



United States Department of the Treasury District of Columbia Pensions Program

Actuarial Valuation Report

Valuation Date: October 1, 2019
Report Date: October 22, 2019

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Executive Summary

Highlights of the Actuarial Valuation

The actuarial valuation report has been completed for the following program for the most recent plan year:

United States Department of the Treasury District of Columbia Pensions Program (Program)

The Program refers to the federal responsibility for benefit payments under the following District of Columbia (D.C.) retirement plans: District of Columbia Police Officers and Firefighters' Retirement Plan, District of Columbia Teachers' Retirement Plan, and District of Columbia Judges' Retirement Plan. The designated assets for the federal administration of these plans are held in two separate funds. The District of Columbia Teachers, Police Officers and Firefighters Federal Pension Fund ("D.C. Federal Pension Fund") covers federal payments under the District of Columbia Police Officers and Firefighters' Retirement Plan and District of Columbia Teachers' Retirement Plan. The Judicial Retirement and Survivors Annuity Fund ("Judicial Retirement Fund") covers payments under the District of Columbia Judges' Retirement Plan.

The purpose of this report is to present the results of the actuarial valuation including:

- To illustrate the current assets and liabilities of each Plan as of the end of Fiscal Year (FY) 2019 (October 1, 2018 through September 30, 2019);
- To review the experience of the Program over the past year and to discuss reasons for changes in Program costs;
- To determine the appropriate contribution to be paid by the Department of the Treasury to the Funds in FY 2020 (October 1, 2019 through September 30, 2020); and
- To identify and discuss any emerging trends in Program costs.

This report also includes certain statement line items and footnote disclosures necessary to compute the annual pension expense in accordance with Statement of Federal Financial Accounting Standards No. 5, Accounting for Liabilities of the Federal Government, and No. 33, Pensions, Other Retirement Benefits, and Other Postemployment Benefits: Reporting the Gains and Losses from Changes in Assumptions and Selecting Discount Rates and Valuation Dates (SFFAS 5 and SFFAS 33). Use of the valuation results for other purposes may not be appropriate.

Summary of Results

As of October 1, 2019	Police Officers and Firefighters', and Teachers' Plans	Judges' Plan
Actuarial Accrued Liability	\$ 8,188,657,073	\$ 255,415,933
Plan Assets	<u>(3,822,592,727)</u>	<u>(177,213,402)</u>
Unfunded Actuarial Accrued Liability	\$ 4,366,064,346	\$ 78,202,531
Normal Cost with Interest (including expected employee contributions)	N/A	\$ 5,300,000

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Highlights of the Actuarial Valuation

Summary of Gains and Losses

As part of the review of the valuation, an actuarial gain/loss analysis was performed. Expected liabilities and plan assets were developed presuming all demographic and economic assumptions from the prior valuation were realized during the plan year. These expected values were then compared to the actual results. The factors causing the liabilities or assets to be greater than expected (a loss for liabilities and a gain for assets), or smaller than expected (a gain for liabilities and a loss for assets) were isolated. Differences in liability not directly attributable to experience different than assumed, such as changes in assumptions and methods, were separately measured from this process.

The different sources of gains and losses, as well as their individual impacts, are outlined below.

Source of Liability (Gain)/Loss due to Actuarial Experience

Source of Demographic (Gain)/Loss	Police Officers and Firefighters', and Teachers' Plans	Judges' Plan
(Gains)/Losses due to Plan Experience:		
Active Decrements	\$ (10,568,514)	\$ 547,378
Inactive Mortality	(10,340,088)	1,174,792
Salary Increase	9,472,025	299,588
New Entrants	N/A	102,503
Cost-of-Living Adjustment (COLA) Different than Expected	14,355,482	1,688,223
(Gains)/Losses due to Census Changes:	25,299,737	451,103
(Gains)/Losses due to New Terminated Vested Plan Members:	2,121,361	N/A
Total	\$ 30,340,003	\$ 4,263,587

We have provided clarification on these items below:

- **(Gains)/Losses due to Plan Experience:** The liability for each plan is expected to change based on certain demographic and economic assumptions; however, actual plan experience will differ to some degree. This creates (gains) or losses due to plan experience being different than expected with these assumptions. This includes the following primary factors:

- **Active Decrements:** The actuarial valuation assumes that each active plan member has a particular probability of terminating, retiring, becoming disabled, or becoming deceased in each year. An individual (gain) or loss is generated based on the plan member's actual status in the current valuation year based on the difference from what was expected. The gain for the Police and Firefighters' and Teachers' Plans is primarily due to a group of new retirees who turned 50 since the prior valuation. The assumption in effect for the measurement of (gain)/loss assumed that an individual who leaves the population prior to attaining age 50 is a termination, causing a gain to be incurred in the active decrements category. The individuals' retirement loss is categorized as "other census changes" resulting in the correct calculation of the liability overall, despite the categorization of the individual pieces. For the Judges' Plan, three individuals retired far sooner than their final decrement age, therefore incurring a loss as the future normal cost under the Entry Age Normal method is now zero.

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Highlights of the Actuarial Valuation

- **Inactive Mortality:** The actuarial valuation assumes that each inactive plan member has a particular probability of becoming deceased in each year. An individual (gain) or loss is generated based on whether the plan member actually dies during the year. The gain shown for the Police and Firefighters' and Teachers' Plans is driven by plan members in pay status dying at an earlier age or in greater number than expected in the past year. For the Judges' Plan there were only three deaths since the prior year, in contrast with the remaining population of older retirees and survivors who survived despite higher probabilities of death. Smaller populations are expected to experience larger deviations from expected year-over-year than a larger population, as individual deaths or survivorship have a more significant relative impact on the liability than in a larger population. Long-term gains and losses are expected to offset each other with experience aligning to the assumed mortality probabilities.
- **Salary Increase:** The actuarial valuation assumes that salaries for active plan members will increase by a certain amount. An individual (gain) or loss is generated for each plan member based on their actual salary amount reported in the current valuation. A gain is reported when a plan member's actual salary is lower than the expected amount, and a loss is reported when a plan member's actual salary is higher than the expected amount. The retroactive salary increase negotiated for the Police and Firefighters' Plan is reflected as a loss for the Police and Firefighters' Plan. This is offset by a small gain in the Teachers' Plan.
- **New Entrants:** The actuarial valuation incurs a loss whenever new members enter the plan with past service. The Police and Firefighters' and Teachers' Plans are closed and will never incur a gain or loss due to this reason. The Judges' Plan reports a small loss due to the new plan member with one year of past service.
- **COLA Different Than Expected:** The actuarial valuation assumes that retirement benefits for inactive plan members that are receiving benefits will increase by a certain amount. An individual (gain) or loss is generated for each plan member based on their actual benefit amount reported in the current valuation. The Police and Firefighters' and Teachers' Plans had a loss primarily due to higher actual COLA percentages than expected. Note that the Police and Firefighters' Plan members who retired prior to February 15, 1980 received retroactive pay increases, however, only the difference between the expected COLA and the actual COLA for 2019 have been included here. The remaining loss due to the retroactive increase for those who retired prior to February 15, 1980 is included in the \$9.7 million loss for continuing inactive plan members as discussed in the (Gains)/Losses due to Census Changes section below. The Judges' Plan had a loss due to higher COLA than expected.

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Highlights of the Actuarial Valuation

• **(Gains)/Losses due to Census Changes:** Each year, ODCP prepares the census data that will be used as the basis for the annual valuation. Inevitably, there will be updates to the census data beyond those that we would expect due to the passage of time. This category of (gain)/loss is described in more detail below.

For the **Police and Firefighters' and Teachers' Plans**, the net loss amount was \$25.3 million and includes the following:

- An \$18.1 million loss resulting from new beneficiaries following the death of plan members for whom the chosen form of payment was unknown.
- A \$14.2 million net loss resulting from ongoing data management, including unexpected changes to data fields such as hire date, salary, service, etc.
- A \$13.7 million loss resulting from active plan members who retired or terminated within the past year, primarily due to benefits calculated at retirement different than previously estimated or those who were not eligible to begin benefits in the prior valuation.
- A \$9.7 million loss resulting from data updates for continuing inactive plan members, primarily due to correction of benefit amounts and retirement dates in the census data. In prior years, retirement date was used to determine COLA type. This year, a flag was provided by ODCP to indicate COLA type. Depending on the prior and current type, this caused a (gain) or loss to be incurred. Overall, a net loss was incurred due to this new data field. In addition, the loss due to the retroactive portion of the COLA increase for plan members in the Police and Firefighters' Plan who retired before February 15, 1980 is included in this loss.
- A \$0.5 million loss resulting from beneficiaries found when previously reported as "no future benefits due" in the prior valuation year and from finding new plan members due to data clean-up.
- A \$0.1 million loss resulting from rehires.
- A \$31.0 million gain resulting from the update to reflect actual form of payment when known, primarily due to there being many more annuitants with Straight Life Annuities than assumed in the prior valuation. The prior assumption split the form of payment expectation into Single Life Annuity and Joint-and-Survivor Annuity. The possibility of a survivor benefit increases the individual's liability.

There will be an additional set of recalculations during the upcoming fiscal year for individuals who retired after February 15, 1980 and are due a benefit increase based on the retroactive pay increase. ODCP has estimated the impact to be \$2.2 million. The revised benefits will be incorporated in the next valuation.

For the **Judges' Plan**, the total loss amount includes the following:

- A \$0.2 million loss resulting from active plan members who retired or terminated within the past year, primarily due to benefits calculated at retirement different than previously estimated.
- A \$0.01 million loss resulting from new beneficiaries following the death of plan members for whom the beneficiary's date of birth was unknown.
- A \$0.2 million loss resulting from ongoing data management.

• **(Gains)/Losses due to New Terminated Vested Plan Members:** There were 25 new terminated vested plan members discovered as a result of a data clean-up initiative performed by the program. This caused a \$2.1 million loss to the Police and Firefighters' and Teachers' Plans.

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Highlights of the Actuarial Valuation

Source of Asset (Gain)/Loss due to Actuarial Experience

Asset (Gain)/Loss	D.C. Federal Pension Fund	Judicial Retirement Fund
Beginning of Year Assets	\$ 3,818,529,238	\$ 170,055,020
Expected Return on Assets	20,863,698	5,279,013
Actual Return on Assets	<u>69,781,818</u>	<u>3,741,019</u>
Asset (Gain)/Loss	\$ (48,918,120)	\$ 1,537,994

The plan assets experienced the following rates of return during the prior plan year:

	D.C. Federal Pension Fund	Judicial Retirement Fund
Assets	1.84%	2.18%

As noted on page 55 of this report in the Interest Rates for (Gain)/Loss section, the expected return on assets for the Judicial Retirement Fund is based on the prior year effective interest rate of 3.12% while the D.C. Federal Pension Fund's expected return on assets is based on the first rate on the prior year's yield curve, 0.59%. The Judicial Retirement Fund experienced a lower-than-anticipated return of 2.18% on fund assets and the D.C. Federal Pension Fund experienced a higher-than-anticipated return of 1.84% on fund assets, thus resulting in an asset loss and an asset gain, respectively.

Changes in Plan Provisions from the Previous Valuation

The valuation for the current plan year was based on the same plan provisions as the valuation for the prior plan year. We are not aware of any other changes to the plans since the last valuation.

A full summary of the plan provisions and plan changes for each plan (if any) can be found later in this report in Appendix C: Plan Provisions Summary.

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Highlights of the Actuarial Valuation

Source of Liability (Gain)/Loss due to Changes in Actuarial Assumptions from the Previous Valuation

Assumption Change	Police Officers and Firefighters', and Teachers' Plans	Judges' Plan
Discount Rate Assumption	\$ 287,100,110	\$ 2,982,324
Other Economic Assumptions	141,805,509	(8,319,171)
Non-Economic Assumptions	<u>63,125,408</u>	<u>577,458</u>
Total	\$ 492,031,027	\$ (4,759,389)

The discount rate assumption was updated according to prescribed guidance. The Effective Interest Rate (EIR) for all plans decreased, causing a loss.

The other economic assumptions changed for this valuation were the cost-of-living adjustment (COLA) for annuitants, the salary increase assumption for active plan members, and the additional salary increase assumption as a result of the experience study. Due to the plans' composition of primarily inactive plan members, the COLA assumption is a primary driver in the calculation of liabilities. The increase in the future expectation of these adjustments caused a loss for the Police Officers and Firefighters' and Teachers' Plans. A decrease in the future expectation of these adjustments caused a gain for the Judges' Plan. A detailed description of the changes since prior year is available in Appendix A: Actuarial Assumptions and Methods.

For the Police Officers and Firefighters', and Teachers' Plans, and the Judges' Plan, the non-economic assumption change included form of payment assumption for the Teachers' Plan, spousal age assumption, expected rates of retirement, expected disability incidence rates, expected rates of termination, mortality base table, mortality improvement scale, and mortality scaling factors. The new base tables were the primary driver of the impact. A complete description of the actuarial assumptions and rationale can be found in Appendix A: Actuarial Assumptions and Methods and Appendix B: Rationale.

The impacts of the demographic assumption changes and assumption for additional salary increases are consistent with the findings of the experience study conducted earlier in 2019. For more information, please see the report dated March 2019.

Executive Summary

Highlights of the Actuarial Valuation

Government Contributions

This report includes a calculation of the Government Contribution required to be made before the end of FY 2020 (excluding the reimbursement for expenses). The table below contains Government Contribution (excluding expenses) for FY 2019 and FY 2020.

Contribution Year	Government Contribution (excluding expenses)	
	D.C. Federal Pension Fund	Judiciary Retirement Fund
September 30, 2019	\$ 477,600,000	\$ 16,100,000
September 30, 2020	\$ 520,300,000	\$ 15,500,000

The increase in the Government Contribution amounts from FY2019 to FY2020 is explained in the table below.

	Police Officers and Firefighters', and Teachers' Plans	Judges' Plan
Full amortization of the 10/1/2009 gain/(loss)	\$ 18,500,000	\$ (600,000)
New amortization base for the 10/1/2019 experience (gain)/loss	(2,100,000)	700,000
New amortization base for the 10/1/2019 assumption (gain)/loss	26,300,000	(400,000)
Normal Cost change	-	(300,000)
Employee Contribution change	-	-
Total	\$ 42,700,000	\$ (600,000)

Executive Summary

Actuarial Valuation Opinion

This report presents the results of the actuarial valuation of the Program as of October 1, 2019. In our opinion, this report is complete and accurate and represents fairly the actuarial position of the Program for the purposes stated herein.

This actuarial valuation has been prepared based upon plan member data and plan provisions provided by the Department of the Treasury as of May 1, 2019 (plan data was projected to September 30, 2019 by adjusting for expected mortality for inactive plan members) and the estimated asset information projected by the Department of the Treasury to September 30, 2019 (provided on July 29, 2019).

We have reviewed the data and other information provided for reasonableness, but have not independently audited the data or other information provided. We have no reason to believe the data and other information provided are not complete and accurate, and know of no further information that is essential to the preparation of the actuarial valuation.

In our opinion, all costs, liabilities, rates of interest, and other factors underlying these actuarial computations have been determined on the basis of actuarial assumptions and methods. Each are reasonable (or consistent with authoritative guidance) for the purposes described herein taking into account the experience of the plans and future expectations. Rates of interest used in this valuation are provided by ODCP and are consistent with authoritative guidance. All other assumptions are reasonable for the purposes described herein.

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 operations of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on each plan's funded status); and
- Changes in plan provisions or applicable law.

Our scope did not include analyzing the potential range of such future measurements; therefore, this analysis was not performed.

The undersigned with actuarial credentials collectively meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

This report was prepared solely for the benefit and internal use of the Department of the Treasury. This report is not intended for the benefit of any other party and may not be relied upon by any third party for any purpose, and Deloitte Consulting LLP accepts no responsibility or liability with respect to any party other than the Department of the Treasury.

To the best of our knowledge, no employee of the Deloitte U.S. Firms is an officer or director of the employer. In addition, we are not aware of any relationship between the Deloitte U.S. Firms and the employer that may impair or appear to impair the objectivity of the work detailed in this report.

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Executive Summary

Summary of Results

Police Officers and Firefighters', and Teachers' Plans

	Valuation Date	
	October 1, 2019	October 1, 2018
Plan Member Counts		
Actives	1,307	1,547
Terminated Vested	204	199
Annuitants	<u>13,440</u>	<u>13,540</u>
Total	14,951	15,286
Contributions		
Federal Required Contribution	\$ 520,300,000	\$ 477,600,000
Present Value of Benefits (PVB)		
Active Plan Members		
Retirement Decrement	\$ 467,942,026	\$ 508,019,251
Termination Decrement	-	1,388,098
Disability Decrement	1,666,607	5,216,339
Death Decrement	<u>678,418</u>	<u>1,845,363</u>
Total	\$ 470,287,051	\$ 516,469,051
Inactive Plan Members		
Normal Retirees ¹	\$ 6,224,919,047	\$ 6,202,100,994
Terminated Vested	34,993,537	35,855,745
Disabled Retirees ¹	717,875,525	704,423,997
Beneficiaries	<u>740,581,913</u>	<u>704,195,406</u>
Total	\$ 7,718,370,022	\$ 7,646,576,142
Total PVB (inactive and active)	\$ 8,188,657,073	\$ 8,163,045,193
Unfunded Actuarial Accrued Liability (AAL)		
Active AAL	\$ 470,287,051	\$ 516,469,051
Inactive AAL	<u>7,718,370,022</u>	<u>7,646,576,142</u>
Total AAL	\$ 8,188,657,073	\$ 8,163,045,193
Asset Value as of Valuation Date	\$ (3,822,592,727)	\$ (3,818,529,238)
Unfunded AAL	\$ 4,366,064,346	\$ 4,344,515,955

¹Throughout this report, former spouses receiving benefits under a qualified domestic relations order are not included in counts. Their benefit amounts are included with their associated retired plan member.

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Summary of Results

Judges' Plan

	Valuation Date	
	October 1, 2019	October 1, 2018
Plan Member Counts		
Actives	59	61
Terminated Vested	-	-
Annuitants	96	94
Total	155	155
Contributions		
Government Contribution (excluding expenses)	\$ 15,500,000	\$ 16,100,000
Present Value of Benefits (PVB)		
Active Plan Members		
Retirement Decrement	\$ 122,282,090	\$ 126,685,652
Termination Decrement	-	-
Disability Decrement	-	-
Death Decrement	561,503	906,069
Total	\$ 122,843,593	\$ 127,591,721
Inactive Plan Members		
Normal Retirees ¹	\$ 162,493,045	\$ 160,271,351
Terminated Vested	-	-
Disabled Retirees ¹	2,119,211	2,983,729
Beneficiaries	8,959,664	8,373,915
Total	\$ 173,571,920	\$ 171,628,995
Total PVB (inactive and active)	\$ 296,415,513	\$ 299,220,716
Unfunded Actuarial Accrued Liability (AAL)		
Active AAL	\$ 81,844,013	\$ 83,938,272
Inactive AAL	173,571,920	171,628,995
Total AAL	\$ 255,415,933	\$ 255,567,267
Asset Value as of Valuation Date	\$ (177,213,402)	\$ (170,055,020)
Unfunded AAL	\$ 78,202,531	\$ 85,512,247
Total Normal Cost	\$ 5,300,000	\$ 5,600,000
Employee Contributions	(500,000)	(500,000)
Net Employer Normal Cost	\$ 4,800,000	\$ 5,100,000

¹Throughout this report, former spouses receiving benefits under a qualified domestic relations order are not included in counts. Their benefit amounts are included with their associated retired plan member.

Assessment of Risk

Risk can be defined as the potential of actual future measurements deviating from expected future measurements resulting from actual future experience deviating from actuarially assumed experience. This section is intended to comply with the requirements of Actuarial Standard of Practice (ASOP) No. 51, Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions.

Measuring pension obligations and calculating actuarially determined contributions require the use of assumptions regarding future economic and demographic experience. However, an intended user of such measurements should understand the effects of future experience differing from the assumptions used in the actuarial valuation and the potential volatility of future measurements resulting from such differences.

Methods used in the assessment of risk may include, but are not limited to scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of an actuarial present value using a discount rate derived from minimal-risk investments to a corresponding actuarial present value from the actuarial valuation.

A more detailed assessment than what is presented below may be beneficial to understand the risks identified. The factors that are considered in making this judgement include risk assessment findings, length of time and changes in plan circumstances since the last assessment, absolute or relative size of the plan, maturity of the plan, funded status, asset allocation, method for determining contributions, or contribution risk (to the extent known by the actuary).

Following is a discussion of the risks that, in our professional judgement, may be anticipated to significantly affect the Program's future financial condition.

For purposes of this section, pension obligations refer to Actuarially Accrued Liability and costs refer to Total Required Government Contribution.

Significant Risks

Below, we have listed a number of anticipated risks that may affect pension plans in general. We have identified potential risks that pertain to ODCP specifically and listed them in order of significance. We have defined "significant risks" as factors that could impact costs or liabilities. Additionally, we have identified any risks that, although they may be relevant to pension plans in general, are not applicable for ODCP.

Cost-of-Living-Adjustment (COLA) Risk

The potential that annual COLA applied to participants' benefits will deviate from expected increases.

The Police Officers and Firefighters', and Teachers' Plans and the Judges' Plan predominantly consist of participants already receiving annuities subject to a cost of living adjustment. The risk of actual COLA deviating from expected increases, in conjunction with the Program's maturity, is a significant risk for ODCP.

Longevity Risk

The potential that mortality experience will be different than expected.

Annuity based plans such as the Police Officers and Firefighters', and Teachers' Plans and the Judges' Plan are subject to longevity risk. Failing to project longevity improvements or to under-project them understates the value of the plan over time. This is particularly acute for plans also subject to a COLA.

Investment Risk

The potential that investment returns will be different than expected.

To the extent that ODCP's investment policy results in more or less cash than expected, there may be a decrease or increase, respectively, in future cost requirements. Due to the makeup of ODCP's portfolio of assets consisting mainly of government treasury bonds, if yields behave differently than expected then the asset returns under the Program could be different than expected causing contribution requirements to increase or decrease.

Interest Rate Risk

The potential that interest rates will be different than expected. As interest rates decrease, the present value of future benefit obligations increases. The magnitude of this risk depends on the Plan's effective duration, maturity, population composition, and benefit structure.

All ODCP plans use the full yield curve derived at the time of the valuation by averaging the quarterly treasury rate over 40 quarters (as published by the Department of the Treasury). A decrease in the yield curve could cause the cost of the plans to increase, while also resulting in an increase in the costs of the bonds to be purchased, thus lowering their return.

Assessment of Risk

Asset/Liability Mismatch Risk

The potential that changes in asset values are not matched by changes in the value of liabilities.

The inability to match asset and liability cash flows due to the limited nature of the available durations of Treasury Bonds could introduce risk to the Funds, depending on the deployment of the Program's Investment Policy.

Data Quality Risk

The potential that the data quality interferes with the ability to develop an accurate estimate of liabilities.

ODCP has implemented many data control processes and procedures to ensure the integrity and quality of their data. Even so, unexpected data breaches or unexpected data changes could have a negative financial impact on the Program.

Legislative and Regulatory Risk

The potential that future legislative or regulatory change could impact the calculation of the obligations and costs of the Program.

Unexpected regulatory rules or new laws could result in reassessing the valuation methods described in this report and could have an impact on the Program. Costs caused by any unexpected regulatory or law change could also pose a potential risk to the Program.

Liquidity Risk

The potential inability to cover short term costs resulting in a quicker than anticipated liquidation of assets.

An unexpected increase in short term benefit obligations could result in a reassessment of ODCP's current investment policy in order to decrease the impact caused by liquidity risk. However, ODCP's current investment policy serves to minimize this occurrence, thereby making this risk less prevalent.

The remaining risks noted below have the potential to impact pension plans in general, however, we concluded that they are not pertinent to the ODCP plans at this time.

Salary Scale Risk

The potential that actual future salary increases deviate from expected future salary increases.

Because the Program consists of predominately inactive plan members, the risks associated with an unexpected increase in active plan members' salaries will have minimal impact on the Program.

Other Demographic Risk

The potential that other demographic experiences will be different than expected.

An unexpected change in assumptions including retirement rates, disability incidence rates, or elected forms of benefit could result in an increase to costs. However, because the Program consists of predominantly inactive plan members, this risk is expected to have minimal impact.

Workforce Risk

The potential that the size and characteristics of the Program's workforce will be different than expected.

For the Police Officers and Firefighters', and Teachers' Plans, active plan members were hired prior to July 1, 1997. Given that these plan members are either retirement eligible or nearly retirement eligible, there is minimal risk that the workforce size or characteristics will deviate from expectation in a way that would introduce significant risk to the plan. While the Judges' Plan is still open and accruing, the workforce is relatively stable in nature, and therefore provides minimal risk overall to the Program.

Contribution Risk

The potential that actual future required contributions will deviate from expected future contributions.

The Department of the Treasury has committed to funding the Program, thereby eliminating risk associated with future required contributions deviating from expected contributions.

Assessment of Risk

Plan Maturity Measures

As a plan shifts from a young, active population accruing benefits to older retirees, pension obligations and costs may increase until the plan approaches fully inactive, after which time the liability will start to decrease. Both the Judges' Plan and the Police Officers and Firefighters', and Teachers' Plans have significantly more inactive liability than active liability and thus, are considered to have mature to very mature populations.

The tables below detail several plan maturity measures that are significant in understanding the risks associated with the Program. As a plan becomes more mature, obligation grows relative to plan assets. Once the plan is mature, the obligation will stay stable or decrease relative to the plan assets. Depending on the value of the measure, different approaches to asset and liability management may be appropriate. It is important to consider these measures in the context of the plans' provisions and features.

The following table shows a comparison of Active Participant Liability to Inactive Participant Liability for the current and prior years.

Year	Police Officers and Firefighters', and Teachers' Plans	Judges' Plan
9/30/2019	6.09%	47.15%
9/30/2018	6.75%	48.91%
9/30/2017	8.17%	50.92%
9/30/2016	9.63%	55.65%
9/30/2015	11.83%	57.09%
9/30/2014	12.71%	50.49%
9/30/2013	13.88%	51.73%
9/30/2012	12.98%	45.81%
9/30/2011	Data not available	Data not available
9/30/2010	Data not available	Data not available

The following table shows a comparison of Active Participant Headcount to Inactive Participant Headcount for the current and prior years.¹

Year	Ratio of Active to Inactive Participant Headcount					Judges	Total
	Police	Fire	Teacher	Subtotal	Judges		
5/1/2019	9.85%	18.55%	6.23%	9.58%	61.46%	9.94%	
5/1/2018	12.22%	21.03%	7.01%	11.26%	64.89%	11.62%	
5/1/2017	15.17%	23.60%	8.24%	13.38%	69.57%	13.75%	
5/1/2016	19.12%	26.27%	9.91%	16.16%	73.63%	16.54%	
5/31/2015	24.66%	28.76%	11.71%	19.56%	76.14%	19.92%	
5/31/2014	28.57%	30.09%	13.19%	21.95%	76.40%	22.31%	
5/31/2013	31.03%	32.41%	15.68%	24.38%	79.78%	24.75%	
6/30/2012	32.65%	34.97%	18.66%	26.76%	74.73%	27.08%	
6/30/2011	35.08%	38.20%	21.76%	29.57%	72.73%	29.86%	
6/30/2010	36.26%	41.44%	23.78%	31.40%	82.93%	31.72%	

¹For years prior to 5/1/2017, Vested Terminated Participants were not included in the inactive participant headcount.

Assessment of Risk

Additional Historical Information

The tables and charts below identify and disclose reasonably available relative historical values of the Program's actuarial measurements that, in the actuary's professional judgement, are significant to understanding the risks of the Program.

Benefit Breakdown by Annuitant Type

The following table shows a summary of the number of plan participants receiving a full or partial federal benefit¹ for the current and prior years (Retirees, Beneficiaries, Disableds).

Year	Police	Firefighters	Teachers	Subtotal	Judges	Total
5/1/2019	5,992	1,927	5,521	13,440	96	13,536
5/1/2018	5,956	1,928	5,656	13,540	94	13,634
5/1/2017	5,890	1,918	5,734	13,542	92	13,634
5/1/2016	5,806	1,911	5,842	13,559	91	13,650
5/31/2015	5,605	1,909	5,884	13,398	88	13,486
5/31/2014	5,527	1,931	5,965	13,423	89	13,512
5/31/2013	5,501	1,922	5,975	13,398	89	13,487
6/30/2012	5,489	1,916	5,937	13,342	91	13,433
6/30/2011	5,470	1,898	5,952	13,320	88	13,408
6/30/2010	5,485	1,875	5,967	13,327	82	13,409

¹Includes annuitants with a deferred federal benefit.

The following table shows a summary of the number of plan participants receiving a full federal benefit for the current and prior years (Retirees, Beneficiaries, Disableds).

Year	Police	Firefighters	Teachers	Subtotal	Judges	Total
5/1/2019	3,591	1,161	1,913	6,665	96	6,761
5/1/2018	3,683	1,206	2,071	6,960	94	7,054
5/1/2017	3,781	1,246	2,197	7,224	92	7,316
5/1/2016	3,881	1,289	2,343	7,513	91	7,604
5/31/2015	3,952	1,323	2,457	7,732	88	7,820
5/31/2014	4,047	1,372	2,626	8,045	89	8,134
5/31/2013	4,134	1,403	2,748	8,285	89	8,374
6/30/2012	4,206	1,445	2,844	8,495	91	8,586
6/30/2011	4,274	1,472	2,990	8,736	88	8,824
6/30/2010	4,351	1,498	3,103	8,952	82	9,034

The following table shows a summary of the number of plan participants receiving a federal benefit and a District split benefit² for the current and prior years (Retirees, Beneficiaries, Disableds).

Year	Police	Firefighters	Teachers	Subtotal	Judges ³	Total
5/1/2019	2,401	766	3,608	6,775	N/A	6,775
5/1/2018	2,273	722	3,585	6,580	N/A	6,580
5/1/2017	2,109	672	3,537	6,318	N/A	6,318
5/1/2016	1,925	622	3,499	6,046	N/A	6,046
5/31/2015	1,653	586	3,427	5,666	N/A	5,666
5/31/2014	1,480	559	3,339	5,378	N/A	5,378
5/31/2013	1,367	519	3,227	5,113	N/A	5,113
6/30/2012	1,283	471	3,093	4,847	N/A	4,847
6/30/2011	1,196	426	2,962	4,584	N/A	4,584
6/30/2010	1,134	377	2,874	4,385	N/A	4,385

²Includes annuitants with a deferred federal benefit.

³These annuitants receive a 100% federal benefit.

Assessment of Risk

Assets

The following table shows the Market Value of Assets¹ (\$ millions) in each plan for the current and prior years.

Year	Police Officers and Firefighters', and Teachers' Plans	Judges' Plan	Total
9/30/2019	\$3,822.6	\$177.2	\$3,999.8
9/30/2018	\$3,818.5	\$170.1	\$3,988.6
9/30/2017	\$3,851.9	\$162.7	\$4,014.6
9/30/2016	\$3,902.3	\$156.1	\$4,058.4
9/30/2015	\$3,959.3	\$150.4	\$4,109.7
9/30/2014	\$3,975.9	\$146.5	\$4,122.4
9/30/2013	\$4,001.8	\$143.9	\$4,145.7
9/30/2012	\$3,959.4	\$140.9	\$4,100.3
9/30/2011	\$3,918.6	\$137.5	\$4,056.1
9/30/2010	\$3,857.2	\$133.2	\$3,990.4

¹Securities are valued at amortized cost, not market value.

Liabilities

The following table shows the Accrued Liability (\$ millions) in each plan for the current and prior years.

Year	Police Officers and Firefighters', and Teachers' Plans	Judges' Plan	Total
9/30/2019	\$8,188.7	\$255.4	\$8,444.1
9/30/2018	\$8,163.0	\$255.6	\$8,418.6
9/30/2017	\$8,479.5	\$248.1	\$8,727.6
9/30/2016	\$8,650.3	\$231.5	\$8,881.8
9/30/2015	\$8,687.6	\$219.4	\$8,907.0
9/30/2014	\$9,046.8	\$218.4	\$9,265.2
9/30/2013	\$9,137.5	\$190.9	\$9,328.4
9/30/2012	\$9,077.8	\$186.3	\$9,264.1
9/30/2011	Data not available	Data not available	Data not available
9/30/2010	Data not available	Data not available	Data not available

The following table shows the Unfunded Liability (\$ millions) in each plan for the current and prior years.

Year	Police Officers and Firefighters', and Teachers' Plans	Judges' Plan	Total
9/30/2019	\$4,366.1	\$78.2	\$4,444.3
9/30/2018	\$4,344.5	\$85.5	\$4,430.0
9/30/2017	\$4,627.6	\$85.4	\$4,713.0
9/30/2016	\$4,748.1	\$75.4	\$4,823.5
9/30/2015	\$4,728.4	\$69.0	\$4,797.4
9/30/2014	\$5,070.9	\$71.9	\$5,142.8
9/30/2013	\$5,135.6	\$46.9	\$5,182.5
9/30/2012	\$5,955.9	\$56.4	\$6,012.3
9/30/2011	Data not available	Data not available	Data not available
9/30/2010	Data not available	Data not available	Data not available

Assessment of Risk

Funded Ratio

The following table shows the ratio of the Market Value of Assets to the Actuarial Accrued Liability.

Year	Police Officers and Firefighters', and Teachers' Plans	Judges' Plan	Total
9/30/2019	46.7%	69.4%	47.4%
9/30/2018	46.8%	66.5%	47.4%
9/30/2017	45.4%	65.6%	46.0%
9/30/2016	45.1%	67.4%	45.7%
9/30/2015	45.6%	68.6%	46.1%
9/30/2014	43.9%	67.1%	44.5%
9/30/2013	43.8%	75.4%	44.4%
9/30/2012	43.6%	75.6%	44.3%
9/30/2011	Data not available	Data not available	Data not available
9/30/2010	Data not available	Data not available	Data not available

Contributions

The following table shows the amount of the total required government contributions (\$ millions) to each fund for the current and prior years¹.

Year	Police Officers and Firefighters', and Teachers' Plans	Judges' Plan	Total
FY 2020	\$520.3	\$15.5	\$535.8
FY 2019	\$477.6	\$16.1	\$493.7
FY 2018	\$451.8	\$15.6	\$467.4
FY 2017	\$452.2	\$15.6	\$467.8
FY 2016	\$460.9	\$14.2	\$475.1
FY 2015	\$487.5	\$14.2	\$501.7
FY 2014	\$467.3	\$10.5	\$477.8
FY 2013	\$495.9	\$ 9.4	\$505.3
FY 2012	\$482.4	\$ 9.6	\$492.0
FY 2011	\$491.7	\$ 9.3	\$501.0

¹Payments for FY2018 and after are before administrative expenses for all plans.

Distribution of Benefit Payments

The following table shows the amount of federal benefit payments and refunds paid (\$ millions) to each plan for the current and prior years.

Year	Police Officers and Firefighters', and Teachers' Plans	Judges' Plan	Total
FY 2019	\$543.3	\$13.3	\$556.6
FY 2018	\$541.1	\$12.5	\$553.6
FY 2017	\$541.4	\$12.2	\$553.6
FY 2016	\$542.4	\$11.8	\$554.2
FY 2015	\$541.7	\$14.1	\$555.8
FY 2014	\$542.9	\$11.9	\$554.8
FY 2013	\$537.2	\$10.2	\$547.4
FY 2012	\$532.9	\$10.0	\$542.9
FY 2011	\$527.3	\$ 9.1	\$536.4
FY 2010	\$518.0	\$ 8.4	\$526.4

Assessment of Risk

Investment Performance

The following table shows the history of the approximate rate of return¹ on the Market Value of Assets.

Year	Police Officers and Firefighters', and Teachers' Plans	Judges' Plan
FY 2019	1.8%	2.2%
FY 2018	1.5%	2.3%
FY 2017	1.4%	2.3%
FY 2016	1.0%	2.4%
FY 2015	0.8%	2.2%
FY 2014	1.3%	2.1%
FY 2013	1.3%	2.2%
FY 2012	2.9%	3.3%
FY 2011	3.2%	3.3%
FY 2010	3.5%	3.6%

¹Rates from FY2013, FY2014, and FY2015 are net of expenses for all plans.

The following table shows the total amount of interest earned in each plan from investments for the current and prior years (\$ millions).

Year	Police Officers and Firefighters', and Teachers' Plans	Judges' Plan	Total
FY 2019	\$ 69.1	\$3.8	\$ 72.9
FY 2018	\$ 57.5	\$3.6	\$ 61.1
FY 2017	\$ 51.0	\$3.5	\$ 54.5
FY 2016	\$ 51.1	\$3.6	\$ 54.7
FY 2015	\$ 54.9	\$3.7	\$ 58.6
FY 2014	\$ 61.9	\$3.8	\$ 65.7
FY 2013	\$ 75.0	\$3.8	\$ 78.8
FY 2012	\$104.2	\$4.4	\$108.6
FY 2011	\$115.3	\$4.3	\$119.6
FY 2010	\$124.8	\$4.4	\$129.2

The following table shows the rates used for the return on market value of assets ("Asset Return") and the percentage of the amortized cost value of investment ("Liability Rates").

Year	Police Officers and Firefighters', and Teachers' Plans		Judges' Plan	
	Liability Rates	Asset Return	Liability Rates	Asset Return
FY 2019	0.7% - 3.9%	1.8%	0.7% - 3.9%	2.2%
FY 2018	0.6% - 3.9%	1.5%	0.6% - 3.9%	2.3%
FY 2017	0.7% - 4.0%	1.4%	0.7% - 4.0%	2.3%
FY 2016	1.1% - 4.2%	1.0%	1.1% - 4.2%	2.4%
FY 2015	1.5% - 4.3%	0.8%	1.5% - 4.3%	2.2%
FY 2014	1.7% - 4.4%	1.3%	1.7% - 4.4%	2.1%
FY 2013	1.9% - 4.6%	1.3%	1.9% - 4.6%	2.2%
FY 2012	2.0% - 4.7%	2.9%	2.0% - 4.7%	3.3%
FY 2011	2.3% - 4.9%	3.2%	2.3% - 4.9%	3.3%
FY 2010	2.8% - 5.0%	3.5%	2.8% - 5.0%	3.6%

Assessment of Risk

(Gains)/Losses

The following table shows the Historical (Gains)/Losses in each plan for the current and prior years (in millions). The plans will experience deviations from expected each year. The amount of the deviation is amortized over future years and included in the contribution calculation.

Year	Police Officers and Firefighters', and Teachers' Plans			Judges Plan		
	Actuarial (Gain)/Loss - Investment	Actuarial (Gain)/Loss - Experience	Actuarial (Gain)/Loss - Method/ Assumptions	Actuarial (Gain)/Loss - Investment	Actuarial (Gain)/Loss - Experience	Actuarial (Gain)/Loss - Method/ Assumptions
9/30/2019	\$ (48.9)	\$ 30.3	\$ 492.0	\$ 1.5	\$ 4.3	\$ (4.8)
9/30/2018	\$ (30.6)	\$ 52.2	\$ 114.0	\$ 1.6	\$ 4.1	\$ 1.7
9/30/2017	\$ (12.2)	\$ 25.7	\$ 251.0	\$ 1.8	\$ 1.6	\$ 13.1
9/30/2016	\$ 4.3	\$ (63.0)	\$ 484.5	\$ 2.0	\$ (2.2)	\$ 11.7
9/30/2015	\$ 9.8	\$ (69.8)	\$ 100.1	\$ 1.4	\$ (0.3)	\$ 1.1
9/30/2014	\$ 7.0	\$ (66.0)	\$ 354.3	\$ 1.9	\$ 21.3	\$ 4.8
9/30/2013	\$ (20.1)	\$ (63.9)	\$ 256.4	\$ (1.3)	\$ (1.4)	\$ 7.6
9/30/2012	\$ (21.1)	\$ 92.8	\$ 591.7	\$ (1.3)	\$ 3.7	\$ 10.4
9/30/2011	Data Not Available					
9/30/2010	Data Not Available					

Inflation Assumptions

The following table shows the annual long term actuarial general pay and inflation assumptions in each plan for the current and prior years. The inflation assumption is used to project future pay for the active population.

Year	Cost-of-Living	Police/Fire Pay	Teachers Pay	Judges Pay
FY 2019	1.4% - 1.8%	1.95% - 2.00%	2.3%	0.8%
FY 2018	1.6% - 1.7%	1.8% - 2.2%	2.4%	1.0%
FY 2017	1.7% - 1.9%	1.8% - 2.2%	3.0%	1.1%
FY 2016	1.9% - 2.0%	2.0% - 2.2%	3.0%	1.2%
FY 2015	2.1% - 2.4%	2.2%	3.0%	1.7%
FY 2014	2.4% - 2.5%	2.2% - 2.3%	3.0%	1.9%
FY 2013	2.4% - 2.6%	3.1% - 3.4%	3.9%	2.3%
FY 2012	2.5% - 2.6%	4.3%	4.3%	1.5%
FY 2011	2.4%	4.3%	4.3%	1.8%
FY 2010	2.6% - 2.8%	4.2%	4.2%	2.1%

Plan Cost

Amortization Schedule and Required Government Contribution

Police Officers and Firefighters', and Teachers' Plans

Amortization Base	Remaining Number of Years	Annual Amortization Installment	Outstanding Balance as of October 1, 2019
Initial Unfunded Accrued Liability	8	\$ 348,600,000	2,573,458,974
Assumption Change 10/1/2000	1	(22,200,000)	(22,036,927)
Assumption Change 10/1/2001	2	40,100,000	79,162,058
Plan Change 10/1/2001	2	16,000,000	31,585,858
Assumption Change 10/1/2004	5	13,700,000	65,761,046
Assumption Change 10/1/2005	6	(6,300,000)	(35,847,882)
Assumption Change 10/1/2006	7	39,800,000	260,737,789
Assumption Change 10/1/2007	8	3,600,000	26,576,168
Assumption Change 10/1/2008	9	3,300,000	27,006,213
Assumption Change 10/1/2009	10	40,700,000	364,470,945
(Gain)/Loss 10/1/2010	1	(3,300,000)	(3,275,759)
Assumption Change 10/1/2010	11	10,500,000	101,827,404
(Gain)/Loss 10/1/2011	2	(16,200,000)	(31,980,682)
Assumption Change 10/1/2011	12	6,900,000	71,845,802
(Gain)/Loss 10/1/2012	3	500,000	1,469,482
Assumption Change 10/1/2012	13	32,500,000	360,731,518
(Gain)/Loss 10/1/2013	4	(9,900,000)	(38,434,395)
Assumption Change 10/1/2013	14	18,700,000	219,922,269
Funding Method Change 10/1/2013	14	(34,800,000)	(409,267,110)
(Gain)/Loss 10/1/2014	5	(6,900,000)	(33,120,527)
Assumption Change 10/1/2014	15	13,400,000	166,117,504
(Gain)/Loss 10/1/2015	6	(7,000,000)	(39,830,980)
Assumption Change 10/1/2015	16	(4,000,000)	(52,033,974)
(Gain)/Loss 10/1/2016	7	(10,000,000)	(65,512,007)
Assumption Change 10/1/2016	17	20,600,000	280,093,746
Method Change 10/1/2016	17	500,000	6,798,392
(Gain)/Loss 10/1/2017	8	1,500,000	11,073,404
Assumption Change 10/1/2017	18	5,000,000	70,815,167
(Gain)/Loss 10/1/2018	9	2,400,000	19,640,882
Assumption Change 10/1/2018	19	(1,600,000)	(23,532,236)
(Gain)/Loss 10/1/2019	10	(2,100,000)	(18,578,117)
Assumption Change 10/1/2019 ¹	20	26,300,000	400,420,321
Total Amortization		\$ 520,300,000	\$ 4,366,064,346
Total Normal Cost with Interest		\$ -	-
Employee Contributions		-	-
Net Employer Normal Cost		\$ -	-
Total Required Government Contribution as of September 30, 2020²		\$ 520,300,000	

¹ Includes assumption change impact, \$492,031,027, as well as effect of discount rate change on prior amortization balances, (\$91,610,706).

² Before administrative expenses.

Plan Cost

Amortization Schedule and Required Government Contribution

Judges' Plan

Amortization Base	Remaining Number of Years	Annual Amortization Installment	Outstanding Balance as of October 1, 2019
Initial Unfunded Accrued Liability	8	\$ 2,100,000	\$ 14,667,015
Assumption Change 10/1/2000	1	(600,000)	(581,846)
Assumption Change 10/1/2001	2	500,000	955,074
Assumption Change 10/1/2004	5	200,000	912,812
Assumption Change 10/1/2006	7	600,000	3,721,322
Assumption Change 10/1/2008	9	200,000	1,548,544
Assumption Change 10/1/2009	10	(800,000)	(6,782,560)
(Gain)/Loss 10/1/2010	1	100,000	96,974
Assumption Changes 10/1/2010	11	1,500,000	13,787,142
(Gain)/Loss 10/1/2011	2	100,000	191,015
Assumption Changes 10/1/2011	12	100,000	988,308
(Gain)/Loss 10/1/2012	3	(400,000)	(1,128,839)
Assumption Changes 10/1/2012	13	600,000	6,332,278
(Gain)/Loss 10/1/2013	4	800,000	2,965,165
Assumption Changes 10/1/2013	14	400,000	4,481,690
Funding Method Change 10/1/2013	14	(1,000,000)	(11,204,225)
(Gain)/Loss 10/1/2014	5	2,900,000	13,235,768
Assumption Change 10/1/2014	15	200,000	2,366,995
(Gain)/Loss 10/1/2015	6	100,000	539,571
Assumption Change 10/1/2016	17	300,000	3,911,939
Method Change 10/1/2016	17	500,000	6,519,899
(Gain)/Loss 10/1/2017	8	400,000	2,793,717
Assumption Change 10/1/2017	18	800,000	10,892,007
(Gain)/Loss 10/1/2018	9	700,000	5,419,904
Assumption Change 10/1/2018	19	100,000	1,417,282
(Gain)/Loss 10/1/2019	10	700,000	5,801,581
Assumption Change 10/1/2019 ¹	20	(400,000)	(5,646,001)
Total Amortization		\$ 10,700,000	\$ 78,202,531
Total Normal Cost with Interest		\$ 5,300,000	
Employee Contributions		(500,000)	
Net Employer Normal Cost		\$ 4,800,000	
Total Required Government Contribution as of September 30, 2020²		\$ 15,500,000	

¹ Includes assumption change impact, (\$4,759,389), as well as effect of discount rate change on prior amortization balances, (\$886,612).

² Before administrative expenses.

Changes in Actuarial Accrued Liability

Reconciliation of Actuarial (Gain)/Loss

	Police Officers and Firefighters', and Teachers' Plans		Judges' Plan	
Assets				
As of October 1, 2018, before adjustments	\$	3,818,529,238	\$	170,055,020
As of October 1, 2018, after adjustments		3,818,991,805		169,975,290
Contributions:				
Employees	\$	-	\$	620,940
Employer		498,900,195		16,653,539
Total		498,900,195		17,274,479
Benefits Paid		(543,318,329)		(13,303,577)
Expenses Paid		(21,300,195)		(553,539)
Income (including adjustments)		69,781,819		3,741,019
Expected Income		20,863,698		5,279,013
Expected End of Year Value		3,773,674,607		178,751,396
October 1, 2019 (Projected) Value		3,822,592,727		177,213,402
Asset (Gain)/Loss	\$	(48,918,120)	\$	1,537,994
Liabilities				
October 1, 2018 AAL	\$	8,163,045,193	\$	255,567,267
Normal Cost:				
Employees		-		500,000
Employers		-		5,100,000
Total		-		5,600,000
Benefits Paid		(543,318,329)		(13,303,577)
Interest		46,559,178		8,048,045
Expected September 30, 2019 AAL		7,666,286,042		255,911,735
Actual September 30, 2019 AAL before assumption and method changes ¹		7,696,626,045		260,175,322
Liability (Gain)/Loss		30,340,003		4,263,587
Total Experience (Gain)/Loss	\$	(18,578,117)	\$	5,801,581

Summary of Changes in Assumptions and Methods

(Gains)/Losses	Police Officers and Firefighters', and Teachers' Plans		Judges' Plan	
Change in Discount Rate		287,100,110		2,982,324
Change in Other Economic Assumptions ²		141,805,509		(8,319,171)
Change in Non-Economic Assumptions ³		63,125,408		577,458
Total Impact	\$	492,031,027	\$	(4,759,389)
Actual End of Year AAL after assumption and method changes	\$	8,188,657,072	\$	255,415,933

¹ Liabilities as of October 1, 2019 for the Police Officers and Firefighters', and Teachers' Plans calculated for this purpose are based on 2019 spot rates implied by the 2018 spot rate yield curve. These spot rates used in gain/loss analysis were calculated by converting the 2018 spot rates to forward rates, removing the forward rate for FY 2019, and then converting the forward rates back to spot rates. See Appendix A: Actuarial Assumptions and Methods for an example of the rates.

² Projected salary increases, COLA, and additional salary increases.

³ Form of payment assumption for the Teachers' Plan, spousal age assumption, expected rates of retirement, expected disability incidence rates, expected rates of termination, mortality base table, mortality improvement scale, and mortality scaling factors.

Asset Information

Statement of Changes in Net Plan Assets

The following table is based on the unaudited statement of assets projected to September 30, 2019, as provided by the Department of the Treasury on July 29, 2019.

Values from the statement are unrounded and truncated to the dollar.

	Police Officers and Firefighters', and Teachers' Plans	Judges' Plan
Projected net assets available for benefits as of October 1, 2018	\$ 3,818,529,238	\$ 170,055,020
Adjusted from estimate to actual	<u>462,568</u>	<u>(79,730)</u>
Actual net assets available as of October 1, 2018	\$ 3,818,991,805	\$ 169,975,290
Additions		
Contributions:		
Government contributions (amortization payment)	\$ 498,900,195	\$ 16,653,539
Employee contributions	<u>-</u>	<u>620,940</u>
Total contributions	\$ 498,900,195	\$ 17,274,479
Investment income (including interest) ¹	69,104,422	3,809,442
Miscellaneous additions	<u>214,829</u>	<u>11,307</u>
Total additions	\$ 568,219,445	\$ 21,095,229
Deductions		
Benefit payments:		
Annuities - Federal only	\$ (543,290,204)	\$ (13,303,577)
Refunds of contributions	<u>(28,124)</u>	<u>-</u>
Total benefit payments	\$ (543,318,329)	\$ (13,303,577)
Expenses and fees:		
Administrative expenses	\$ (22,554,307)	\$ (553,539)
Other expenses	<u>1,254,112</u>	<u>-</u>
Total expenses and fees	\$ (21,300,195)	\$ (553,539)
Total deductions	\$ (564,618,524)	\$ (13,857,116)
Net additions/(deductions)	\$ 3,600,922	\$ 7,238,113
Net assets available for benefits as of October 1, 2019	<u>\$ 3,822,592,727</u>	<u>\$ 177,213,402</u>

¹ The approximate rate of return on the Market Value of Assets is 1.84% for the Police Officers and Firefighters', and Teacher's Plans, and 2.18% for the Judges' Plan.

Benefit Payments and Funding Projections

Benefit Payment Projections

Police Officers and Firefighters', and Teachers' Plans (closed group)

Fiscal Year Ending In	Expected Net Benefit Payments	Fiscal Year Ending In	Expected Net Benefit Payments
2020	\$ 542,486,529	2058	\$ 48,091,459
2021	539,061,661	2059	42,284,984
2022	534,273,398	2060	36,950,959
2023	527,923,034	2061	32,067,861
2024	520,050,649	2062	27,619,132
2025	511,037,221	2063	23,591,040
2026	500,669,632	2064	19,970,757
2027	489,030,329	2065	16,745,170
2028	476,387,281	2066	13,899,122
2029	462,837,064	2067	11,414,888
2030	448,393,516	2068	9,272,158
2031	433,092,290	2069	7,447,783
2032	417,087,032	2070	5,915,927
2033	400,366,634	2071	4,648,508
2034	383,039,754	2072	3,615,762
2035	365,198,388	2073	2,787,240
2036	346,943,737	2074	2,132,860
2037	328,382,851	2075	1,623,826
2038	309,643,307	2076	1,233,471
2039	290,854,334	2077	937,890
2040	272,152,782	2078	716,345
2041	253,677,833	2079	551,371
2042	235,568,308	2080	428,744
2043	217,954,928	2081	337,246
2044	200,955,548	2082	268,295
2045	184,672,976	2083	215,524
2046	169,190,289	2084	174,338
2047	154,567,932	2085	141,528
2048	140,841,632	2086	114,881
2049	128,023,125	2087	92,909
2050	116,102,935	2088	74,653
2051	105,053,992	2089	59,442
2052	94,835,981	2090	46,804
2053	85,399,333	2091	36,379
2054	76,689,810	2092	27,872
2055	68,653,250	2093	21,030
2056	61,238,118	2094	15,618
2057	54,397,763		

Benefit Payments and Funding Projections

Benefit Payment Projections

Police Officers (closed group)

Fiscal Year Ending In	Expected Net Benefit Payments	Fiscal Year Ending In	Expected Net Benefit Payments
2020	\$ 254,497,512	2058	\$ 32,441,299
2021	255,124,928	2059	28,687,397
2022	255,051,914	2060	25,185,457
2023	254,235,710	2061	21,935,033
2024	252,603,731	2062	18,938,183
2025	250,271,037	2063	16,197,501
2026	247,254,208	2064	13,714,668
2027	243,537,921	2065	11,489,674
2028	239,266,293	2066	9,519,445
2029	234,464,634	2067	7,797,416
2030	229,150,150	2068	6,313,293
2031	223,292,703	2069	5,053,104
2032	216,959,171	2070	3,999,583
2033	210,188,761	2071	3,132,944
2034	202,986,018	2072	2,431,544
2035	195,383,847	2073	1,872,929
2036	187,424,808	2074	1,434,924
2037	179,155,955	2075	1,096,473
2038	170,632,825	2076	838,322
2039	161,917,560	2077	643,485
2040	153,078,813	2078	497,508
2041	144,189,797	2079	388,469
2042	135,326,094	2080	306,841
2043	126,561,684	2081	245,270
2044	117,966,338	2082	198,222
2045	109,604,686	2083	161,639
2046	101,532,173	2084	132,635
2047	93,792,880	2085	109,188
2048	86,418,185	2086	89,880
2049	79,426,472	2087	73,755
2050	72,824,078	2088	60,179
2051	66,606,754	2089	48,702
2052	60,762,331	2090	39,013
2053	55,272,914	2091	30,876
2054	50,117,439	2092	24,100
2055	45,274,591	2093	18,527
2056	40,724,605	2094	14,017
2057	36,450,989		

Benefit Payments and Funding Projections

Benefit Payment Projections

Firefighters (closed group)

Fiscal Year Ending In	Expected Net Benefit Payments	Fiscal Year Ending In	Expected Net Benefit Payments
2020	\$ 94,703,337	2058	\$ 10,911,496
2021	94,480,468	2059	9,660,961
2022	93,997,673	2060	8,507,665
2023	93,128,169	2061	7,448,674
2024	91,866,023	2062	6,480,782
2025	90,411,198	2063	5,600,636
2026	88,596,951	2064	4,804,692
2027	86,542,427	2065	4,089,166
2028	84,297,147	2066	3,450,026
2029	81,899,881	2067	2,883,098
2030	79,355,339	2068	2,384,393
2031	76,690,207	2069	1,949,989
2032	73,919,018	2070	1,575,942
2033	71,058,290	2071	1,258,063
2034	68,127,279	2072	991,837
2035	65,143,372	2073	772,442
2036	62,125,781	2074	594,733
2037	59,093,714	2075	453,344
2038	56,066,030	2076	342,865
2039	53,060,646	2077	258,038
2040	50,093,769	2078	193,947
2041	47,179,429	2079	146,154
2042	44,329,320	2080	110,835
2043	41,552,518	2081	84,799
2044	38,855,828	2082	65,509
2045	36,244,232	2083	51,044
2046	33,721,274	2084	39,974
2047	31,289,503	2085	31,314
2048	28,950,450	2086	24,406
2049	26,705,067	2087	18,820
2050	24,554,284	2088	14,291
2051	22,499,364	2089	10,644
2052	20,541,767	2090	7,742
2053	18,683,042	2091	5,478
2054	16,924,665	2092	3,760
2055	15,267,936	2093	2,497
2056	13,713,623	2094	1,599
2057	12,261,770		

Benefit Payments and Funding Projections

Benefit Payment Projections

Teachers (closed group)

Fiscal Year Ending In	Expected Net Benefit Payments	Fiscal Year Ending In	Expected Net Benefit Payments
2020	\$ 193,285,680	2058	\$ 4,738,663
2021	189,456,264	2059	3,936,625
2022	185,223,811	2060	3,257,837
2023	180,559,155	2061	2,684,154
2024	175,580,896	2062	2,200,167
2025	170,354,986	2063	1,792,902
2026	164,818,473	2064	1,451,397
2027	158,949,982	2065	1,166,330
2028	152,823,840	2066	929,651
2029	146,472,549	2067	734,373
2030	139,888,026	2068	574,472
2031	133,109,380	2069	444,690
2032	126,208,843	2070	340,403
2033	119,119,583	2071	257,502
2034	111,926,457	2072	192,381
2035	104,671,169	2073	141,869
2036	97,393,148	2074	103,203
2037	90,133,182	2075	74,009
2038	82,944,452	2076	52,285
2039	75,876,128	2077	36,367
2040	68,980,200	2078	24,891
2041	62,308,607	2079	16,748
2042	55,912,893	2080	11,068
2043	49,840,726	2081	7,178
2044	44,133,381	2082	4,564
2045	38,824,058	2083	2,841
2046	33,936,842	2084	1,729
2047	29,485,549	2085	1,026
2048	25,472,997	2086	594
2049	21,891,586	2087	335
2050	18,724,574	2088	183
2051	15,947,874	2089	96
2052	13,531,883	2090	49
2053	11,443,377	2091	25
2054	9,647,706	2092	12
2055	8,110,722	2093	5
2056	6,799,890	2094	2
2057	5,685,004		

Benefit Payments and Funding Projections

Benefit Payment Projections

Judges' Plan (open group)

Fiscal Year Ending In	Expected Net Benefit Payments ¹
2020	\$ 14,895,602
2021	15,112,708
2022	15,100,470
2023	15,450,444
2024	15,552,494
2025	15,443,493
2026	15,454,076
2027	15,381,779
2028	15,389,124
2029	15,356,926
2030	15,541,627
2031	15,534,777
2032	15,512,306
2033	15,306,749
2034	15,217,463
2035	15,033,734
2036	15,168,347
2037	15,094,777
2038	14,944,586
2039	14,772,592
2040	14,543,527
2041	14,527,363
2042	14,282,048
2043	14,151,677
2044	13,935,041

¹ Expected Net Benefit Payments are net of retiree contributions paid to provide for survivor benefits.

Benefit Payments and Funding Projections

Benefit Payment Projections

Judges' Plan (closed group)

Fiscal Year Ending In	Expected Net Benefit Payments	Fiscal Year Ending In	Expected Net Benefit Payments
2020	\$ 14,895,602	2058	\$ 3,582,682
2021	15,114,923	2059	3,234,213
2022	15,104,887	2060	2,907,689
2023	15,461,007	2061	2,602,723
2024	15,568,499	2062	2,318,914
2025	15,462,454	2063	2,055,668
2026	15,476,976	2064	1,812,273
2027	15,408,489	2065	1,588,113
2028	15,420,807	2066	1,382,649
2029	15,391,499	2067	1,194,894
2030	15,582,516	2068	1,024,017
2031	15,536,435	2069	869,292
2032	15,459,517	2070	730,141
2033	15,190,120	2071	606,173
2034	14,965,886	2072	496,876
2035	14,617,107	2073	401,579
2036	14,243,179	2074	319,567
2037	13,883,414	2075	250,142
2038	13,490,072	2076	192,362
2039	12,974,939	2077	145,162
2040	12,444,284	2078	107,355
2041	12,147,241	2079	77,738
2042	11,570,654	2080	55,044
2043	11,088,163	2081	38,068
2044	10,496,447	2082	25,673
2045	9,958,104	2083	16,866
2046	9,369,529	2084	10,782
2047	8,841,470	2085	6,702
2048	8,268,539	2086	4,045
2049	7,710,444	2087	2,366
2050	7,169,184	2088	1,339
2051	6,646,386	2089	735
2052	6,143,388	2090	394
2053	5,661,262	2091	204
2054	5,200,746	2092	101
2055	4,762,426	2093	50
2056	4,346,636	2094	24
2057	3,953,439		

Benefit Payments and Funding Projections

District Benefit Payments

Police Officers and Firefighters', and Teachers' Plans

Fiscal Year Ending In	Benefits Paid by District (\$ millions)
1998-1999	\$ 2.3
2000	3.9
2001	4.6
2002	6.7
2003	10.9
2004	16.2
2005	21.7
2006	28.6
2007	38.4
2008	47.1
2009	58.1
2010	65.5
2011	73.3
2012	86.0
2013	99.8
2014	112.6
2015	126.4
2016	146.0
2017	163.0
2018	183.8
2019	201.1

Benefit Payments and Funding Projections

15-Year Funding Projections - Closed Group

Police Officers and Firefighters', and Teachers' Plans

Fiscal Year Ending In	Expected Return on Assets	Beginning of Year Assets	Federal Contribution (with Expense Reimbursement)	Net Benefit Payments	Expenses	Investment Return	End of Year Assets
2020	0.74%	\$ 3,822,592,727	\$ 546,400,000	\$ (542,486,529)	\$ (26,100,000)	\$ 26,183,416	\$ 3,826,589,614
2021	1.14%	3,826,589,614	570,800,000	(539,061,661)	(25,000,000)	40,422,044	3,873,749,997
2022	1.72%	3,873,749,997	530,300,000	(534,273,398)	(24,400,000)	61,896,187	3,907,272,786
2023	2.28%	3,907,272,786	530,200,000	(527,923,034)	(24,800,000)	82,941,989	3,967,691,741
2024	2.78%	3,967,691,741	540,600,000	(520,050,649)	(25,300,000)	102,598,751	4,065,539,843
2025	3.12%	4,065,539,843	534,300,000	(511,037,221)	(25,800,000)	118,387,542	4,181,390,164
2026	3.37%	4,181,390,164	548,200,000	(500,669,632)	(26,400,000)	131,963,770	4,334,484,302
2027	3.61%	4,334,484,302	518,900,000	(489,030,329)	(26,900,000)	147,117,970	4,484,571,943
2028	3.70%	4,484,571,943	165,700,000	(476,387,281)	(27,400,000)	156,521,985	4,303,006,647
2029	3.90%	4,303,006,647	160,600,000	(462,837,064)	(28,000,000)	158,190,637	4,130,960,220
2030	3.85%	4,130,960,220	122,500,000	(448,393,516)	(28,500,000)	149,725,739	3,926,292,443
2031	3.95%	3,926,292,443	112,600,000	(433,092,290)	(29,100,000)	145,828,885	3,722,529,038
2032	4.02%	3,722,529,038	106,300,000	(417,087,032)	(29,700,000)	140,530,996	3,522,573,002
2033	3.91%	3,522,573,002	74,400,000	(400,366,634)	(30,300,000)	129,456,734	3,295,763,102
2034	3.90%	3,295,763,102	91,100,000	(383,039,754)	(30,900,000)	120,576,578	3,093,499,926

Benefit Payments and Funding Projections

15-Year Funding Projections - Open Group

Judges' Plan

Fiscal Year Ending In	Expected Return on Assets	Beginning of Year Assets	Employee Contributions	Federal Contribution (with Expense Reimbursement)	Net Benefit Payments	Expenses	Investment Return	End of Year Assets
2020	0.74%	\$ 177,213,402	\$ 486,115	\$ 16,000,000	\$ (14,895,602)	\$ (500,000)	\$ 1,256,214	\$ 179,560,129
2021	1.14%	179,560,129	490,150	16,539,840	(15,112,708)	(500,000)	1,961,470	182,938,881
2022	1.72%	182,938,881	494,218	15,980,011	(15,100,470)	(500,000)	3,020,162	186,832,802
2023	2.28%	186,832,802	498,320	16,520,515	(15,450,444)	(600,000)	4,090,247	191,891,440
2024	2.78%	191,891,440	502,456	15,761,355	(15,552,494)	(600,000)	5,110,934	197,113,691
2025	3.12%	197,113,691	506,626	12,702,534	(15,443,493)	(600,000)	5,903,451	200,182,809
2026	3.37%	200,182,809	510,831	12,644,055	(15,454,076)	(600,000)	6,480,920	203,764,539
2027	3.61%	203,764,539	515,071	12,085,921	(15,381,779)	(600,000)	7,074,592	207,458,344
2028	3.70%	207,458,344	519,346	9,628,134	(15,389,124)	(600,000)	7,385,657	209,002,357
2029	3.90%	209,002,357	523,657	8,770,698	(15,356,926)	(600,000)	7,847,400	210,187,186
2030	3.85%	210,187,186	528,003	8,913,614	(15,541,627)	(600,000)	7,784,572	211,271,748
2031	3.95%	211,271,748	532,386	7,456,887	(15,534,777)	(600,000)	8,029,853	211,156,097
2032	4.02%	211,156,097	536,805	7,500,520	(15,512,306)	(700,000)	8,165,597	211,146,713
2033	3.91%	211,146,713	541,260	6,944,514	(15,306,749)	(700,000)	7,962,322	210,588,060
2034	3.90%	210,588,060	545,753	7,588,873	(15,217,463)	(700,000)	7,920,651	210,725,874

Basis for the Valuation

Plan Member Summary

Police Officers and Firefighters', and Teachers' Plans

	Police Officers	Firefighters	Teachers	Total
Date Of Census Data:	5/1/2019	5/1/2019	5/1/2019	5/1/2019
Plan Member Counts:				
Actives	593	360	354	1,307
Terminated Vested	32	14	158	204
Normal Retirees ¹ - Current Benefits	3,868	1,168	4,850	9,886
Normal Retirees - Deferred Benefits	4	0	0	4
Beneficiaries	1,286	462	424	2,172
Disabled Retirees - Current Benefits	732	276	230	1,238
Disabled Retirees - Deferred Benefits	<u>102</u>	<u>21</u>	<u>17</u>	<u>140</u>
Total	6,617	2,301	6,033	14,951
Active Plan Member Characteristics:				
Total Pay	\$ 67,240,804	\$ 40,585,162	\$ 40,482,668	\$ 148,308,634
Average Age	51.57	52.28	58.24	53.57
Average Service	27.50	27.49	29.11	27.93
Inactive Plan Member Characteristics:				
<u>Average Age:</u>				
Terminated Vested	53.68	53.58	57.49	56.62
Normal Retirees	67.46	69.86	76.89	72.37
Beneficiaries	74.27	76.72	79.50	75.81
Disabled Retirees	70.04	74.56	76.65	72.20
<u>Total Annual Federal Benefits - Current:</u>				
Normal Retirees	\$ 180,305,338	\$ 64,483,454	\$ 180,503,568	\$ 425,292,359
Beneficiaries	41,132,532	14,815,704	8,580,768	64,529,004
Disabled Retirees	32,230,458	14,824,212	6,315,984	53,370,654
<u>Total Annual Federal Benefits - Deferred:</u>				
Terminated Vested	\$ 459,312	\$ 146,484	\$ 1,098,768	\$ 1,704,564
Normal Retirees	96,684	-	-	96,684
Disabled Retirees	1,020,384	168,108	142,428	1,330,920

¹ Throughout this report, "Normal Retirees" refer to Voluntary Retirements for the District of Columbia Teachers' Retirement Plan and Optional Retirements for the District of Columbia Police Officers and Firefighters' Retirement Plan.

Basis for the Valuation

Plan Member Summary

Judges' Plan

	Total
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Date of Census Data	5/1/2019
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Plan Member Counts:

Actives	59
Terminated Vested	0
Normal Retirees ¹	81
Beneficiaries	14
Disabled Retirees	1
Total	155

Active Plan Member Characteristics

Total Compensation for Covered Plan Members	\$	12,533,700
Average Age		60.14
Average Service		13.07

Inactive Plan Member Characteristics

Average Age

Terminated Vested	N/A
Normal Retirees	75.95
Beneficiaries	82.92
Disabled Retirees	63.42

Total Annual Benefits

Terminated Vested		N/A
Normal Retirees	\$	12,391,573
Beneficiaries		1,070,124
Disabled Retirees		144,893

¹ Throughout this report, "Normal Retirees" refer to Regular Retirements for the District of Columbia Judges' Retirement Plan.

Basis for the Valuation

Plan Member Reconciliation

The following tables show a reconciliation of the number of plan members from the previous census date to the current census date.

Police Officers and Firefighters', and Teachers' Plans

	Actives	Terminated Vested	Normal Retirees	Beneficiaries	Disabled Retirees	Totals
Plan Members as of June 1, 2018	1,547	199	9,965	2,125	1,450	15,286
New Plan Members	0	0	0	0	0	0
Rehires	4	(4)	0	0	0	0
Vested Terminations	(3)	3	0	0	0	0
Retirements	(234)	(15)	249	0	0	0
Deaths - Beneficiary	0	0	(107)	146	(39)	0
Deaths - No Beneficiary	(1)	(3)	(220)	(88)	(38)	(350)
Refund of Contributions	(1)	(1)	0	0	0	(2)
Disabled	(4)	0	0	0	4	0
Payments Reinstated/Ceased	0	0	0	(12)	1	(11)
Data Corrections	(1)	25	3	1	0	28
Plan Members as of June 1, 2019	1,307	204	9,890	2,172	1,378	14,951

Police Officers

	Actives	Terminated Vested	Normal Retirees	Beneficiaries	Disabled Retirees	Totals
Plan Members as of June 1, 2018	732	34	3,825	1,262	869	6,722
New Plan Members	0	0	0	0	0	0
Rehires	0	0	0	0	0	0
Vested Terminations	0	0	0	0	0	0
Retirements	(138)	(4)	142	0	0	0
Deaths - Beneficiary	0	0	(61)	80	(19)	0
Deaths - No Beneficiary	0	0	(34)	(49)	(17)	(100)
Refund of Contributions	0	0	0	0	0	0
Disabled	(1)	0	0	0	1	0
Payments Reinstated/Ceased	0	0	0	(7)	0	(7)
Data Corrections	0	2	0	0	0	2
Plan Members as of June 1, 2019	593	32	3,872	1,286	834	6,617

Basis for the Valuation

Plan Member Reconciliation

The following tables show a reconciliation of the number of plan members from the previous census date to the current census date.

Firefighters

	Actives	Terminated Vested	Normal Retirees	Beneficiaries	Disabled Retirees	Totals
Plan Members as of June 1, 2018	408	12	1,153	454	321	2,348
New Plan Members	0	0	0	0	0	0
Rehires	0	0	0	0	0	0
Vested Terminations	(2)	2	0	0	0	0
Retirements	(43)	(2)	45	0	0	0
Deaths - Beneficiary	0	0	(14)	31	(17)	0
Deaths - No Beneficiary	0	0	(16)	(20)	(9)	(45)
Refund of Contributions	(1)	0	0	0	0	(1)
Disabled	(2)	0	0	0	2	0
Payments Reinstated/Ceased	0	0	0	(3)	0	(3)
Data Corrections	0	2	0	0	0	2
Plan Members as of June 1, 2019	360	14	1,168	462	297	2,301

Teachers

	Actives	Terminated Vested	Normal Retirees	Beneficiaries	Disabled Retirees	Totals
Plan Members as of June 1, 2018	407	153	4,987	409	260	6,216
New Plan Members	0	0	0	0	0	0
Rehires	4	(4)	0	0	0	0
Vested Terminations	(1)	1	0	0	0	0
Retirements	(53)	(9)	62	0	0	0
Deaths - Beneficiary	0	0	(32)	35	(3)	0
Deaths - No Beneficiary	(1)	(3)	(170)	(19)	(12)	(205)
Refund of Contributions	0	(1)	0	0	0	(1)
Disabled	(1)	0	0	0	1	0
Payments Reinstated/Ceased	0	0	0	(2)	1	(1)
Data Corrections	(1)	21	3	1	0	24
Plan Members as of June 1, 2019	354	158	4,850	424	247	6,033

Basis for the Valuation

Plan Member Reconciliation

The following table shows a reconciliation of the number of plan members from the previous census date to the current census date.

Judges' Plan

	Actives	Terminated Vested	Normal Retirees	Beneficiaries	Disabled Retirees	Totals
Plan Members as of June 1, 2018	61	0	79	14	1	155
New Plan Members	2	0	0	0	0	2
Rehires	0	0	0	0	0	0
Vested Terminations	0	0	0	0	0	0
Retirements	(4)	0	4	0	0	0
Deaths - Beneficiary	0	0	(1)	1	0	0
Deaths - No Beneficiary	0	0	(1)	(1)	0	(2)
Refund of Contributions	0	0	0	0	0	0
Disabled	0	0	0	0	0	0
Payments Reinstated/Ceased	0	0	0	0	0	0
Data Corrections	0	0	0	0	0	0
Plan Members as of June 1, 2019	59	0	81	14	1	155

Basis for the Valuation

Age-Service Grid

Police Officers

Active Population															
Service	Under 20		20-24		25-29		30-34		35-39		40+		All Service		
Age Group	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	
0 - 39	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	
40 - 44	-	-	3	100,878	5	117,381	-	-	-	-	-	-	8	111,192	
45 - 49	-	-	70	108,802	127	113,489	12	110,900	-	-	-	-	209	111,771	
50 - 54	-	-	29	109,608	203	114,471	31	113,280	-	-	-	-	263	113,794	
55 - 59	-	-	8	114,242	58	113,289	27	121,431	3	107,242	-	-	96	115,469	
60 - 64	-	-	2	109,663	7	105,020	3	124,161	2	135,010	3	127,117	17	116,372	
65 - 69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
70+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
All Ages	-	\$ -	112	\$109,202	400	\$113,859	73	\$116,351	5	\$118,349	3	\$127,117	593	\$113,391	

Basis for the Valuation

Age-Service Grid

Firefighters

Active Population															
Service	Under 20		20-24		25-29		30-34		35-39		40+		All Service		
Age Group	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	
0 - 39	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	
40 - 44	-	-	1	128,510	2	90,805	-	-	-	-	-	-	3	103,373	
45 - 49	-	-	29	100,978	66	112,662	24	122,012	-	-	-	-	119	111,700	
50 - 54	-	-	47	98,028	72	117,262	27	129,087	-	-	-	-	146	113,257	
55 - 59	-	-	25	96,776	26	114,298	30	130,023	-	-	-	-	81	114,714	
60 - 64	-	-	-	-	-	-	9	103,815	2	110,498	-	-	11	105,030	
65 - 69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
70+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
All Ages	-	\$ -	102	\$ 98,859	166	\$114,650	90	\$124,985	2	\$110,498	-	\$ -	360	\$112,737	

Basis for the Valuation

Age-Service Grid

Teachers

Active Population															
Service	Under 20		20-24		25-29		30-34		35-39		40+		All Service		
Age Group	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	
0 - 39	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	
40 - 44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
45 - 49	-	-	29	110,307	15	113,648	-	-	-	-	-	-	44	111,446	
50 - 54	-	-	14	113,485	43	115,375	20	115,287	-	-	-	-	77	115,009	
55 - 59	-	-	12	113,313	28	114,268	56	114,014	1	130,346	-	-	97	114,169	
60 - 64	-	-	8	112,370	29	118,332	33	110,302	7	112,443	3	130,387	80	114,360	
65 - 69	-	-	-	-	12	115,360	13	116,276	11	119,405	2	113,294	38	116,736	
70+	-	-	2	113,294	3	114,332	9	113,948	1	112,919	3	118,732	18	114,680	
All Ages	-	\$ -	65	\$111,892	130	\$115,572	131	\$113,493	20	\$117,191	8	\$121,743	354	\$114,358	

Basis for the Valuation

Age-Service Grid

Judges

Active Population																					
Service	Under 1		1-4		5-9		10-14		15-19		20-24		25-29		30-34		35+		All Service		
Age Group	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	No.	Avg. Comp.	
0 - 34	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	
35 - 39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
40 - 44	1	210,900	1	210,900	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	210,900	
45 - 49	-	-	1	210,900	5	213,460	1	210,900	-	-	-	-	-	-	-	-	-	-	7	212,729	
50 - 54	-	-	1	210,900	3	210,900	2	210,900	-	-	-	-	-	-	-	-	-	-	6	210,900	
55 - 59	-	-	3	210,900	6	215,167	-	-	4	214,225	2	210,900	-	-	-	-	-	-	15	213,493	
60 - 64	-	-	2	210,900	2	210,900	3	210,900	3	210,900	1	210,900	-	-	-	-	-	-	11	210,900	
65 - 69	-	-	1	210,900	-	-	3	215,167	2	210,900	3	211,067	1	210,900	-	-	-	-	10	212,230	
70+	-	-	-	-	-	-	1	223,700	1	210,900	2	217,300	3	210,900	1	210,900	-	-	8	214,100	
All Ages	1	\$210,900	9	\$210,900	16	\$213,300	10	\$213,460	10	\$212,230	8	\$212,563	4	\$210,900	1	\$210,900	-	-	59	\$212,436	

Basis for the Valuation

Federal Allocation by Plan

Police Officers and Firefighters', and Teachers' Plans

Active Plan Members	Police Officers		Firefighters		Teachers	
Number	593		360		354	
Average Age	51.57		52.28		58.24	
Average Service	27.50		27.49		29.11	
Average Pay	\$	113,391	\$	112,737	\$	114,358

	Police Officers		Firefighters		Teachers	
	100% Federal	Partial Federal	100% Federal	Partial Federal	100% Federal	Partial Federal
Normal Retirees - Current Federal Benefit						
Number	1,876	1,992	521	647	1,472	3,378
Average Age	74.94	60.43	78.70	62.74	85.72	73.04
Average Federal Benefit	\$ 55,564	\$ 38,187	\$ 65,422	\$ 46,984	\$ 46,529	\$ 33,159
Average Total Benefit	\$ 55,564	\$ 76,921	\$ 65,422	\$ 85,932	\$ 46,529	\$ 53,681
Normal Retirees - Deferred Federal Benefit						
Number	N/A	4	N/A	0	N/A	0
Average Age	N/A	51.50	N/A	N/A	N/A	N/A
Average Federal Benefit	N/A	\$ 24,171	N/A	N/A	N/A	N/A
Average Total Benefit	N/A	\$ 69,864	N/A	N/A	N/A	N/A
Beneficiaries - Current Federal Benefit¹						
Number	1,127	159	407	55	283	141
Average Age	77.02	54.76	80.08	51.84	83.33	71.83
Average Federal Benefit	\$ 33,270	\$ 22,872	\$ 33,687	\$ 20,093	\$ 23,703	\$ 13,283
Average Total Benefit	\$ 33,270	\$ 33,585	\$ 33,687	\$ 35,929	\$ 23,703	\$ 19,125
Disabled Retirees - Current Federal Benefit						
Number	588	144	233	43	158	72
Average Age	75.23	61.69	78.41	64.85	81.71	70.06
Average Federal Benefit	\$ 48,255	\$ 26,779	\$ 56,478	\$ 38,715	\$ 31,979	\$ 17,545
Average Total Benefit	\$ 48,255	\$ 47,235	\$ 56,478	\$ 56,109	\$ 31,979	\$ 36,163
Disabled Retirees - Deferred Federal Benefit						
Number	N/A	102	N/A	21	N/A	17
Average Age	N/A	51.89	N/A	51.83	N/A	57.63
Average Federal Benefit	N/A	\$ 10,004	N/A	\$ 8,005	N/A	\$ 8,378
Average Total Benefit	N/A	\$ 38,498	N/A	\$ 36,778	N/A	\$ 38,828
Terminated Vested - Deferred Federal Benefit						
Number		32		14		158
Average Age		53.68		53.58		57.49
Average Federal Benefit		\$ 14,354		\$ 10,463		\$ 6,954

¹ Includes child beneficiaries.

Basis for the Valuation

Plan Member Counts

Judges' Plan

Active Plan Members	
Number	59
Average Age	60.14
Average Service	13.07
Average Pay	\$ 212,436
Number Eligible to Retire	30

Inactive Plan Members	
Normal Retirees	
Number	81
Average Age	75.95
Average Benefit	\$ 152,982
Spouse Beneficiaries	
Number	13
Average Age	85.20
Average Benefit	\$ 81,828
Disabled Retirees	
Number	1
Average Age	63.42
Average Benefit	\$ 144,893
Child Beneficiaries	
Number	1
Average Age	53.38
Average Benefit	\$ 6,363

Basis for the Valuation

Inactive Benefit Information

Inactive Police Officers - Current Benefits

Normal Retirees	100% Federal Count	100% Federal Average Benefit	Partial Federal Count	Partial Federal Average Benefit	Partial Federal Average Total Benefit
Under 35	-	\$ -	-	\$ -	\$ -
35-39	-	-	-	-	-
40-44	-	-	-	-	-
45-49	-	-	-	-	-
50-54	-	-	459	21,130	75,892
55-59	-	-	617	26,520	73,124
60-64	15	43,456	407	40,376	76,884
65-69	314	47,467	332	61,155	81,236
70-74	754	53,994	152	74,431	84,319
75-79	455	58,885	24	78,153	87,740
80-84	253	58,845	1	81,264	89,388
85-89	66	69,093	-	-	-
90-94	15	94,357	-	-	-
95-100	4	78,399	-	-	-
100 and over	-	-	-	-	-
Total	1,876	\$ 55,564	1,992	\$ 38,187	\$ 76,921

Beneficiaries	100% Federal Count	100% Federal Average Benefit	Partial Federal Count	Partial Federal Average Benefit	Partial Federal Average Total Benefit
Under 35	5	\$ 29,009	26	\$ 3,482	\$ 10,680
35-39	-	-	-	-	-
40-44	-	-	1	14,280	37,296
45-49	2	19,026	13	15,788	34,074
50-54	10	28,121	18	17,026	30,709
55-59	21	38,334	21	21,849	40,661
60-64	60	32,695	27	27,844	37,873
65-69	152	31,963	29	32,597	40,430
70-74	230	32,811	17	37,658	41,886
75-79	212	32,880	5	32,232	37,714
80-84	199	34,143	2	31,440	39,858
85-89	123	35,205	-	-	-
90-94	77	33,360	-	-	-
95-100	32	33,056	-	-	-
100 and over	4	34,539	-	-	-
Total	1,127	\$ 33,270	159	\$ 22,872	\$ 33,585

Basis for the Valuation

Inactive Benefit Information

Inactive Police Officers - Current Benefits

Disabled Retirees	100% Federal Count	100% Federal Average Benefit	Partial Federal Count	Partial Federal Average Benefit	Partial Federal Average Total Benefit
Under 35	-	\$ -	-	\$ -	\$ -
35-39	-	-	-	-	-
40-44	-	-	-	-	-
45-49	1	21,780	-	-	-
50-54	5	22,255	-	-	-
55-59	18	25,528	64	15,330	39,321
60-64	33	32,617	43	26,332	50,522
65-69	108	43,633	29	45,809	56,322
70-74	142	46,985	5	49,874	57,859
75-79	118	49,491	3	54,992	63,424
80-84	82	54,796	-	-	-
85-89	43	59,650	-	-	-
90-94	33	62,423	-	-	-
95-100	5	72,574	-	-	-
100 and over	-	-	-	-	-
Total	588	\$ 48,255	144	\$ 26,779	\$ 47,235

Inactive Police Officers - Deferred Benefits

Terminated Vested	Count	Average Federal Benefit
Under 35	-	\$ -
35-39	-	-
40-44	-	-
45-49	1	6,096
50-54	23	11,969
55-59	5	16,217
60-64	3	32,284
65-69	-	-
70-74	-	-
75-79	-	-
80-84	-	-
85-89	-	-
90-94	-	-
95-100	-	-
100 and over	-	-
Total	32	\$ 14,354

Basis for the Valuation

Inactive Benefit Information

Inactive Police Officers - Deferred Benefits

Normal Retirees	Partial Federal Count	Partial Federal Average Benefit	Partial Federal Average Total Benefit
Under 35	-	\$ -	\$ -
35-39	-	-	-
40-44	-	-	-
45-49	-	-	-
50-54	4	24,171	69,864
55-59	-	-	-
60-64	-	-	-
65-69	-	-	-
70-74	-	-	-
75-79	-	-	-
80-84	-	-	-
85-89	-	-	-
90-94	-	-	-
95-100	-	-	-
100 and over	-	-	-
Total	4	\$ 24,171	\$ 69,864

Disabled Retirees	Partial Federal Count	Partial Federal Average Benefit	Partial Federal Average Total Benefit
Under 35	-	\$ -	\$ -
35-39	-	-	-
40-44	-	-	-
45-49	23	7,349	39,649
50-54	76	10,810	38,148
55-59	3	9,944	38,540
60-64	-	-	-
65-69	-	-	-
70-74	-	-	-
75-79	-	-	-
80-84	-	-	-
85-89	-	-	-
90-94	-	-	-
95-100	-	-	-
100 and over	-	-	-
Total	102	\$ 10,004	\$ 38,498

Basis for the Valuation

Inactive Benefit Information

Inactive Firefighters - Current Benefits

Normal Retirees	100% Federal Count	100% Federal Average Benefit	Partial Federal Count	Partial Federal Average Benefit	Partial Federal Average Total Benefit
Under 35	-	\$ -	-	\$ -	\$ -
35-39	-	-	-	-	-
40-44	-	-	-	-	-
45-49	-	-	-	-	-
50-54	-	-	55	19,583	74,413
55-59	-	-	165	29,595	79,904
60-64	-	-	217	42,383	85,247
65-69	26	47,164	134	61,707	87,385
70-74	116	60,492	58	85,766	102,278
75-79	184	65,826	18	111,019	121,161
80-84	123	68,267	-	-	-
85-89	52	72,888	-	-	-
90-94	19	77,690	-	-	-
95-100	1	66,144	-	-	-
100 and over	-	-	-	-	-
Total	521	\$ 65,422	647	\$ 46,984	\$ 85,932

Beneficiaries	100% Federal Count	100% Federal Average Benefit	Partial Federal Count	Partial Federal Average Benefit	Partial Federal Average Total Benefit
Under 35	-	\$ -	13	\$ 8,885	\$ 23,033
35-39	-	-	1	1,200	4,236
40-44	1	29,580	-	-	-
45-49	-	-	2	7,806	34,338
50-54	2	33,126	5	15,139	59,170
55-59	6	28,894	10	13,621	35,633
60-64	14	29,040	6	26,228	36,044
65-69	24	31,758	11	31,523	39,493
70-74	62	33,101	6	37,532	44,724
75-79	103	32,621	1	31,596	32,544
80-84	68	33,268	-	-	-
85-89	59	35,583	-	-	-
90-94	48	35,806	-	-	-
95-100	20	39,002	-	-	-
100 and over	-	-	-	-	-
Total	407	\$ 33,687	55	\$ 20,093	\$ 35,929

Basis for the Valuation

Inactive Benefit Information

Inactive Firefighters - Current Benefits

Disabled Retirees	100% Federal Count	100% Federal Average Benefit	Partial Federal Count	Partial Federal Average Benefit	Partial Federal Average Total Benefit
Under 35	-	\$ -	-	\$ -	\$ -
35-39	-	-	-	-	-
40-44	-	-	-	-	-
45-49	-	-	-	-	-
50-54	-	-	-	-	-
55-59	2	20,892	8	15,356	47,808
60-64	9	35,001	11	27,403	49,999
65-69	28	49,230	19	46,599	58,690
70-74	38	52,795	5	71,016	73,030
75-79	63	58,942	-	-	-
80-84	48	59,007	-	-	-
85-89	22	61,064	-	-	-
90-94	18	64,362	-	-	-
95-100	3	74,972	-	-	-
100 and over	2	72,768	-	-	-
Total	233	\$ 56,478	43	\$ 38,715	\$ 56,109

Inactive Firefighters - Deferred Benefits

Terminated Vested	Count	Average Federal Benefit
Under 35	-	\$ -
35-39	-	-
40-44	-	-
45-49	4	12,636
50-54	6	10,680
55-59	2	6,540
60-64	2	9,390
65-69	-	-
70-74	-	-
75-79	-	-
80-84	-	-
85-89	-	-
90-94	-	-
95-100	-	-
100 and over	-	-
Total	14	\$ 10,463

Basis for the Valuation

Inactive Benefit Information

Inactive Firefighters - Deferred Benefits

Disabled Retirees	Partial Federal Count	Partial Federal Average Benefit	Partial Federal Average Total Benefit
Under 35	-	\$ -	\$ -
35-39	-	-	-
40-44	-	-	-
45-49	6	11,574	42,148
50-54	13	5,597	34,880
55-59	2	12,954	33,006
60-64	-	-	-
65-69	-	-	-
70-74	-	-	-
75-79	-	-	-
80-84	-	-	-
85-89	-	-	-
90-94	-	-	-
95-100	-	-	-
100 and over	-	-	-
Total	21	\$ 8,005	\$ 36,778

Basis for the Valuation

Inactive Benefit Information

Inactive Teachers - Current Benefits

Normal Retirees	100% Federal Count	100% Federal Average Benefit	Partial Federal Count	Partial Federal Average Benefit	Partial Federal Average Total Benefit
Under 35	-	\$ -	-	\$ -	\$ -
35-39	-	-	-	-	-
40-44	-	-	-	-	-
45-49	-	-	-	-	-
50-54	-	-	8	10,644	47,466
55-59	-	-	56	14,503	54,406
60-64	2	22,722	257	19,121	54,718
65-69	8	9,360	622	26,006	54,736
70-74	58	28,016	1,167	35,104	54,317
75-79	208	43,695	893	38,789	53,047
80-84	412	50,958	294	37,617	50,096
85-89	410	47,953	65	40,579	52,034
90-94	251	43,969	14	45,230	57,839
95-100	110	48,220	2	45,342	59,538
100 and over	13	50,874	-	-	-
Total	1,472	\$ 46,529	3,378	\$ 33,159	\$ 53,681

Beneficiaries	100% Federal Count	100% Federal Average Benefit	Partial Federal Count	Partial Federal Average Benefit	Partial Federal Average Total Benefit
Under 35	-	\$ -	2	\$ 3,834	\$ 6,960
35-39	-	-	-	-	-
40-44	-	-	1	8,136	23,628
45-49	2	8,016	1	7,080	8,820
50-54	2	5,460	1	10,452	13,032
55-59	2	17,916	6	11,994	23,820
60-64	5	18,466	16	8,362	15,599
65-69	7	22,582	24	12,674	20,205
70-74	28	21,627	33	16,461	21,571
75-79	55	23,723	35	13,355	17,866
80-84	49	23,693	12	13,598	17,445
85-89	60	23,353	7	14,520	19,963
90-94	44	24,311	2	18,936	26,682
95-100	27	27,903	1	16,368	20,208
100 and over	2	49,548	-	-	-
Total	283	\$ 23,703	141	\$ 13,283	\$ 19,125

Basis for the Valuation

Inactive Benefit Information

Inactive Teachers - Current Benefits

Disabled Retirees	100% Federal Count	100% Federal Average Benefit	Partial Federal Count	Partial Federal Average Benefit	Partial Federal Average Total Benefit
Under 35	-	\$ -	-	\$ -	\$ -
35-39	-	-	-	-	-
40-44	-	-	-	-	-
45-49	-	-	-	-	-
50-54	-	-	-	-	-
55-59	3	24,104	-	-	-
60-64	4	22,827	12	11,033	34,920
65-69	2	34,584	15	17,052	37,956
70-74	32	28,736	39	18,757	36,301
75-79	31	31,081	5	26,582	37,166
80-84	30	30,888	1	10,620	13,740
85-89	24	31,514	-	-	-
90-94	15	36,290	-	-	-
95-100	13	40,171	-	-	-
100 and over	4	46,845	-	-	-
Total	158	\$ 31,979	72	\$ 17,545	\$ 36,163

Inactive Teachers - Deferred Benefits

Terminated Vested	Count	Average Federal Benefit
Under 35	-	\$ -
35-39	-	-
40-44	-	-
45-49	15	3,393
50-54	38	5,112
55-59	54	7,245
60-64	34	8,800
65-69	16	9,969
70-74	1	3,672
75-79	-	-
80-84	-	-
85-89	-	-
90-94	-	-
95-100	-	-
100 and over	-	-
Total	158	\$ 6,954

Basis for the Valuation

Inactive Benefit Information

Inactive Teachers - Deferred Benefits

Disabled Retirees	Partial Federal Count	Partial Federal Average Benefit	Partial Federal Average Total Benefit
Under 35	-	\$ -	\$ -
35-39	-	-	-
40-44	-	-	-
45-49	1	6,180	39,216
50-54	2	1,992	35,046
55-59	8	8,540	38,117
60-64	6	10,658	40,974
65-69	-	-	-
70-74	-	-	-
75-79	-	-	-
80-84	-	-	-
85-89	-	-	-
90-94	-	-	-
95-100	-	-	-
100 and over	-	-	-
Total	17	\$ 8,378	\$ 38,828

Basis for the Valuation

Inactive Benefit Information

Inactive Judges

Normal Retirees	Count	Average Benefit
Under 35	-	\$ -
35-39	-	-
40-44	-	-
45-49	-	-
50-54	-	-
55-59	-	-
60-64	5	141,755
65-69	17	156,016
70-74	17	149,449
75-79	15	159,492
80-84	14	162,387
85-89	9	170,741
90-94	4	71,863
95-100	-	-
100 and over	-	-
Total	81	\$ 152,982

Beneficiaries	Count	Average Benefit
Under 35	-	\$ -
35-39	-	-
40-44	-	-
45-49	-	-
50-54	1	6,363
55-59	-	-
60-64	-	-
65-69	-	-
70-74	2	105,247
75-79	2	100,737
80-84	3	78,578
85-89	1	71,913
90-94	2	77,288
95-100	3	63,190
100 and over	-	-
Total	14	\$ 76,437

Disabled Retirees	Count	Average Benefit
Under 35	-	\$ -
35-39	-	-
40-44	-	-
45-49	-	-
50-54	-	-
55-59	-	-
60-64	1	144,893
65-69	-	-
70-74	-	-
75-79	-	-
80-84	-	-
85-89	-	-
90-94	-	-
95-100	-	-
100 and over	-	-
Total	1	\$ 144,893

Terminated Vested	Count	Average Benefit
Under 35	-	\$ -
35-39	-	-
40-44	-	-
45-49	-	-
50-54	-	-
55-59	-	-
60-64	-	-
65-69	-	-
70-74	-	-
75-79	-	-
80-84	-	-
85-89	-	-
90-94	-	-
95-100	-	-
100 and over	-	-
Total	-	\$ -

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Actuarial Assumptions and Methods

Methods

Liability Valuation Method

The funding method is the individual entry age normal method for the Judges' Plan and projected unit credit method for the Police Officers and Firefighters' and Teachers' Plans. The individual entry age normal method allocates the actuarial present value of the projected benefits of each individual on a level basis over the service of the individual between participation age and projected exit age. The projected unit credit method recognizes the portion of the present value of the projected benefits earned as of the valuation date. Since there are no remaining participants earning new benefit accruals in the Police Officers and Firefighters' and Teachers' Plans, ODCP believes that it is prudent to accelerate the recognition of the benefit accruals, as opposed to deferring the value of benefits already earned.

Under the Entry Age Normal Method, the present value of future benefits is equal to the value of the projected benefit payable at retirement discounted back to the plan member's current age. Discounts include such items as interest and mortality. The difference between the present value of future benefits and the present value of future normal cost contributions represents the actuarial liability at the plan member's current age.

Under the Projected Unit Credit Method (Benefit Accrual Method), the accrued liability is determined by calculating a benefit based on service earned to the valuation date with compensation projected to the expected retirement date (or other event), then discounting those amounts to the valuation date. The actuarial accrued liability for participants currently receiving payments is calculated as the actuarial present value of future benefits expected to be paid.

For the purposes of determining the actuarial gains and losses during the year, liabilities as of October 1, 2019 for the Judges' Plan uses the prior year Effective Interest Rate. The liabilities for the Police Officers and Firefighters' and Teachers' Plans are based on 2019 spot rates implied by the 2018 spot rate yield curve. These spot rates used in gain/loss analysis were calculated by converting the 2018 spot rates to forward rates, removing the forward rate for FY 2019, and then converting the forward rates back to spot rates. See the table below for an example of the rates.

Fiscal Year	2018 Valuation Spot Rate Assumption	Forward Rate (rounded)	Implied 2019 Spot Rates used for (Gain)/Loss only
FY 2019	0.59%	0.59%	N/A
FY 2020	0.82%	1.05%	1.05%
FY 2021	1.11%	1.69%	1.37%
FY 2022	1.41%	2.32%	1.69%

Example: $1.69\% \text{ adjusted FY 2020 spot rate} = (1.0105 \times 1.0169 \times 1.0232)^{(1/3)} - 1$

Asset Valuation Method

The market value of assets projected to September 30, 2019 without smoothing is provided by ODCP and used for purposes of the valuation. When assets are subtracted from the actuarial liability the remainder represents the unfunded liability.

Funding Method

For Judges', the normal cost under the individual entry age normal method is a level percentage of pay. The normal cost is calculated by discounting the value of all expected benefits to a participant's entry date and dividing by an increasing annuity reflecting anticipated salary increases from plan entry to expected exit ages. The normal cost to the Department of the Treasury is the full amount, less expected employee contributions. The funding method for the Police Officers and Firefighters' and Teachers' Plans is the projected unit credit method. No normal cost is payable for these participants as benefit service is frozen. For both methods, changes in actuarial assumptions, changes in plan provisions, and differences in actual experience compared to expected experience are reflected as part of the annual amount of gain or loss, which is a component of the total amortization of the Unfunded Accrued Liability.

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Methods

The prior amortization periods and payments are fixed from year-to-year. Because of this, the balances of prior amortization bases are recalculated each year to reflect changes in the underlying interest rates. New amortization payments due to (Gain)/Loss are recognized over a 10-year period, while those due to assumption changes are recognized over a period of 20 years.

For the Police Officers', Firefighters' and Teachers' Plans, the outstanding amortization bases are re-calculated each year using the new spot rates. For the Judges' Plan, the outstanding amortization bases are re-calculated each year at the new funding effective interest rate (EIR).

The asset (Gain)/Loss is determined using the same interest rates as the liability (Gain)/Loss.

Mortality Adjustment from Census Date to Valuation Date

The census data is adjusted from the date it is provided to the valuation date. A factor is applied to the liabilities calculated using the census data to account for the estimated mortality between the census date and the valuation date.

Procedures

Financial and Census data were submitted by the Department of the Treasury. Information provided was reviewed for internal consistency and there is no reason to doubt its substantial accuracy.

No benefits of materiality were excluded from the valuation of the liabilities.

The Department of the Treasury provided us with data on actives who, as of the valuation date, had completed the plan's eligibility requirements.

Method Changes Since Last Year

None.

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Assumptions

Interest Rates

The June 30, 2019 rates (averaged over 40 quarters, as published by the Department of the Treasury) shown below were used for the current valuation. The Police Officers and Firefighters', and Teachers' Plans are measured using the full yield curve for the liability interest rate, while the Judges' Plan is measured using the equivalent Effective Interest Rate (EIR).

Duration	Return	Duration	Return	Duration	Return	Duration	Return
0-1	0.74%	25-26	3.45%	50-51	3.71%	75-76	3.79%
1-2	0.94%	26-27	3.47%	51-52	3.71%	76-77	3.80%
2-3	1.20%	27-28	3.49%	52-53	3.72%	77-78	3.80%
3-4	1.47%	28-29	3.51%	53-54	3.72%	78-79	3.80%
4-5	1.73%	29-30	3.52%	54-55	3.73%	79-80	3.80%
5-6	1.96%	30-31	3.54%	55-56	3.73%	80-81	3.80%
6-7	2.16%	31-32	3.55%	56-57	3.74%	81-82	3.81%
7-8	2.34%	32-33	3.56%	57-58	3.74%	82-83	3.81%
8-9	2.49%	33-34	3.58%	58-59	3.74%	83-84	3.81%
9-10	2.63%	34-35	3.59%	59-60	3.75%	84-85	3.81%
10-11	2.74%	35-36	3.60%	60-61	3.75%	85-86	3.81%
11-12	2.84%	36-37	3.61%	61-62	3.75%	86-87	3.82%
12-13	2.93%	37-38	3.62%	62-63	3.76%	87-88	3.82%
13-14	3.00%	38-39	3.63%	63-64	3.76%	88-89	3.82%
14-15	3.06%	39-40	3.63%	64-65	3.76%	89-90	3.82%
15-16	3.12%	40-41	3.64%	65-66	3.77%	90-91	3.82%
16-17	3.17%	41-42	3.65%	66-67	3.77%	91-92	3.82%
17-18	3.21%	42-43	3.66%	67-68	3.77%	92-93	3.83%
18-19	3.25%	43-44	3.66%	68-69	3.77%	93-94	3.83%
19-20	3.28%	44-45	3.67%	69-70	3.78%	94-95	3.83%
20-21	3.32%	45-46	3.68%	70-71	3.78%	95-96	3.83%
21-22	3.35%	46-47	3.69%	71-72	3.78%	96-97	3.83%
22-23	3.38%	47-48	3.69%	72-73	3.79%	97-98	3.83%
23-24	3.40%	48-49	3.70%	73-74	3.79%	98-99	3.83%
24-25	3.42%	49-50	3.70%	74-75	3.79%	99-100	3.84%

The Effective Interest Rates (single rate that produces the same results when applied to all cash flows) for all plans are as follows:

	Police	Fire	Teachers	Judges
EIR	3.03%	3.01%	2.86%	3.12%

Interest Rates for (Gain)/Loss

The same interest rates were used for purposes of rolling forward plan assets and rolling forward plan liabilities for determining gains and losses. For Judges, the EIR (3.23%) was used for this purpose. For Police, Fire and Teachers, the first spot rate from the 2018 spot rate curve (0.59%) was used for this purpose.

Economic Assumptions

	Police	Fire	Teachers	Judges
COLA ¹	1.80%	1.80%	1.82%	1.36%
Wage Inflation	1.95% ²	2.00% ²	2.30%	0.83%

¹The Cost-of-Living Adjustment (COLA) assumption above does not apply to police officers and firefighters who retired prior to February 15, 1980, as they receive COLAs based on wage inflation.

²The wage inflation assumption for the Police was set to 3.50% in FY 2020 and for the Fire was set to 2.00% in FY 2020 to reflect the most recent contract negotiation.

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Actuarial Assumptions and Methods

Assumptions

Salary Growth	The additional salary increases (on top of the general wage increases for all actives as shown in the above table) are shown below:				
	Years of Service	Police	Fire	Teachers	Judges
	20	8.00%	5.50%	2.00%	0.00%
	21	0.50%	1.50%	1.00%	0.00%
	22	0.50%	1.50%	1.00%	0.00%
	23	0.50%	1.50%	1.00%	0.00%
	24	0.50%	1.50%	1.00%	0.00%
	25	3.00%	4.40%	1.00%	0.00%
	26	0.50%	1.20%	1.00%	0.00%
	27	0.50%	1.20%	1.00%	0.00%
	28	0.50%	1.20%	1.00%	0.00%
	29	0.50%	1.20%	1.00%	0.00%
	30	3.00%	5.70%	0.60%	0.00%
	31+	0.25%	1.30%	0.60%	0.00%
		<p>Police officers receive longevity increases of 5% of step 1 pay in the officers' pay class after 15 years of service and additional increases of 5% of step 1 pay in the officers' pay class after 20, 25 and 30 years of service. Longevity pay is included in pensionable compensation once the member has 25 years of service. Police officers receive an additional increase of 5% of base pay for the Base Retention Differential after 20 years of service.</p> <p>Firefighters are assumed to receive longevity increases of 5%, 10%, 15%, and 20% applied to base pay after 15, 20, 25, and 30 years of service, respectively, and are included in pensionable compensation for all years.</p>			
Active Plan Member Base Mortality	<ul style="list-style-type: none"> • Police Officers and Firefighters: Pub-2010 Public Safety Employee, Above-Median Income • Teachers: Pub-2010 Teacher Employee, Above-Median Income • Judges: Pub-2010 General Employee, Above-Median Income 				
Retired Plan Member Base Mortality	<ul style="list-style-type: none"> • Police Officers and Firefighters: Credibility Adjusted Pub-2010 Public Safety Healthy Retiree, Above-Median Income • Teachers: Credibility Adjusted Pub-2010 Teacher Healthy Retiree, Above-Median Income • Judges: Pub-2010 General Healthy Retiree, Above-Median Income 				

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Beneficiary - Surviving Spouse Member Base Mortality	<ul style="list-style-type: none"> • Police Officers and Firefighters: Credibility Adjusted Pub-2010 Contingent Survivor, Above-Median Income • Teachers: Credibility Adjusted Pub-2010 Contingent Survivor, Above-Median Income • Judges: Pub-2010 Contingent Survivor, Above-Median Income
Beneficiary - Non-Disabled Child Member Base Mortality	<ul style="list-style-type: none"> • Police Officers and Firefighters: Age 0-17, Pub-2010 Juvenile; Age 18+, Pub-2010 General Healthy Employee, Above-Median Income • Teachers: Age 0-17, Pub-2010 Juvenile; Age 18+, Pub-2010 General Healthy Employee, Above-Median Income
Disabled Plan Member Base Mortality	<ul style="list-style-type: none"> • Police Officers and Firefighters: Credibility Adjusted Pub-2010 Public Safety Disabled Retiree, Full Data Set • Teachers: Pub-2010 Teacher Disabled Retiree, Full Data Set • Judges: Pub-2010 General Disabled Retiree, Full Data Set
Beneficiary - Disabled Child Member Base Mortality	<ul style="list-style-type: none"> • Police Officers and Firefighters: Age 0-17, Pub-2010 Juvenile; Age 18+, Pub-2010 General Disabled Retiree, Full Data Set • Teachers: Age 0-17, Pub-2010 Juvenile; Age 18+, Pub-2010 General Disabled Retiree, Full Data Set
Longevity Improvement Projection Scale	<p>Mortality tables are adjusted using generational projection from 2010 using Scale MP-2018.</p>
Mortality Adjustment from Census Date to Valuation Date	<p>The liabilities are adjusted to account for mortality during the 5 month period between the census collection date of May 1, 2019 and the valuation date of October 1, 2019. The liabilities for inactive plan members in the Police Officers and Firefighters' Plan are decreased by 0.1441% per month (0.992795 factor applied). The liabilities for inactive plan members in the Teachers' Plan are decreased by 0.1808% per month (0.990960 factor applied). The liabilities for inactive plan members in the Judges' Plan are reduced by 0.1987% per month (0.990065 factor applied). The liabilities for active plan members are unadjusted.</p>

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Assumptions

Disability

No disabilities are assumed among Judges.

Below are sample rates of disability assumed to occur:

Age	Police	Fire	Teachers	Judges
30-34	0.000%	0.000%	0.070%	0.000%
35-39	0.000%	0.000%	0.120%	0.000%
40-44	0.500%	0.500%	0.128%	0.000%
45-49	0.150%	0.100%	0.208%	0.000%
50-54	0.100%	0.100%	0.500%	0.000%
55-59	0.000%	0.000%	0.800%	0.000%
60-64	0.000%	0.000%	0.800%	0.000%
65+	0.000%	0.000%	0.000%	0.000%

Note that the Federal portion of the disability benefits for police officers and firefighters is the same for service and non-service related disabilities. Therefore, an assumption on percentage of service related disabilities was not necessary. All incidents of disability were assumed to result in plan members being 100% disabled.

Retirement Age

Retirement is assumed to occur in accordance with the table below:

Age	Police-Male	Police-Female	Fire	Teachers	Judges
50	55%	65%	55%	0%	0%
51	30%	40%	30%	0%	0%
52	30%	40%	30%	0%	0%
53	30%	40%	30%	0%	0%
54	30%	40%	30%	0%	0%
55	30%	40%	30%	25%	0%
56	30%	40%	30%	25%	0%
57	30%	40%	30%	25%	0%
58	30%	40%	30%	25%	10%
59	30%	40%	40%	25%	10%
60	100%	100%	100%	40%	10%
61	100%	100%	100%	25%	10%
62	100%	100%	100%	30%	10%
63	100%	100%	100%	25%	10%
64	100%	100%	100%	25%	10%
65	100%	100%	100%	30%	10%
66	100%	100%	100%	30%	10%
67	100%	100%	100%	30%	10%
68	100%	100%	100%	30%	10%
69	100%	100%	100%	30%	10%
70	100%	100%	100%	100%	100%
71+	100%	100%	100%	100%	100%

Return of Employee Contributions

In valuing return of contribution benefits for employees assumed to die without a spouse or to terminate and elect a refund of their contribution balance, the employee contributions balance was estimated based on the actual employee contribution balance when available (provided as of the census date for the Judges' Plan and July 1, 1998 for the other plans), otherwise using estimated prior salaries. The actual contribution amount for Judges is used to project the hypothetical employee contribution refund due.

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Post Retirement Contributions	Retired Judges may elect to contribute 3.5% or 7.0% of their retirement benefit to provide a survivor benefit. The net amount of this benefit was included in benefit payments and projections, and the normal cost was not offset by these contributions.
Expenses	The 15-Year Fund projections for all plans use expense projections provided by the Department of the Treasury. The 15-Year Fund projections for the Judges' Plan assumes employee contribution increases at the same rate as pay for actives.
Spousal Age	<ul style="list-style-type: none">• Police Officers and Firefighters and Teachers: Male spouses are assumed to be two years older than their female spouse when actual beneficiary data was unavailable.• Judges: Male spouses are assumed to be three years older than their female spouse when actual beneficiary data was unavailable.
Effective Form of Payment Election	<ul style="list-style-type: none">• Police Officers and Firefighters: 70% of plan members are assumed to receive a Joint-and-57% Survivor Annuity, and 30% of plan members are assumed to receive a Single Life Annuity. Any additional survivor benefit for police officers and firefighters whose average pay was less than class 1, step 6 pay was not valued.• Teachers: 100% of active and terminated vested plan members were valued assuming benefits are payable as a Single Life Annuity. For retirees, 5% were assumed to elect a Joint-and-55% Survivor Annuity, 20% to elect a Joint-and-25% Survivor Annuity, and 75% to elect a Straight Life Annuity.• Judges: Judges who have elected survivor benefits are assumed to have a covered spouse with a Joint-and-55% Survivor Annuity. All others assumed to have a Single Life Annuity.
Open Group Projections for Judges	All active judges were assumed to be replaced upon termination from the plan. The replacement is based on a 50/50 blend of a new age 45 judge and a new age 55 judge, assuming 50% male and 50% female. The starting salary is assumed to be \$210,900 for all new entrants.
Data	This actuarial valuation has been prepared based upon plan member data provided by the Department of the Treasury. We have reviewed the data for reasonableness, but have not independently audited the data. We have no reason to believe the data is not complete and accurate, and know of no further information that is essential to the preparation of the actuarial valuation.

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Changes from Prior Report

Interest Rate

The interest rate assumption was changed to reflect average quarterly Treasury yield rates for the 10-year period ending on June 30, 2019. The June 30, 2018 rates (averaged over 40 quarters, as published by the Department of the Treasury) shown below were used for the prior valuation of the Police Officers and Firefighters', and Teachers' Plans. The prior year EIR for the Judges' Plan was 3.23%.

Duration	Return	Duration	Return	Duration	Return	Duration	Return
0-1	0.59%	25-26	3.55%	50-51	3.77%	75-76	3.85%
1-2	0.82%	26-27	3.57%	51-52	3.78%	76-77	3.85%
2-3	1.11%	27-28	3.58%	52-53	3.78%	77-78	3.85%
3-4	1.41%	28-29	3.60%	53-54	3.79%	78-79	3.86%
4-5	1.70%	29-30	3.61%	54-55	3.79%	79-80	3.86%
5-6	1.96%	30-31	3.62%	55-56	3.79%	80-81	3.86%
6-7	2.20%	31-32	3.64%	56-57	3.80%	81-82	3.86%
7-8	2.41%	32-33	3.65%	57-58	3.80%	82-83	3.86%
8-9	2.58%	33-34	3.66%	58-59	3.81%	83-84	3.87%
9-10	2.74%	34-35	3.67%	59-60	3.81%	84-85	3.87%
10-11	2.87%	35-36	3.68%	60-61	3.81%	85-86	3.87%
11-12	2.98%	36-37	3.69%	61-62	3.82%	86-87	3.87%
12-13	3.07%	37-38	3.70%	62-63	3.82%	87-88	3.87%
13-14	3.15%	38-39	3.70%	63-64	3.82%	88-89	3.87%
14-15	3.21%	39-40	3.71%	64-65	3.82%	89-90	3.87%
15-16	3.27%	40-41	3.72%	65-66	3.83%	90-91	3.88%
16-17	3.31%	41-42	3.72%	66-67	3.83%	91-92	3.88%
17-18	3.35%	42-43	3.73%	67-68	3.83%	92-93	3.88%
18-19	3.38%	43-44	3.74%	68-69	3.83%	93-94	3.88%
19-20	3.41%	44-45	3.74%	69-70	3.84%	94-95	3.88%
20-21	3.44%	45-46	3.75%	70-71	3.84%	95-96	3.88%
21-22	3.47%	46-47	3.76%	71-72	3.84%	96-97	3.89%
22-23	3.49%	47-48	3.76%	72-73	3.84%	97-98	3.89%
23-24	3.51%	48-49	3.76%	73-74	3.85%	98-99	3.89%
24-25	3.53%	49-50	3.77%	74-75	3.85%	99-100	3.89%

COLA/Wage Inflation

	Police	Fire	Teachers	Judges
	<u>Prior Year</u>			
COLA	1.62%	1.62%	1.64%	1.66%
Wage Inflation	1.80%	2.20%	2.36%	0.97%

Effective Form of Payment Election

In the prior valuation for the Teachers' Plan, the assumed effective form of payment election for the entire population was 50%/50% for Straight Life Annuity and Joint-and-55% Survivor Annuity.

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Changes from Prior Report

Spousal Age

In the prior valuation year for the Police Officers and Firefighters', Teachers', and Judges' Plans, male spouses were assumed to be three years older than their female spouse when actual beneficiary data was unavailable.

Retirement Rates

In the previous valuation the retirement rate assumptions for active plan members were the following:

Age	Police-Male	Police-Female	Fire	Teachers
45-49	10%	10%	10%	0%
50	40%	40%	15%	0%
51	25%	30%	17%	0%
52	25%	30%	19%	0%
53	25%	30%	21%	0%
54	25%	30%	23%	0%
55	25%	30%	25%	35%
56	22%	30%	27%	35%
57	22%	31%	29%	35%
58	22%	32%	31%	35%
59	22%	33%	33%	35%
60-62	100%	100%	100%	25%
63-69	100%	100%	100%	25%
70+	100%	100%	100%	100%

Disability Incidence Rates

In the prior valuation the disability incidence rate assumptions for members were the following:

Age	Police	Fire
30	0.900%	0.750%
35	0.900%	0.750%
40	0.405%	0.375%
45	0.405%	0.375%
50	0.405%	0.375%
55	0.000%	0.000%
59	0.000%	0.000%
60	0.000%	0.000%

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Changes from Prior Report

Termination Rates

In the prior valuation the sample termination rate assumptions for members were the following:

Age	Police	Fire	Teachers- Male	Teachers- Female
30	1.600%	1.500%	15.830%	7.920%
35	1.600%	1.250%	13.700%	6.850%
40	0.900%	1.000%	13.500%	6.760%
45	0.900%	0.750%	10.120%	5.060%
50	0.900%	0.500%	6.070%	3.040%
55	0.900%	0.250%	3.600%	2.160%
60	0.000%	0.000%	3.600%	2.160%
62+	0.000%	0.000%	0.000%	0.000%

Salary Scale

The additional salary increases (on top of the general wage increases for all actives as shown in the above table) for the prior valuation are shown below, via representative rates:

Years of Service	Police	Fire	Teachers
10	3.00%	3.00%	2.00%
15	2.10%	7.36%	1.60%
20	8.80%	4.70%	0.75%
25	3.60%	3.75%	0.60%
30	3.35%	7.90%	0.40%

Longevity Improvement Projection Scale

The mortality projection scale for all plans was updated from Scale MP-2017 to Scale MP-2018.

Mortality

The Mortality tables used for the Active Plan Member Base Mortality for each plan for the prior valuation are shown below:

- **Police Officers and Firefighters:** 80% of RP-2000 Combined Healthy mortality with Blue Collar Adjustment with a 1-year setback for males and no setback for females.
- **Teachers:** 80% of RP-2000 Combined Healthy mortality with White Collar Adjustment with a 4-year setback for males and a 3-year setback for females.
- **Judges:** RP-2014 Non-Annuitant mortality with White Collar Adjustment, with no setbacks.

APPENDIX A

Actuarial Assumptions and Methods

Assumptions

Changes from Prior Report

The Mortality tables used for the Inactive Plan Member Base Mortality for each plan for the prior valuation are shown below:

- **Police Officers and Firefighters:** RP-2000 Combined Healthy mortality with Blue Collar Adjustment with a 1-year setback for males and no setback for females.
- **Teachers:** RP-2000 Combined Healthy mortality with White Collar Adjustment with a 4-year setback for males and a 3-year setback for females.
- **Judges:** RP-2014 Annuitant mortality with White Collar Adjustment, with no setbacks. For periods of deferral, RP-2014 Non-Annuitant mortality with White Collar Adjustment, with no setbacks.

The Mortality tables used for the Disabled Plan Member Base Mortality for each plan for the prior valuation are shown below:

- **Police Officers and Firefighters:** RP-2000 Combined Healthy mortality with Blue Collar Adjustment with no set forward for males and a 1-year set forward for females.
- **Teachers:** RP-2000 Combined Healthy mortality with White Collar Adjustment with a 1-year set forward for males and a 2-year set forward for females.
- **Judges:** RP-2014 Annuitant mortality with White Collar Adjustment, with no setbacks.

Mortality Scaling Factor

The liabilities in the prior valuation were adjusted to account for mortality during the 5 month period between the census collection date of May 1, 2018 and the valuation date of October 1, 2018. The liabilities for inactive plan members in the Police Officers and Firefighters', and Teachers' Plans were decreased by 0.1225% per month (0.993875 factor applied), while the liabilities for inactive plan members in the Judges' Plan are reduced by 0.1900% per month (0.9905 factor applied). The liabilities for active plan members are unadjusted.

APPENDIX B

Rationale Methods

Funding Method	<p>SFFAS 5 permits the use of a funding method other than the Aggregate Entry Age Normal method if an explanation is provided and the difference in results are immaterial.</p> <p>The Judges' Plan uses Individual Entry Age Normal method to develop the accrued liability and normal costs. The differences in results between Aggregate and Individual Entry Age Normal methods are very small and the Individual Entry Age Method provides more detail by individual for the movements in the liability.</p> <p>The Police Officers and Firefighters' and the Teachers' Plans use the Projected Unit Credit ("PUC") Method in place of the Entry Age Normal Method ("EAN"). Although the plans do not have future service accruals, the EAN method would defer a portion of past service into the future and thereby generating a normal cost until all actives have decremented. The PUC method better recognizes that all service has been fully accrued by participants, and attributes the anticipated change in compensation to that accrued service. This approach does not defer a portion of past service into the future, and therefore does not generate a normal cost. The PUC method aligns to the annual payment required for the plan under the Balanced Budget Act of 1997 (Pub. Law 105-33).</p>
Interest Rate Application	<p>To calculate the present value of plan members' benefits for the Police Officers and Firefighters', and Teachers' Plans, spot rates were used in accordance with SFFAS 5 and SFFAS 33. For the Judges' Plan, an Effective Interest Rate (EIR) was used. The EIR is the single interest rate calculated to provide the same present value of benefits as the spot rates and allows for the appropriate liability calculation using the Entry Age Normal Funding Method with an active population.</p>

APPENDIX B

Rationale Assumptions

Interest Rates and Economic Assumptions	The underlying interest rate, inflation, Cost-of-Living Adjustment (based on 10-year averages), and wage inflation assumptions (based on the 10-year average of actual negotiated pay increases) were prescribed by the Department of the Treasury, based on their analysis of investments and historical experience, and are intended to comply with SFFAS 5 and 33.
Interest Rates for (Gain)/Loss	The use of EIR for the Judges' Plan produced the same Present Value of Benefits as is produced using the yield curve. For an active plan, the EIR is used for the period of time between plan member entry and the valuation date. The EIR is a good proxy for long term discount rate because it captures the weighted cash flows of the yield curve as a single rate. The use of the first spot rate for the other plans reflects the most relevant expectation of the discount rate over the course of the prior year.
Salary Growth	The underlying salary growth assumptions are based upon expectations of plan experience and the most recent experience study conducted in 2019.
Base Mortality Table	The base mortality tables were adjusted to reflect actual plan experience during the most recent experience study conducted in 2019.
Longevity Improvement Projection Scale	The MP-2018 projection scale reflects the most recently developed mortality improvement outlook from the Society of Actuaries.
Mortality Adjustment from Census Date to Valuation Date	The adjustment to the liability to account for assumed mortality experience during the gap between the census collection date and the valuation date is based on the most recent experience study conducted in 2019.
Disability Rates	Rates of disablement for included actives are based upon expectations of plan experience and the most recent experience study conducted in 2019.
Withdrawal Rates	Rates of withdrawal for included actives are based upon broad termination patterns and expectations of plan experience and the most recent experience study conducted in 2019.
Retirement Rates	Rates of retirement for included actives are based upon broad retirement patterns and expectations of plan experience and the most recent experience study conducted in 2019.
Expenses	The 15-Year Fund projections for all plans use expense projections provided by the Department of the Treasury. Due to the active nature of the Judges' Plan, employee contributions have a further increase factor to account for increases in pay rate for actives.

APPENDIX B

Rationale

Assumptions

Spousal Age	The marriage assumptions are based on expectations of plan experience and the most recent experience study conducted in 2019.
Effective Form of Payment Election	The benefit form election assumptions are based on expectations of plan experience and the most recent experience study conducted in 2019.
Open Group Projections	Open group projections are based upon expectations of plan experience.
Benefits Not Valued	<p>The refund of unexpended employee contributions was not valued for the Police Officers and Firefighters' and the Teachers' Plans payable to retirees who died without eligible surviving beneficiaries. The Department of the Treasury is only responsible for the balance as of June 30, 1997 without interest; therefore, this liability, if any, was deemed immaterial.</p> <p>Survivor benefits for the Teachers' Plan are not valued for deferred benefits. The Teachers Plan provides a reduction for Joint-and-Survivor benefits; therefore, the actuarial value of the life annuity is similar to the actuarial value of the Joint-and-Survivor annuity. Surviving children's benefits for active plan members in the Police Officers and Firefighters' Plan are valued indirectly, by assuming a Joint-and-57% Survivor annuity for married plan members.</p> <p>For the Judges' Plan, plan members are due a refund of the portion of their employee contribution balance due to the coverage of a spouse in the event that their spouse predeceases them. This has not been valued to the complexity and low probability of occurrence.</p>

APPENDIX C

Plan Provisions Summary Police Officers and Firefighters' Plan

Plan Year	October 1 - September 30
Eligibility for Participation	All police officers and firefighters of the District of Columbia automatically become plan members on their date of employment. Police Cadets are not eligible.
Contributions	<p>Plan members hired before November 10, 1996 are required to contribute 7% of annual salary, including any differential for special assignment, but excluding overtime, longevity, holiday, or military pay. Plan members hired on or after November 10, 1996 contribute 8% of annual salary, including any differential for special assignment, but excluding overtime, holiday, or military pay. Interest is not credited to each plan member's accumulated contributions.</p> <p>Emerging inactive plan members not eligible for additional benefits will receive a refund of their contributions.</p>
Departmental Service	A plan member receives service for each full year and additional months of employment with either the Metropolitan Police Force or the D.C. Fire Department. Only service earned prior to July 1, 1997 is used to compute the plan benefits.
Credited Service	Service granted or purchased in addition to departmental service.
Final Average Annual Earnings	For those hired before February 15, 1980, basic pay for the highest 12 consecutive months. For those hired on or after February 15, 1980, basic pay for the highest 36 consecutive months divided by three.
Longevity Pay - Police Officers	<p>Plan members who complete 25 years of active service prior to retirement are entitled to have longevity pay included in pensionable compensation.</p> <p>Plan members hired before February 15, 1980, who complete 20 but less than 25 years of active service prior to retirement, are entitled to have longevity pay included in pensionable compensation (as this benefit adjustment was not included in June 30, 1997 plan provisions governing federal benefits, the District funds this benefit adjustment).</p>
Normal form of benefit	Straight Life Annuity (no eligible spouse survivor); Joint-and-Survivor Annuity (eligible spouse survivor)
Optional form of benefit	<p>Optional Additional Survivor Benefit:</p> <p>If elected by the plan member, the retiree benefit is reduced by 10% and the survivor is entitled to an additional survivor benefit equal to the amount of the benefit reduction; except the additional survivor benefit is reduced by 5% for each full five years the survivor is younger than the plan member, with this reduction not to exceed 40%.</p>

APPENDIX C

Plan Provisions Summary Police Officers and Firefighters' Plan

Cost-of-Living Adjustments	<p>Former employees (not beneficiaries) who retired prior to February 15, 1980, receive equalization, defined as a percentage increase in benefits equal to the percentage increase in pay active employees receive.</p> <p>All other retired plan members and their survivors receive an increase April 1 each year based on the annual change in the Consumer Price Index (All Urban Consumers) from December to December. The annual increase will not be less than 0% for any plan member, and is limited to a maximum of 3% for plan members hired on or after November 10, 1996.</p> <p>The cost-of-living adjustment for plan members disabled after June 30, 1997 and not eligible for an optional retirement benefit starts only with the payment of the Federal portion of the benefit at age 55.</p>
<u>Retirement Benefits</u>	
Optional Retirement Date	<p>For plan members hired before November 10, 1996:</p> <ul style="list-style-type: none"> • Age 60; or • Age 50 with 25 years of departmental service; or • No age requirement with 20 years of service (only if hired before February 15, 1980.) <p>For plan members hired on or after November 10, 1996:</p> <ul style="list-style-type: none"> • Age 60; or • No age requirement with 25 years of service.
Optional Retirement Benefit	<p>For plan members hired before November 10, 1996:</p> <ul style="list-style-type: none"> • 2.5% of Average Pay times departmental service up to 25 years (20 years if hired before February 15, 1980), plus • 3.0% of Average Pay times departmental service over 25 (or 20) years, plus • 2.5% of Average Pay times credited service. <p>For plan members hired on or after November 10, 1996:</p> <ul style="list-style-type: none"> • 2.5% of Average Pay times total service. <p>For all plan members, there is a maximum benefit of 80% of Average Pay. Service after June 30, 1997 is excluded from the calculation of the Federal portion of the benefit.</p>
Vesting	5 years of departmental service.
Deferred Vested Benefit	Optional Retirement Benefit beginning at age 55.

APPENDIX C

Plan Provisions Summary Police Officers and Firefighters' Plan

Disability Benefits	
Service-Related Disability Benefit Eligibility	Plan members who are disabled as a result of an illness or injury in the line of duty are eligible for this benefit. If disabled after June 30, 1997 and not eligible for an optional retirement benefit, the Federal portion of this benefit is payable beginning at age 55.
Service-Related Disability Benefit	<p>For plan members hired before February 15, 1980, 2.5% of Average Pay times total years of service, subject to a minimum benefit of 66-2/3% of Average Pay and subject to a maximum benefit of 70% of Average Pay.</p> <p>For plan members hired on or after February 15, 1980, 70% of final pay times percentage of disability, subject to a minimum benefit of 40% of final pay.</p> <p>The Federal portion of this benefit is a deferred vested benefit payable upon attainment of age 55, unless the conditions for optional retirement are met, in which case the Federal portion of this benefit is an optional retirement benefit. Service after June 30, 1997 is excluded from this calculation.</p>
Non-Service-Related Disability Benefit Eligibility	Eligible with 5 years of departmental service and a physical or mental disability that prevents the plan member from performing his/her job. If disabled after June 30, 1997 and not eligible for an optional retirement benefit, the Federal portion of this benefit is payable beginning at age 55.
Non-Service-Related Disability Benefit	<p>For plan members hired before February 15, 1980, 2.0% of Average Pay times total years of service, subject to a minimum benefit of 40% of Average Pay and subject to a maximum benefit of 70% of Average Pay.</p> <p>For plan members hired on or after February 15, 1980, 70% of Final Pay times percentage of disability, subject to a minimum benefit of 30% of Final Pay.</p> <p>The Federal portion of this benefit is a deferred vested benefit payable upon attainment of age 55, unless the conditions for optional retirement are met, in which case the Federal portion of this benefit is an optional retirement benefit. Service after June 30, 1997 is excluded from this calculation.</p>

APPENDIX C

Plan Provisions Summary Police Officers and Firefighters' Plan

Death Benefits	
Lump Sum Death Benefit	Lump sum of \$50,000 payable for death occurring in the line of duty, provided the death is not the result of willful misconduct or by intention to bring about his/her own death.
Survivor Benefit (Spouse Only) - Death Outside Line of Duty after 12/29/93	Eligible upon death and, if retired, married for at least one year or have a child by the marriage. The benefit will be 40% of the greater of Average Pay and the salary for class 1, step 6 of the D.C. Police and Fireman's Salary Act in effect at the date of death, adjusted for cost-of-living increases if death occurs after retirement. The benefit cannot exceed the rate of pay for the position occupied at death (or retirement if death occurs after retirement.)
Survivor Benefit (Spouse Only) - Death In Line of Duty after 12/29/93	Eligible upon death in the line of duty. The benefit will be 100% of final pay. The Federal portion of this benefit is 40% of average pay per June 30, 1997 plan provisions.
Survivor Benefit - Spouse and Dependent Children	<p>Eligibility for the spouse is the same as Spouse Only benefit; for the children, unmarried and under 18 (22 if full-time student), or any child dependent because of a disability incurred before age 18.</p> <p>Spouse benefit as described above, plus, provided death does not occur in the line of duty, a benefit per child (payable until the children are no longer eligible) equal to the smallest of:</p> <ul style="list-style-type: none"> • 60% of Average Pay divided by the number of eligible children; • \$4,248 (\$4,152 if hired on or after November 1, 1996) - Federal portion is \$1,548; or • \$12,744 (\$12,456 if hired on or after November 1, 1996) divided by the number of children - Federal portion is \$4,644. <p>These amounts are increased annually based on cost-of-living adjustments.</p>
Survivor Benefit - Dependent Children Only	Eligibility is same as the Dependent Children benefit above. The benefit will be 75% of Average Pay divided by the number of eligible children, adjusted for cost-of-living increases.
Refund of Contributions	Refund contributions if death before retirement and no eligible spouse or children. All plan member contributions will be refunded to a named, or statutorily-designated if none named, beneficiary.
Changes Since Prior Valuation	None of which we are aware.

APPENDIX C

Plan Provisions Summary

Teachers' Plan

Plan Year	October 1 - September 30
Eligibility for Participation	Permanent, temporary, and probationary teachers for the District of Columbia public day schools become plan members automatically on their date of employment. Other employees covered by the Retirement of Public School Teachers Act – including librarians, principals, and counselors – also become plan members on their date of employment. Substitute teachers and employees of the Department of School Attendance and Work Permits are not covered. Some former D.C. teachers working at charter schools are eligible to remain in the Plan.
Contributions	Plan members hired before November 1, 1996 are required to contribute 7% of annual pay. Plan members hired on or after November 1, 1996 contribute 8% of annual pay. Emerging inactive plan members not eligible for additional benefits will receive a refund of their contributions without interest.
School Service	One year of school service is granted for each year of employment with the D.C. public day schools.
Credited Service	Service granted or purchased in addition to school service.
Final Average Annual Earnings	Highest 36 consecutive months of pay, divided by three.
Optional forms of benefit	<p><u>Reduced Annuity with a Maximum Survivor Annuity (to Spouse)</u> The original benefit is reduced by 2.5% of annual pension up to \$3,600, plus 10% of any amount over \$3,600. Spouse will receive 55% of Unreduced Annuity.</p> <p><u>Reduced Annuity with a Partial Survivor Annuity (to Spouse)</u> An annuity with a benefit payable to the spouse of between \$1 up to any amount less than 55% of the Unreduced Annuity. The original benefit is reduced by dividing the amount of the survivor's annuity by 55%, then reducing the original benefit by 2.5% of this amount up to \$3,600, plus 10% of any amount over \$3,600.</p> <p><u>Reduced Annuity with a Survivor Annuity to a Person with an Insurable Interest</u> A joint and 55% survivor annuity with the original benefit reduced 10% plus an additional 5% for each full 5 years, up to 25 years, the survivor is younger, with a total reduction of 40% for any survivor who is 25 or more years younger.</p> <p><u>Reduced Annuity with a Life Insurance Benefit</u> Benefits are reduced to provide a lump sum life insurance benefit to a designated beneficiary.</p>

APPENDIX C

Plan Provisions Summary

Teachers' Plan

Cost-of-Living Adjustments	All plan members receive an increase on April 1 each year based on the annual change in the Consumer Price Index (all items – U.S. City average) from December to December. The annual increase will not be less than 0% for any plan member, and is limited to 3.0% for plan members hired on or after November 1, 1996. The cost-of-living adjustment for plan members who become disabled after June 30, 1997 starts only with the payment of the federal portion of the benefit at age 62.
<u>Retirement Benefits</u>	
Voluntary Retirement Date	<p>For plan member hired before November 1, 1996, earliest of:</p> <ul style="list-style-type: none"> • Age 62 with 5 years of school service; • Age 60 with 20 years of total service, including 5 years of school service; • Age 55 with 30 years of total service, including 5 years of school service. <p>For plan member hired on or after November 1, 1996, earliest of:</p> <ul style="list-style-type: none"> • Age 62 with 5 years of school service; • Age 60 with 20 years of total service, including 5 years of school service; • Any age with 30 years of total service, including 5 years of school service.
Voluntary Retirement Benefit	<p>For plan member hired before November 1, 1996:</p> <ul style="list-style-type: none"> • 1.5% of Average Pay times service up to 5 years, plus; • 1.75% of Average Pay times service between 5 and 10 years, plus • 2.0% of Average Pay times service over 10 years. <p>For plan member hired on or after November 1, 1996:</p> <ul style="list-style-type: none"> • 2.0% of Average Pay times service. <p>For all plan members, there is a minimum benefit of 1.0% of Average Pay plus \$25 for each year of service.</p> <p>Service after June 30, 1997 is excluded from the calculation of the Federal portion of the benefit.</p>
Involuntary Retirement Date	<p>Retired involuntarily for reasons other than misconduct or delinquency with:</p> <ul style="list-style-type: none"> • 25 years of total service, including 5 years of school service; or • Age 50 with 20 years of total service, including 5 years of school service.
Involuntary Retirement Amount	Voluntary Retirement Benefit is reduced by 1/6% per month (2% per year) for each full month that the date of retirement precedes age 55.
Vesting	5 years of school service.
Deferred Vested Benefit	The benefit amount is calculated as a Voluntary Retirement Benefit beginning at age 62, based on service earned as of the termination of employment.

APPENDIX C

Plan Provisions Summary

Teachers' Plan

Disability Benefits	
Disability Benefit Eligibility	5 years of school service and a physical or mental disability that prevents the plan member from performing the job.
Disability Benefit	Voluntary Retirement benefit, subject to a minimum of the lesser of 40% of Average Pay and the benefit that the plan member would receive, projecting service to age 60. If disabled after June 30, 1997 and not eligible for voluntary retirement, the Federal portion of this benefit is a deferred vested benefit payable upon attainment of age 62. Service after June 30, 1997 is excluded from this calculation.
Death Benefits	
Lump Sum Death Benefit - No Survivor	Teachers who die before retirement and before completing 18 months of school service or who die without an eligible spouse, child, or parent, will receive a lump sum death benefit. The benefit will be a refund of plan member contributions without interest.
Survivor Benefit - Spouse Only	Teachers who die before retirement and were married for at least two years or have a child by the marriage will provide their survivors a benefit. The benefit will be 55% of the Voluntary Retirement benefit subject to minimums.
Survivor Benefit - Spouse and Dependent Children	<p>Eligibility for the spouse is the same as Spouse Only benefit; for the children, unmarried and under 18 (22 if a full-time student); or any child dependent because of a disability incurred before age 18. Death does not have to occur before retirement for the children's benefits. The benefit will be:</p> <p>Spouse benefit as described above, plus a benefit per child (payable until the children are no longer eligible) equal to the smallest of:</p> <ul style="list-style-type: none"> • 60% of Average Pay divided by the number of eligible children; • \$7,212 (if hired before January 1, 1980), \$6,960 (if hired between January 1, 1980 and October 31, 1996), or \$6,792 (if hired on or after November 1, 1996) per child; or • \$21,636 (if hired before January 1, 1980), \$20,880 (if hired between January 1, 1980 and October 31, 1996), or \$20,376 (if hired on or after November 1, 1996) divided by the number of children. <p>These amounts are increased annually based on cost-of-living adjustments.</p>

APPENDIX C

Plan Provisions Summary

Teachers' Plan

Survivor Benefit - Dependent Children Only	Eligibility is the same as for the children's benefit when there is a surviving spouse. Benefit Amount Per child (payable until the children are no longer eligible), the smallest of: <ul style="list-style-type: none">• 75% of Average Pay divided by the number of eligible children;• \$8,820 (if hired before January 1, 1980), \$8,496 (if hired between January 1, 1980 and October 31, 1996), or \$8,220 (if hired on or after November 1, 1996) per child; or• \$26,460 (if hired before January 1, 1980), \$25,488 (if hired between January 1, 1980 and October 31, 1996), or \$24,660 (if hired on or after November 1, 1996) divided by the number of children. These amounts are increased annually based on cost-of-living adjustments.
Survivor Benefit - Surviving Parents Only	Eligible if death before retirement and no eligible spouse or children, and parents receive at least one-half of their total income from the plan member. The benefit will be the same as the Surviving Spouse benefit.
Changes Since Prior Valuation	None of which we are aware.

APPENDIX C

Plan Provisions Summary

Judges' Plan

Plan Year	October 1 - September 30
Eligibility for Participation	All Judges of the District of Columbia Court of Appeals or the Superior Court are members in the plan. The Executive Officer of the Court System is also eligible.
Contributions	All Judges contribute 3.5% of their salaries to the Fund. Judges electing survivor coverage pay an additional 3.5% of annual salary (or retirement benefit if retired). Plan member contributions for survivor coverage do not end at retirement. Emerging inactive plan members not eligible for additional benefits will receive a refund of their contributions without interest.
Judicial Service	A plan member receives credit for each full year and additional months of employment as a Judge with the District of Columbia Courts.
Credited Service	Service granted or purchased in addition to judicial service.
Cost-of-Living Adjustments	All pensioners will receive cost-of-living increases in line with those applicable to retirees in the Civil Service Retirement System. Cost-of-living adjustments are paid on January 1.
<u>Retirement Benefits</u>	
Regular Retirement Date	Earlier of: <ul style="list-style-type: none"> • Age 50 with 20 years of Judicial Service; or • Age 60 with 10 years of Judicial Service.
Regular Retirement Benefit	Basic salary at retirement times the ratio of Judicial Service to 30, plus An additional benefit for any Credited Service (non Judicial) as follows: <ul style="list-style-type: none"> • 1.50% of basic salary times Credited Service up to 5 years, plus • 1.75% of basic salary times Credited Service from 5 to 10 years, plus • 2.00% of basic salary times Credited Service in excess of 10 years. <p>The maximum total benefit is 80% of basic salary.</p>
Vesting	10 years of Judicial Service.

APPENDIX C

Plan Provisions Summary

Judges' Plan

Mandatory Retirement Date	Mandatory retirement is at age 74.
Early Retirement Eligibility	Age 55 with 10 years of Judicial Service.
Early Retirement Benefit	1/12% per month prior to age 60 reduction in Judicial Service benefit.
Deferred Vested Benefit	The deferred vested benefit is the same as the Early Retirement Benefit beginning at age 55 or the Regular Retirement Benefit beginning at age 60, but only reflecting service to the date of employment termination.
<u>Disability Benefits</u>	
Disability Benefit Eligibility	A plan member is eligible for disability retirement after 5 years of Judicial and Credited Service and becoming physically or mentally disabled to an extent that interferes with proper performance of judicial duties. No service requirement applies to involuntary disability retirement.
Disability Benefit	Regular Retirement Benefit, subject to a minimum of 50% of basic salary (if an involuntary disability retirement).
<u>Death Benefits</u>	
Survivor Benefit Eligibility	Judges who contribute an additional 3.5% of salary during their working career and during retirement will provide a survivor benefit to their surviving spouse and/or children. The judge must also have completed at least 5 years of Judicial and Credited Service, and have been married for 2 years or have a child by marriage. A refund of excess contributions, less benefits paid to the retiree, will be paid if there are no eligible survivors.
Survivor Benefit	<p>Spouse Benefit: If judge was retired, 55% of the benefit the judge was receiving. If judge was active, 55% of the benefit the judge would have received had the judge retired on the day prior to death, not less than 55% of the benefit that would be provided to a judge with 15 years of Judicial Service without adjustment for early retirement.</p> <p>Dependent Children Benefit: A benefit will be paid to the children under the age of 18 (22 if full time student), or to any unmarried child incapable of self-support due to a disability which occurred before age 18. Benefit per child is the smallest of:</p> <ul style="list-style-type: none"> ● 50% of the spouse's annuity ● \$6,363.12 (\$7,636.92 if no spouse benefits apply) as of 12/01/2018, increased annually ● \$19,089.36 (\$22,910.76 if no spouse benefits apply) divided by the number of children as of 12/01/2018, increased annually.
Changes Since Prior Valuation	None of which we are aware.