Butler County
Employees' Retirement System

Actuarial Valuation as of January 1, 2018
Actuarially Determined Contribution for 2018

BOOMERSHINE
CONSULTING GROUP, L.L.C.
ACTUARIAL & RETIREMENT PLAN SOLUTIONS

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for

Butler County Employees Retirement System

November 20, 2018

Contents

Executive Summary

This report presents the results of an actuarial review and analysis of the Butler County Employees' Retirement System (the Plan) as of January 1, 2018. The required Employer contribution for Fiscal Year 2018 has been determined based on actual demographic and asset information as of December 31, 2017. All information for GASB Statements 67 and 68 is presented in a separate report. Information for years prior to 2017 shown herein has been gathered from prior actuarial reports.

Purpose of the Report

The purposes of this Report are:
- To compute the employer contribution amount for 2018;
- To review the experience of the Plan over the past year and to discuss reasons for changes in contributions and funding progress; and
- To present and discuss other issues associated with funding progress and actuarial costs.

A comparative summary of the status of the Plan is as follows:

	1/1/2017	1/1/2018
Plan Membership		
Active	570	574
Terminated with Deferred Benefits	86	88
Receiving Benefits	589	594
Total Plan Participants	1,245	1,256
Average Valuation Salary (active employees)	$52,202	$53,390
Assets ($ millions)		
Market Value of Assets (MVA)	$187.9	$209.7
Actuarial Value of Assets (AVA)	$197.3	$204.5
Valuation Results ($ millions)		
Actuarial Accrued Liability (AAL)	$222.3	$226.7
Unfunded Actuarial Accrued Liability (UAAL)	$25.0	$22.2
Funding Ratio (AVA/AAL)	88.7%	90.2%
Funding Ratio (MVA/AAL)	84.5%	92.5%
Contributions ($ millions)		
Employer Normal Cost, with Interest	$1.8	$1.6
Amortization of Unfunded Liability	3.7	3.5
Total Employer Contribution	$5.5	$5.1
Employer Contribution as a percentage of payroll	17.8%	16.0%

Change in Plan Cost from Prior Valuation

The employer contribution determined based on actual demographic and asset information has decreased since the prior report. The table and discussion below summarize the impact of actuarial experience on Plan cost. There were no changes in plan provisions since the prior valuation.

	Employer Contribution ($ millions)	Employer Contribution Rate (% of Pay)
County Contribution for 2017	$5.5	17.8%
Change in Cost Due to:		
New Actuary/Transition – Prior Methods	+0.3	+1.0%
Expected Change	-0.2	-0.9%
Experience during 2017	-0.4	-1.8%
New Methodology - discounting	-1.5	-4.5%
New Methodology – asset smoothing	+0.6	+1.8%
Changes in Actuarial Assumptions (7.25%)	+0.8	+2.6%
Total Change	-$0.4	-1.8%
County Contribution for 2018	**$5.1**	**16.0%**

- Change in Actuary

  We ran last year's valuation using our own valuation software, and applied all of the same data and assumptions as the prior actuary. While our results were well within a reasonable margin, the cost we computed was slightly higher than the previous valuation report indicated.

- Expected Increase

  The contribution for 2018 was expected to increase slightly versus 2017 due to an increased payroll and resulting higher normal cost.

- Actual Experience

  Both investment returns and demographic experience were favorable in 2017. This served to decrease the contribution requirement.

- Changes in methodology

  Two changes in methodology were adopted in 2018. The first was the method of discounting expected refunds of employee contributions. This resulted in a cost decrease. The other change was to adopt a five year smoothing method. This change decreased the actuarial value of assets, thus increasing Plan cost.

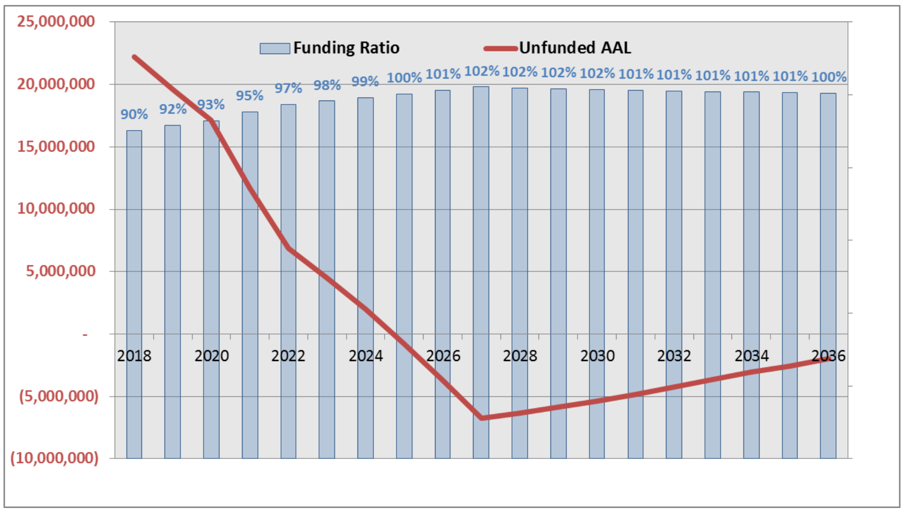
- Changes in assumptions

  One change in assumptions was adopted in 2018: the assumed rate of return was decreased from 7.50% to 7.25%. This increased the normal cost and actuarial liability of the Plan, as well as the total annual cost.

Future Costs and Funding

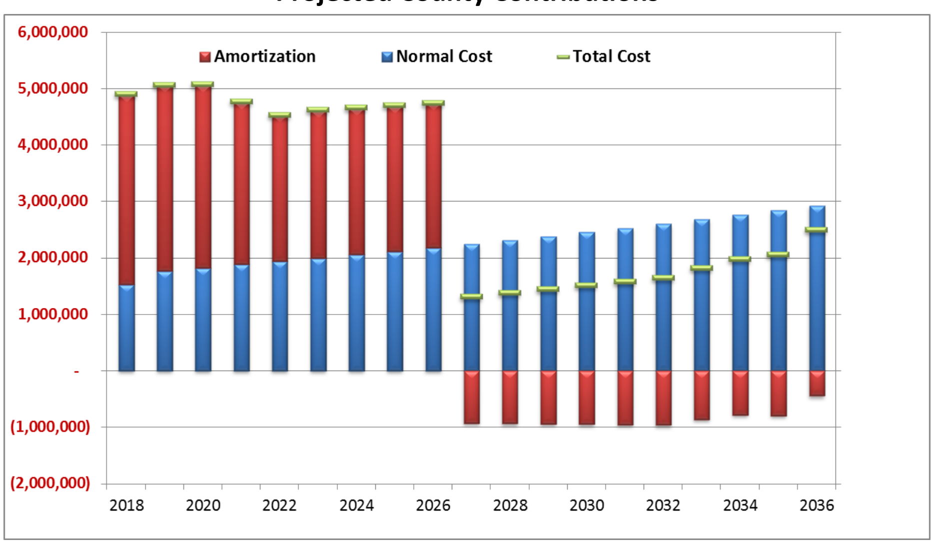
The two graphs below represent the projected funding progress and required contributions over the next two decades. In each projection, only one scenario is shown – that all experience will be exactly as predicted by actuarial assumptions, including 7.25% investment returns each year. **While this precise scenario is impossible, it does provide a general sense of the expected trends.**

Projected Funding Progress



In the first graph, we can see that the current amortization schedule will lead to overfunding (funding ratio greater than 100%) within a decade. However, this does not account for any deviations in experience (e.g., investment losses).

Projected County Contributions



In the second graph, the expected employer contributions are shown. The amounts are expected to remain above $4 million per year until the past unfunded amounts (pre-2018) are fully amortized, then decrease by several million dollars. The actual funding progress and contributions going forward will not match what is shown above, but instead will be affected by the actual experience of the Plan over that time frame.

Actuarial Certification

In this study, we conducted an examination of all participant data for reasonableness and consistency, but did not audit such data. Actuarial funding is based on the Entry Age Normal Cost Method. Under this method, the employer contribution provides for current cost (normal cost) plus an amount to amortize the unfunded actuarial accrued liability (UAAL). For actuarial valuation purposes, Plan assets are valued at Actuarial Value, using a method that gradually recognizes investment gains and losses. The plan provisions are the same as those used in the prior valuation. Actuarial assumptions and methods were updated as described herein.

We certify that the valuation was performed in accordance with generally accepted actuarial principles and practices. The undersigned are members of the American Academy of Actuaries, and meet the Qualification Standards to provide the actuarial opinions herein.

Respectfully Submitted,

Gregory M. Stump

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Chief Actuary

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Senior Actuary

Section 1: Plan Asset Information

1.1: Comparative Value of Net Assets

		12/31/2016		12/31/2017
ASSETS				
Cash and Short-Term Investments	$	1,500,111	$	3,626,938
Receivables and Prepaids		3,805		15,342
Investments, at fair market value:				
U.S. Government Obligations & Corporate Fixed Income		50,583,377		54,072,699
U.S Treasury Inflation Protected Securities (TIPS)		9,671,730		9,602,359
Domestic Common Stock		80,481,725		87,308,145
International Stocks		34,680,089		44,558,201
Real Estate Investment Trusts (REIT)		10,414,937		9,947,067
Invested Cash & Equivalents		586,629		474,092
Accrued Income				202,714
Total Investments		186,418,487		206,165,277
Total Assets		187,922,403		209,807,557
LIABILITIES				
Accounts Payable		56,323		58,725
Net Assets Held in Trust For Plan Benefits	**$**	**187,866,080**	**$**	**209,748,832**

The information above was provided by the Secretary, and was not audited by BCG.

1.2: Comparative Income Statements

		2016		2017
Net Plan Assets, as of January 1	$	175,922,688	$	187,866,080
ADDITIONS				
Member Contributions		3,231,334		3,331,239
Member Contributions (County Share)		0		2,273
County Contributions		5,474,488		5,473,038
Investment Income:				
Interest		1,944,540		2,257,983
Dividends		2,760,278		2,847,838
Realized Gain/(Loss)		4,242,319		4,053,176
Unrealized Gain/(Loss)		6,055,472		16,609,102
Miscellaneous		37,763		2,312
Total Additions	+$	23,746,194	+$	34,576,961
DEDUCTIONS				
Refunds of member contributions		223,632		207,552
Retirement Allowances		11,242,029		11,536,161
Death Benefits				608,994
Administrative Expenses		130,941		123,379
Investment Expenses		206,200		218,123
Total Deductions	-$	11,802,802	-$	12,694,209
NET INCREASE IN NET PLAN ASSETS		11,943,392		21,882,752
Net Plan Assets, as of December 31	**$**	**187,866,080**	**$**	**209,748,832**

1.3.1: Computation of Actuarial Value of Assets – Prior Method

(1)	Market Value 1/1/2017	$	187,866,080
(2)	Actuarial Value 1/1/2017		197,288,109
(3)	Total Contributions		8,806,550
(4)	Total Disbursements		(12,476,086)
(5)	Expected Return on Actuarial Value at 1% less than the Plan's assumed rate of return (6.50%)*		12,452,044
(6)	Preliminary Actuarial Value 1/1/2018: [(2)+(3)+(4)+(5)]		206,070,617
(7)	Market Value 1/1/2018		209,748,832
(8)	80% of Market Value		167,799,066
(9)	120% of Market Value		251,698,598
(10)	**Final Actuarial Value [Greater of (6) and (7)]** **(not less than 80% nor more than 120% of Market Value)**	**$**	**209,748,832**
(11)	Ratio of Actuarial Value to Market Value		100%

Approximate Annual Investment Return – AVA basis	8.25%
Approximate Annual Investment Return – MVA basis	13.74%
AVA/Actuarial Accrued Liability	92.5%
MVA/Actuarial Accrued Liability	92.5%

* Employee contributions and benefits assumed to be paid throughout the year, employer contributions at end of year.

1.3.2: Computation of Actuarial Value of Assets – New Method

(1)	Market Value 1/1/2017	$	187,866,080
(2)	Actuarial Value 1/1/2017		197,288,109
(3)	Total Contributions		8,806,550
(4)	Total Disbursements		(12,476,086)
(5)	Expected Return on Market Value (7.50% for 2017)*		13,630,561
(6)	Expected Market Value 1/1/2018: [(1)+(3)+(4)+(5)]		197,827,105
(7)	Market Value 1/1/2018		209,748,832
(8)	Gain/(Loss): [(7)-(6)]		11,921,727
(9)	Deferral of Gain/(Loss), 2017 (80%)		9,537,382
	Deferral of Gain/(Loss), 2016 (60%)		1,181,619
	Deferral of Gain/(Loss), 2015 (40%)		(5,805,163)
	Deferral of Gain/(Loss), 2014 (20%)		317,354
(10)	Preliminary Actuarial Value: [(7)-(9)]		204,517,640
(11)	**Final Actuarial Value** **(not less than 80% nor more than 120% of Market Value)**	**$**	**204,517,640**
(12)	Ratio of Actuarial Value to Market Value		98%
	Unrecognized Gain/(Loss): (7) - (11)	$	5,231,192
	Approximate Annual Investment Return – AVA basis		5.58%
	Approximate Annual Investment Return – MVA basis		13.74%
	AVA/Actuarial Accrued Liability		90.2%
	MVA/Actuarial Accrued Liability		92.5%

* Employee contributions and benefits assumed to be paid throughout the year, employer contributions at end of year.

1.4: Fund Assets and Liabilities

ASSETS	
Member Annuity Reserve Account (MARA)	$ 48,199,674
County Annuity Reserve Account (CARA)	10,701,653
Retired Members Reserve Account (RMRA)	113,828,671
Unrealized Appreciation of Assets	37,018,834
Current Assets (Market Value) of the Plan	209,748,832
Present Value of Future Employer Contributions	52,183,052
Total Assets	**$ 261,931,884**
LIABILITIES	
Actuarial Present Value of:	
Accumulated Plan Benefits (Unit Credit Basis)	
Vested Participants	$ 63,127,653
Nonvested Participants	2,697,547
Terminated Vested Benefits	12,592,188
Retired Benefits	113,828,671
Total Present Value of Accumulated Benefits	$192,246,059
Future Benefit Accruals	69,685,825
Total Liability of the Butler County Employees' Retirement Fund	**$261,931,884**
(Present Value of Future Benefits)	

1.5: Reconciliation of Reserve Balances

	M.A.R.A	C.A.R.A	R.M.R.A	TOTAL
Balance as of January 1, 2017	$ 44,870,879	$ 14,888,779	$ 107,696,689	$ 167,456,347
County Appropriations		5,473,038		5,473,038
Member Contributions	3,331,239	2,273		3,333,512
Member Purchases				
Net Investment Income		9,161,310		9,161,310
Investment Expenses		(218,123)		(218,123)
Member Contribution Refunds	(207,552)			(207,552)
Pension Payments			(11,536,161)	(11,536,161)
Death Benefits			(608,994)	(608,994)
Retiree and Death Benefit Transfers	(2,275,050)	(4,885,611)	7,160,661	-
Cost of Living Funding Requirement				-
Administrative Expenses		(123,379)		(123,379)
Miscellaneous				-
Balance Before Interest	45,719,516	24,298,287	102,712,195	172,729,998
Interest Allocated During Year	2,480,158	(10,370,491)	7,890,333	-
Balance Before Actuarial Adjustments	48,199,674	13,927,796	110,602,528	172,729,998
Actuarial Adjustments[1]		(3,226,143)	3,226,143	-
Balance as of December 31, 2017 (Cost Value)	$ 48,199,674	$ 10,701,653	$ 113,828,671	$ 172,729,998
Unrealized Appreciation/(Depreciation)				37,018,834
Market Value as of December 31, 2017				$ 209,748,832

M.A.R.A.: Member Annuity Reserve Account

C.A.R.A.: County Annuity Reserve Account

R.M.R.A.: Retired Members Reserve Account

[1] The actuarial adjustment represents an amount that should be transferred between the C.A.R.A. and the R.M.R.A.

1.6: Historical Investment Returns

Year	Market Value Return	Actuarial Value Return
2008	-23.5%	-5.4%
2009	20.1%	6.2%
2010	13.3%	6.3%
2011	1.0%	6.3%
2012	13.5%	8.0%
2013	17.3%	17.3%
2014	8.4%	8.4%
2015	-0.7%	6.4%
2016	8.6%	6.4%
2017	13.7%	5.6%
5 Year Compound Return	9.3%	8.7%
10 Year Compound Return	6.4%	6.4%

Section 2: Actuarial Computations

2.1: Development of Unfunded Actuarial Liability

	1/1/2017	1/1/2018	
		Prior Basis	New Basis
Actuarial Accrued Liability			
Active Members	$63,390,773	$67,409,504	$100,315,904
Inactive Members:			
Retirees/Beneficiaries	105,407,088	109,472,634	111,668,836
Retiree Cost-of-Living	2,289,601	2,123,848	2,159,835
Terminated	6,379,348	8,394,792	12,592,188
Total Inactive	114,076,037	119,991,274	126,420,859
Accumulated Deductions	44,870,879	Active: 41,702,086 Inactive: 6,497,588	Active: 41,702,086 Inactive: 6,497,588 (liability included above)
Total Actuarial Accrued Liability	**$222,337,689**	**$233,925,286**	**$226,736,763**
Actuarial Value of Assets	$197,288,110	$209,748,832	$204,517,640
Unfunded Actuarial Accrued Liability	$25,049,579	$24,176,454	$22,219,123
Ratio of Assets to Liability	88.7%	89.7%	90.2%
Total Normal Cost (Beginning of Year)	**$1,629,057**	**$1,879,534**	**$4,227,017**

The new basis above includes the following changes:

1. Projection and discounting of cash flows from employee contributions
2. Return assumption decreased from 7.50% to 7.25%
3. Change in actuarial firm/software (not material)

Solvency Test

(a) Accumulated Deductions	(b) Retired Benefit Liability	(c) Remaining Liability	Market Value of Assets	Percent of (a) Covered by Assets	Percent of (b) Covered by Assets	Percent of (c) Covered by Assets
$48,199,674	$113,828,671	$64,708,418	$209,748,832	100%	100%	74%

2.2: Development of Actuarial Gain/Loss

1	Unfunded actuarial accrued liability as of January 1, 2017	$25,049,579
2	Normal Cost as of January 1, 2017	1,629,057
3	Employer Contributions during 2017	(5,473,038)
4	Interest on the above	2,000,898
5	Expected Change during 2017	(1,843,083)
6	Expected Unfunded Actuarial Liability as of January 1, 2018	23,206,496
7	Unfunded Actuarial Liability as of January 1, 2018, Before Changes[2]	20,794,092
8	Experience (Gain)/Loss: [(7)-(6)]	(2,412,405)
9	Impact of Changes in Assumptions	5,472,315
10	Impact of Changes in Methods	(4,047,284)
11	**Unfunded Actuarial Liability as of January 1, 2018**	**$22,219,123**

Experience Gain/Loss by Source

Source	Gain	Loss
Investment Experience	($1,418,159)	
Salary Increases	(170,677)	
Active Member Retirements	(184,157)	
Active Member Terminations		54,500
Retiree Deaths	(355,200)	
New Entrants		52,934
Other Experience	(391,646)	
Total	($2,519,839)	$107,434
Net Amount of (Gain)/Loss	**($2,412,405)**	

[2] Prior to any changes in actuarial methods or assumptions

2.3.1: Development of Employer Contribution – Prior Assumptions/Methods

Normal Cost					
End of Year Employer Normal Cost					$1,863,166
Employer Normal Cost Rate (% of Pay)					5.87%
Amortization of Unfunded AAL					
Base	Initial Amount	Date Established	Years Remaining	Remaining Balance	Annual Payment
Initial UAAL	$28,229,305	1/1/2005	17	$ 22,549,148	$2,390,210
COLA Increase	734,747	1/1/2009	1	99,575	107,043
Experience loss	1,745,327	1/1/2006	3	514,184	197,723
Experience loss	59,174	1/1/2007	4	22,456	6,705
Experience gain	(2,392,470)	1/1/2008	5	(1,096,581)	(271,036)
Experience loss	14,230,176	1/1/2009	6	7,566,934	1,612,097
Experience loss	9,249,636	1/1/2010	7	5,550,129	1,047,866
Experience loss	3,404,942	1/1/2011	8	2,259,381	385,737
Experience loss	2,321,453	1/1/2012	9	1,677,590	262,991
Experience loss	931,198	1/1/2013	10	724,112	105,493
Salary assumption	(5,905,887)	1/1/2010	12	(4,481,208)	(579,321)
Asset method	(7,397,011)	1/1/2010	12	(5,612,632)	(725,589)
Mortality assumption	1,865,621	1/1/2013	10	1,450,731	211,351
Experience gain	(11,162,488)	1/1/2014	11	(9,250,848)	(1,264,568)
Experience gain	(4,290,844)	1/1/2015	12	(3,760,103)	(486,098)
Experience loss	3,752,830	1/1/2016	13	3,454,682	425,148
Experience loss	1,600,214	1/1/2017	14	1,538,946	181,284
Experience gain	(2,412,402)	1/1/2018	15	(2,412,402)	(273,295)
			Total	$20,794,092	$3,333,741
Total Required Employer Contribution as of December 31, 2018					**$5,196,907**
Percentage of Payroll					16.38%

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2.3.2: Development of Employer Contribution - New Assumptions/Methods

Normal Cost	
Gross Normal Cost	$4,227,017
Expected Employee Contributions	(2,854,650)
Interest to End of Year	204,788
End of Year Employer Normal Cost	$1,577,155
Employer Normal Cost Rate (% of Pay)	4.97%

Amortization of Unfunded AAL

Base	Initial Amount	Date Established	Years Remaining	Remaining Balance	Annual Payment
Combined (Pre-2018) Bases	$23,206,495	1/1/2018	9	$23,206,495	$3,599,857
Experience (Gain)/Loss - 2017	(2,412,402)	1/1/2018	15	(2,412,402)	(269,066)
Method Changes	(4,047,284)	1/1/2018	15	(4,047,284)	(451,412)
Assumption Changes	5,472,315	1/1/2018	15	5,472,315	610,353
			Total	$22,219,123	$3,489,732

Total Required Employer Contribution as of December 31, 2018	**$5,066,887**
Expected Payroll	$31,718,329
Percentage of Expected Payroll[3]	15.97%

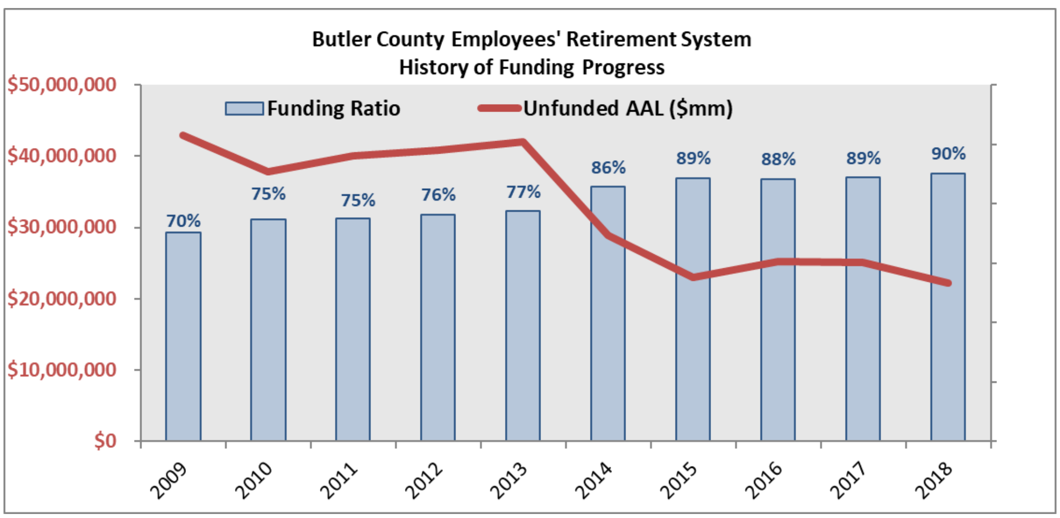
The new basis above includes the following changes:

1. Projection and discounting of cash flows from employee contributions
2. Return assumption decreased from 7.50% to 7.25%
3. Change in actuarial firm/software (not material)
4. Change in asset smoothing methodology
5. Combined amortization bases for experience prior to 12/31/2017 (not material)

[3] As a percentage of actual 2017 payroll ($29,651,632) for those included in the 2017 valuation, this is 17.09%

2.4: Schedule of Funding Progress

Actuarial Valuation Date	Actuarial Value of Assets	Actuarial Accrued Liability	Unfunded Actuarial Accrued Liability	Funded Ratio
1/1/2009	$102,163,256	$145,148,259	$42,985,003	70.4%
1/1/2010	111,030,976	148,852,958	37,821,982	74.6%
1/1/2011	120,338,204	160,325,187	39,986,983	75.1%
1/1/2012	131,446,907	172,292,041	40,845,134	76.3%
1/1/2013	144,118,424	186,098,445	41,980,021	77.4%
1/1/2014	171,903,108	200,826,982	28,923,874	85.6%
1/1/2015	180,054,293	203,079,020	23,024,727	88.7%
1/1/2016	188,485,177	213,698,092	25,212,915	88.2%
1/1/2017	197,288,110	222,337,689	25,049,579	88.7%
1/1/2018	204,517,640	226,736,763	22,219,123	90.2%



2.5: Schedule of Employer Contributions

Year	Actuarially Determined Employer Contribution	Actual County Contribution	Contribution Deficiency/(Excess)	Covered Payroll	Contribution as a Percent of Payroll
2008	$4,712,669	$4,712,669	$0	$29,936,923	15.7%
2009	6,486,486	6,486,486	0	30,575,991	21.2%
2010	6,095,561	6,095,561	0	31,576,155	19.3%
2011	6,564,903	6,564,903	0	33,098,062	19.8%
2012	6,860,358	6,860,358	0	34,891,445	19.7%
2013	7,313,625	7,313,625	0	36,117,283	20.2%
2014	6,152,213	6,152,213	0	36,891,238	16.7%
2015	5,052,744	5,052,744	0	28,933,497	17.5%
2016	5,474,488	5,474,488	0	30,826,860	17.8%
2017	5,473,038	5,473,038	0	30,796,428	17.8%

Section 3: Demographic Information

3.1: Participant Summary

	1/1/2017			1/1/2018		
Active Participants	**Males**	**Females**	**Total**	**Males**	**Females**	**Total**
Active Participants	260	310	570	259	315	574
Total Compensation	$14,578,686	$15,176,317	$29,755,003	$14,865,240	$15,780,489	$30,645,729
Average Compensation	$56,072	$48,956	$52,202	$57,395	$50,097	$53,390
Average Age	42.1	46.4	44.4	42.7	46.6	44.8
Average Service	10.3	12.1	11.3	10.5	12.3	11.5
	Average Remaining Service		11.2	Average Remaining Service		11.2
Percent male / female	45.6%	54.4%		45.1%	54.9%	

	1/1/2017			1/1/2018		
Inactive Participants	**Males**	**Females**	**Total**	**Males**	**Females**	**Total**
Retired Participants and Beneficiaries	158	431	589	156	438	594
Total Benefit	$298,296	$572,133	$870,429	$310,593	$598,333	$908,926
Average Benefit	$1,888	$1,327	$1,478	$1,991	$1,363	$1,528
Average Age	68	67.4	67.5	68.4	67.8	68
Vested Partcipants	19	67	86	24	64	88
Total Benefit	$33,421	$123,889	$157,310	$50,312	$121,707	$172,020
Average Benefit	$1,759	$1,849	$1,829	$2,096	$1,902	$1,955
Average Age	48.8	50.3	49.9	47.5	50.3	49.5
	Average Remaining Lifetime of All Inactive Participants		21.2	Average Remaining Lifetime of All Inactive Participants		20.9

3.2: Data Reconciliation

	Active	Terminated Deferred	Terminated Due Refund	Disabled	Retired	Beneficiary	Total
Number as of 1/1/2017	570	86		14	549	26	1,245
Additions							
a. New entrants	37						37
b. Rehired							
Changes in Status							
a. Terminated Non-Vested							
b. Refund	(11)						(11)
c. Terminated Vested	(7)	7					
d. Death without Beneficiary					(9)	(3)	(12)
e. Death with Beneficiary					(2)	2	
f. Death with Cashout	(1)				(2)		(3)
g. Retired	(14)	(5)			19		
h. Disabled							
i. Data changes (+)						1	1
j. Data changes (-)					(1)		(1)
Number as of 1/1/2018	574	88		14	554	26	1,256

3.3: Distribution of Active Participants

BY AGE AND SERVICE AS OF JANUARY 1, 2018

Nearest Age	-----Completed Years of Service from Date of Hire----- <1	1	2 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	>29	Total
<20	0	0	0	0	0	0	0	0	0	0
20 – 24	5	3	3	0	0	0	0	0	0	11
avg sal.	$35,498	$45,534	$43,518							$40,423
25 – 29	9	8	34	7	0	0	0	0	0	58
avg sal.	$42,865	$46,235	$48,433	$53,955						$47,932
30 – 34	1	4	20	37	7	0	0	0	0	69
avg sal.	$40,637	$41,196	$49,449	$52,511	$48,383					$50,377
35 – 39	4	3	16	21	17	5	0	0	0	66
avg sal.	$40,247	$67,873	$45,909	$56,717	$55,360	$62,161				$53,669
40 – 44	6	6	11	13	10	22	2	0	0	70
avg sal.	$40,687	$49,125	$55,727	$54,410	$54,680	$62,176	$45,128			$55,202
45 – 49	5	2	9	16	19	24	14	5	1	95
avg sal.	$35,937	$68,333	$53,576	$64,898	$51,585	$57,044	$58,704	$63,524	$41,807	$56,498
50 – 54	3	2	8	10	8	19	17	14	4	85
avg sal.	$42,861	$73,035	$47,045	$55,822	$54,336	$57,168	$58,203	$62,338	$53,697	$56,554
55 – 59	3	2	1	17	14	18	4	2	7	68
avg sal.	$37,621	$48,588	$24,620	$51,041	$48,944	$51,627	$56,040	$80,048	$54,385	$51,203
60 – 64	1	1	2	4	8	4	2	7	6	35
avg sal.	$89,366	$47,272	$42,214	$52,793	$56,026	$55,755	$53,012	$55,852	$60,663	$56,126
>64	0	0	1	3	3	3	2	0	5	17
avg sal.			$26,333	$35,814	$44,593	$71,128	$54,686		$65,555	$54,005
Total	37	31	105	128	86	95	41	28	23	574
avg sal.	$41,068	$51,510	$48,645	$54,702	$52,426	$57,891	$57,101	$62,193	$57,784	$53,390

3.4: Membership History

Actuarial Valuation Date	Active and Terminated Vested Members			Retired Members and Beneficiaries		
	Male	Female	Total	Male	Female	Total
1/1/2009	240	542	782	97	268	365
1/1/2010	264	547	811	103	279	382
1/1/2011	273	541	814	113	299	412
1/1/2012	294	544	838	113	307	420
1/1/2013	298	544	842	120	327	447
1/1/2014	299	538	837	131	344	475
1/1/2015	269	381	650	150	424	574
1/1/2016	280	385	665	150	428	578
1/1/2017	279	377	656	158	431	589
1/1/2018	283	379	662	156	438	594

Section 4: Plan Benefits

Summary of Plan Provisions

Effective Date and Membership

The effective date of this plan is January 1, 1971. An employee shall be eligible to become a participant immediately upon becoming an employee.

Definitions

Compensation

Pick-up contributions plus remuneration received as a County employee excluding refunds for expenses, contingency and accountable expense allowances and excluding severance payments or payments for unused vacation or sick leave.

Final Average Salary

Final Average Salary is determined as the average of the member's compensation for the three years which produce the highest average.

Membership Service Retirement Eligibility

Members are eligible for Normal Retirement (Superannuation) at age 60, or at age 55 with 20 years of service. Early Retirement (reduced benefit) eligibility is at 20 years of service (voluntary) or 8 years of service (involuntary).

Benefit Amount

Benefit amounts are determined as portions of Final Average Salary, and based on years and months of service in each Class, as defined below.

Class	Percentage	Effective Date (Date Hired)
1/40	2.50%	01/01/1971
1/60	1.67%	04/01/2009

In addition to this benefit, a monthly annuity is provided; equal to the actuarial equivalent of the member's accumulated contributions with credited interest. Benefits paid before eligibility for Normal Retirement are actuarially reduced from age 60, using the Plan funding assumptions.

Form of Benefit

The Service Retirement Benefit will be paid monthly beginning at retirement and for the life of the member. If the member selects a Joint and Survivor Option, a percentage of the benefit will continue for the life of the member's beneficiary, upon the member's death. Other optional benefit forms are also available, as described below.

Disability

Eligibility

Members are eligible for a Disability Retirement Benefit at any age if they are permanently disabled after rendering five years of County service.

Benefit Amount

The Disability Retirement Benefit payable to members is equal to 25% of their Final Average Pay, plus an annuity based on the actuarial equivalent of accumulated member contributions.

Form of Benefit

The Disability Retirement Benefit will be paid monthly beginning at the effective date of disability retirement and for the life of the member.

Pre-Retirement Death

Eligibility

Members are eligible for a pre-retirement death benefit at age 60, or after ten years of service.

Benefit Amount

A payment, equal to the actuarial present value of the member's County paid retirement benefit, is made to the beneficiary. Additionally, the member's accumulated contributions with interest are refunded to the beneficiary.

Form of Benefit

The benefit is paid as a one-time lump sum payment.

Withdrawal Benefit

Eligibility

A member is eligible for a Withdrawal Benefit upon termination of employment.

Benefit Amount

The Withdrawal Benefit is a refund of the member's accumulated contributions with interest. Upon receipt of the Withdrawal Benefit the member forfeits all credited service.

Form of Benefit

The Withdrawal Benefit is paid in a lump sum upon election by the member.

Deferred Vested Benefit

Eligibility

A member is eligible for a Deferred Vested Benefit upon termination of employment after earning five years of credited service. The member must leave his or her member contributions with interest on deposit with the Plan.

Benefit Amount

The Deferred Vested Benefit is computed in the same manner as the Normal Retirement Benefit, but it is based on credited service and Final Average Pay on the date of termination.

Form of Benefit

The Deferred Vested Benefit will be paid monthly beginning at age 60 (or at age 55 if service is at least 20 years), and for the life of the member.

Optional Benefit Forms

Prior to retirement, a member may elect to convert his retirement allowance into a benefit of equivalent actuarial value in accordance with one of the optional forms described below.

No Option: Benefit paid as a single life annuity with a refund of unused member contributions payable to designated beneficiary(ies) at the time of death.

Option 1: Reduced benefit paid for the life of the retiree with the guarantee that if the full present value (at time of retirement) has not been paid, then the remaining balance will be paid to designated beneficiary(ies).

Option 2: Reduced benefit paid for the life of the member, with the same amount continuing to the beneficiary for their remaining lifetime after the retiree's death.

Option 3: Reduced benefit paid for the life of the member, with half of that amount continuing to the beneficiary for their remaining lifetime after the retiree's death.

Option 4: Withdrawal of member contributions at the time of retirement, and the County provided benefit payable for the life of the retiree.

Option 4 may also be combined with any of the other options (4A, 4B, 4C, 4D).

Member Contributions

Each member contributes a percentage of Compensation to the Plan through payroll deduction. The percentage contributed ranges from 9% to 19% of Compensation, determined by individual election. The minimum amount is 9%, and additional optional amounts are contributed on an after- tax basis. Interest is credited annually to each member's accumulated contributions. The crediting rate is set by the Retirement Board; the current annual rate is 5.5%.

Cost-of-Living Adjustments (COLA)

The cost-of-living adjustments shall be reviewed at least once every three years by the Retirement Board. There have been ten cost-of-living adjustments in the past from January, 1972 through January, 1997 and since then as follows:

PERCENTAGE CHANGE IN C.P.I	EFFECTIVE DATE OF INCREASE
85%	1/1/1998
85%	1/1/1999
85%	1/1/2000
100%	1/1/2001
100%	1/1/2003
100%	1/1/2004
100%	1/1/2005
100%	1/1/2006
100%	1/1/2007
100%	1/1/2008

Other

An Early Retirement Incentive Program was implemented in 1995. Additional service (20%) was granted.

Section 5: Outline of Actuarial Assumptions and Methods
Glossary of Actuarial Terms

5.1: Actuarial Methods

Actuarial Cost Method

Annual contributions to the Butler County Employees' Retirement System are computed under the Entry Age Normal Actuarial Cost Method. Under this Cost Method, the Normal Cost is calculated as the amount necessary to fund members' benefits as a level percentage of total payroll over their projected working lives. This rate is multiplied by the expected payroll to determine the Employer Normal Cost contribution.

At each valuation date, the Actuarial Accrued Liability is equal to the difference between the liability for the members' total projected benefit and the present value of future Normal Cost contributions. The excess of the Actuarial Accrued Liability (AAL) over Plan assets is the Unfunded Actuarial Accrued Liability (UAAL), and the liability for each change in UAAL is amortized as a level dollar amount according to the amortization table below.

Type of Change	Amortization Period
Outstanding UAAL from experience prior to 12/31/2017	9 years remaining
Actuarial Gains/Losses or Assumption Changes after 12/31/2017	15 year layers

The total Plan cost is the sum of the Normal Cost and the amortization of the Unfunded Actuarial Accrued Liability.

Actuarial Value of Plan Assets

Beginning with this valuation, the valuation assets are equal to the market value of assets plus a portion of the deferred asset gains and losses for the current and four prior years, limited to no less than 80% and no more than 120% of the market value. Asset gains and losses are equal to the difference between the actual market value and the expected market value, and are spread out over five years. The detailed calculations of the Actuarial Value of Assets under the prior and new methods are shown in Sections 1.3.1 and 1.3.2.

Changes in Actuarial Methods since Prior Valuation

1. Projection and discounting of cash flows from employee contributions
2. Change in actuarial firm/software (not material)
3. Asset smoothing now based on standard five year recognition, as described above
4. Combined amortization bases for experience prior to 12/31/2017

5.2: Actuarial Assumptions

Valuation Date — All assets and liabilities are computed as of January 1, 2018.

The actuarial assumptions below are based on an experience study covering 2008 to 2012, done by the prior actuary. The next study will cover experience through 2018, and will be completed in 2019.

Rate of Investment Return/ Discount Rate — The annual rate of return on all Plan assets is assumed to be 7.25%, net of investment and administrative expenses.

Inflation — The cost of living as measured by the Consumer Price Index (CPI) will increase at the rate of 3.00% per year.

Increases in Pay — Salaries are assumed to increase by 3.50% per year

Member Mortality — Rates of mortality, including projected improvements for Plan members are specified by the IRS 2013 Annuitant and Non-Annuitant Mortality Tables for males and females.

Service Retirement — Eligible members are assumed to retire in accordance with the rates shown in the table below.

Age	Rate
55-59	7%
60-61	8%
62-64	15%
65	34%
66-70	23%
71-79	21%
80+	100%

Disability — No disabilities are assumed among Plan members.

Termination/Withdrawal — Rates of termination vary based on the service and age of the member as shown in the table below.

Less than Five Years of Service					
	Years of Service				
Age at Hire	**0**	**1**	**2**	**3**	**4**
20	29.8%	27.2%	24.6%	22.0	19.5%
30	27.9%	25.3%	22.8%	20.2	17.7%
40	23.3%	20.7%	18.1%	15.7	13.4%
50	12.7%	10.1%	7.8%	5.8%	4.1%
59	0.9%	0.0%	0.0%	0.0%	0.0%

For Members who meet the requirements for vesting prior to termination, it is assumed a percentage will elect to receive a refund of their employee contributions with interest and forfeit the County provided benefit. Prior to age 30 this percentage is 100%, and for ages past 30 it is defined as 100% less (age – 30) x 3⅓%, as shown in the table below (representative rates).

Five or More Years of Service				
		Withdrawal Rates		
Age	**Total Withdrawal**	**Forfeit County Benefits**	**Retain County Benefits**	**Forfeit Percentage 100%-(age-30)x3 1/3%**
30	9.3%	9.3%	-	100%
40	7.8%	5.2%	2.6%	66.7%
50	4.2%	1.4%	2.8%	33.3%
59	0.29%	0.01%	0.28%	3.3%

Family Composition

85% of Plan members are assumed to be married. Male spouses are assumed to be three years older than their wives.

Change in Actuarial Assumptions since Prior Valuation

The assumed rate of return was decreased from 7.50% to 7.25% for this valuation.

5.3: Glossary of Actuarial Terms

Actuarial Accrued Liability

A plan's Actuarial Accrued Liability is the level of assets estimated by the Plan actuary to be needed as of the valuation date to finance the sum of

- All previously earned benefits for actively employed members of the plan (and potential beneficiaries) for when they eventually retire, die or terminate with deferred vested benefits.
- All currently payable benefits of current pensioners and their beneficiaries (if applicable).

It is important to note that the Actuarial Accrued Liability is not a debt; instead, it is an asset target set by the actuarial cost method to produce an orderly accumulation of assets to pay for the plan's obligations.

Actuarial Assumptions

The actuarial assumptions are the actuary's anticipated rates of future termination, death, disability and retirement for each member of the plan as well as the actuary's anticipated rate of investment return on underlying assets. Because these assumptions will not be in exact accord with actual events, actuarial gains and losses will materialize.

Actuarial Value of Assets

The Actuarial Value of Assets, used for funding purposes, is computed using an asset smoothing technique in which investment gains and losses are not fully recognized in the year they occur, but are spread out over time, typically a specified number of years. Use of an Actuarial Value of Assets (as opposed to market value) helps avoid large fluctuations in the recognized value of the underlying assets and, as a result, avoids large fluctuations in required contribution rates.

Actuarial Present Value of Benefits

The actuarial present value of benefits is the Actuarial Accrued Liability plus actuarial present value of future Normal Costs. The actuarial present value of benefits can also be explained as the actuarial present value of all future benefits expected to be paid to the Plan's current members, whether based on current or future service.

Actuarial Funding Policy

The plan's actuarial funding policy is the scheduled program of accumulating assets to finance the plan's obligations. The funding policy includes:

- The Normal Cost, and
- Amortization of the Unfunded or Overfunded Actuarial Accrued Liability (whichever is applicable).

Investment Gains and Losses

When the investment return on assets exceeds the assumed rate of return (the actuarial assumption as to investment return), this difference is identified as an investment gain. Correspondingly, when the returns are less than expected, this difference is identified as an investment loss. These investment gains and losses are either recognized immediately to produce the market value of assets or are spread out to produce the Actuarial Value of Assets.

Normal Cost

The Normal Cost is calculated as the annual amount necessary to fund each member's benefits from that member's Plan entry date to the end of his or her projected service.

Unfunded Actuarial Accrued Liability

When the Actuarial Value of Assets is below the Actuarial Accrued Liability, there is an Unfunded Actuarial Accrued Liability which must be paid off or amortized on a schedule. When the actuarial value of assets is in excess of the Actuarial Accrued Liability, this can lead to a reduction in future contributions on an amortization schedule.