown is the average of estimated FY2020 pay (pay rate provided as of June 30, 2019 increased with salary scale for one year).

Age	Years of Service as of 10/01/2019										Total	
	Under 1	1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Up		
Under 25	3	57	1	0	0	0	0	0	0	0	0	61
	61,662	63,373	63,223	0	0	0	0	0	0	0	0	63,287
25 - 29	20	455	133	0	0	0	0	0	0	0	0	608
	70,654	72,419	79,671	0	0	0	0	0	0	0	0	73,947
30 - 34	22	503	454	104	4	0	0	0	0	0	0	1,087
	78,485	83,291	93,195	106,783	84,509	0	0	0	0	0	0	89,582
35 - 39	22	352	358	208	36	0	0	0	0	0	0	976
	93,120	93,328	102,410	107,020	109,715	0	0	0	0	0	0	100,177
40 - 44	9	254	242	164	95	21	0	0	0	0	0	785
	94,624	97,802	110,093	110,474	119,518	117,667	0	0	0	0	0	107,362
45 - 49	6	142	157	103	105	103	17	1	0	0	0	634
	92,719	96,434	108,905	109,370	113,297	117,186	115,484	116,240	0	0	0	108,295
50 - 54	5	88	74	83	41	48	47	21	0	0	0	407
	92,549	94,513	107,379	108,682	113,813	120,765	123,718	119,652	0	0	0	109,428
55 - 59	0	46	47	40	33	41	37	61	1	0	0	306
	0	91,261	103,321	113,910	113,350	118,347	120,644	118,757	122,813	0	0	111,222
60 - 64	1	30	26	35	33	29	28	37	10	1	1	230
	81,220	94,339	108,715	111,989	117,256	114,994	124,402	115,398	119,827	116,240	116,240	112,736
65 - 69	1	10	12	16	11	13	10	24	5	1	1	103
	92,902	91,590	109,649	106,966	118,355	118,869	122,912	120,848	134,661	116,240	116,240	114,585
70 & Up	0	1	1	4	1	9	1	10	0	2	2	29
	0	98,749	140,791	108,182	106,758	118,674	122,813	119,116	0	119,131	119,131	117,218
Totals	89	1,938	1,505	757	359	264	140	154	16	4	4	5,226
	83,350	85,761	99,972	108,837	114,828	117,948	121,978	118,405	124,649	117,685	117,685	98,854

Averages	
Age	41.3
Service	8.6



Section IV. Participant Information

Active Age/Service Distribution Including Compensation - Police

Shown below is the distribution of active participants based on age and service. The compensation shown is the average of estimated FY2020 pay (pay rate provided as of June 30, 2019 increased with salary scale for one year).

Age	Years of Service as of 10/01/2019										Total	
	Under 1	1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Up		
Under 25	50	91	2	0	0	0	0	0	0	0	0	143
	63,970	67,003	72,999	0	0	0	0	0	0	0	0	66,026
25 - 29	50	388	105	3	0	0	0	0	0	0	0	546
	63,970	71,580	78,067	74,456	0	0	0	0	0	0	0	72,147
30 - 34	27	194	255	95	2	0	0	0	0	0	0	573
	63,970	72,593	80,225	87,320	86,654	0	0	0	0	0	0	78,074
35 - 39	7	67	115	306	88	0	0	0	0	0	0	583
	63,970	72,557	81,049	90,198	98,673	0	0	0	0	0	0	87,330
40 - 44	3	25	33	125	212	63	7	0	0	0	0	468
	63,970	71,036	80,705	91,284	101,584	115,447	118,917	0	0	0	0	97,613
45 - 49	3	14	15	67	186	175	108	44	0	0	0	612
	63,970	70,225	83,398	91,015	102,549	114,597	120,844	118,658	0	0	0	107,720
50 - 54	0	6	6	35	100	66	187	35	0	0	0	435
	0	70,835	82,741	89,350	103,895	114,753	119,504	119,859	0	0	0	111,619
55 - 59	0	2	3	14	43	20	55	33	3	0	0	173
	0	69,834	77,377	89,423	104,914	114,488	117,911	126,409	111,800	0	0	112,235
60 - 64	0	0	1	3	9	3	8	4	2	3	0	33
	0	0	82,232	89,239	103,082	106,388	109,376	128,942	140,748	132,520	0	111,111
65 - 69	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
70 & Up	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
Totals	140	787	535	648	640	327	365	116	5	3	3	3,566
	63,970	71,332	80,086	89,930	102,023	114,710	119,427	121,580	123,379	132,520	132,520	91,904

Averages	
Age	39.9
Service	12.9



Section IV. Participant Information

Active Age/Service Distribution Including Compensation - Fire

Shown below is the distribution of active participants based on age and service. The compensation shown is the average of estimated FY2020 pay (pay rate provided as of June 30, 2019 increased with salary scale for one year).

Age	Under 1	1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & Up	Total
Under 25	10	54	31	0	0	0	0	0	0	0	95
	57,931	61,007	68,213	0	0	0	0	0	0	0	63,035
25 - 29	31	116	69	1	0	0	0	0	0	0	217
	57,931	65,271	70,617	65,463	0	0	0	0	0	0	65,923
30 - 34	21	84	68	126	5	0	0	0	0	0	304
	58,214	65,947	76,170	86,189	87,481	0	0	0	0	0	76,443
35 - 39	4	30	44	187	74	0	0	0	0	0	339
	57,931	68,892	79,305	87,663	99,667	0	0	0	0	0	87,187
40 - 44	0	8	17	88	146	12	5	0	0	0	276
	0	67,056	79,383	87,606	101,728	115,891	115,120	0	0	0	95,702
45 - 49	1	3	2	3	138	40	67	31	0	0	285
	57,931	64,497	82,478	87,772	99,680	109,362	118,734	130,251	0	0	108,081
50 - 54	0	2	2	2	42	62	74	31	0	0	215
	0	61,118	85,741	125,791	97,982	106,349	124,339	135,834	0	0	114,726
55 - 59	0	0	0	1	0	31	27	35	0	0	94
	0	0	0	134,134	0	101,149	119,882	139,213	0	0	121,053
60 - 64	0	0	0	0	1	1	1	9	3	0	15
	0	0	0	0	100,459	88,500	151,633	110,335	130,498	0	115,007
65 - 69	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
70 & Up	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
Totals	67	297	233	408	406	146	174	106	3	0	1,840
	58,020	65,065	74,429	87,443	100,090	106,732	121,381	133,152	130,498	0	91,345

Averages	
Age	40.0
Service	14.2



Section IV. Participant Information

Participant Reconciliation – Teachers

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

Teachers	Active Participants	Inactive Participants With Deferred Benefits	Receiving Benefits	Total
Participants in Last Valuation	5,066	1,429	3,990	10,485
Death	(1)	(3)	(72)	(76)
Disabled	(2)	0	2	0
Retired	(47)	(63)	110	0
Vested Termination	(169)	169	0	0
Nonvested Termination	(428)	0	0	(428)
Benefits Expired/Refunded	0	(49)	0	(49)
New Actives	759	0	0	759
Rehire from Vested Term	27	(27)	0	0
Rehire from Nonvested Term	21	0	0	21
New Beneficiaries	0	0	14	14
Data Adjustment	0	(10)	15	5
Participants in This Valuation	5,226	1,446	4,059	10,731



Section IV. Participant Information

Participant Reconciliation – Police

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

Police	Active Participants	Inactive Participants With		Total
		Deferred Benefits	Receiving Benefits	
Participants in Last Valuation	3,567	222	2,593	6,382
Death	0	(6)	(23)	(29)
Disabled	(10)	(3)	13	0
Retired	(144)	(32)	176	0
Vested Termination	(29)	29	0	0
Nonvested Termination	(64)	0	0	(64)
Benefits Expired/Refunded	0	(14)	0	(14)
New Actives	227	0	0	227
Rehire from Vested Term	3	(3)	0	0
Rehire from Nonvested Term	18	0	0	18
New Beneficiaries	0	(1)	21	20
Data Adjustment	(2)	(13)	19	4
Participants in This Valuation	3,566	179	2,799	6,544



Section IV. Participant Information

Participant Reconciliation – Fire

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

Fire	Inactive Participants			Total
	Active Participants	With Deferred Benefits	Receiving Benefits	
Participants in Last Valuation	1,782	93	848	2,723
Death	(1)	(1)	(12)	(14)
Disabled	(5)	(1)	6	0
Retired	(48)	(7)	55	0
Vested Termination	(10)	10	0	0
Nonvested Termination	(10)	0	0	(10)
Benefits Expired/Refunded	0	(5)	0	(5)
New Actives	127	0	0	127
Rehire from Vested Term	0	0	0	0
Rehire from Nonvested Term	8	0	0	8
New Beneficiaries	0	0	7	7
Data Adjustment	(3)	(7)	(4)	(14)
Participants in This Valuation	1,840	82	900	2,822



Section IV. Participant Information

Schedule of Retiree Member Data – Teachers – District Benefit Only

Shown below is the schedule of retiree member data.

Attained Age	Service Retirement		Disability Retirement		Survivors and Beneficiaries		Total	
	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits
Under 20	-	\$ -	-	\$ -	8	\$ 49,665	8	\$ 49,665
20 to 24	-	-	-	-	-	-	-	-
25 to 29	-	-	-	-	-	-	-	-
30 to 34	-	-	-	-	-	-	-	-
35 to 39	-	-	-	-	3	38,304	3	38,304
40 to 44	-	-	-	-	3	51,571	3	51,571
45 to 49	-	-	3	116,880	2	20,591	5	137,471
50 to 54	8	294,579	4	145,584	2	24,323	14	464,486
55 to 59	59	2,383,991	14	530,820	7	76,871	80	2,991,682
60 to 64	300	10,297,245	23	681,782	20	205,878	343	11,184,904
65 to 69	756	21,201,839	17	376,873	28	270,944	801	21,849,656
70 to 74	1,306	24,925,453	43	755,243	43	320,254	1,392	26,000,950
75 to 79	945	13,558,817	5	52,906	39	355,986	989	13,967,708
80 to 84	308	3,893,186	1	3,124	17	123,867	326	4,020,177
85 to 89	69	809,871	-	-	8	62,170	77	872,041
90 to 94	14	176,546	-	-	1	2,182	15	178,729
95 and over	2	28,387	-	-	1	3,845	3	32,232
Total	3,767	\$ 77,569,914	110	\$ 2,663,211	182	\$ 1,606,451	4,059	\$81,839,576



Section IV. Participant Information

Schedule of Retiree Member Data – Teachers – District and Federal Benefit

Shown below is the schedule of retiree member data.

Attained Age	Service Retirement		Disability Retirement		Survivors and Beneficiaries		Total	
	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits
Under 20	-	\$ -	-	\$ -	8	\$ 54,621	8	\$ 54,621
20 to 24	-	-	-	-	-	-	-	-
25 to 29	-	-	-	-	-	-	-	-
30 to 34	-	-	-	-	-	-	-	-
35 to 39	-	-	-	-	3	38,304	3	38,304
40 to 44	-	-	-	-	3	59,707	3	59,707
45 to 49	-	-	3	116,880	4	43,703	7	160,583
50 to 54	8	379,731	4	145,584	4	45,695	16	571,010
55 to 59	59	3,196,331	17	603,132	9	182,351	85	3,981,814
60 to 64	302	15,249,333	27	905,486	25	429,510	354	16,584,328
65 to 69	764	37,428,059	19	701,821	34	751,748	817	38,881,628
70 to 74	1,364	67,248,769	75	2,406,311	71	1,593,118	1,510	71,248,198
75 to 79	1,147	56,888,261	36	1,149,322	92	2,436,858	1,275	60,474,440
80 to 84	716	35,644,730	28	850,612	63	1,458,492	807	37,953,833
85 to 89	473	22,736,715	23	736,368	63	1,458,010	559	24,931,093
90 to 94	259	11,507,354	15	544,356	41	1,002,430	315	13,054,141
95 and over	118	5,752,123	17	709,608	29	839,789	164	7,301,520
Total	5,210	\$ 256,031,406	264	\$ 8,869,479	449	\$ 10,394,336	5,923	\$ 275,295,221



Section IV. Participant Information

Schedule of Retiree Member Data – Teachers – Federal Benefit Only

Shown below is the schedule of retiree member data.

Attained Age	Service Retirement		Disability Retirement		Survivors and Beneficiaries		Total	
	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits
Under 20	-	\$ -	-	\$ -	1	\$ 4,956	1	\$ 4,956
20 to 24	-	-	-	-	-	-	-	-
25 to 29	-	-	-	-	-	-	-	-
30 to 34	-	-	-	-	-	-	-	-
35 to 39	-	-	-	-	-	-	-	-
40 to 44	-	-	-	-	1	8,136	1	8,136
45 to 49	-	-	-	-	3	23,112	3	23,112
50 to 54	8	85,152	-	-	3	21,372	11	106,524
55 to 59	56	812,340	3	72,312	8	105,480	67	990,132
60 to 64	259	4,952,088	16	223,704	19	223,632	294	5,399,424
65 to 69	628	16,226,220	17	324,948	29	480,804	674	17,031,972
70 to 74	1,222	42,323,316	71	1,651,068	60	1,272,864	1,353	45,247,248
75 to 79	1,091	43,329,444	36	1,096,416	87	2,080,872	1,214	46,506,732
80 to 84	700	31,751,544	28	847,488	58	1,334,625	786	33,933,657
85 to 89	467	21,926,844	23	736,368	61	1,395,840	551	24,059,052
90 to 94	259	11,330,808	15	544,356	41	1,000,248	315	12,875,412
95 and over	118	5,723,736	17	709,608	29	835,944	164	7,269,288
Total	4,808	\$ 178,461,492	226	\$ 6,206,268	400	\$ 8,787,885	5,434	\$ 193,455,645



Section IV. Participant Information

Schedule of Retiree Member Data – Police – District Benefit Only

Shown below is the schedule of retiree member data.

Attained Age	Service Retirement		Disability Retirement		Survivors and Beneficiaries		Total	
	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits
Under 20	-	\$ -	-	\$ -	36	\$ 315,781	36	\$ 315,781
20 to 24	-	-	-	-	11	128,378	11	128,378
25 to 29	-	-	4	123,828	-	-	4	123,828
30 to 34	-	-	1	49,620	1	2,558	2	52,178
35 to 39	-	-	11	403,236	2	59,580	13	462,816
40 to 44	-	-	15	516,144	2	89,172	17	605,316
45 to 49	-	-	40	1,542,232	21	415,814	61	1,958,046
50 to 54	507	27,374,845	99	3,721,032	46	931,092	652	32,026,969
55 to 59	638	29,352,712	69	1,729,643	54	1,002,960	761	32,085,316
60 to 64	415	14,962,560	47	1,184,172	70	1,133,518	532	17,280,250
65 to 69	341	6,879,059	31	387,600	69	1,155,901	441	8,422,559
70 to 74	152	1,513,096	6	83,667	58	856,543	216	2,453,306
75 to 79	25	247,651	3	25,297	18	329,918	46	602,866
80 to 84	1	8,130	-	-	2	26,728	3	34,858
85 to 89	-	-	-	-	4	90,924	4	90,924
90 to 94	-	-	-	-	-	-	-	-
95 and over	-	-	-	-	-	-	-	-
Total	2,079	\$ 80,338,053	326	\$ 9,766,471	394	\$ 6,538,868	2,799	\$ 96,643,391



Section IV. Participant Information

Schedule of Retiree Member Data – Police – District and Federal Benefit
Shown below is the schedule of retiree member data.

Attained Age	Service Retirement		Disability Retirement		Survivors and Beneficiaries		Total	
	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits
Under 20	-	\$ -	-	\$ -	38	\$ 411,949	38	\$ 411,949
20 to 24	-	-	-	-	13	239,282	13	239,282
25 to 29	-	-	4	123,828	1	49,488	5	173,316
30 to 34	-	-	1	49,620	1	4,178	2	53,798
35 to 39	-	-	11	403,236	2	59,580	13	462,816
40 to 44	-	-	15	516,144	2	89,172	17	605,316
45 to 49	-	-	41	1,589,308	22	651,602	63	2,240,910
50 to 54	507	37,164,337	104	3,832,308	56	1,516,644	667	42,513,289
55 to 59	638	45,739,480	87	3,175,895	75	2,299,872	800	51,215,248
60 to 64	430	31,974,528	80	3,390,900	130	3,871,090	640	39,236,518
65 to 69	653	41,645,878	137	6,338,748	221	6,999,877	1,011	54,984,503
70 to 74	903	52,527,772	148	6,886,311	288	9,223,095	1,339	68,637,179
75 to 79	478	28,533,739	121	6,031,225	226	7,326,357	825	41,891,321
80 to 84	252	14,725,386	80	4,357,416	200	6,819,628	532	25,902,430
85 to 89	66	4,496,664	43	2,554,488	123	4,294,008	232	11,345,160
90 to 94	13	1,255,512	32	2,001,264	75	2,497,368	120	5,754,144
95 and over	4	313,596	4	305,736	34	1,127,688	42	1,747,020
Total	3,944	\$ 258,376,892	908	\$ 41,556,427	1,507	\$ 47,480,879	6,359	\$ 347,414,198



Section IV. Participant Information

Schedule of Retiree Member Data – Police – Federal Benefit Only

Shown below is the schedule of retiree member data.

Attained Age	Service Retirement		Disability Retirement		Survivors and Beneficiaries		Total	
	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits
Under 20	-	\$ -	-	\$ -	17	\$ 96,168	17	\$ 96,168
20 to 24	-	-	-	-	11	110,904	11	110,904
25 to 29	-	-	-	-	1	49,488	1	49,488
30 to 34	-	-	-	-	1	1,620	1	1,620
35 to 39	-	-	-	-	-	-	-	-
40 to 44	-	-	-	-	-	-	-	-
45 to 49	-	-	2	47,076	14	235,788	16	282,864
50 to 54	465	9,789,492	5	111,276	27	585,552	497	10,486,320
55 to 59	619	16,386,768	83	1,446,252	43	1,296,912	745	19,129,932
60 to 64	421	17,011,968	76	2,206,728	87	2,737,572	584	21,956,268
65 to 69	644	34,766,819	135	5,951,148	180	5,843,976	959	46,561,943
70 to 74	902	51,014,676	147	6,802,644	248	8,366,552	1,297	66,183,872
75 to 79	477	28,286,088	121	6,005,928	213	6,996,439	811	41,288,455
80 to 84	252	14,717,256	80	4,357,416	199	6,792,900	531	25,867,572
85 to 89	66	4,496,664	43	2,554,488	119	4,203,084	228	11,254,236
90 to 94	13	1,255,512	32	2,001,264	75	2,497,368	120	5,754,144
95 and over	4	313,596	4	305,736	34	1,127,688	42	1,747,020
Total	3,863	\$ 178,038,839	728	\$ 31,789,956	1,269	\$ 40,942,011	5,860	\$ 250,770,807



Section IV. Participant Information

Schedule of Retiree Member Data – Fire – District Benefit Only

Shown below is the schedule of retiree member data.

Attained Age	Service Retirement		Disability Retirement		Survivors and Beneficiaries		Total	
	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits
Under 20	-	\$ -	-	\$ -	17	\$ 210,837	17	\$ 210,837
20 to 24	-	-	-	-	4	58,414	4	58,414
25 to 29	-	-	-	-	-	-	-	-
30 to 34	-	-	3	73,656	3	65,358	6	139,014
35 to 39	-	-	5	164,730	1	3,034	6	167,763
40 to 44	-	-	8	335,508	1	28,356	9	363,864
45 to 49	-	-	13	544,956	5	93,639	18	638,595
50 to 54	62	3,359,408	17	591,420	8	285,178	87	4,236,006
55 to 59	167	8,225,101	11	377,591	24	554,214	202	9,156,907
60 to 64	230	10,325,108	11	248,558	20	517,787	261	11,091,454
65 to 69	139	3,771,890	21	399,293	22	390,683	182	4,561,866
70 to 74	58	951,648	5	10,055	15	269,849	78	1,231,551
75 to 79	17	175,033	-	-	8	152,267	25	327,300
80 to 84	-	-	-	-	5	86,920	5	86,920
85 to 89	-	-	-	-	-	-	-	-
90 to 94	-	-	-	-	-	-	-	-
95 and over	-	-	-	-	-	-	-	-
Total	673	\$ 26,808,188	94	\$ 2,745,767	133	\$ 2,716,536	900	\$ 32,270,491



Section IV. Participant Information

Schedule of Retiree Member Data – Fire – District and Federal Benefit

Shown below is the schedule of retiree member data.

Attained Age	Service Retirement		Disability Retirement		Survivors and Beneficiaries		Total	
	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits
Under 20	-	\$ -	-	\$ -	17	\$ 242,625	17	\$ 242,625
20 to 24	-	-	-	-	5	120,262	5	120,262
25 to 29	-	-	-	-	-	-	-	-
30 to 34	-	-	3	73,656	3	89,826	6	163,482
35 to 39	-	-	5	164,730	1	4,234	6	168,963
40 to 44	-	-	8	335,508	2	57,936	10	393,444
45 to 49	-	-	13	544,956	5	109,239	18	654,195
50 to 54	62	4,455,752	17	591,420	10	427,126	89	5,474,298
55 to 59	167	13,108,309	13	542,219	30	863,790	210	14,514,319
60 to 64	230	19,522,160	20	864,998	34	1,081,715	284	21,468,874
65 to 69	164	13,151,258	49	2,634,317	47	1,501,547	260	17,287,122
70 to 74	173	12,692,508	42	2,266,187	76	2,513,633	291	17,472,327
75 to 79	199	13,891,717	62	3,621,252	110	3,517,547	371	21,030,516
80 to 84	121	8,182,620	48	2,765,304	73	2,349,148	242	13,297,072
85 to 89	51	3,737,964	22	1,343,400	59	2,099,424	132	7,180,788
90 to 94	18	1,406,124	15	994,872	45	1,614,360	78	4,015,356
95 and over	1	66,144	5	370,452	20	780,036	26	1,216,632
Total	1,186	\$ 90,214,556	322	\$ 17,113,271	537	\$ 17,372,448	2,045	\$ 124,700,275



Section IV. Participant Information

Schedule of Retiree Member Data – Fire – Federal Benefit Only

Shown below is the schedule of retiree member data.

Attained Age	Service Retirement		Disability Retirement		Survivors and Beneficiaries		Total	
	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits
Under 20	-	\$ -	-	\$ -	6	\$ 31,788	6	\$ 31,788
20 to 24	-	-	-	-	5	61,848	5	61,848
25 to 29	-	-	-	-	-	-	-	-
30 to 34	-	-	-	-	2	24,468	2	24,468
35 to 39	-	-	-	-	1	1,200	1	1,200
40 to 44	-	-	-	-	1	29,580	1	29,580
45 to 49	-	-	-	-	2	15,600	2	15,600
50 to 54	56	1,096,344	-	-	7	141,948	63	1,238,292
55 to 59	165	4,883,208	10	164,628	16	309,576	191	5,357,412
60 to 64	217	9,197,052	20	616,440	20	563,928	257	10,377,420
65 to 69	158	9,379,368	47	2,235,024	35	1,110,864	240	12,725,256
70 to 74	173	11,740,860	42	2,256,132	67	2,243,784	282	16,240,776
75 to 79	199	13,716,684	62	3,621,252	103	3,365,280	364	20,703,216
80 to 84	121	8,182,620	48	2,765,304	68	2,262,228	237	13,210,152
85 to 89	51	3,737,964	22	1,343,400	59	2,099,424	132	7,180,788
90 to 94	18	1,406,124	15	994,872	45	1,614,360	78	4,015,356
95 and over	1	66,144	5	370,452	20	780,036	26	1,216,632
Total	1,159	\$ 63,406,368	271	\$ 14,367,504	457	\$ 14,655,912	1,887	\$ 92,429,784



Section IV. Participant Information

Schedule of Retiree Member Data – Added and Removed from Rolls – District Benefit Only

Shown below is the schedule of retiree members added and removed.

Fiscal Year Ended	Plan	District Only Benefit (\$ in Thousands)					Rolls at End of Year		Percentage Increase in Annual Allowances	Average Annual Allowances
		Added	Removed		Increase due to Plan Amendments	Number	Annual Allowances			
		Number	Annual Allowances	Number	Annual Allowances		Number	Annual Allowances		
September 30, 2015	Teachers	183	\$ 4,950	66	\$ 822	\$ 84	3,718	\$ 62,899	7.2%	\$ 17
	Police	240	\$ 10,865	24	\$ 189	\$ (535)	1,923	\$ 50,412	25.2%	\$ 26
	Fire	44	\$ 1,953	16	\$ 235	\$ (95)	686	\$ 19,802	8.9%	\$ 29
September 30, 2016	Teachers	222	\$ 6,844	58	\$ 1,021	\$ 68	3,882	\$ 68,790	9.4%	\$ 18
	Police	381	\$ 15,394	39	\$ 822	\$ (1,397)	2,265	\$ 63,587	26.1%	\$ 28
	Fire	60	\$ 2,811	8	\$ 200	\$ (262)	738	\$ 22,151	11.9%	\$ 30
September 30, 2017	Teachers	96	\$ 2,599	79	\$ 1,211	\$ 1,023	3,899	\$ 71,201	3.5%	\$ 18
	Police	189	\$ 8,485	35	\$ 537	\$ 928	2,419	\$ 72,463	14.0%	\$ 30
	Fire	63	\$ 2,802	5	\$ 141	\$ 411	796	\$ 25,223	13.9%	\$ 32
September 30, 2018	Teachers	160	\$ 4,892	69	\$ 977	\$ 1,419	3,990	\$ 76,535	7.5%	\$ 19
	Police	208	\$ 10,269	34	\$ 683	\$ 1,427	2,593	\$ 83,476	15.2%	\$ 32
	Fire	63	\$ 2,910	11	\$ 226	\$ 441	848	\$ 28,348	12.4%	\$ 33
September 30, 2019	Teachers	141	\$ 4,693	72	\$ 1,278	\$ 1,890	4,059	\$ 81,840	6.9%	\$ 20
	Police	233	\$ 12,244	27	\$ 569	\$ 1,492	2,799	\$ 96,643	15.8%	\$ 35
	Fire	68	\$ 3,673	16	\$ 252	\$ 501	900	\$ 32,270	13.8%	\$ 36



Section IV. Participant Information

Schedule of Retiree Member Data – Added and Removed from Rolls – Federal and District Benefit

Shown below is the schedule of retiree members added and removed.

Federal Plus District Benefit (\$ in Thousands)											
Fiscal Year Ended	Plan	Added		Removed			Rolls at End of Year		Percentage Increase in Annual Allowances	Average Annual Allowances	
		Number	Annual Allowances	Number	Annual Allowances	Increase due to Plan Amendments	Number	Annual Allowances			
September 30, 2015	Teachers	197	\$ 8,040	249	\$ 17,224	\$ 7,071	6,137	\$ 267,577	-0.8%	\$ 44	
	Police	312	\$ 19,957	168	\$ 9,132	\$ 4,269	5,861	\$ 290,909	5.5%	\$ 50	
	Fire	70	\$ 3,988	103	\$ 5,370	\$ 2,006	1,993	\$ 110,624	0.6%	\$ 56	
September 30, 2016	Teachers	446	\$ 15,992	400	\$ 18,508	\$ 5,143	6,183	\$ 270,204	1.0%	\$ 44	
	Police	465	\$ 25,416	216	\$ 9,739	\$ (1,317)	6,110	\$ 305,269	4.9%	\$ 50	
	Fire	83	\$ 4,887	68	\$ 3,260	\$ (16)	2,008	\$ 112,235	1.5%	\$ 56	
September 30, 2017	Teachers	107	\$ 3,937	229	\$ 8,829	\$ 5,495	6,061	\$ 270,807	0.2%	\$ 45	
	Police	261	\$ 14,438	214	\$ 9,061	\$ 5,772	6,157	\$ 316,418	3.7%	\$ 51	
	Fire	84	\$ 4,919	58	\$ 2,727	\$ 2,233	2,034	\$ 116,660	3.9%	\$ 57	
September 30, 2018	Teachers	226	\$ 8,601	281	\$ 9,897	\$ 4,195	6,006	\$ 273,706	1.1%	\$ 46	
	Police	300	\$ 17,322	228	\$ 9,611	\$ 5,322	6,229	\$ 329,451	4.1%	\$ 53	
	Fire	81	\$ 4,649	78	\$ 3,786	\$ 2,310	2,037	\$ 119,833	2.7%	\$ 59	
September 30, 2019	Teachers	165	\$ 6,648	248	\$ 10,146	\$ 5,088	5,923	\$ 275,295	0.6%	\$ 46	
	Police	314	\$ 18,580	184	\$ 8,464	\$ 7,848	6,359	\$ 347,414	5.5%	\$ 55	
	Fire	98	\$ 5,985	90	\$ 4,425	\$ 3,306	2,045	\$ 124,700	4.1%	\$ 61	



Section V. Summary of Plan Provisions

Teachers' Retirement Plan

Effective Date

Established on September 18, 1998, the Plan applies to benefit payments based on service accrued after June 30, 1997. The U.S. Department of the Treasury is responsible for paying all benefits accrued before this date.

Definitions

Affiliated Employers

District of Columbia Public Schools

Covered Members

Teachers and other educational employees in a salary class position ET 1-15 under the District of Columbia Public Schools (DCPS) system become members automatically on their date of employment. Covered members who leave the DCPS system to work for a D.C. public charter school may elect to remain in the Plan. Substitute teachers and rehired retirees are not covered.

Service Credit

One year of teaching service is given for each year of employment with DCPS. Service credit may also include purchased prior civilian government service and outside teaching service. For purposes of retirement eligibility and benefit accrual, creditable Federal and District service is aggregated in determining total creditable service.

Average Salary

Highest 36 consecutive months of pay, divided by three.

Vested

Members who accrue five or more years of creditable DCPS teaching service are vested for benefits. If a vested member leaves service, they may leave their Member Contributions with the Plan for a future deferred vested benefit when reaching eligibility for retirement (deferred vested in this report).

Contributions

Member Contributions

Members hired before November 1, 1996 are required to contribute 7% of annual pay. Members hired on or after November 1, 1996 contribute 8% of annual pay. Interest is not credited to each Member's accumulated contributions.

Refund of Member Contributions

In the event a member leaves service prior to retirement, vested members may leave their contributions in the Plan or request a refund. Nonvested members must take a refund.



Section V. Summary of Plan Provisions

Service Retirement

Eligibility

The Age and Service Credit requirements to be eligible for a full Service Retirement are listed below:

Members hired before November 1, 1996

Age	Service Credit
55	30, including 5 years DCPS service
60	20, including 5 years DCPS service
62	5 years DCPS service

Members hired on and after November 1, 1996

Age	Service Credit
Any Age	30, including 5 years DCPS service
60	20, including 5 years DCPS service
62	5 years DCPS service

Benefit

For members hired before November 1, 1996:

- 1.5% of Average Salary times service up to 5 years, plus
- 1.75% of Average Salary times service between 5 and 10 years, plus
- 2.0% of Average Salary times service over 10 years.

For members hired on or after November 1, 1996:

- 2.0% of Average Salary times service.

All members receive a minimum benefit of 1.0% of Average Salary plus \$25 for each year of service.

Involuntary Service Retirement

Eligibility

The Age and Service Credit requirements to be eligible for a Reduced Service Retirement are listed below:

All Members, regardless of date of hire

Age	Service Credit
Any Age	25, including 5 years DCPS service
50	20, including 5 years DCPS service

Benefit

Service Retirement Benefit reduced by 1/6% per month (or 2% per year) that date of retirement precedes age 55.



Section V. Summary of Plan Provisions

Disability Retirement

Eligibility

Active members with five or more years of DCPS service credit are covered (vested) for disability retirement. To be eligible, the member must be found to be incapable of satisfactorily performing the duties of his/her position.

Benefit

Equal to Service Retirement benefit. Minimum benefit is the lesser of a) or b):

- a. 40% of Average Salary
- b. Calculated benefit amount by projecting service to age 60.

Survivor Benefits

Lump Sum

Eligibility

Death before completion of 18 months of school service or death without an eligible spouse/domestic partner, child or parent.

Benefit

Refund of member contributions.

Spouse/Domestic Partner Only

Eligibility

Death before retirement and married/registered domestic partnership for at least two years, or have a child by the marriage or registered domestic partnership.

Benefit

55% of Service Retirement benefit. Minimum benefit is the lesser of a) or b):

- a. 55% of 40% of Average Salary
- b. 55% of the calculated benefit amount by projecting service to age 60.

Spouse/Domestic Partner & Dependent Children

Eligibility

Death before retirement and married/registered domestic partnership for at least two years, or have a child by the marriage or registered domestic partnership. Children must be unmarried and not in a domestic partnership and under age 18, 22 if full-time student, or any dependent child incapable of self-support due to a disability incurred before age 18. Death does not have to occur before retirement for the children's benefit.

Spouse/Domestic Partner Benefit

55% of Service Retirement benefit. Minimum benefit is the lesser of a) or b):

- 55% of 40% of Average Salary
- 55% of the calculated benefit amount by projecting service to age 60.

Section V. Summary of Plan Provisions

Survivor Benefits

Spouse/Domestic Partner & Dependent Children (continued)

Child Benefit

A benefit per child equal to the smallest of a) or b) or c):

- a. 60% of Average Salary divided by the number of eligible children
- b. \$7,210² (if hired before 1/1/1980), \$6,963² (if hired between 1/1/1980 and 10/31/1996), or \$6,781² (if hired on or after 11/1/1996) per child
- c. \$21,805² (if hired before 1/1/1980), \$21,057² (if hired between 1/1/1980 and 10/31/1996), or \$20,507² (if hired on or after 11/1/1996) divided by the number of children.

Dependent Children Only

Eligibility

Children must be unmarried and not in a domestic partnership and under age 18, 22 if full-time student, or any dependent child incapable of self-support due to a disability incurred before age 18. Death does not have to occur before retirement for the children's benefit.

Benefit

A benefit per child equal to the smallest of a) or b) or c):

- a. 75% of Average Salary divided by the number of eligible children
- b. \$8,812² (if hired before 1/1/1980), \$8,486² (if hired between 1/1/1980 and 10/31/1996), or \$7,384² (if hired on or after 11/1/1996) per child
- c. \$26,646³ (if hired before 1/1/1980), \$25,664² (if hired between 1/1/1980 and 10/31/1996), or \$24,876² (if hired on or after 11/1/1996) divided by the number of children.

Parents Only

Eligibility

Death before retirement and no eligible spouse/domestic partner or children, and parents must have received at least one-half of their total income from the member immediately before the member's death.

Benefit

55% of Service Retirement benefit. Minimum benefit is the lesser of a) or b):

- a. 55% of 40% of Average Salary
- b. 55% of the calculated benefit amount by projecting service to age 60.

² Survivor benefit amounts are as of March 1, 2019 and are subject to annual inflation adjustments.



Section V. Summary of Plan Provisions

Deferred Vested Retirement

Eligibility

Active members with five or more years of DCPS service credit.

Benefit

Benefit is calculated in the same manner as Service Retirement benefit and may be collected starting at age 62.

Retirement Options

Retirement and disability benefits are payable for the life of the retired member. Optional reduced retirement benefits may be elected at the time of retirement to provide for continuation of a reduced survivor benefit amount to a designated beneficiary. Optional forms include:

- a. **Reduced Annuity with a Maximum Survivor Annuity (to Spouse/Domestic Partner):**
Reduced benefit paid to the member so that upon the member's death, the spouse/domestic partner will receive 55% of the unreduced (normal life) annuity. Member's benefit is reduced by 2.5% of retirement benefit, up to \$3,600, plus 10% of any retirement benefit over \$3,600.
- b. **Reduced Annuity with a Partial Survivor Annuity (to Spouse/Domestic Partner)**
Reduced benefit paid to the member so that upon the member's death, the spouse/domestic partner will receive a partial annuity that can range from \$1 up to any amount less than 55% of the unreduced (normal life) annuity amount. Member's benefit is reduced by the same amount as option a) above, multiplied by the ratio of the chosen benefit percent to the maximum benefit percent (55%).
- c. **Reduced Annuity with a Life Insurance Benefit**
Member elects a life insurance amount, payable in a lump sum to a designated beneficiary upon the member's death.
- d. **Reduced Annuity with a Survivor Annuity to a Person with an Insurable Interest**
A 55% joint and survivor annuity where the original benefit is reduced by 10% plus an additional 5% for each full 5 years, up to 25 years, that the designated beneficiary is younger than the member. Maximum reduction is 40% for any beneficiary who is 25 or more years younger than the member.



Section V. Summary of Plan Provisions

Cost-of-Living Adjustments (COLA)

Each year on March 1, benefits which have been paid for at least twelve months preceding March 1 may be increased. The increase is equal to the annual CPI. COLA's are included in benefit payments on and after April 1. If a member's retirement is effective after March 1 of the preceding year, the COLA amount will be prorated.

For members hired on or after November 1, 1996, the cost-of-living increase is limited to no more than 3% per year.

Changes since Prior Valuation

None.



Section V. Summary of Plan Provisions

Police Officers and Firefighters' Retirement Plan

Effective Date

Established on September 18, 1998, the Plan applies to benefit payments based on service accrued after June 30, 1997. The U.S. Department of the Treasury is responsible for paying all benefits accrued before this date.

Definitions

Affiliated Employers

The District of Columbia Metropolitan Police Department (MPD) and the District of Columbia Department of Fire and Emergency Medical Services (FEMS).

Covered Members

Sworn Police Officers and Firefighters become members on their first day of active duty (cadets are not eligible). Membership is not automatic for uniformed EMT Firefighters.

Service Credit

One year of service is given for each year of employment with MPD or FEMS. Service Credit may also include purchased lateral transferred service, prior civilian government service and prior military service. For purposes of retirement eligibility and benefit accrual, creditable Federal and District service is aggregated in determining total creditable service.

Average Salary

For members hired before February 15, 1980, the highest 12 consecutive months of pay. For members hired on or after February 15, 1980, the highest 36 consecutive months of pay, divided by 3. Base pay does not include overtime, holiday or military pay. Longevity pay is included in Firefighters' base pay but not police officers' base pay.

Vested

Members who accrue five or more years of Service Credit are vested for benefits. If these members leave service, they may leave their Member Contribution Accounts with the Plan for a future benefit when reaching eligibility for retirement (deferred vested in this report).

Section V. Summary of Plan Provisions

Contributions

Member Contributions

Members hired before November 10, 1996 contribute 7.0% of salary. Members hired on or after November 10, 1996 contribute 8.0% of salary. Member contributions, together with any purchased service credit payments, are credited to individual Member Contribution Accounts. No interest is accrued on contributions.

Refund of Member Contributions

In the event a vested member leaves service prior to retirement, member contributions may be left in the Plan or refunded upon request. Nonvested members must take a refund.

Service Retirement

Eligibility

The Age and Service Credit requirements to be eligible for a full Service Retirement are listed below:

Members hired before November 10, 1996

Age	Service Credit
Any age	20 years departmental service (only if hired before 2/15/1980)
50	25 years departmental service
60	5 years departmental service

Members hired on and after November 10, 1996

Age	Service Credit
Any age	25 years departmental service
60	

Benefit

For members hired before November 10, 1996:

- 2.5% of Average Salary times departmental service up to 25 years (20 years if hired before 2/15/1980), plus
- 3.0% of Average Salary times departmental service over 25 years (or 20 years if hired before 2/15/1980), plus
- 2.5% of Average Salary times purchased or credited service.

For members hired on or after November 10, 1996:

- 2.5% of Average Salary times total service.

All members are subject to a maximum benefit of 80% of Average Salary.



Section V. Summary of Plan Provisions

Service-Related Disability Retirement

Eligibility

Disabled as a result of an injury or disease that permanently disables him/her for the performance of duty.

Benefit

For members hired before February 15, 1980:

2.5% of Average Salary times total years of service, subject to a minimum of 66-2/3% of Average Salary and a maximum of 70% of Average Salary.

For members hired on or after February 15, 1980:

70% of final pay times percentage of disability, subject to a minimum of 40% of final pay.

Nonservice-Related Disability Retirement

Eligibility

Active members with five or more years of departmental service are covered (vested) for disability retirement. The member is eligible if found that the disability precludes further service with his/her department.

Benefit

For members hired before February 15, 1980:

2.0% of Average Salary times total years of service, subject to a minimum of 40% of Average Salary and a maximum of 70% of Average Salary.

For members hired on or after February 15, 1980:

70% of final pay times percentage of disability, subject to a minimum of 30% of final pay.

Survivor Benefits

Lump Sum

Eligibility

Death before retirement without an eligible spouse/domestic partner or child.

Benefit

Refund of member contributions according to Plan's order of precedence.

Lump Sum – Death In Line Of Duty

Eligibility

Death occurring in the line of duty, not resulting from willful misconduct.

Benefit

\$50,000



Section V. Summary of Plan Provisions

Survivor Benefits

Spouse Only – Death In Line Of Duty

Eligibility

Member killed in line of duty, after December 29, 1993.

Benefit

100% of final pay.

Spouse Only – Death Not In Line Of Duty

Eligibility

Member death, not in line of duty, after December 29, 1993. If retired, must be married for at least one year or have a child by the marriage/domestic partnership.

Benefit

40% of the greater of a) or b):

- a. Average Salary
- b. Salary for step 6 salary class 1 of the DC Police and Fireman's Salary Act in effect, adjusted for cost-of-living increases if death occurs after retirement.

Benefit cannot be higher than rate of pay at death (or retirement if death occurs after retirement).

Spouse/Domestic Partner & Dependent Children

Eligibility

Member death, not in line of duty, after December 29, 1993. If retired, must be married/in a domestic partnership for at least one year or have a child by the marriage/domestic partnership. Children must be unmarried, not in a domestic partnership and under age 18, 22 if full-time student, or any dependent child incapable of self-support due to having a disability incurred before age 18. Death does not have to occur before retirement for the children's benefit.

Spouse Benefit

40% of the greater of a) or b):

- a. Average Salary
- b. Salary for step 6 salary class 1 of the DC Police and Fireman's Salary Act in effect, adjusted for cost-of-living increases if death occurs after retirement.

Benefit cannot be higher than rate of pay at death (or retirement if death occurs after retirement).

Section V. Summary of Plan Provisions

Survivor Benefits

Spouse/Domestic Partner & Dependent Children (continued)

Child Benefit

A benefit per child equal to the smallest of a) or b) or c):

- a. 60% of Average Salary divided by the number of eligible children
- b. \$4,242³ (if hired before 11/10/1996) or \$4,150³ (if hired on or after 11/10/1996) per child
- c. \$12,726³ (if hired before 11/10/1996) or \$12,450³ (if hired on or after 11/10/1996) divided by the number of children.

Dependent Children Only

Eligibility

Children must be unmarried and not in a domestic partnership and under age 18, 22 if full-time student, or any dependent child incapable of self-support due to a disability incurred before age 18. Death does not have to occur before retirement for the children's benefit.

Benefit

75% of Average Salary divided by the number of eligible children, adjusted for cost-of-living increases.

Deferred Vested Retirement

Eligibility

Active members with five or more years of departmental service.

Benefit

Benefit is calculated in the same manner as Service Retirement benefit and may be collected starting at age 55.

Retirement Options

Retirement and disability benefits are payable for the life of the retired member. This includes an unreduced joint and survivor annuity as defined above in the "Survivor Benefits – Spouse/Domestic Partnership and Dependent Children" sections.

An optional reduced benefit may be elected at the time of retirement to provide for an additional survivor benefit to a designated beneficiary. Member's original annuity is reduced by 10% and that amount is added to the survivor's benefit. If the designated beneficiary is more than five years younger than the member, the additional amount will be reduced by 5% for each full five years that the beneficiary is younger than the member, subject to a maximum of 40%.

³ Survivor benefit amounts are as of March 1, 2019 and are subject to annual inflation adjustments.



Section V. Summary of Plan Provisions

Cost-of-Living Adjustments (COLA)

Each year on March 1, benefits which have been paid for at least twelve months preceding March 1 may be increased. The increase is equal to the annual CPI. COLA's are included in benefit payments on and after April 1. If member's retirement is effective after March 1 of the preceding year, the COLA amount will be prorated.

For members hired on or after November 10, 1996, the cost-of-living increase is limited to no more than 3% per year. Members hired before February 15, 1980, receive equalization pay, which is defined as the percentage increase of active employees' salary increases. Equalization increases are not paid to survivors.

Changes since Prior Valuation

None.



Section VI. Actuarial Methods and Assumptions

Valuation Date

All assets and liabilities are computed as of October 1, 2019. Demographic information was collected as of June 30, 2019. For valuation purposes (e.g., age, service), all members are treated as if remaining in the System as of October 1, 2019.

Investment Rate of Return

6.50% per annum, compounded annually (net of investment expenses).

Inflation Assumption

3.50% per annum.

Payroll Growth Assumption

4.25% per annum.

Percent Married

64% of Teachers are assumed to be married and 80% of Police Officers and Firefighters are assumed to be married, with the wife 3 years younger than the husband. Active members are assumed to have one dependent child aged 10.

Actuarial Method

The valuation is completed on the basis of the entry age normal cost method calculated on an individual basis with level percentage of pay normal cost.

Amortization of Unfunded Actuarial Accrued Liability

The unfunded actuarial accrued liability (UAAL) is amortized on a level dollar basis based on the following funding policy adopted by the Board in 2012 and amended in 2017:

- Amortize the legacy UAAL as of October 1, 2017 over a closed 15-year period.
- Amortize the assumption and method changes and experience gains for the October 1, 2017 valuation over a closed 20-year period from the valuation date.
- Amortize all subsequent benefit changes, assumption and method changes and experience gains or losses over a closed 20-year period from the date established.

Assets

The method of valuing assets is intended to recognize a “smoothed” market value of assets. Under this method, the difference between actual return on market value from investment experience and the expected return on market value is recognized over a five-year period. The actuarial value of assets is constrained to an 80% to 120% corridor around market value of assets.

Withdrawal Assumption

For Teachers and Firefighters, it was assumed that 15% of the vested members who terminate elect to withdraw their contributions while the remaining 85% elect to leave their contributions in the Plan in order to be eligible for a benefit at their deferred retirement date. For Police Officers, it was assumed that 25% of the vested members who terminate elect to withdraw their contributions while the remaining 75% elect to leave their contributions in the Plan.



Section VI. Actuarial Methods and Assumptions

Other Assumptions

To value the post-retirement death benefit for Police Officers and Firefighters, the benefit form for all retirements (normal or disabled) is assumed to be a 67.8% Joint and Survivor annuity for all participants (based on 40% of average pay survivor benefits). One-fourth of all Police Officers and Firefighter active deaths are assumed to occur in the line of duty.

Cost-of-Living Adjustment

The cost of living, as measured by the Consumer Price Index (CPI), will increase at the rate of 3.5% per year for members hired before November 1, 1996, and 3.0% per year for members hired on or after November 1, 1996.

Credited Service and Date of Entry

Service is credited as elapsed time from date of hire. The entry date for participation is date of service.

Military Service

All Police and Fire members are assumed to have 0.40 years of military service at retirement.

Administrative Expenses

For Teachers, budgeted administrative expenses of 1.20% of payroll are added to the normal cost rate. For Police Officers and Firefighters, budgeted administrative expenses of 2.10% of payroll are added to the normal cost rate.

Mortality

The RPH-2014 Blue Collar Mortality Table projected generationally with Scale BB, set back 1 year for males is used for healthy active members, retirees, and beneficiaries. The RPH-2014 Disabled Mortality Table set back 6 years for males and set forward 7 years for females is used for disabled retirees. Mortality improvement is anticipated under these assumptions.

Section VI. Actuarial Methods and Assumptions

Teachers

Salary Increases

Representative values of the assumed annual rates of future salary increases are as follows, and include inflation at 4.25% per annum:

Pay Increase Assumptions for an Individual Member			
Years of Service	Merit & Seniority	Inflation & Productivity (Economy)	Total Increase (Next Year)
5	4.20%	4.25%	8.63%
10	3.20	4.25	7.59
15	1.20	4.25	5.50
20	1.20	4.25	5.50
25	1.20	4.25	5.50
30	1.20	4.25	5.50
35	1.20	4.25	5.50

Separations from Active Service

Representative values of the assumed annual rates of withdrawal, service retirement, and disability are shown in the following tables:

Sample	Percent of Members Separating Within the Next Year				Disability
	Withdrawal 5 years of service and up ⁴		Service Retirement		
	Male	Female	Under 30 yrs	30 & up yrs	
25	18.00%	18.00%			
30	16.00	16.00			0.01%
35	12.00	10.00			0.02
40	12.00	8.00			0.03
45	8.00	6.50			0.07
50	8.00	6.50	5.00%	5.00%	0.12
55	8.00	6.50	9.00	22.00	0.20
60			27.00	28.00	0.25
62			22.00	25.00	0.30
65			25.00	35.00	
70			30.00	30.00	
71			25.00	30.00	
75			100.00	100.00	

⁴ Members of any age with less than 5 years of service have withdrawal rates of 18% to 26% for males, and 16% to 23% for females

Section VI. Actuarial Methods and Assumptions

Police Officers

Salary Increases

Police Officers are assumed to receive longevity increases applied to individual base pay after 25, and 30 years of service. Representative values of the assumed annual rates of future salary increases before longevity increases are as follows and include inflation at 4.25% per annum:

Pay Increase Assumptions for an Individual Member			
Years of Service	Merit & Seniority	Inflation & Productivity (Economy)	Total Increase (Next Year)
5	2.00%	4.25%	6.34%
10	2.00	4.25	6.34
15	2.00	4.25	6.34
20	1.75	4.25	6.07
25	0.75	4.25	5.03
30	0.00	4.25	4.25

Separations from Active Service

Representative values of the assumed annual rates of withdrawal, service retirement, and disability are shown in the following tables:

Percent of Members Separating Within the Next Year						
Sample Ages	Withdrawal				Years of Service	Service Retirement ⁷
	(5 years of service & up) ⁵		Disability Retirement ⁶			
	Males	Females	Males	Females		
20	5.00%	5.00%	0.03%	0.02%		
25	5.00	5.00	0.06	0.05		
30	4.25	4.50	0.11	0.10		
35	1.50	3.50	0.16	0.15		
40	1.50	1.50	0.23	0.30	20	15.0%
45	1.50	1.50	0.32	0.40	25	22.0
50	1.50	1.50	0.42	0.60	30	38.0
55	1.50	1.50	0.44	0.70	35	18.0
60	1.50	1.50	0.51	1.00	40	16.0

⁵ Members of any age with less than 5 years of service have withdrawal rates of 6% to 13% for males, and 5% to 11% for females

⁶ It is assumed that 75% of the disabilities are due to accidents in the line of duty and the "percent of disability" is assumed to be 100%

⁷ 100% of active members are assumed to retire at age 65, regardless of service.

Section VI. Actuarial Methods and Assumptions

Firefighters

Salary Increases

Firefighters are assumed to receive longevity increases applied to individual base pay after 15, 20, 25, and 30 years of service. Representative values of the assumed annual rates of future salary increases before longevity increases are as follows and include inflation at 4.25% per annum:

Pay Increase Assumptions for an Individual Member			
Years of Service	Merit & Seniority	Inflation & Productivity (Economy)	Total Increase (Next Year)
5	3.00%	4.25%	7.38%
10	3.00	4.25	7.38
15	3.00	4.25	7.38
20	1.25	4.25	5.55
25	1.25	4.25	5.55
30	1.25	4.25	5.55
35	1.25	4.25	5.55

Separations from Active Service:

Representative values of the assumed annual rates of withdrawal, service retirement, and disability are shown in the following tables:

Percent of Members Separating Within the Next Year				
Sample Ages	Withdrawal		Years of Service	Service Retirement ¹⁰
	(5 years of service & up) ⁸	Disability Retirement ⁹		
20	3.00%	0.01%		
25	3.00	0.05		
30	2.60	0.18		
35	1.80	0.25		
40	1.40	0.30	20	12.50%
45	1.20	0.35	25	12.50
50	1.20	0.40	30	22.00
55	0.80	0.45	35	40.00
60	0.60	0.50	40	40.00

⁸ Members of any age with less than 5 years of service have withdrawal rates of 4.0% to 7.5%.

⁹ It is assumed that 75% of the disabilities are due to accidents in the line of duty and the "percent of disability" is assumed to be 100%.

¹⁰ 100% of active members are assumed to retire at age 60, regardless of service.



Section VI. Actuarial Methods and Assumptions

Rationale for Assumptions

The economic and demographic assumptions are the same as those used by the prior actuary and were adopted by the Board on June 22, 2017. Bolton reviewed the assumptions and have concluded that they are generally valid and reasonable. At the direction of the Board, an experience study will be conducted in the future and changes may be made as a result of the study.

Changes Since Prior Valuation

The amortization method for gains/loss, assumptions, methods, and plan changes is closed level dollar over 20 years. The previous method calculated the new amortization base as of the valuation date, increased it with one year of interest, and amortized the base over 19 years. The current method projects the unfunded accrued liability one year forward, calculates the new amortization base, and amortizes the base over 20 years.

Section VII. Glossary

Actuarial Accrued Liability (AAL)

The difference between the Actuarial Present Value of Future Benefits and the Actuarial Present Value of Future Normal Costs or the portion of the present value of future benefits allocated to service before the valuation date in accordance with the actuarial cost method. Represents the present value of benefits expected to be paid from the plan in the future allocated to service prior to the date of the measurement.

Actuarial Asset Valuation Method

The method of determining the value of the assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets or a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the actuarially determined contribution (ADC).

Actuarial Cost Method

A procedure for allocating the Actuarial Present Value of Future Benefits and the actuarial Present Value of Future Normal costs and the Actuarial Accrued Liability. Also known as the “funding method”. Examples of actuarial cost methods include Aggregate, Entry Age Normal, Projected Unit Credit, and Pay-as-you-go.

Actuarial Present Value of Future Benefits (APVFB)

The Actuarial Present Value of amounts which are expected to be paid at various future times to active members, retired members, beneficiaries receiving benefits, and inactive, nonretired members entitled to either a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.

Aggregate Cost Method

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

Annual Determined Contributions of the Employer(s) (ADC)

The employer’s periodic determined contributions to a pension plan, calculated in accordance with the assumptions and methods used by the plan actuary. The ADC replaced the actuarially required contribution (ARC), with the replacement of GASB 27 with GASB 68.

Cost-of-Living Adjustment (COLA)

An annual increase in the amount of a retired member’s or survivor’s benefit intended to adjust the benefit for inflation.

Covered Group

Plan members included in actuarial valuation.

Section VII. Glossary

Deferred Retirement Option Program (DROP)

A program allowing participants eligible to retire to continue working for a fixed period of time, while accumulating the benefit payments they would have received if they had retired on their entry to DROP.

Demographic Assumption

Assumptions regarding the future population of pension participants, including retirement, termination, disability and mortality assumptions.

Economic Assumption

Assumptions regarding future economic factors, including COLA, salary improvement, change in average wages, changes in Social Security benefits and investment returns.

Employer's Contributions

Contributions made in relation to the actuarially determined contributions of the employer (ADC). An employer has made a contribution in relation to the ADC if the employer has (a) made payments of benefits directly to or on behalf of a retiree or beneficiary, (b) made premium payments to an insurer, or (c) irrevocably transferred assets to a trust, or an equivalent arrangement, in which plan assets are dedicated to providing benefits to retirees and their beneficiaries in accordance with the terms of the plan and are legally protected from creditors of the employer(s) or plan administrator.

Entry Age Normal (EAN) Cost Method

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

Expenses

Plan expenses paid by the plan are divided into administrative and investment related expenses.

Funded Ratio

The actuarial value of assets expressed as a percentage of the plan's actuarial accrued liability.

GASB

Government Accounting Standards Board.

Section VII. Glossary

GASB No. 67 and GASB No. 68

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

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

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

Level Percentage of Projected Payroll Amortization Method

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

Normal Cost or Normal Actuarial Cost

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

Pay-As-You-Go (PAYG)

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

Payroll Growth Rate

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

Plan Liabilities

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

Plan Members

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

Projected Unit Credit (PUC) Funding Method

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



Section VII. Glossary

Post-Employment

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

Salary Improvement

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

Select and Ultimate Rates

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

Unfunded Actuarial Accrued Liabilities

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

Vested Plan Benefits

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



Appendix 1

Summary of Funding Progress

	(1)	(2)	(3)	(4)	(5)	(6)
Valuation Date	Actuarial Value of Assets	Actuarial Accrued Liability	Percentage Funded (1) / (2)	Unfunded Actuarial Accrued Liability (2) - (1)	Annual Covered Payroll	Unfunded Actuarial Accrued Liability as a Percentage of Covered Payroll (4) / (5)
Teachers' Retirement Plan						
10/1/2015	\$ 1,732,017	\$ 1,953,305	88.7%	\$ 221,288	\$ 417,090	53.1%
10/1/2016	\$ 1,845,476	\$ 2,029,640	90.9%	\$ 184,164	\$ 438,079	42.0%
10/1/2017	\$ 1,982,019	\$ 2,142,491	92.5%	\$ 160,472	\$ 447,762	35.8%
10/1/2018	\$ 2,139,911	\$ 2,301,314	93.0%	\$ 161,403	\$ 470,749	34.3%
10/1/2019	\$ 2,271,160	\$ 2,494,291	91.1%	\$ 223,131	\$ 516,609	43.2%
Police Officers and Firefighters' Retirement Plan						
10/1/2015	\$ 4,607,300	\$ 4,283,093	107.6%	\$ (324,207)	\$ 446,201	(72.7%)
10/1/2016	\$ 4,985,051	\$ 4,498,513	110.8%	\$ (486,538)	\$ 438,114	(111.1%)
10/1/2017	\$ 5,406,366	\$ 4,878,260	110.8%	\$ (528,106)	\$ 441,905	(119.5%)
10/1/2018	\$ 5,848,576	\$ 5,223,760	112.0%	\$ (624,816)	\$ 454,209	(137.6%)
10/1/2019	\$ 6,269,628	\$ 5,604,573	111.9%	\$ (665,055)	\$ 495,809	(134.1%)
Total						
10/1/2015	\$ 6,339,317	\$ 6,236,398	101.7%	\$ (102,919)	\$ 863,291	(11.9%)
10/1/2016	\$ 6,830,527	\$ 6,528,153	104.6%	\$ (302,374)	\$ 876,193	(34.5%)
10/1/2017	\$ 7,388,385	\$ 7,020,751	105.2%	\$ (367,634)	\$ 889,667	(41.3%)
10/1/2018	\$ 7,988,487	\$ 7,525,074	106.2%	\$ (463,413)	\$ 924,958	(50.1%)
10/1/2019	\$ 8,540,788	\$ 8,098,864	105.5%	\$ (441,924)	\$ 1,012,418	(43.7%)

(\$ in Thousands)

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



Appendix 2

Valuation Solvency Test

The following table shows the accrued liabilities and the portion of accrued liabilities covered by reported assets.

Valuation Date	Aggregate Accrued Liabilities For			Portion of Accrued Liabilities Covered by Reported Asset			
	(1) Active Member Contributions	(2) Retirees, Survivors and Inactive Members	(3) Active Members (Employer Financed Portion)	Reported Assets	(1)	(2)	(3)
TEACHERS							
10/1/2015	\$ 144,927	\$ 1,053,078	\$ 755,300	\$ 1,670,976	100.0%	100.0%	62.6%
10/1/2016	\$ 152,459	\$ 1,108,032	\$ 769,149	\$ 1,822,113	100.0%	100.0%	73.0%
10/1/2017	\$ 156,263	\$ 1,154,696	\$ 831,532	\$ 2,051,006	100.0%	100.0%	89.0%
10/1/2018	\$ 165,629	\$ 1,234,796	\$ 900,889	\$ 2,193,598	100.0%	100.0%	88.0%
10/1/2019	\$ 228,893	\$ 1,263,613	\$ 1,001,785	\$ 2,264,428	100.0%	100.0%	77.1%
POLICE AND FIRE							
10/1/2015	\$ 262,674	\$ 1,388,908	\$ 2,631,511	\$ 4,462,228	100.0%	100.0%	100.0%
10/1/2016	\$ 260,786	\$ 1,650,195	\$ 2,587,532	\$ 4,954,464	100.0%	100.0%	100.0%
10/1/2017	\$ 261,428	\$ 1,990,699	\$ 2,626,133	\$ 5,629,911	100.0%	100.0%	100.0%
10/1/2018	\$ 267,845	\$ 2,258,695	\$ 2,697,220	\$ 6,015,953	100.0%	100.0%	100.0%
10/1/2019	\$ 338,775	\$ 2,547,138	\$ 2,828,542	\$ 6,256,213	100.0%	100.0%	100.0%

(\$ in Thousands)

Appendix 3

ASOP 51 Disclosure

Actuarial Standard of Practice No. 51 *Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions* is effective for actuarial valuations after November 2018. The standard requires actuaries to provide information so that users of the report can better understand the potential for future results to vary from the results presented in this report and identify risks on the plan's future financial condition. This standard does not require the assessment to be based on numerical calculations.

Examples of risk common to most public plans include the following (generally listed from greatest to least risk):

- Investment risk: The potential that investment returns will be different than expected. The Trustees are well aware of this risk.
- Contribution risk: Most commonly this is associated with the potential that actual future contributions are not made in accordance with the plan's actuarially based funding policy. When this occurs, it can create negative long-term problems.
- Longevity and other demographic risks: The potential that mortality or other demographic experience will be different than expected.
- Asset/liability mismatch risk: The potential that changes in asset values are not matched by changes in the value of liabilities.
- Cash flow risks: The potential that contributions coming into the plan will not cover benefit payments. While common in well-funded plans, this still requires the use of interest, dividends or principal to cover benefit payments. When assets need to be sold (or more cash held) it can be an issue. Poorly funded plans with DROP lump sum payments can be a particular issue.

One item left off this list is "interest rate risk" (i.e., the potential that interest rates will be different than expected). This risk is common in corporate ERISA plans where funding is based on bond rates. Interest rates on bonds are still an important consideration when setting an expected return assumption and can change over time.

There are some plan maturity measures that are significant to understanding the risks associated with the plan. The following table shows four commonly used measures of the relative riskiness of a pension plan, relative to the plan sponsor and the employee group covered by the plan.

Appendix 3

ASOP 51 Disclosure

Teachers				Conservative
Risk Measure	10/1/2017	10/1/2018	10/1/2019	Measures
Retiree Liability as a Percent of Total Liability	46%	37%	44%	<50%
Assets to Payroll (Asset Volatility Ratio)	4.6	4.7	4.4	<5
Liabilities to Payroll (Liability Volatility Ratio)	4.8	4.9	4.8	<5
Benefit Payments to Contributions	0.9	0.9	0.9	1-3

Police and Fire				Conservative
Risk Measure	10/1/2017	10/1/2018	10/1/2019	Measures
Retiree Liability as a Percent of Total Liability	39%	30%	45%	<50%
Assets to Payroll (Asset Volatility Ratio)	12.7	13.3	12.6	<5
Liabilities to Payroll (Liability Volatility Ratio)	11.0	11.5	11.3	<5
Benefit Payments to Contributions	0.5	0.8	0.8	1-3

The Asset Volatility Ratio (AVR) is equal to the market value of assets (MVA) divided by payroll. A higher AVR implies that the Plan is exposed to greater contribution volatility. The current Teachers AVR of 4.4 indicates that a 1% asset gain/loss can be related to about 4.4% of the annual payroll. The current Police and Fire AVR of 12.6 indicates that a 1% asset gain/loss can be related to about 12.6% of the annual payroll. The Plan currently amortizes asset gains/losses over a period of 20 years. This would result in a change in the District's contribution of about 0.4% of payroll for Teachers and 1.1% of payroll for Police and Fire for each 1.0% change in market assets in each Plan.

The Liability Volatility Ratio (LVR) is equal to the Actuarial Accrued Liability (AAL) divided by payroll. A higher LVR implies that the Plan is exposed to greater contribution volatility due to changes in liability measurements. The current Teachers LVR of 4.8 indicates that a 1% liability gain/loss can be related to about 4.8% of the annual payroll. The current Police and Fire LVR of 11.3 indicates that a 1% liability gain/loss can be related to about 11.3% of the annual payroll. The Plan currently amortizes liability gains/losses over a period of 20 years. This would result in a change in the District's contribution of about 0.4% of payroll for Teachers and about 1.0% of payroll for Police and Fire for each 1.0% change in each Plan.

Appendix 3

ASOP 51 Disclosure

The use of payroll in these risk measures is an easily available substitute for the employer's revenue and often reflects the employer's ability to afford the plan. Each of these measures are a measure of plan maturity. Some ratios are approaching or outside of the "conservative" range because the plans are becoming more mature. Mature plans present more risk to plan sponsors because changes to the liability or assets will result in large changes in the unfunded liability as compared to the overall size of the employer as measured by payroll.

If the plan or employer were interested in doing more quantitative assessment of risks, the following are example of tests that could be performed:

Scenario Test—A process for assessing the impact of one possible event, or several simultaneously or sequentially occurring possible events, on a plan's financial condition.

Sensitivity Test—A process for assessing the impact of a change in an actuarial assumption on an actuarial measurement.

Stochastic Modeling—A process for generating numerous potential outcomes by allowing for random variations in one or more inputs over time for the purpose of assessing the distribution of those outcomes.

Stress Test—A process for assessing the impact of adverse changes in one or relatively few factors affecting a plan's financial condition.



Appendix 4

D.C. Code §1-907.02(c) Adjustment to FY2021 Payment

Beginning in fiscal year 2001, the District payment was adjusted pursuant to D.C. Code §1-907.02(c). This section stipulates that "...the enrolled actuary shall determine whether the amount appropriated for the applicable fiscal year resulted in an overpayment or a shortfall based upon the actual covered payroll."

The D.C. Code §1-907.02(c) adjustment to the fiscal year 2021 District payment is calculated by taking the actual fiscal year 2019 covered payroll for each employee class and multiplying by the corresponding fiscal year 2019 contribution rates, which were determined as of October 1, 2017. This result is the fiscal year 2019 contribution that was required to be made by the District, based on actual payroll. The required contribution is then compared to the actual contribution that was paid by the District based on projected payroll. The difference between the required and actual contributions is the D.C. Code §1-907.02(c) adjustment. Any adjustment amount that cannot be used in a given year is carried forward to the next fiscal year.

The following table shows the D.C. Code §1-907.02(c) Adjustment to FY2021 Payment.

	Teachers	Police	Fire
1. Actual FY2019 Covered Payroll	\$ 504,217	\$ 300,348	\$ 172,808
2. FY2019 Contribution Rate	11.09%	19.05%	25.39%
3. Actual FY2019 Contribution Required	\$ 55,918	\$ 57,216	\$ 43,876
4. Actual FY2019 Contribution Paid without Adjustment	\$ 51,767	\$ 59,486	\$ 37,684
5. Preliminary D.C. Code §1-907.02(c) Adjustment to FY2021 Payment (3. - 4.)	\$ 4,151	\$ (2,270)	\$ 6,192
6. FY2019 Unrecognized Amount	\$ 0	\$ 0	\$ 0
7. Final D.C. Code §1-907.02(c) Adjustment to FY2021 Payment (5. + 6.)	\$ 4,151	\$ (2,270)	\$ 6,192
8. Adjustment Applied to FY2021 Payment	\$ 4,151	\$ (2,270)	\$ 6,192
9. Carryover Adjustment (7. - 8.)	\$ 0	\$ 0	\$ 0

(\$ in Thousands)



Appendix 5

Experience Gain/(Loss)

The following table shows the gain/(loss), or change in unfunded accrued liability, due to experience other than expected.

(\$ in Millions)

Experience Gain/(Loss)	Teachers	Police	Fire	Police and Fire	Total
Age & Service Retirements If members retire at older ages, there is a gain. If younger ages, a loss.	\$ (8.4)	\$ (38.0)	\$ (8.2)	\$ (46.2)	\$ (54.6)
Disability Retirements If disability claims are less than assumed, there is a gain. If more claims, a loss.	\$ (1.1)	\$ 2.1	\$ 3.7	\$ 5.8	\$ 4.8
Death-in Service Benefits If survivor claims are less than assumed, there is a gain. If more claims, there is a loss.	\$ (2.4)	\$ (11.1)	\$ (3.6)	\$ (14.7)	\$ (17.1)
Withdrawal from Employment If more liabilities are released by withdrawals than assumed, there is a gain. If smaller releases, a loss.	\$ (11.5)	\$ (8.5)	\$ 5.4	\$ (3.1)	\$ (14.6)
Pay Increases If there are smaller pay increases than assumed, there is a gain. If greater increases, a loss.	\$ 1.0	\$ (127.5)	\$ (3.2)	\$ (130.7)	\$ (129.7)
New Members Additional unfunded actuarial accrued liability will produce a loss.	\$ (45.3)	\$ (12.5)	\$ (8.5)	\$ (20.9)	\$ (66.2)
Investment Income If there is greater investment income than assumed, there is a gain. If less income, a loss.	\$ (10.4)	\$ 29.8	\$ 14.1	\$ 43.8	\$ 33.5
Death after Retirement If retirees live longer than assumed, there is a loss. If not as long, a gain.	\$ 14.7	\$ 32.6	\$ 10.1	\$ 42.6	\$ 57.4
COLA/CPI If inflation is different than expected, gains or losses can occur.	\$ 9.9	\$ 26.0	\$ 8.1	\$ 34.1	\$ 43.9
Other Miscellaneous gains and losses resulting from data adjustments, timing of financial transactions, etc.	\$ (8.4)	\$ 83.3	\$ 19.7	\$ 103.0	\$ 94.5
Gain/(Loss) During Year from Experience	\$ (61.9)	\$ (23.8)	\$ 37.5	\$ 13.7	\$ (48.2)
Adjustment to Prior Year's Valuation¹¹	\$ (9.0)	\$ 9.9	\$ 43.0	\$ 52.9	\$ 43.9
Non-Recurring Items Adjustments for plan amendments, assumption changes, method changes or audit changes.	\$ -	\$ -	\$ -	\$ -	\$ -
Composite Gain/(Loss) During Year	\$ (70.9)	\$ (13.9)	\$ 80.5	\$ 66.6	\$ (4.3)

¹¹ The item "Adjustment to Prior Year's Valuation" is an adjustment due to the difference in unfunded actuarial accrued liability between the amounts calculated by the prior actuary as of October 1, 2018 and the amounts calculated by Bolton in the replication of the October 1, 2018 results. This replication was necessary to create a "starting point" for the calculation of the expected unfunded liability at October 1, 2019. This line item is only applicable at October 1, 2019 and will not apply to future valuations.