



## **Fulton County Employees Retirement System**

**Actuarial Valuation and Review as of  
January 1, 2019**

This report has been prepared at the request of the Board of Trustees to assist in administering the System. This valuation report may not otherwise be copied or reproduced in any form without the consent of the Board of Trustees and may only be provided to other parties in its entirety, unless expressly authorized by Segal. The measurements shown in this actuarial valuation may not be applicable for other purposes.

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April 15, 2019

Board of Trustees  
Fulton County Employees Retirement System  
141 Pryor Street, Suite 7001  
Atlanta, GA 30303-3468

Dear Board Members:

We are pleased to submit this Actuarial Valuation and Review as of January 1, 2019. It summarizes the actuarial data used in the valuation, analyzes the preceding year's experience, and establishes the funding requirements for fiscal 2019.

This report was prepared in accordance with generally accepted actuarial principles and practices at the request of the Board to assist in administering the Retirement System. The census information and financial information on which our calculations were based was prepared by the staff of Fulton County. That assistance is gratefully acknowledged.

We hereby certify that the Fulton County Employees Retirement System has been funded in conformity with the minimum funding standards specified in Code Section 47-20-10 of the Official Code of Georgia Annotated, known as the Public Retirement Systems Standards Law. This certification covers the 2018 fiscal year of the Plan.

The actuarial calculations were directed under our supervision. We are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the best of our knowledge, the information supplied in this actuarial valuation is complete and accurate, except as noted in Section 4. Further, in our opinion, the assumptions as approved by the Board are reasonably related to the experience of and the expectations for the System.

We look forward to reviewing this report at your next meeting and to answering any questions.

Sincerely,

Segal Consulting, a Member of The Segal Group, Inc.

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# Section 1: Actuarial Valuation Summary

## Purpose and Basis

This report was prepared by Segal Consulting to present a valuation of the Fulton County Employees Retirement System as of January 1, 2019. The valuation was performed to determine whether the assets and contributions are sufficient to provide the prescribed benefits and to provide information for required disclosures under Governmental Accounting Standards Board (GASB) Statements No. 67 and 68. The measurements shown in this actuarial valuation may not be applicable for other purposes. In particular, the measures herein are not necessarily appropriate for assessing the sufficiency of System assets to cover the estimated cost of settling the System's benefit obligations. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements; and changes in plan provisions or applicable law.

The contribution requirements presented in this report are based on:

- The benefit provisions of the Pension Plan, as administered by the Board;
- The characteristics of covered active participants, inactive participants, and retired participants and beneficiaries as of December 31, 2018, provided by the County;
- The assets of the Plan as of December 31, 2018, provided by the County;
- Economic assumptions regarding future salary increases and investment earnings;
- Other actuarial assumptions regarding employee terminations, retirement, death, etc. and
- The funding policy adopted by the Board.

## Significant Issues

1. Segal Consulting (“Segal”) strongly recommends an actuarial funding method that targets 100% funding of the actuarial accrued liability. Generally, this implies payments that are ultimately at least enough to cover normal cost, interest on the unfunded actuarial accrued liability and the principal balance. The funding policy adopted by the Board meets this standard.
2. Actual contributions made during the fiscal year ending December 31, 2018 were \$59.2 million, 99% of the actuarially determined contribution. In the prior fiscal year, actual contributions were \$57.2 million, 108% of the prior year actuarially determined contribution.
3. Georgia Code Section 47-20-10(b) allows a Plan to be in compliance the minimum funding standards under Georgia law if the sponsor makes contributions equal to or greater than the annual required contribution (ARC) under Governmental Accounting Standards Board (GASB) Statements No. 25 and No. 27 as in effect on June 15, 2013. The lowest ARC allowable is based on a 30-year level percent-of-pay amortization of the Plan’s unfunded actuarial liability. The County is making annual contributions in excess of this amount, and therefore the Plan is in compliance with Georgia law.
4. Additionally, the Georgia law allows sponsors to offset future required contributions with accumulated contributions in excess of the minimum (i.e., credit balance). The County currently has a credit balance of \$2.8 million. It should be noted that the contributions that contributed to this balance are already recognized in the System’s assets, and drawing upon the credit balance to cover a portion of County contribution requirements has the impact of increasing future actuarially determined contributions.
5. The actuarially determined contribution for the upcoming year is \$64.8 million, an increase of \$5.0 million from last year, based on a 15-year level dollar amortization of the unfunded actuarial accrued liability.
6. The unfunded actuarial accrued liability is \$553.0 million, which is an increase of \$35.7 million since the prior valuation. Most of this increase is due to investment losses and actuarial assumption changes made this year.
7. The following actuarial assumptions were approved by the Board and changed with this valuation:
  - The Pension Board Investment Committee decided in January 2019 to lower the assumed rate of return from 7.35% to 7.25%.
  - Administrative expenses increased from \$650,000 to \$800,000 for the year beginning January 1, 2019, based on the actual prior year expenses rounded to the nearest \$50,000.

As a result of these assumption changes, the net employer normal cost increased by \$0.2 million and the actuarial accrued liability increased by \$17.7 million. The total impact was an increase in the actuarially determined contribution of \$1.8 million.
8. The funded ratio (the ratio of the actuarial value of assets to actuarial accrued liability) is 70.2%, compared to the prior year funded ratio of 71.8%. This ratio is one measure of funding status, and its history is a measure of funding progress. Using the market value of assets, the funded ratio is 66.0%, compared to 75.4% as of the prior valuation date. These measurements are not necessarily appropriate for assessing the sufficiency of System assets to cover the estimated cost of settling the System’s benefit obligation or the need for or the amount of future contributions.

9. The actuarial loss from investment and other experience is \$37.6 million, or 2.1% of actuarial accrued liability.
10. The rate of return on the market value of assets was -6.00% for the 2018 plan year. The return on the actuarial value of assets was 4.92% for the same period due to the recognition of prior years' investment gains and losses. This resulted in an actuarial loss when measured against the assumed rate of return of 7.35%. This actuarial investment loss increased the employer contribution by \$3.4 million. Given the low fixed income interest rate environment, target asset allocation and expectations of future investment returns for various classes, we advise the Board to continue to monitor actual and anticipated investment returns relative to the assumed long-term rate of return on investments. As noted previously, the Trustees lowered the assumption to 7.25% with this valuation.
11. The actuarial value of assets is 106.2% of the market value of assets. The investment experience in the past years has only been partially recognized in the actuarial value of assets. As the deferred net loss is recognized in future years, the cost of the Plan is likely to increase unless the net loss is offset by future experience. The recognition of the market losses of \$76.4 million will also have an impact on the future funded ratio. If the net deferred gains were recognized immediately in the actuarial value of assets, the actuarially determined contribution would increase from \$64.8 million to about \$73.0 million.
12. As requested by County Staff, the actuarially determined contribution has been allocated to various County Funds and to DFACS. The allocation schedule is provided on page 8 in this report.
13. The Retirement System was closed to new entrants in 1999, and the covered active employee group is declining. There are 240 actives remaining as of the valuation date. There are 3,252 annuitants, and monthly benefit payments totaled \$138.1 million in 2018. Over the next ten years, benefit payments are projected to grow to \$154.4 million, as shown in Exhibit H in Section 3.
14. This report constitutes an actuarial valuation for the purpose of determining the actuarially determined contribution (ADC) under the Plan's funding policy. The information contained in Section 5 provides the accounting information for Governmental Accounting Standards Board (GASB) Statements No. 67 and No. 68, for inclusion in the plan and employer's financial statements as of December 31, 2018.
15. The Net Pension Liability (NPL) is equal to the difference between the Total Pension Liability (TPL) and the Plan's fiduciary net position (equal to the market value of assets). The NPL as of December 31, 2018 is \$629.3 million.
16. This actuarial report as of January 1, 2019 is based on financial and demographic data as of December 31, 2018. Changes subsequent to that date are not reflected and will affect future actuarial costs of the System.
17. Segal has not been engaged to perform a detailed analysis of the potential range of the impact of risk relative to the System's future financial condition, but have included a brief discussion of some risks that may affect the System in Section 2. A more detailed assessment would provide the Board with a better understanding of the inherent risks. This could be important because retired participants account for most of the System's liabilities, leaving limited options for reducing costs in the event of adverse experience.

## Summary of Key Valuation Results

		2019	2018
<b>Contributions for plan year beginning January 1:</b>	• Actuarially determined employer contributions	\$64,772,780	\$59,745,750
	• Actual employer contributions	--	59,203,000
	• Georgia credit balance	2,791,707	3,297,635
<b>Actuarial accrued liability for plan year beginning January 1:</b>	• Retired participants and beneficiaries	\$1,730,665,060	\$1,670,026,021
	• Inactive vested participants and participants due a refund	2,808,087	4,157,557
	• Active participants	119,390,048	158,986,808
	• Total	1,852,863,195	1,833,170,386
	• Normal cost including administrative expenses	3,499,787	4,418,154
<b>Assets for plan year beginning January 1:</b>	• Market value of assets (MVA)	\$1,223,532,000	\$1,382,953,000
	• Actuarial value of assets (AVA)	1,299,897,798	1,315,952,327
	• Actuarial value of assets as a percentage of market value of assets	106.24%	95.16%
<b>Funded status for plan year beginning January 1:</b>	• Unfunded actuarial accrued liability on market value of assets	\$629,331,195	\$450,217,386
	• Funded percentage on MVA basis	66.03%	75.44%
	• Unfunded actuarial accrued liability on actuarial value of assets	\$552,965,397	\$517,218,059
	• Funded percentage on AVA basis	70.16%	71.79%
<b>Key assumptions:</b>	• Net investment return	7.25%	7.35%
	• Inflation rate	2.00%	2.00%
<b>GASB information</b>	• Discount rate	7.25%	7.35%
	• Total pension liability	\$1,852,863,195	\$1,833,170,386
	• Plan fiduciary net position	1,223,532,000	1,382,953,000
	• Net pension liability	629,331,195	450,217,386
	• Plan fiduciary net position as a percentage of total pension liability	66.03%	75.44%
	• Pension expense	\$87,952,440	\$163,256,310
<b>Demographic data for plan year beginning January 1</b>	• Number of retired participants and beneficiaries	3,252	3,230
	• Number of inactive vested participants	18	23
	• Number of active participants	240	339
	• Total payroll	\$14,845,291	\$20,373,597
	• Average payroll	61,855	60,099

Actuarially Determined Employer Contribution Allocated by Fund			
Fulton County Fund	Fund Number	Percentage of Total Liability	Actuarially Determined Employer Contribution (ADEC)*
General	100	68.08%	\$44,097,567
Airport	200	0.17%	109,068
Water & Sewer	201 & 203	3.15%	2,041,128
Old SSD	300	7.11%	4,605,882
South Fulton District	301 & 307	9.35%	6,054,644
Emergency 911	340	0.49%	314,961
Fulton Employee Retirement	415	0.13%	83,500
Restricted Assets	441	0.09%	59,546
Grants	461	0.31%	198,556
Risk Management	725	0.05%	35,341
Grants - Health & Wellness	818 & 310	5.87%	3,799,731
Comm Dev Block Grants	865	0.04%	25,558
DFACS	DFACS	<u>5.17%</u>	<u>3,347,298</u>
Total		100.00%	\$64,772,780

*\* Each Fund's normal cost was calculated independently. The administrative expenses and the amortization of the unfunded liability were allocated based on the actuarial accrued liability of each Fund as a percentage of the System's total, and then added to normal cost to determine an ADEC. Allocating the cost in this manner ensures that the funded percentage for each Fund equals the funded percentage for the System as a whole.*



## Important Information About Actuarial Valuations

An actuarial valuation is a budgeting tool with respect to the financing of future projected obligations of a pension plan. It is an estimated forecast – the actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.

In order to prepare a valuation, Segal Consulting (“Segal”) relies on a number of input items. These include:

<b>Plan of benefits</b>	Plan provisions define the rules that will be used to determine benefit payments, and those rules, or the interpretation of them, may change over time. Even where they appear precise, outside factors may change how they operate. It is important to keep Segal informed with respect to plan provisions and administrative procedures, and to review the plan summary included in our report to confirm that Segal has correctly interpreted the plan of benefits.
<b>Participant data</b>	An actuarial valuation for a plan is based on data provided to the actuary by the County. Segal does not audit such data for completeness or accuracy, other than reviewing it for obvious inconsistencies compared to prior data and other information that appears unreasonable. It is important for Segal to receive the best possible data and to be informed about any known incomplete or inaccurate data.
<b>Assets</b>	The valuation is based on the market value of assets as of the valuation date, as provided by the County. The County uses an “actuarial value of assets” that differs from market value to gradually reflect year-to-year changes in the market value of assets in determining the contribution requirements.
<b>Actuarial assumptions</b>	In preparing an actuarial valuation, Segal projects the benefits to be paid to existing plan participants for the rest of their lives and the lives of their beneficiaries. This projection requires actuarial assumptions as to the probability of death, disability, withdrawal, and retirement of each participant for each year. In addition, the benefits projected to be paid for each of those events in each future year reflect actuarial assumptions as to salary increases and cost-of-living adjustments. The projected benefits are then discounted to a present value, based on the assumed rate of return that is expected to be achieved on the plan’s assets. There is a reasonable range for each assumption used in the projection and the results may vary materially based on which assumptions are selected. It is important for any user of an actuarial valuation to understand this concept. Actuarial assumptions are periodically reviewed to ensure that future valuations reflect emerging plan experience. While future changes in actuarial assumptions may have a significant impact on the reported results, that does not mean that the previous assumptions were unreasonable.

The user of Segal’s actuarial valuation (or other actuarial calculations) should keep the following in mind:

- The actuarial valuation is prepared at the request of the County. Segal is not responsible for the use or misuse of its report, particularly by any other party.
- An actuarial valuation is a measurement of the plan’s assets and liabilities at a specific date. Accordingly, except where otherwise noted, Segal did not perform an analysis of the potential range of future financial measures. The actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.
- Actuarial results in this report are not rounded, but that does not imply precision.
- If the County is aware of any event or trend that was not considered in this valuation that may materially change the results of the valuation, Segal should be advised, so that we can evaluate it.
- Segal does not provide investment, legal, accounting, or tax advice. Segal’s valuation is based on our understanding of applicable guidance in these areas and of the plan’s provisions, but they may be subject to alternative interpretations. The County should look to their other advisors for expertise in these areas.

As Segal Consulting has no discretionary authority with respect to the management or assets of the System, it is not a fiduciary in its capacity as actuaries and consultants with respect to the System.

## Section 2: Actuarial Valuation Results

### Participant Data

The Actuarial Valuation and Review considers the number and demographic characteristics of covered participants, including active participants, inactive vested participants, retired participants and beneficiaries. This section presents a summary of significant statistical data on these participant groups. More detailed information for this valuation year and the preceding valuation can be found in *Section 3, Exhibits A, B, and C*.

The system was closed to new entrants in 1999. Therefore, the number of active participants is declining and the ratio of non-actives to actives is increasing.

#### PARTICIPANT POPULATION: 2009 – 2018

Year Ended December 31	Active Participants	Inactive Vested Participants <sup>1</sup>	Retired Participants and Beneficiaries	Total Non-Actives	Ratio of Non-Actives to Actives
2009	1,264	33	2,764	2,797	2.21
2010	1,103	36	2,886	2,922	2.65
2011	937	29	2,995	3,024	3.23
2012	811	23	3,071	3,094	3.82
2013	678	23	3,137	3,160	4.66
2014	576	27	3,179	3,206	5.57
2015	478	27	3,210	3,237	6.77
2016	394	26	3,232 <sup>2</sup>	3,258	8.27
2017	339	23	3,230	3,253	9.60
2018	240	18	3,252	3,270	13.63

<sup>1</sup>Excludes terminated participants due a refund of employee contributions

<sup>2</sup>Excludes one suspended beneficiary

## Active Participants

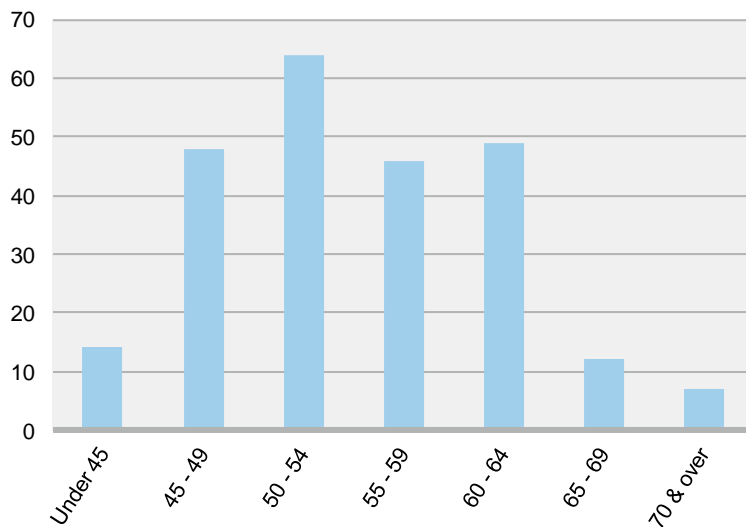
Plan costs are affected by the age, years of service and payroll of active participants. In this year's valuation, there were 240 active participants with an average age of 55.4, average years of service of 24.5 years and average payroll of \$61,855. The 339 active participants in the prior valuation had an average age of 54.3, average service of 24.0 years and average payroll of \$60,099.

## Inactive Participants

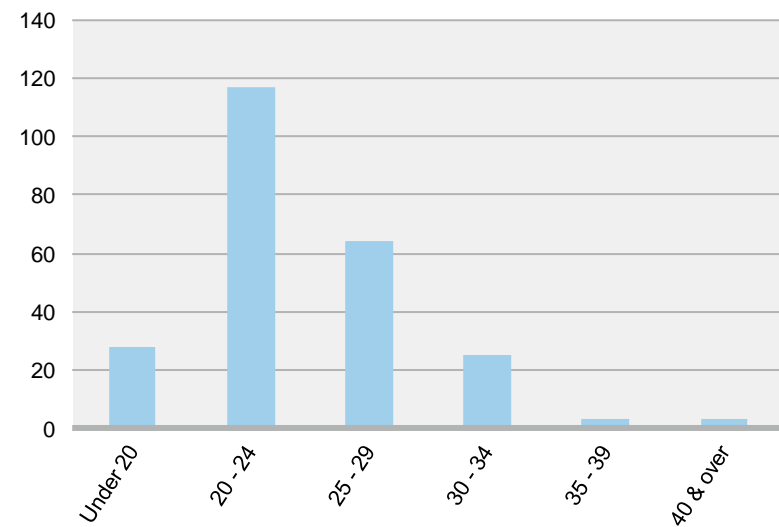
In this year's valuation, there were 18 participants with a vested right to a deferred or immediate vested benefit.

### Distribution of Active Participants as of December 31, 2018

#### ACTIVES BY AGE



#### ACTIVES BY YEARS OF SERVICE



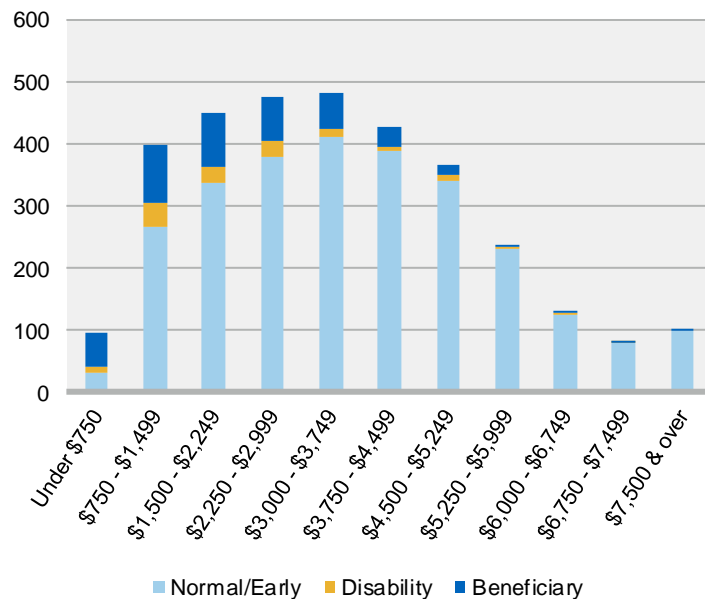
## Retired Participants and Beneficiaries

As of December 31, 2018, 2,826 retired participants and 426 beneficiaries were receiving total monthly benefits of \$11,460,282. For comparison, in the previous valuation, there were 2,809 retired participants and 421 beneficiaries receiving monthly benefits of \$11,080,567.

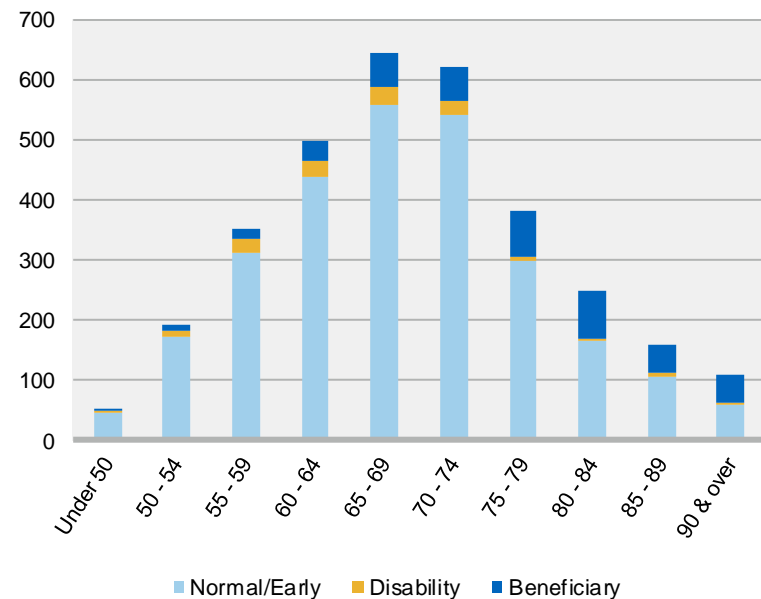
As of December 31, 2018, the average monthly benefit for retired participants and beneficiaries is \$3,524, compared to \$3,431 in the previous valuation. The average age is 69.1 in the current valuation, compared with 68.8 in the prior valuation.

### Distribution of Pensioners as of December 31, 2018

**PENSIONERS BY TYPE AND MONTHLY AMOUNT**



**PENSIONERS BY TYPE AND AGE**



## Historical Plan Population

The chart below demonstrates the progression of the active population over the last eight years. The chart also shows the changes among the retired population over the same time period.

### PARTICIPANT DATA STATISTICS: 2011 – 2018

Year Ended December 31	Active Participants			Retired Participants and Beneficiaries		
	Count	Average Age	Average Service	Count	Average Age	Average Monthly Amount
2011	937	51.5	20.1	2,995	66.8	- - <sup>1</sup>
2012	811	51.7	20.7	3,071	67.2	\$2,886
2013	678	52.2	21.2	3,137 <sup>2</sup>	67.4	2,999
2014	576	52.6	22.0	3,179	67.6	3,107
2015	478	52.9	22.5	3,210	68.0	3,208
2016	394	53.4	23.3	3,232 <sup>3</sup>	68.3	3,303
2017	339	54.3	24.0	3,230	68.8	3,431
2018	240	55.4	24.5	3,252	69.1	3,524

<sup>1</sup>Historical information not available as of December 31, 2011; the valuation was prepared by another actuary

<sup>2</sup>Includes one retiree in suspended status

<sup>3</sup>Excluded one suspended beneficiary

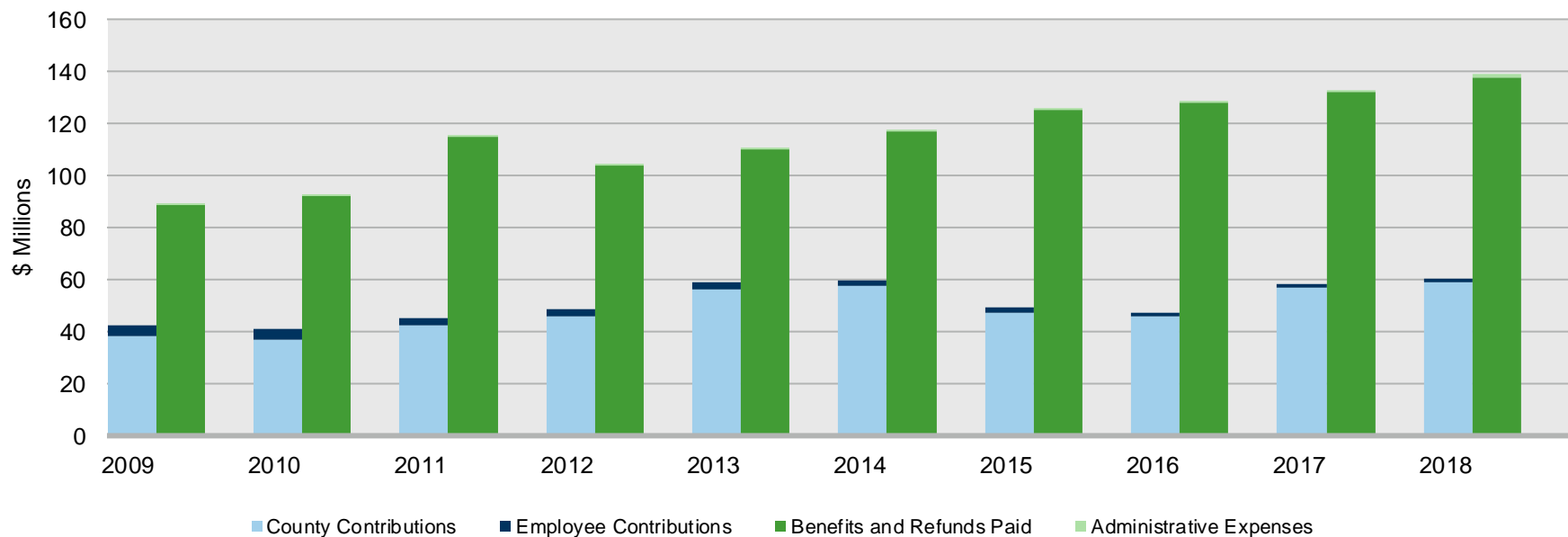
## Financial Information

Retirement plan funding anticipates that, over the long term, both contributions (less administrative expenses) and investment earnings (less investment fees) will be needed to cover benefit payments. Retirement plan assets change as a result of the net impact of these income and expense components.

Total contributions were \$60.3 million for the year ended December 31, 2018. Benefit payments and refunds totaled \$138.1 million, and are projected to increase over the next ten years. To the extent that future contributions are less than benefit payments, investment earnings or fund assets will be needed to cover the shortfall.

Additional financial information, including a summary of transactions for the valuation year, is presented in *Section 3, Exhibits D, E and F*.

**COMPARISON OF CONTRIBUTIONS MADE WITH BENEFITS AND EXPENSES PAID  
FOR YEARS ENDED DECEMBER 31, 2009 – 2018**



It is desirable to have level and predictable plan costs from one year to the next. For this reason, the Board has approved an asset valuation method that gradually adjusts to market value. Under this valuation method, the full value of market fluctuations is not recognized in a single year and, as a result, the asset value and the plan costs are more stable. The amount of the adjustment to recognize market value is treated as income, which may be positive or negative. Realized and unrealized gains and losses are treated equally and, therefore, the sale of assets has no immediate effect on the actuarial value.

### DETERMINATION OF ACTUARIAL VALUE OF ASSETS FOR YEAR ENDED DECEMBER 31, 2018

<b>1.</b>	Market value of assets, December 31, 2018			\$1,223,532,000
<b>2.</b>	Calculation of unrecognized return	<b>Original Amount<sup>1</sup></b>	<b>Percent Deferred</b>	<b>Unrecognized Amount<sup>2</sup></b>
(a)	Year ended December 31, 2018	-\$179,310,977	80%	-\$143,448,782
(b)	Year ended December 31, 2017	157,468,025	60	94,480,815
(c)	Year ended December 31, 2016	-14,099,074	40	-5,639,630
(d)	Year ended December 31, 2015	-108,791,007	20	-21,758,201
(e)	Year ended December 31, 2014	-34,989,501	0	<u>0</u>
(f)	Total unrecognized return <sup>3</sup>			-76,365,798
<b>3.</b>	Preliminary actuarial value: <b>(1) - (2f)</b>			\$1,299,897,798
<b>4.</b>	Adjustment to be within 20% corridor			0
<b>5.</b>	Final actuarial value of assets as of December 31, 2018: <b>(3) + (4)</b>			<u>\$1,299,897,798</u>
<b>6.</b>	Actuarial value as a percentage of market value: <b>(5) ÷ (1)</b>			106.2%
<b>7.</b>	Amount deferred for future recognition: <b>(1) - (5)</b>			-\$76,365,798

<sup>1</sup>Total return minus expected return on a market value basis

<sup>2</sup>Recognition at 20% per year over five years

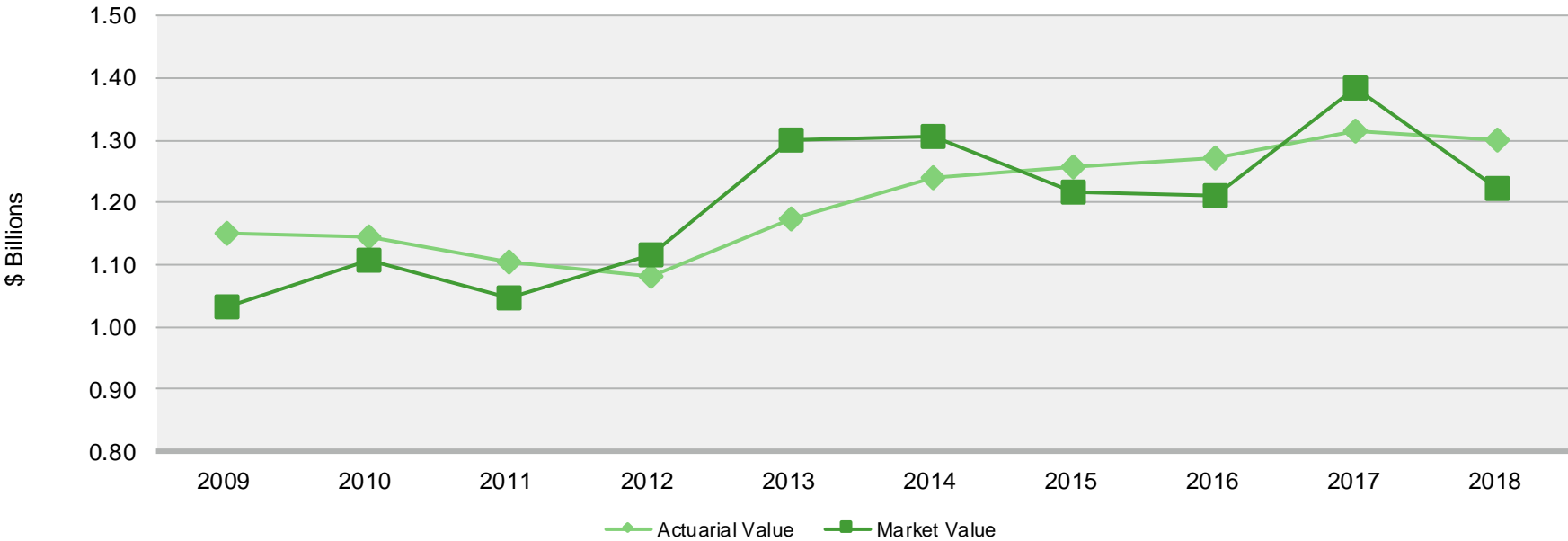
<sup>3</sup>Deferred return as of December 31, 2018 recognized in each of the next four years:

(a) Amount recognized on December 31, 2019	-\$28,946,607	(c) Amount recognized on December 31, 2021	-\$4,368,590
(b) Amount recognized on December 31, 2020	-7,188,406	(d) Amount recognized on December 31, 2022	-35,862,195



Both the actuarial value and market value of assets are representations of the Plan’s financial status. As investment gains and losses are gradually taken into account, the actuarial value of assets tracks the market value of assets. The actuarial asset value is significant because the Plan’s liabilities are compared to these assets to determine what portion, if any, remains unfunded. Amortization of the unfunded actuarial accrued liability is an important element in determining the contribution requirement.

**ACTUARIAL VALUE OF ASSETS VS. MARKET VALUE OF ASSETS AS OF DECEMBER 31, 2009 – 2018**



## Actuarial Experience

To calculate any actuarially determined contribution, assumptions are made about future events that affect the amount and timing of benefits to be paid and assets to be accumulated. Each year actual experience is measured against the assumptions. If overall experience is more favorable than anticipated (an actuarial gain), any contribution requirement will decrease from the previous year. On the other hand, any contribution requirement will increase if overall actuarial experience is less favorable than expected (an actuarial loss).

Taking account of experience gains or losses in one year without making a change in assumptions reflects the belief that the single year's experience was a short-term development and that, over the long term, experience will return to the original assumptions. For contribution requirements to remain stable, assumptions should approximate experience.

If assumptions are changed, the contribution requirement is adjusted to take into account a change in experience anticipated for all future years.

The total loss is \$37,633,237, which includes \$31,019,957 from investment experience and \$6,613,280 from all other sources. The net experience variation from individual sources other than investments was 0.4% of the actuarial accrued liability. A discussion of the major components of the actuarial experience is on the following pages.

### ACTUARIAL EXPERIENCE FOR YEAR ENDED DECEMBER 31, 2018

<b>1</b>	Net loss from investments <sup>1</sup>	-\$31,019,957
<b>2</b>	Net loss from administrative expenses	-106,405
<b>3</b>	Net loss from other experience	<u>-6,506,875</u>
<b>4</b>	Net experience loss: <b>1 + 2 + 3</b>	-\$37,633,237

<sup>1</sup>Details on next page.

## Investment Experience

A major component of projected asset growth is the assumed rate of return. The assumed return should represent the expected long-term rate of return, based on the Plan's investment policy. The rate of return on the market value of assets was -6.00% for the year ended December 31, 2018.

For valuation purposes, the assumed rate of return on the actuarial value of assets is 7.35%. The actual rate of return on an actuarial basis for the 2018 plan year was 4.92%. Since the actual return for the year was less than the assumed return, the Plan experienced an actuarial loss during the year ended December 31, 2018 with regard to its investments.

### INVESTMENT EXPERIENCE

	Year Ended December 31, 2018		Year Ended December 31, 2017	
	Market Value	Actuarial Value	Market Value	Actuarial Value
<b>1</b> Net investment income	-\$80,562,000	\$62,804,471	\$245,564,000	\$118,416,292
<b>2</b> Average value of assets	1,343,523,000	1,276,522,827	1,174,613,000	1,234,760,035
<b>3</b> Rate of return: <b>1 ÷ 2</b>	-6.00%	4.92%	20.91%	9.59%
<b>4</b> Assumed rate of return	7.35%	7.35%	7.50%	7.50%
<b>5</b> Expected investment income: <b>2 x 4</b>	98,748,977	93,824,428	88,095,975	92,607,003
<b>6</b> Actuarial gain/(loss): <b>1 - 5</b>	<u>-\$179,310,977</u>	<u>-\$31,019,957</u>	<u>\$157,468,025</u>	<u>\$25,809,289</u>

Because actuarial planning is long term, it is useful to see how the assumed investment rate of return has followed actual experience over time. The chart below shows the rate of return on an actuarial basis compared to the actual market value investment return for the last 11 years, including averages over select time periods.

The Pension Board Investment Committee decided in January 2019 to lower the assumed rate of return from 7.35% to 7.25%. This rate is a reasonable assumption based on the System’s investment policy.

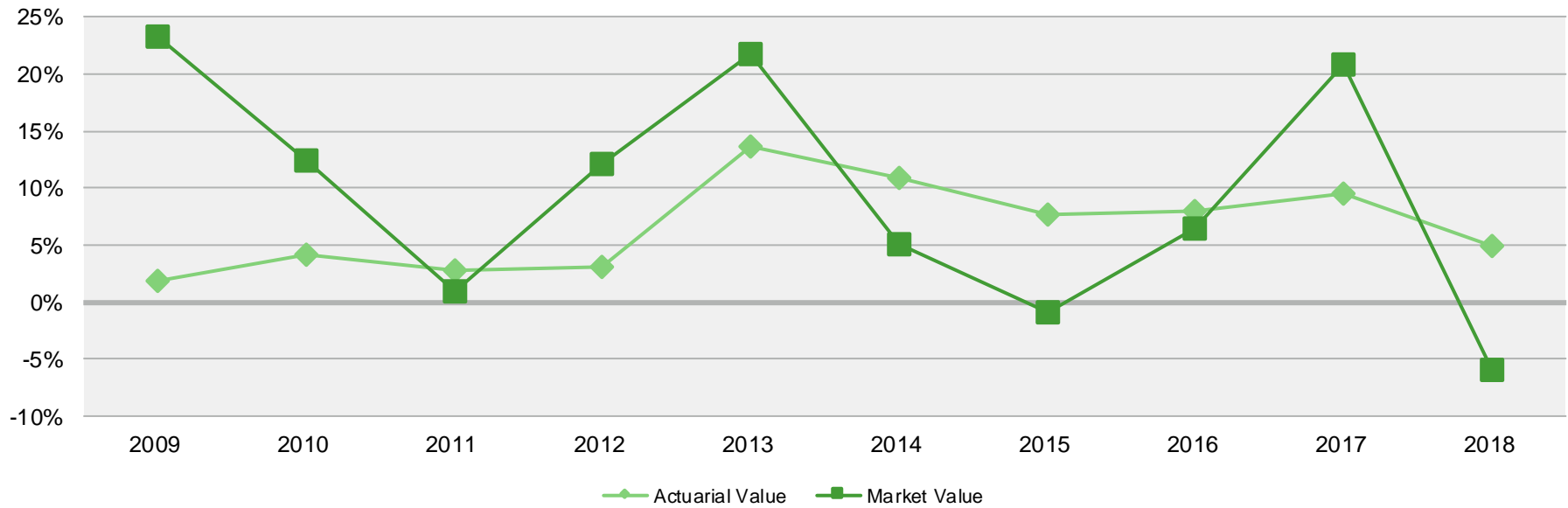
### INVESTMENT RETURN – ACTUARIAL VALUE VS. MARKET VALUE: 2009 - 2018

Year Ended December 31	Actuarial Value Investment Return		Market Value Investment Return	
	Amount	Percent	Amount	Percent
2009	\$21,198,000	1.84%	\$200,095,000	23.35%
2010	46,207,000	4.11	125,667,000	12.47
2011	30,332,424	2.73	9,935,000	0.93
2012	33,418,150	3.10	123,662,000	12.13
2013	143,949,477	13.63	236,967,000	21.76
2014	124,992,222	10.92	64,143,000	5.05
2015	92,696,727	7.71	-11,187,000	-0.88
2016	96,916,835	7.97	75,369,000	6.40
2017	118,416,292	9.59	245,564,000	20.91
2018	<u>62,804,471</u>	4.92	<u>-80,562,000</u>	-6.00
Total	\$770,931,598		\$989,653,000	
Most recent five-year average return		8.16%		4.71%
Most recent ten-year average return		6.65%		8.77%

Note: Each year’s yield is weighted by the average asset value in that year.

Subsection B described the actuarial asset valuation method gradually recognizes fluctuations in the market value rate of return. The goal of this is to stabilize the actuarial rate of return and to produce more level pension plan costs.

### MARKET AND ACTUARIAL RATES OF RETURN FOR YEARS ENDED DECEMBER 31, 2009 - 2018



## **Administrative Expenses**

Administrative expenses for the year ended December 31, 2018 totaled \$776,000 compared to the assumption of \$650,000. This resulted in a loss of \$106,405 for the year, when adjusted for timing. The assumed administrative expenses are the prior year actual amount rounded to the nearest \$50,000, the assumption increased from \$650,000 to \$800,000 for the current year.

## **Other Experience**

There are other differences between the expected and the actual experience that appear when the new valuation is compared with the projections from the previous valuation. These include:

- the extent of turnover among participants,
- retirement experience (earlier or later than projected),
- mortality (more or fewer deaths than projected),
- the number of disability retirements (more or fewer than projected), and
- salary increases (greater or smaller than projected).

The net loss from this other experience for the year ended December 31, 2018 amounted to \$6,506,875, which is 0.4% of the actuarial accrued liability.

## Changes in the Actuarial Accrued Liability

The actuarial accrued liability as of January 1, 2019 is \$1,852,863,195, an increase of \$19,692,809, or 1.1%, from the actuarial accrued liability as of the prior valuation date. The liability is expected to grow each year with normal cost and interest, and to decline due to benefit payments made. Additional fluctuations can occur due to actual experience that differs from expected (as discussed in the previous subsection), and due to changes in assumptions. The majority of the increase this year is due to the lower assumed rate of return, which is also the discount rate used to value the liabilities.

## Actuarial Assumptions

- The Pension Board Investment Committee decided in January 2019 to lower the assumed rate of return from 7.35% to 7.25%.
- This change increased the actuarial accrued liability by 1.0% and increased the normal cost by 2.6%.
- Assumed administrative expenses also increased to \$800,000 for the year beginning January 1, 2019.
- Details on actuarial assumptions and methods are in *Section 4, Exhibit I*.

## Plan Provisions

- There were no changes in plan provisions since the prior valuation.
- A summary of plan provisions is in *Section 4, Exhibit II*.

## Development of Unfunded Actuarial Accrued Liability

### DEVELOPMENT FOR YEAR ENDED DECEMBER 31, 2018

<b>1</b>	Unfunded actuarial accrued liability at beginning of year		\$517,218,059
<b>2</b>	Normal cost at beginning of year		4,418,154
<b>3</b>	Total contributions		-60,313,000
<b>4</b>	Interest		
	• For whole year on <b>1 + 2</b>	\$38,340,262	
	• For half year on <b>3</b>	<u>-2,005,777</u>	
	Total interest		<u>36,334,485</u>
<b>5</b>	Expected unfunded actuarial accrued liability		\$497,657,698
<b>6</b>	Changes due to:		
	• Net experience loss	\$37,633,237	
	• Assumption changes	<u>17,674,462</u>	
	Total changes		<u>55,307,699</u>
<b>7</b>	Unfunded actuarial accrued liability at end of year		<u>\$552,965,397</u>



## Actuarially Determined Contribution

The actuarially determined contribution is equal to the employer normal cost payment and a payment on the unfunded actuarial accrued liability. As of January 1, 2019, the actuarially determined contribution is \$64,772,780.

The Board sets the methodology used to calculate the actuarially determined contribution, and the Trustees have opted to amortize the changes that occur each year over closed 15-year periods. As of January 1, 2018, the remaining outstanding bases were replaced with a single 15-year closed level dollar amortization. New bases will be established each year to recognize experience gains and losses, plan changes, assumption changes, and method changes. A credit balance of \$2.8 million creates a buffer for differences between the budget and recommended contribution.

The contribution requirement as of January 1, 2019 are based on the data previously described, the actuarial assumptions and Plan provisions described in *Section 4*, including all changes affecting future costs adopted at the time of the actuarial valuation, actuarial gains and losses, and changes in the actuarial assumptions.

### ACTUARIALLY DETERMINED CONTRIBUTION FOR YEAR BEGINNING JANUARY 1

	2019	2018
1. Total normal cost	\$2,699,787	\$3,768,154
2. Administrative expenses	800,000	650,000
3. Expected employee contributions	<u>-841,608</u>	<u>-1,161,788</u>
4. Employer normal cost: (1) + (2) - (3)	\$2,658,179	\$3,256,366
5. Actuarial accrued liability	1,852,863,195	1,833,170,386
6. Actuarial value of assets	1,299,897,798	1,315,952,327
7. Unfunded actuarial accrued liability: (5) - (6)	552,965,397	517,218,059
8. Payment on unfunded actuarial accrued liability	59,899,686	54,419,800
9. Adjustment for timing <sup>1</sup>	<u>2,214,915</u>	<u>2,069,584</u>
10. Total recommended contribution: (4) + (8) + (9)	<u>\$64,772,780</u>	<u>\$59,745,750</u>

<sup>1</sup>Actuarially determined contributions are assumed to be paid at the middle of every month.

## Reconciliation of Actuarially Determined Contribution

The chart below details the changes in the actuarially determined contribution from the prior valuation to the current year's valuation.

### RECONCILIATION OF ACTUARIALLY DETERMINED CONTRIBUTION FROM JANUARY 1, 2018 TO JANUARY 1, 2019

	Amount
Actuarially Determined Contribution as of January 1, 2018	\$59,745,750
• Effect of investment loss	3,359,502
• Effect of other gains and losses on accrued liability	716,227
• Effect of change in assumed rate of return	1,640,621
• Effect of change in administrative expense assumption	155,311
• Net effect of other changes, including composition and number of participants	<u>-844,631</u>
Total change	\$5,027,030
Actuarially Determined Contribution as of January 1, 2019	\$64,772,780

## History of Employer Contributions

A history of the most recent years of contributions is shown below.

### HISTORY OF EMPLOYER CONTRIBUTIONS: 2010 – 2019

Fiscal Year Ended December 31	Actuarially Determined Employer Contribution (ADEC) <sup>1</sup>	Actual Employer Contribution	Percent Contributed
2010	\$36,639,000	\$37,226,000	101.60%
2011	45,049,000	42,170,000	93.61%
2012	51,199,000	45,936,000	89.72%
2013	52,881,747	56,244,000	106.36%
2014	55,255,317	57,529,000	104.11%
2015	48,586,172	47,230,000	97.21%
2016	50,493,163	45,977,000	91.06%
2017	52,988,357	57,228,000	108.00%
2018	59,745,750	59,203,000	99.09%
2019	64,772,780	--	--

<sup>1</sup>Prior to 2015, this amount was the Annual Required Contribution (ARC)

## Risk

Since the actuarial valuation results are dependent on a given set of assumptions and data as of a specific date, there is a risk that emerging results may differ significantly as actual experience differs from the assumptions.

➤ Investment Risk (the risk that returns will be different than expected)

The market value rate of return over the last 10 years has ranged from a low of -6.00% to a high of 23.35%.

➤ Longevity Risk (the risk that mortality experience will be different than expected)

The actuarial valuation includes an expectation of future improvement in life expectancy. Emerging plan experience that does not match these expectations will result in either an increase or decrease in the actuarially determined contribution.

➤ Contribution Risk (the risk that actual contributions will be different from actuarially determined contribution)

The Plan's funding policy requires payment of the actuarially determined contribution. As long as this policy is adhered to, contribution risk is negligible.

➤ Demographic Risk (the risk that participant experience will be different than assumed)

Examples of this risk include:

- Actual retirements occurring earlier or later than assumed. The value of retirement plan benefits is sensitive to the rate of benefit accruals and any early retirement subsidies that apply.
- More or less active participant turnover than assumed.

➤ Maturity Measures

As pension plans mature, the cash need to fulfill benefit obligations will increase over time. Therefore, cash flow projections and analysis should be performed to assure that the Plan's asset allocation is aligned to meet emerging pension liabilities.

Currently the Plan has a non-active to active participant ratio of 13.6 to 1. In 2018, benefits paid were \$77.8 million more than contributions received. As the Plan matures, more cash will be needed from the investment portfolio to meet benefit payments.

This report does not contain a detailed analysis of the potential range of future measurements, but does include a brief discussion of some risks that may affect the System. Upon request, a more detailed assessment can be provided to enable a better understanding of the risks specific to the Fulton County Employees Retirement System.

## GFOA Solvency Test

The Actuarial Accrued Liability represents the present value of benefits earned, calculated using the plan’s actuarial cost method. The Actuarial Value of Assets reflects the financial resources available to liquidate the liability. The portion of the liability covered by assets reflects the extent to which accumulated plan assets are sufficient to pay future benefits, and is shown for liabilities associated with employee contributions, pensioner liabilities, and other liabilities. The Government Finance Officers Association (GFOA) recommends that the funding policy aim to achieve a funded ratio of 100 percent.

### GFOA SOLVENCY TEST AS OF DECEMBER 31, 2018

Actuarial accrued liability (AAL)	
• Active member contributions	\$22,435,652
• Retirees and beneficiaries	1,730,665,060
• Active and inactive members (employer-financed)	99,762,483
<b>Total</b>	<b>\$1,852,863,195</b>
Actuarial value of assets	\$1,299,897,798
Cumulative portion of AAL covered	
• Active member contributions	100.00%
• Retirees and beneficiaries	73.81%
• Active and inactive members (employer-financed)	0.00%

## **State Minimum Requirements**

Georgia Code Section 47-20-10(b) allows a Plan to be in compliance the minimum funding standards if the sponsor makes contributions equal to or greater than the annual required contribution (ARC) under Governmental Accounting Standards Board (GASB) Statements No. 25 and No. 27 as in effect on June 15, 2013. The lowest ARC allowable is based on a 30-year level percent-of-pay amortization of the Plan's unfunded actuarial liability. The County is making annual contributions in excess of this amount, based on a 15-year level dollar amortization, and therefore the Plan is in compliance with Georgia law.

## Section 3: Supplemental Information

### EXHIBIT A – TABLE OF PLAN COVERAGE

Category	Year Ended December 31		Change From Prior Year
	2018	2017	
<b>Active participants in valuation:</b>			
• Number	240	339	-29.2%
• Average age	55.4	54.3	1.1
• Average years of service	24.5	24.0	0.5
• Total payroll	\$14,845,291	\$20,373,597	-27.1%
• Average payroll	61,855	60,099	2.9%
• Account balances	22,435,652	29,885,588	-24.9%
<b>Inactive vested participants:</b>	18	23	-21.7%
<b>Retired participants:</b>			
• Number in pay status	2,690	2,667	0.9%
• Average age	68.1	67.9	0.2
• Average monthly benefit	\$3,783	\$3,675	2.9%
<b>Disabled participants:</b>			
• Number in pay status	136	142	-4.2%
• Average age	65.8	65.1	0.7
• Average monthly benefit	\$2,343	\$2,356	-0.6%
<b>Beneficiaries:</b>			
• Number in pay status	426	421	1.2%
• Average age	76.1	75.8	0.3
• Average monthly benefit	\$2,268	\$2,246	1.0%

**EXHIBIT B – PARTICIPANTS IN ACTIVE SERVICE AS OF DECEMBER 31, 2018  
BY AGE, YEARS OF SERVICE, AND AVERAGE PAYROLL**

Age	Years of Service							
	Total	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 & over
Under 45	14	--	8	6	--	--	--	--
	58,029	--	53,355	64,262	--	--	--	--
45 - 49	48	1	6	37	3	1	--	--
	60,895	4,621	39,952	64,527	80,343	50,070	--	--
50 - 54	64	--	6	35	19	4	--	--
	58,675	--	58,378	55,391	67,924	43,923	--	--
55 - 59	46	--	4	22	13	7	--	--
	65,798	--	44,658	59,782	73,042	83,333	--	--
60 - 64	49	1	2	13	21	10	--	2
	64,997	75,084	41,024	52,229	69,256	81,044	--	41,974
65 - 69	12	--	--	3	2	3	3	1
	65,598	--	--	42,296	77,654	48,131	64,294	167,700
70 & over	7	--	--	1	6	--	--	--
	50,851	--	--	42,762	52,200	--	--	--
<b>Total</b>	<b>240</b>	<b>2</b>	<b>26</b>	<b>117</b>	<b>64</b>	<b>25</b>	<b>3</b>	<b>3</b>
	\$61,855	\$39,853	\$49,135	\$58,766	\$68,813	\$70,557	\$64,294	\$83,883



## EXHIBIT C – RECONCILIATION OF PARTICIPANT DATA

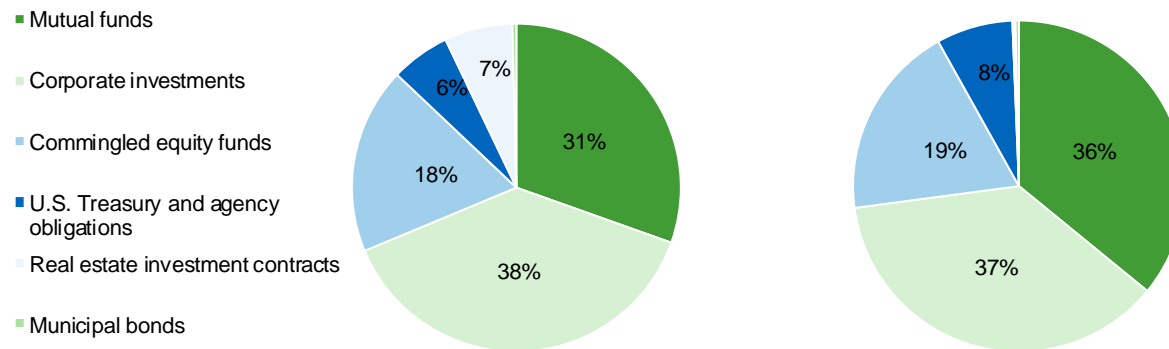
	Active Participants	Inactive Vested Participants	Disableds	Retired Participants	Beneficiaries	Total
<b>Number as of January 1, 2018</b>	<b>339</b>	<b>23</b>	<b>142</b>	<b>2,667</b>	<b>421</b>	<b>3,592</b>
• New participants	0	N/A	N/A	N/A	N/A	0
• Terminations	0	0	0	N/A	N/A	0
• Retirements	-96	-3	N/A	99	N/A	0
• New disabilities	-1	0	1	N/A	N/A	0
• Return to work	1	-1	0	0	N/A	0
• New beneficiaries	0	0	0	0	25	25
• Deaths	-2	0	-7	-76	-20	-105
• Lump sum cash-outs	0	-1	0	0	0	-1
• Data adjustments	0	0	0	0	0	0
• Transfer to DC Plan	-1	N/A	N/A	N/A	N/A	-1
<b>Number as of January 1, 2019</b>	<b>240</b>	<b>18</b>	<b>136</b>	<b>2,690</b>	<b>426</b>	<b>3,510</b>

## EXHIBIT D – SUMMARY STATEMENT OF INCOME AND EXPENSES ON A MARKET VALUE BASIS

	Year Ended December 31, 2018	Year Ended December 31, 2017
Net assets at market value at the beginning of the year	\$1,382,953,000	\$1,211,837,000
<b>Contribution income:</b>		
• Employer contributions	\$59,203,000	\$57,228,000
• Employer contributions	1,110,000	1,358,000
• Less administrative expenses	<u>-776,000</u>	<u>-656,000</u>
<i>Net contribution income</i>	<i>\$59,537,000</i>	<i>\$57,930,000</i>
<b>Investment income:</b>		
• Interest, dividends and other income	\$18,428,000	\$22,840,000
• Asset appreciation	-94,898,000	226,712,000
• Less investment fees	<u>-4,092,000</u>	<u>-3,988,000</u>
<i>Net investment income</i>	<i>-\$80,562,000</i>	<i>\$245,564,000</i>
<b>Total income available for benefits</b>	<b>-\$21,025,000</b>	<b>\$303,494,000</b>
<b>Less benefit payments:</b>		
• Benefit payments	-\$138,051,000	-\$132,378,000
• Transfers to DC Plan	-247,000	0
• Refunds of contributions	<u>-98,000</u>	<u>0</u>
<i>Net benefit payments</i>	<i>-\$138,396,000</i>	<i>-\$132,378,000</i>
<b>Change in reserve for future benefits</b>	<b>-\$159,421,000</b>	<b>\$171,116,000</b>
<b>Net assets at market value at the end of the year</b>	<b>\$1,223,532,000</b>	<b>\$1,382,953,000</b>

## EXHIBIT E – SUMMARY STATEMENT OF PLAN ASSETS

	December 31, 2018	December 31, 2017
Cash equivalents	\$13,112,000	\$22,533,000
Accounts receivable and funds held in escrow	1,467,000	8,190,000
Prepaid pension benefits	11,962,000	11,646,000
<b>Investments:</b>		
• Mutual funds	\$364,987,000	\$484,718,000
• Corporate investments	458,472,000	499,194,000
• Commingled equity funds	220,375,000	256,531,000
• U.S. Treasury and agency obligations	69,891,000	100,654,000
• Real estate investment contracts	80,311,000	3,980,000
• Municipal bonds	<u>4,629,000</u>	<u>4,610,000</u>
Total investments at market value	\$1,198,665,000	\$1,349,687,000
<b>Total assets</b>	<b>\$1,225,206,000</b>	<b>\$1,392,056,000</b>
Due to brokers for securities purchase	-\$1,667,000	-\$9,091,000
Other liabilities	<u>-7,000</u>	<u>-12,000</u>
Total accounts payable	-1,674,000	-9,103,000
<b>Net assets at market value</b>	<b>\$1,223,532,000</b>	<b>\$1,382,953,000</b>
<b>Net assets at actuarial value</b>	<b>\$1,299,897,798</b>	<b>\$1,315,952,327</b>



Note: Real estate investment contracts accounted for less than 1% of the assets in 2018. Municipal bonds made up less than 1% in both years.

## EXHIBIT F – DEVELOPMENT OF THE FUND THROUGH DECEMBER 31, 2018

Year Ended December 31	Employer Contributions	Employee Contributions	Net Investment Return*	Admin. Expenses	Benefit Payments	Market Value of Assets at Year-End	Actuarial Value of Assets at Year-End	Actuarial Value as a Percent of Market Value
2009	\$38,502,000	\$4,187,000	\$200,095,000	\$479,000	\$88,921,000	\$1,033,596,000	\$1,149,786,000	111.2%
2010	37,226,000	3,602,000	125,667,000	546,000	91,904,000	1,107,641,000	1,144,371,000	103.3%
2011	42,170,000	3,225,000	9,935,000	554,000	114,776,000	1,047,651,000	1,104,779,000	105.5%
2012	45,936,000	2,827,000	123,662,000	578,000	104,202,000	1,115,296,000	1,082,179,774	97.0%
2013	56,244,000	2,533,000	236,967,000	617,000	110,448,000	1,299,975,000	1,173,841,252	90.3%
2014	57,529,000	2,129,000	64,143,000	705,000	117,044,000	1,306,027,000	1,240,742,474	95.0%
2015	47,230,000	1,868,000	-11,187,000	581,000	125,402,000	1,217,955,000	1,256,554,200	103.2%
2016	45,977,000	1,633,000	75,369,000	788,000	128,309,000	1,211,837,000	1,271,984,035	105.0%
2017	57,228,000	1,358,000	245,564,000	656,000	132,378,000	1,382,953,000	1,315,952,327	95.2%
2018	59,203,000	1,110,000	-80,562,000	776,000	138,396,000	1,223,532,000	1,299,897,798	106.2%

\* On a market basis, net of investment fees

## EXHIBIT G – TABLE OF AMORTIZATION BASES

Type*	Date Established	Initial Period	Initial Amount	Annual Payment*	Years Remaining	Outstanding Balance
Initial Liability	01/01/2018	15	\$413,296,938	\$42,994,259	14	\$397,288,217
Actuarial experience gain	01/01/2018	15	-5,216,165	-542,625	14	-5,014,121
Change in assumptions	01/01/2018	15	112,434,921	11,696,327	14	108,079,846
Actuarial experience gain	01/01/2019	15	37,633,237	3,913,669	15	37,633,237
Change in assumptions	01/01/2019	15	17,674,462	1,838,056	15	17,674,462
<b>Total</b>				<b>\$59,899,686</b>		<b>\$555,661,641</b>

\* Level percentage of payroll

## EXHIBIT G-1– DEVELOPMENT OF CREDIT BALANCE

1. Credit balance as of January 1, 2018	\$3,297,635
2. County contributions with interest	61,171,863
3. Employee contributions with interest	1,146,914
4. Normal cost	-3,768,154
5. Administrative expenses	-650,000
6. Net amortization payments	-54,419,800
7. Interest at 7.35%	<u>-4,082,214</u>
8. Credit balance as of January 1, 2019	\$2,696,244
9. 2019 credit balance adjusted for contribution timing	<u>\$2,791,707</u>

## EXHIBIT H – BENEFIT PAYMENT PROJECTION

Segal has determined the anticipated benefits to be paid from the Plan over the next ten years. This projection is provided to help the Pension Board assess the future liquidity needs of the System, and to help determine whether the Plan should plan to sell assets to pay participants' benefits or to restructure the debt and equity allocations.

This is a mature and closed fund, and thus it is expected that the contributions paid into the Plan each year will not be sufficient to pay all of the annual benefit requirements and expenses. Investment income is required to make up the difference. The Board needs to ensure that interest and dividend income, along with maturing fixed income investments and the sale of equity investments, are at a sufficient level to provide existing and emerging benefit payments to participants and beneficiaries. This matter should be considered by the investment managers in designing their strategies.

The projection is shown below. The assumptions for retirement and mortality are the same rates shown in Section 4 of the report.

Projected Benefit Payments, 2019 - 2028				
Year Ended December 31	Number of Benefit Recipients	Benefits to Active Participants	Benefits to Non-Active Participants	Total Benefits Projected
2019	3,252	\$2,012,590	\$136,545,760	\$138,558,350
2020	3,255	3,642,842	138,117,301	141,760,143
2021	3,233	5,064,647	139,523,391	144,588,038
2022	3,200	6,252,265	140,712,254	146,964,519
2023	3,156	7,343,150	141,757,430	149,100,580
2024	3,106	8,324,871	142,536,204	150,861,075
2025	3,050	9,216,525	143,090,473	152,306,998
2026	2,987	9,956,918	143,441,817	153,398,735
2027	2,920	10,600,656	143,526,802	154,127,458
2028	2,847	11,109,411	143,305,350	154,414,761

## EXHIBIT I – DEFINITION OF PENSION TERMS

The following list defines certain technical terms for the convenience of the reader:

<b>Actuarial Accrued Liability for Actives:</b>	The equivalent of the accumulated normal costs allocated to the years before the valuation date.
<b>Actuarial Accrued Liability for Pensioners and Beneficiaries:</b>	The single-sum value of lifetime benefits to existing pensioners and beneficiaries. This sum takes account of life expectancies appropriate to the ages of the annuitants and the interest that the sum is expected to earn before it is entirely paid out in benefits.
<b>Actuarial Cost Method:</b>	A procedure allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability that are used to determine the actuarially determined contribution.
<b>Actuarial Gain or Loss:</b>	A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates. Through the actuarial assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted, or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., assets earn more than projected, salary increases are less than assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results yield in actuarial liabilities that are larger than projected. Actuarial gains will shorten the time required for funding of the actuarial balance sheet deficiency while actuarial losses will lengthen the funding period.
<b>Actuarially Equivalent:</b>	Of equal actuarial present value, determined as of a given date and based on a given set of Actuarial Assumptions.
<b>Actuarial Present Value (APV):</b>	The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. Each such amount or series of amounts is: Adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.) Multiplied by the probability of the occurrence of an event (such as survival, death, disability, withdrawal, etc.) on which the payment is conditioned, and Discounted according to an assumed rate (or rates) of return to reflect the time value of money.

<b>Actuarial Present Value of Future Plan Benefits:</b>	The Actuarial Present Value of benefit amounts expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age, anticipated future compensation, and future service credits. The Actuarial Present Value of Future Plan Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive members entitled to either a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.
<b>Actuarial Valuation:</b>	The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial Valuation for a governmental retirement system typically also includes calculations of items needed for compliance with GASB, such as the Actuarially Determined Contribution (ADC) and the Net Pension Liability (NPL).
<b>Actuarial Value of Assets (AVA):</b>	The value of the Fund's assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly plans use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the ADC.
<b>Actuarially Determined:</b>	Values that have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.
<b>Actuarially Determined Contribution (ADC):</b>	The employer's periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation, determined under the Plan's funding policy. The ADC consists of the Employer Normal Cost and the Amortization Payment.
<b>Amortization Method:</b>	A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization Payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.
<b>Amortization Payment:</b>	The portion of the pension plan contribution, or ADC, that is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.



<b>Assumptions or Actuarial Assumptions:</b>	The estimates upon which the cost of the Fund is calculated, including: <u>Investment return</u> - the rate of investment yield that the Fund will earn over the long-term future; <u>Mortality rates</u> - the death rates of employees and pensioners; life expectancy is based on these rates; <u>Retirement rates</u> - the rate or probability of retirement at a given age or service; <u>Disability rates</u> - the probability of disability retirement at a given age; <u>Withdrawal rates</u> - the rates at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement; <u>Salary increase rates</u> - the rates of salary increase due to inflation and productivity growth.
<b>Closed Amortization Period:</b>	A specific number of years that is counted down by one each year, and therefore declines to zero with the passage of time. For example, if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc. See Open Amortization Period.
<b>Decrements:</b>	Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or withdrawal.
<b>Defined Benefit Plan:</b>	A retirement plan in which benefits are defined by a formula applied to the member's compensation and/or years of service.
<b>Defined Contribution Plan:</b>	A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.
<b>Employer Normal Cost:</b>	The portion of the Normal Cost to be paid by the employer. This is equal to the Normal Cost less expected member contributions.
<b>Experience Study:</b>	A periodic review and analysis of the actual experience of the Fund that may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified as deemed appropriate by the Actuary.
<b>Funded Ratio:</b>	The ratio of the actuarial value of assets (AVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a market funded ratio, using the market value of assets (MVA), rather than the AVA.

<b>GASB 67 and GASB 68:</b>	Governmental Accounting Standards Board (GASB) Statements No. 67 and No. 68. These are the governmental accounting standards that set the accounting rules for public retirement systems and the employers that sponsor or contribute to them. Statement No. 68 sets the accounting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 67 sets the rules for the systems themselves.
<b>Investment Return:</b>	The rate of earnings of the Fund from its investments, including interest, dividends and capital gain and loss adjustments, computed as a percentage of the average value of the fund. For actuarial purposes, the investment return often reflects a smoothing of the capital gains and losses to avoid significant swings in the value of assets from one year to the next.
<b>Net Pension Liability (NPL):</b>	The Net Pension Liability is equal to the Total Pension Liability minus the Plan Fiduciary Net Position.
<b>Normal Cost:</b>	That portion of the Actuarial Present Value of pension plan benefits and expenses allocated to a valuation year by the Actuarial Cost Method. Any payment in respect of an Unfunded Actuarial Accrued Liability is not part of Normal Cost (see Amortization Payment). For pension plan benefits that are provided in part by employee contributions, Normal Cost refers to the total of employee contributions and employer Normal Cost unless otherwise specifically stated.
<b>Open Amortization Period:</b>	An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. If the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year. In theory, if an Open Amortization Period with level percentage of payroll is used to amortize the Unfunded Actuarial Accrued Liability, the UAAL will never decrease, but will become smaller each year, in relation to covered payroll, if the actuarial assumptions are realized.
<b>Plan Fiduciary Net Position:</b>	Market value of assets.
<b>Total Pension Liability (TPL):</b>	The actuarial accrued liability under the entry age normal cost method and based on the blended discount rate as described in GASB 67 and 68.
<b>Unfunded Actuarial Accrued Liability:</b>	The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative, in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus.
<b>Valuation Date or Actuarial Valuation Date:</b>	The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Plan Benefits is determined. The expected benefits to be paid in the future are discounted to this date.

## Section 4: Actuarial Valuation Basis

### EXHIBIT I – ACTUARIAL ASSUMPTIONS AND ACTUARIAL COST METHOD

<b>Rationale for Assumptions</b>	The information and analysis used in selecting each demographic assumption that has a significant effect on this actuarial valuation is shown in the Experience Study Report for the five-year period ended December 31, 2016. The new assumptions recommended in that study are implemented for the first time in this valuation. Changes from the prior year are listed at the end of this exhibit.			
<b>Net Investment Return:</b>	7.25% The net investment return assumption was chosen by the Pension Board Investment Committee. The Committee received input from the actuary, including a long-term range estimate derived from historical data, current and recent market expectations, and professional judgment. As part of the actuarial analysis, a building block approach was used that reflects inflation expectations and anticipated risk premiums for each of the portfolio's asset classes as provided by Segal Marco Advisors, as well as the Plan's target asset allocation.			
<b>Salary Increases:</b>	<b>Non-Public Safety Rates</b>		<b>Public Safety Rates</b>	
	<b>Age</b>	<b>Rate (%)</b>	<b>Age</b>	<b>Rate (%)</b>
	40-44	4.0%	40-44	6.0%
	45-49	3.0%	45-49	5.0%
	50 and older	2.0%	50-54	4.0%
			55 and older	3.0%
<b>Mortality Rates:</b>	<i>Pre-retirement</i>	RP-2014 Blue Collar Mortality Table, adjusted backward to the base year (2006) using Scale MP-2014, and projected generationally from 2006 using Scale MP-2016		
	<i>Healthy annuitants:</i>	RP-2014 Blue Collar Healthy Annuitant Mortality Table, adjusted backward to the base year (2006) using Scale MP-2014, set forward two years for males and one year for females, and projected generationally from 2006 using Scale MP-2016		
	<i>Disabled annuitants:</i>	RP-2014 Disabled Retiree Mortality Table, adjusted backward to the base year (2006) using Scale MP-2014, set forward four years for males and unadjusted for females, projected generationally using Scale MP-2016		
	The tables above, with adjustments as shown, reasonably reflect the mortality experience of the System as of the measurement date. The mortality tables are generationally projected to reflect future mortality improvement.			

**Termination Rates before Retirement:**

Age	Rate (%)				
	Mortality Base Rates (Without Projection from 2006)		Disability		Withdrawal
	Male	Female	Non-Public Safety	Public Safety	All Lives
40	0.10	0.05	0.07	0.18	2.00
45	0.16	0.09	0.12	0.29	2.00
50	0.26	0.13	0.20	0.48	2.00
55	0.38	0.19	0.34	0.81	2.00
60	0.64	0.31	0.54	1.30	2.00

\* Withdrawal rates cut off at first eligibility for retirement

**Retirement Rates:**

Rates for Unreduced Pension			
<u>Non-Public Safety</u>		<u>Public Safety</u>	
Age	Retirement Probability (%)	Age	Retirement Probability (%)
First eligibility	26.50	First eligibility	50.00
First eligibility plus one to two years	26.50	First eligibility plus one to two years	40.00
Ages through 69	26.50	Ages through 64	20.00
70	100.00	65	100.00
Rates for Reduced Pension			
<u>Non-Public Safety</u>		<u>Public Safety</u>	
Age	Retirement Probability (%)	Age	Retirement Probability (%)
40-44	0.00	40-44	5.00
45-49	5.00	45-49	15.00
50-54	10.00	50-54	20.00
55-59	15.00	55-59	30.00

<b>Description of Weighted Average Retirement Age</b>	Age 59, determined as follows: The weighted average retirement age for each participant is calculated as the sum of the product of each potential current or future retirement age times the probability of surviving from current age to that age and then retiring at that age, assuming no other decrements. The overall weighted retirement age is the average of the individual retirement ages based on all the active participants included in the January 1, 2019 actuarial valuation.
<b>Retirement Rates for Inactive Vested Participants:</b>	Earliest unreduced retirement age
<b>Unknown Data for Participants:</b>	Same as those exhibited by participants with similar known characteristics. If not specified, participants are assumed to be male.
<b>Family Composition:</b>	70% of males and 40% of females are assumed to be married. None are assumed to have dependent children. Females are assumed to be three years younger than their spouses.
<b>Benefit Election:</b>	All participants are assumed to take an annuity. No participants are assumed to transfer to the County's defined contribution plan.
<b>Final Average Earnings and Years of Service Loads:</b>	The following loads were applied in the computation of final average earnings or years of service used to compute benefits: <ul style="list-style-type: none"> <li>➤ A 1.3% load applied to final average earnings to adjust for a 27th pay period in some years</li> <li>➤ A 7.5% load applied to final average earnings to adjust for unused vacation time</li> <li>➤ A 2.0% load applied to years of service to adjust for unused sick leave</li> </ul>
<b>Interest on Employee Contributions:</b>	4.0%
<b>Administrative Expenses:</b>	Prior year actual amount rounded to the nearest \$50,000 (\$800,000 for 2019)
<b>Actuarial Value of Assets:</b>	Market value of assets less unrecognized returns in each of the last five years. Unrecognized return is equal to the difference between the actual market return and the expected return on the market value, and is recognized over a five-year period, further adjusted, if necessary, to be within 20% of the market value.
<b>Actuarial Cost Method:</b>	Entry Age Normal Actuarial Cost Method. Entry Age is the age at the time the participant commenced employment. Normal Cost and Actuarial Accrued Liability are calculated on an individual basis and are allocated by salary.
<b>Justification for Change in Actuarial Assumptions:</b>	The following changes in assumptions are reflected in this valuation: <ul style="list-style-type: none"> <li>➤ The net investment return assumption was lowered from 7.35% to 7.25%.</li> <li>➤ The administrative expense assumption increased from \$650,000 to \$800,000 as a result of higher actual expenses in 2018</li> </ul>

## EXHIBIT II – SUMMARY OF PLAN PROVISIONS

This exhibit summarizes the major provisions of the Plan included in the valuation. It is not intended to be, nor should it be interpreted as, a complete statement of all plan provisions.

<b>Plan Year:</b>	January 1 through December 31
<b>Plan Status:</b>	Closed to new entrants as of July 1, 1999
<b>Normal Retirement:</b>	
<i>Age and Service Requirement</i>	Earlier of age 65 with 10 years of Service, age 60 with 15 years of Service, age 55 with 30 years of Service, or 10 years of service and the sum of age and service equals 79 or more For elected officials or department heads, if termination is the result of resignation, failure to be re-elected, or abolishment of office, age 55 with 10 years of service
<i>Amount</i>	1991 Plan - 2.00% of Final Average Compensation times years of Creditable Service. Enhanced Plan - 2.25% of Final Average Compensation times years of Creditable Service for the first five years, plus 2.50% of Final Average Compensation per year of Credited Service in excess of five years. The maximum benefit is 75% of Final Average Compensation. The minimum benefit is \$460 per month.
<i>Final Average Compensation</i>	The average of the Participant's earnings during the three years of employment that produce the highest average. For elected officials and department heads, Final Average Compensation is not less than the average earnings during the 12 months prior to termination.
<b>Early Retirement:</b>	
<i>Age Requirement</i>	None
<i>Service Requirement</i>	15 years of Credited Service
<i>Amount</i>	Normal pension accrued, reduced 0.5% for the first 60 months and 0.25% for the remaining months preceding employee's normal retirement date. The benefit of a Peace Officer with 25 years will be reduced by 0.25% for each month that commencement precedes age 55. The minimum benefit is \$300 per month.
<b>Disability:</b>	
<i>Age Requirement</i>	None
<i>Service Requirement</i>	10 years of Credited Service or disabled in the line of duty
<i>Amount</i>	Normal pension accrued (For Peace Officers, the benefit assumes 35 years of service.)

<b>Vesting:</b>	
<i>Age Requirement</i>	None
<i>Service Requirement</i>	10 years of Credited Service
<i>Amount</i>	Normal pension accrued
<b>Death Benefit</b>	<p>A percentage of the amount the Participant either a) was receiving at death, b) would have received had he retired with a normal retirement benefit at death, or c) would have received as a vested pension benefit had he survived to age 65.</p> <p>75% for the Enhanced Plan, 1991 Plan, and 1982 Plan 50% for other Plans</p> <p>A beneficiary of a Peace Officer who dies in the line of duty receives the amount of compensation that the deceased would have received from the employer for one year from the date of death. After the first year, 75% of the greater of the participant's salary at death or the salary paid to a six-year police officer.</p>
<b>Interest on Contributions</b>	Employee contributions are credited with an annual interest rate of 4%
<b>Cost of Living Adjustments</b>	3% per year for the Enhanced, 1991 and 1992 Plans if CPI is greater than zero
<b>Member Contribution Rates</b>	<p>Enhanced Plan - 6% of pay 1991 and 1982 Plans – 5% of pay Other Plans – 0% to 4% of pay</p>
<b>Changes in Plan Provisions:</b>	There have been no changes in plan provisions since the last valuation.

## Section 5: GASB Information

### EXHIBIT 1 – GENERAL INFORMATION

At December 31, 2018, pension plan membership consisted of the following:

Inactive employees or beneficiaries currently receiving benefits	3,252
Inactive employees entitled to but not yet receiving benefits*	18
Active employees	240
Total	3,510

\*Excludes terminated participants due a refund of contributions.

The System was closed to new entrants in 1999.

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*Contributions:* The Plan is subject to minimum funding standards of the Public Retirement Systems Standards Law (Georgia Code Section 47-20-10). The System establishes an actuarially determined contribution as recommended by an independent actuary. The actuarially determined contribution is the estimated amount necessary to finance the costs of benefits earned by employees during the year, plus an additional amount to finance any unfunded accrued liability.

*Benefits provided:* See Section 4, Exhibit II for a summary of plan provisions.



## EXHIBIT 2 – NET PENSION LIABILITY

The components of the net pension liability at December 31, 2018 were as follows:

Total pension liability	\$1,852,863,195
Plan fiduciary net position	1,223,532,000
Net pension liability	629,331,195
Plan fiduciary net position as a percentage of the total pension liability	66.03%

*Actuarial assumptions.* The total pension liability was determined by an actuarial valuation as of December 31, 2018, using the following actuarial assumptions, applied to all periods included in the measurement:

Inflation	2.00%
Salary increases	2.00% - 6.00%
Investment rate of return	7.25%, net of pension plan investment expense, including inflation

Pre-retirement mortality is based on to the RP-2014 Blue Collar Employee Mortality Table, adjusted backward to 2006 with Scale MP-2014. Post-retirement mortality for non-disabled lives is based on the RP-2014 Blue Collar Healthy Annuitant Mortality Table, adjusted backward to 2006 with Scale MP-2014, set forward two years for males and one year for females. Mortality for disabled lives is based on the RP-2014 Disabled Retiree Mortality Table, adjusted backward to 2006 with Scale MP-2014, set forward four years for males and unadjusted for females. All tables are projected generationally from 2006 with Scale MP-2016.

The actuarial assumptions used in the December 31, 2018 valuation were based on the results of an experience study for the period January 1, 2012 to December 31, 2016.

The long-term expected rate of return on pension plan investments was determined using a building-block method in which best-estimate ranges of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation. Best estimates of geometric real rates of return

for each major asset class included in the pension plan’s target asset allocation as of December 31, 2018 are summarized in the following table:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return*
U.S. Large Cap Equity	34%	5.50%
U.S. Small/Mid Cap Equity	14%	5.75%
International Equity	15%	5.75%
International Small Cap Equity	5%	6.00%
Emerging Market Equity	5%	7.25%
Core Bonds	12%	2.34%
Global Bonds (Unhedged)	5%	1.01%
Bank Loans	5%	3.50%
Global Asset Allocation	5%	4.22%
Total	100%	

\* Real rates of return are net of inflation

*Discount rate:* The discount rate used to measure the total pension liability was 7.25%. The projection of cash flows used to determine the discount rate assumed plan member contributions will be made at the current contribution rates (as a percentage of pay) and that County contributions will be made equal to the actuarially determined contribution. Based on those assumptions, the pension plan's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability. For the prior year, the discount rate was 7.35%.

### EXHIBIT 3 – CHANGES IN NET PENSION LIABILITY AND SENSITIVITY TO DISCOUNT RATES

	Total Pension Liability (TPL) (a)	Fiduciary Net Position (FNP) (b)	Net Pension Liability (NPL) (a) - (b)
Balances at December 31, 2017	\$1,833,170,386	\$1,382,953,000	\$450,217,386
Changes for the year:			
Service cost	\$3,768,154	--	\$3,768,154
Interest	129,928,930	--	129,928,930
Change of benefit terms	--	--	--
Change of assumptions	17,674,462	--	17,674,462
Differences between expected and actual experience	6,717,263	--	6,717,263
Contributions – employer	--	\$59,203,000	-59,203,000
Contributions – employee	--	1,110,000	-1,110,000
Net investment income	--	-80,562,000	80,562,000
Benefit payments, including refunds of employee contributions	-138,396,000	-138,396,000	--
Administrative expense	--	-776,000	776,000
Net changes	\$19,692,809	-\$159,421,000	\$178,866,809
Balances at December 31, 2018	<u>\$1,852,863,195</u>	<u>\$1,223,532,000</u>	<u>\$629,331,195</u>

*Sensitivity of the net pension liability to changes in the discount rate.* The following presents the net pension liability of the System, calculated using the discount rate of 7.25%, as well as what the System’s net pension liability would be if it were calculated using a discount rate that is one-percentage-point lower (6.25%) or one-percentage-point higher (8.25%) than the current rate:

	1% Decrease (6.25%)	Current Discount (7.25%)	1% Increase (8.25%)
Net pension liability	\$824,005,383	\$629,331,195	\$465,204,109

## EXHIBIT 4 – PENSION EXPENSE AND DEFERRED OUTFLOWS/INFLOWS RELATED TO PENSIONS

For the year ended December 31, 2018, the County recognized pension expense of \$87,952,440.

Pension Expense for the Year Ended December 31, 2017	
Service cost	\$3,768,154
Interest on TPL	129,928,930
Employee contributions	-1,110,000
Administrative expenses	776,000
Expected return on assets	-98,748,977
Expensed portion of current year period differences between expected and actual experience in TPL	6,717,263
Expensed portion of current year period assumption changes	17,674,462
Current year plan changes	--
Expensed portion of current year period differences between projected and actual investment earnings	35,862,197
Current year recognition of deferred inflows established and outflows established in prior years	<u>-6,915,589</u>
<b>Total expense</b>	<b><u>\$87,952,440</u></b>

At December 31, 2018, the County reported deferred outflows and inflows of resources related to pensions from the following sources:

	Deferred Outflows of Resources	Deferred Inflows of Resources
Differences between expected and actual experience	--	--
Net difference between projected and actual earnings on pension plan investments	\$76,365,796	--
Assumption changes	--	--
<b>Total</b>	<b>\$76,365,796</b>	<b>--</b>

Amounts reported as deferred outflows of resources and deferred inflows of resources related to pensions will be recognized in pension expense as follows:

Year Ended December 31	
2019	\$28,946,606
2020	7,188,405
2021	4,368,590
2012	35,862,195
Thereafter	0

Additional detail on these deferred outflows and inflows is shown below.

	Initial Year	Outstanding Balance at December 31, 2017	Amount Recognized During FYE December 31, 2018	Outstanding Balance at December 31, 2018	To Be Recognized December 31, 2019	To Be Recognized December 31, 2020	To Be Recognized December 31, 2021	To Be Recognized December 31, 2022
<b>Fiscal Year Outflows</b>								
Investment loss	2015	\$43,516,402	\$21,758,201	\$21,758,201	\$21,758,201	--	--	--
Investment loss	2016	8,459,445	2,819,815	5,639,630	2,819,815	\$2,819,815	--	--
Liability loss	2018	--	6,717,263	0	--	--	--	--
Assumption change	2018	--	17,674,462	0	--	--	--	--
Investment loss	2018	--	35,862,197	143,448,780	35,862,195	35,862,195	\$35,862,195	\$35,862,195
<b>Total Outflows</b>		<b>\$51,975,847</b>	<b>\$84,831,938</b>	<b>\$170,846,611</b>	<b>\$60,440,211</b>	<b>\$38,682,010</b>	<b>\$35,862,195</b>	<b>\$35,862,195</b>
<b>Fiscal Year Inflows</b>								
Investment gain	2017	125,974,420	\$31,493,605	\$94,480,815	\$31,493,605	\$31,493,605	\$31,493,605	--
<b>Total Inflows</b>		<b>125,974,420</b>	<b>\$31,493,605</b>	<b>\$94,480,815</b>	<b>\$31,493,605</b>	<b>\$31,493,605</b>	<b>\$31,493,605</b>	<b>--</b>
<b>Total</b>		<b>-\$73,998,573</b>	<b>\$53,338,333</b>	<b>\$76,365,796</b>	<b>\$28,946,606</b>	<b>\$7,188,405</b>	<b>\$4,368,590</b>	<b>\$35,862,195</b>

Note: In accordance with Paragraph 71 of GASB Statement 68, the difference between projected and actual earnings on investments is recognized over a closed five-year period. Assumption changes and the difference between expected and actual total pension liability experience are each recognized over a closed period equal to the average of the expected remaining service lives of all employees that are provided with pensions through the pension plan (active employees and inactive employees), determined as of the beginning of the measurement period. For 2018 the period is one year, and therefore those changes are recognized immediately.

## EXHIBIT 5 – SCHEDULE OF CHANGES IN NET PENSION LIABILITY

	2018	2017
<b>Total pension liability</b>		
• Service cost	\$3,768,154	\$2,347,757
• Interest	129,928,930	123,205,295
• Change of benefit terms	0	0
• Differences between expected and actual experience	6,717,263	20,981,901
• Changes of assumptions	17,674,462	112,434,921
• Benefit payments, including refunds of employee contributions	<u>-138,396,000</u>	<u>-132,378,000</u>
<b>Net change in total pension liability</b>	<b>\$19,692,809</b>	<b>\$126,591,874</b>
<b>Total pension liability – beginning</b>	<b><u>1,833,170,386</u></b>	<b><u>1,706,578,512</u></b>
<b>Total pension liability – ending</b>	<b><u>1,852,863,195</u></b>	<b><u>1,833,170,386</u></b>
<b>Plan fiduciary net position</b>		
• Contributions – employer	\$59,203,000	\$57,228,000
• Contributions – employee	1,110,000	1,358,000
• Net investment income	-80,562,000	245,564,000
• Benefit payments, including refunds of employee contributions	-138,396,000	-132,378,000
• Administrative expense	<u>-776,000</u>	<u>-656,000</u>
<b>Net change in plan fiduciary net position</b>	<b>-\$159,421,000</b>	<b>\$171,116,000</b>
<b>Plan fiduciary net position – beginning</b>	<b><u>1,392,953,000</u></b>	<b><u>1,211,837,000</u></b>
<b>Plan fiduciary net position – ending</b>	<b><u>1,223,532,000</u></b>	<b><u>1,382,953,000</u></b>
<b>Net pension liability</b>	<b><u>629,331,195</u></b>	<b><u>450,217,386</u></b>
<b>Plan fiduciary net position as a percentage of the total pension liability</b>	<b>66.03%</b>	<b>75.44%</b>
<b>Covered employee payroll</b>	<b>\$14,864,291</b>	<b>\$20,373,597</b>
<b>Net pension liability as percentage of covered employee payroll</b>	<b>4,233.85%</b>	<b>2,209.81%</b>

### Notes to Schedule:

*Benefit changes:* There have been no changes in benefit provisions since GASB67 implementation.

*Change of Assumptions:* As of December 31, 2018, the assumed discount rate was changed from 7.35% to 7.25%. See Section 4, Exhibit 1 of the January 1, 2018 valuation report for a full list of assumption changes as of December 31, 2017.

## EXHIBIT 6 – SCHEDULE OF EMPLOYER CONTRIBUTIONS

Year Ended December 31	Actuarially Determined Contributions	Contributions in Relation to the Actuarially Determined Contributions	Contribution Deficiency (Excess)	Covered- Employee Payroll	Contributions as a Percentage of Covered Employee Payroll
2014	\$55,255,317	\$57,529,000	-\$2,273,683	\$32,828,504	175.24%
2015	48,586,172	47,230,000	1,356,172	27,819,954	169.77%
2016	50,493,163	45,977,000	4,516,163	23,391,200	196.56%
2017	52,988,352	57,228,000	-4,239,643	20,373,597	280.89%
2018	59,745,750	59,203,000	542,750	14,845,291	398.80%

**Notes to Schedule:**

**Methods and assumptions used to determine contribution rates for the year ended December 31, 2018:**

<b>Valuation date</b>	Actuarially determined contribution is calculated using a January valuation date as of the beginning of the fiscal year in which contributions are reported
<b>Actuarial cost method</b>	Entry age normal
<b>Amortization method</b>	Level dollar, closed period
<b>Remaining amortization period</b>	Remaining amortization period varies for the bases, with an average effective period of 15 years.
<b>Asset valuation method</b>	Market value of assets less unrecognized returns in each of the last five years. Unrecognized return is equal to the difference between the actual market return and the expected return on the market value, and is recognized over a five-year period, further adjusted, if necessary, to be within 20% of the market value.
<b>Investment rate of return</b>	7.35%, including inflation, net of pension plan investment expense
<b>Inflation rate</b>	2.00%
<b>Projected salary increases</b>	2.00% - 6.00%
<b>Retirement rates</b>	Separate retirement rates for public safety employees and non-public safety employees. Rates for reduced retirement run from age 40 to age 59. Rates for unreduced retirement begin at first eligibility, and extend to age 65 for public safety and to age 70 for other employees. A full table is available in Section 4 of the January 1, 2019 actuarial valuation.

**Mortality Rates:**

<i>Pre-retirement</i>	RP-2014 Blue Collar Mortality Table, adjusted backward to the base year (2006) using Scale MP-2014, and projected generationally from 2006 using Scale MP-2016
<i>Healthy annuitants:</i>	RP-2014 Blue Collar Healthy Annuitant Mortality Table, adjusted backward to the base year (2006) using Scale MP-2014, set forward two years for males and one year for females, and projected generationally from 2006 using Scale MP-2016
<i>Disabled annuitants:</i>	RP-2014 Disabled Retiree Mortality Table, adjusted backward to the base year (2006) using Scale MP-2014, set forward four years for males and unadjusted for females, projected generationally using Scale MP-2016

The tables above, with adjustments as shown, reasonably reflect the mortality experience of the System as of the measurement date. The mortality tables are generationally projected to reflect future mortality improvement.

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