

**Butler County
Employees' Retirement System**

**Actuarial Valuation as of January 1, 2019
Actuarially Determined Contribution for 2019**



Prepared by:

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for

Butler County Employees Retirement System

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October 29, 2019

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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, 2019. The required Employer contribution for Fiscal Year 2019 has been determined based on actual demographic and asset information as of December 31, 2018. All information for GASB Statements 67 and 68 is presented in a separate report. Information for years prior to 2018 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 2019;
- 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:

	1/1/2018	1/1/2019
Plan Membership		
Active	574	571
Terminated with Deferred Benefits	88	91
<u>Receiving Benefits</u>	<u>594</u>	<u>612</u>
Total Plan Participants	1,256	1,274
Average Valuation Salary (active employees)	\$53,390	\$53,980
Assets (\$ millions)		
Market Value of Assets (MVA)	\$209.7	\$193.4
Actuarial Value of Assets (AVA)	\$204.5	\$209.8
Valuation Results (\$ millions)		
Actuarial Accrued Liability (AAL)	\$226.7	\$232.4
Unfunded Actuarial Accrued Liability (UAAL)	\$22.2	\$22.6
Funding Ratio (AVA/AAL)	90.2%	90.3%
Funding Ratio (MVA/AAL)	92.5%	83.2%
Contributions (\$ millions)		
Employer Normal Cost, with Interest	\$1.6	\$1.7
<u>Amortization of Unfunded Liability</u>	<u>3.5</u>	<u>3.7</u>
Total Employer Contribution	\$5.1	\$5.4
Employer Contribution as a percentage of payroll	16.0%	16.4%

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 2018	\$5.1	16.0%
Change in Cost Due to:		
Expected Change	0.2	0.0%
Investment Experience during 2018	0.7	1.9%
Other Experience during 2018	(0.6)	(1.6%)
<u>Changes in Actuarial Assumptions/Methods</u>	<u>0.0</u>	<u>0.0%</u>
Total Change	\$0.3	0.3%
County Contribution for 2019	\$5.4	16.4%

- Expected Increase

The contribution for 2019 was expected to increase slightly versus 2018 due to an increased payroll and resulting higher normal cost.

- Investment Experience

Investment returns were unfavorable during 2018. However, because only a portion of the 2018 investment loss was recognized, the immediate impact does not reflect the full loss.

- Demographic Experience

In the aggregate, demographic experience was favorable in 2018, and partially offset the investment loss, in terms of cost impact.

The net effect of these factors was an increase in actuarial cost versus the prior year.

Risk Assessment

There are a number of risks inherent in managing a pension plan/trust. Some of the most substantial risks include (not an all-inclusive list):

- **Investment Return Risk:** Future investment returns may be unfavorable compared to what is assumed for Plan funding purposes.
- **Investment Volatility Risk:** Investment returns will vary from year to year and over time, with a possible single or multiple year significant drop in plan assets. This impacts contribution amounts as well as compound returns.
- **Longevity Risk:** Plan members and beneficiaries may live longer than projected, and thus be entitled to additional years of benefit payments versus what had been expected.
- **Other Demographic Risks:** Future demographic experience may be unfavorable compared to expected rates of retirement, termination, and disability. Future salary increases may also be higher than expected, thereby increasing the liability of pay-related benefits.

The following examples quantify several of these risks by showing the impact of alternate assumptions on the current valuation results. In the first table, we can see that a lower investment return would have a significant impact on funding and plan costs.

Investment Return Risk

As of 1/1/2019 (\$ mm)	Current Return Assumption	1% Lower Per Year	2% Lower Per Year
Actuarial Liability	\$232.4	\$262.3	\$296.1
Plan Assets (smoothed)	209.8	209.8	209.8
Unfunded Liability	\$22.6	\$52.5	\$86.3
Funding Ratio	90%	80%	71%
Plan Cost	\$5.4	\$9.4	\$13.6
Total Contribution Rate	16.44%	28.66%	41.35%

The following table illustrates the impact of plan participants living longer than expected. In general, a 10% lower rate of mortality entails one additional year of life expectancy.

Longevity Risk

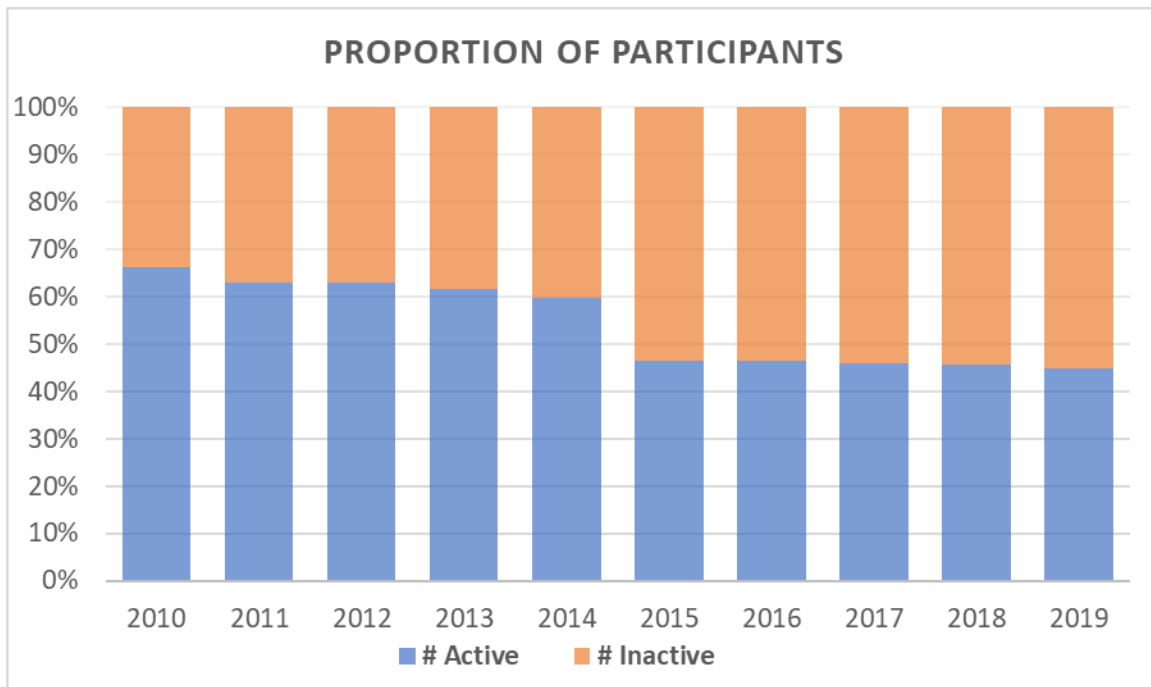
As of 1/1/2019 (\$ mm)	Current Mortality Assumption	10% Lower Mortality Rates	20% Lower Mortality Rates
Actuarial Liability	\$232.4	\$236.8	\$241.3
Plan Assets (smoothed)	209.8	209.8	209.8
Unfunded Liability	\$22.6	\$27.0	\$31.5
Funding Ratio	90%	89%	87%
Plan Cost	\$5.4	\$5.9	\$6.5
Total Contribution Rate	16.44%	18.11%	19.80%

Plan Maturity

Another challenging risk faced by many pension plans is the maturing of the plan over time. This can be seen in the number of inactive (retirees, beneficiaries, etc.) versus the number of active employees in the plan population, as well as the liability of each group. As the plan matures, several risks emerge, including:

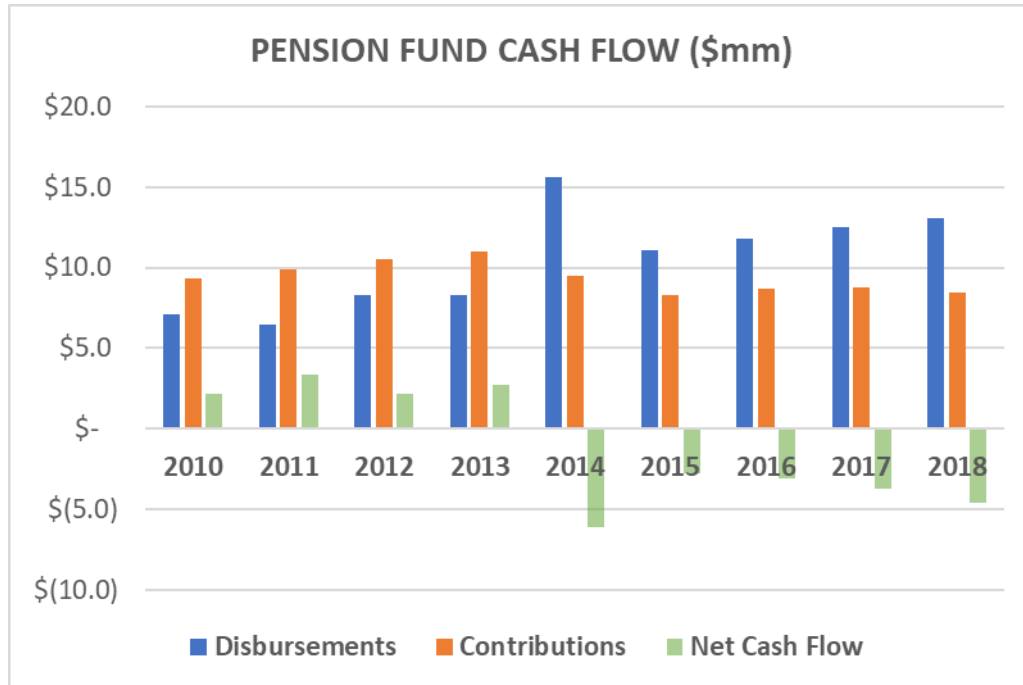
- Higher ratio of assets to payroll, which leads to a greater degree of contribution rate volatility.
- Negative cash flow (benefit payments exceeding contributions), which exacerbates the impact of an economic downturn.
- Greater degree of longevity risk (as illustrated above).
- Higher ratio of Actuarial Accrued Liability to Normal Cost, which causes more contribution volatility when demographic experience is unfavorable.

The following graphs illustrate some of these plan maturity measures in recent years, showing how the plan is maturing over time. The current population is over 50% inactive members.



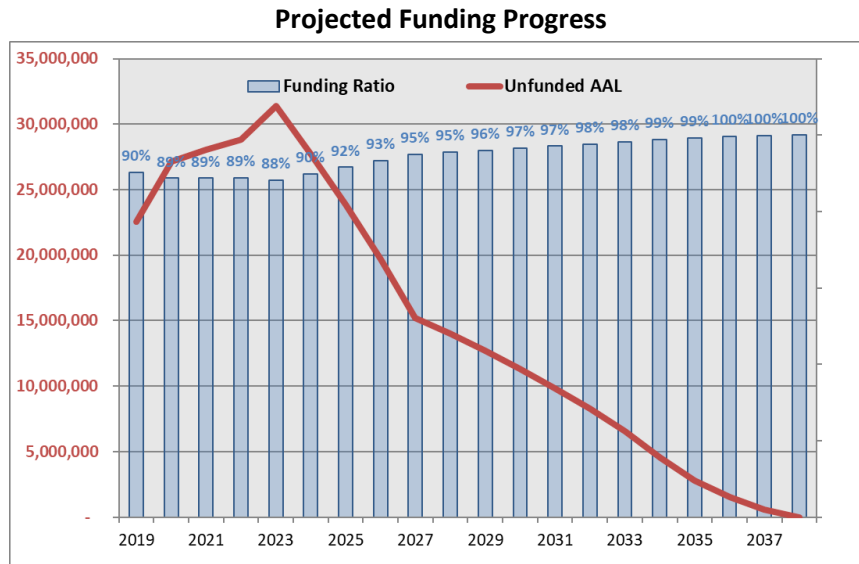
The Plan liability is also over 50% inactive and this trend is likely to continue as the System matures in the coming years.

As shown below, the fund has gone from positive cash flow in 2010 – 2013 to negative cash flow (disbursements greater than contributions) in recent years. The level of negative cash flow has not changed significantly since 2014.

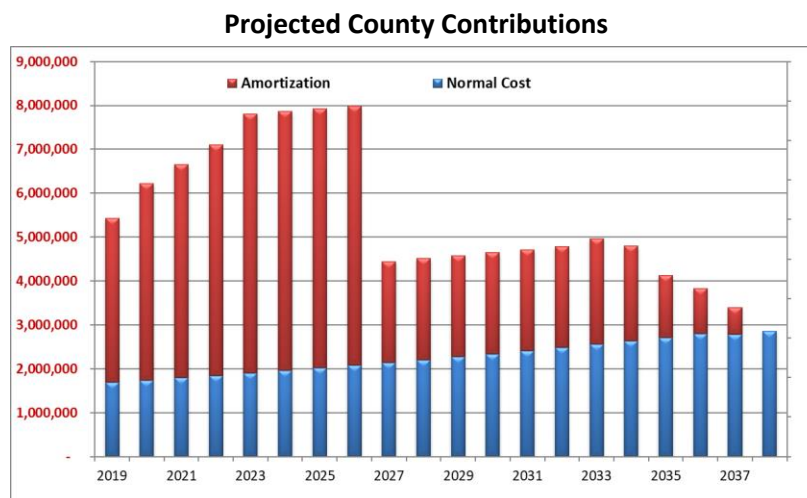


Future Costs and Funding

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.**



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



In the second graph, the expected employer contributions are shown. The amounts are expected to increase from \$5 million to \$8 million per year, as investment losses are recognized and the current unfunded amount is 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 System 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, FSA, EA, FCA, MAAA
Chief Actuary



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Senior Actuary

Section 1: Plan Asset Information

1.1: Comparative Value of Net Assets

	12/31/2017	12/31/2018
<u>ASSETS</u>		
Cash and Short-Term Investments	\$ 3,626,938	\$ 1,900,610
Receivables and Prepaids	15,342	6,253
Investments, at fair market value:		
U.S. Government Obligations & Corporate Fixed Income	54,072,699	53,625,700
U.S Treasury Inflation Protected Securities (TIPS)	9,602,359	9,562,994
Domestic Common Stock	87,308,145	78,072,599
International Stocks	44,558,201	39,822,160
Real Estate Investment Trusts (REIT)	9,947,067	9,357,518
Invested Cash & Equivalents	474,092	841,200
Accrued Income	202,714	238,179
Total Investments	206,165,277	191,520,350
Total Assets	209,807,557	193,427,213
<u>LIABILITIES</u>		
Accounts Payable	58,725	75,476
Net Assets Held in Trust For Plan Benefits	\$ 209,748,832	\$ 193,351,737

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

1.2: Comparative Income Statements

	<u>2017</u>	<u>2018</u>
Net Plan Assets, as of January 1	\$ 187,866,080	\$ 209,748,832
<u>ADDITIONS</u>		
Member Contributions	3,331,239	3,424,361
Member Contributions (County Share)	2,273	2,493
County Contributions	5,473,038	5,066,887
Investment Income:		
Interest	2,257,983	2,551,865
Dividends	2,847,838	3,153,470
Realized Gain/(Loss)	4,053,176	3,330,305
Unrealized Gain/(Loss)	16,609,102	(20,694,710)
Miscellaneous	2,312	35,464
Total Additions	+\$ 34,576,961	+\$ (3,129,865)
<u>DEDUCTIONS</u>		
Refunds of member contributions	207,552	227,380
Retirement Allowances	11,536,161	12,316,993
Death Benefits	608,994	347,232
Administrative Expenses	123,379	156,280
Investment Expenses	218,123	219,345
Total Deductions	-\$ 12,694,209	-\$ 13,267,230
<u>NET INCREASE IN NET PLAN ASSETS</u>	21,882,752	(16,397,095)
Net Plan Assets, as of December 31	\$ 209,748,832	\$ 193,351,737

1.3: Computation of Actuarial Value of Assets

(1)	Market Value 1/1/2018	\$	209,748,832
(2)	Actuarial Value 1/1/2018		204,517,640
(3)	Total Contributions		8,493,741
(4)	Total Disbursements		(13,047,885)
(5)	Expected Return on Market Value (7.25% for 2018)*		15,041,703
(6)	Expected Market Value 12/31/2018: [(1)+(3)+(4)+(5)]		220,236,391
(7)	Market Value 12/31/2018		193,351,737
(8)	Gain/(Loss): [(7)-(6)]		(26,884,654)
(9)	Deferral of Gain/(Loss), 2018 (80%)		(21,507,723)
	Deferral of Gain/(Loss), 2017 (60%)		7,153,037
	Deferral of Gain/(Loss), 2016 (40%)		787,746
	Deferral of Gain/(Loss), 2015 (20%)		(2,902,582)
(10)	Preliminary Actuarial Value: [(7)-(9)]		209,821,259
(11)	Final Actuarial Value (not less than 80% nor more than 120% of Market Value)	\$	209,821,259
(12)	Ratio of Actuarial Value to Market Value		109.50%
	Unrecognized Gain/(Loss): (7) - (11)	\$	(16,469,522)
	Approximate Annual Investment Return – AVA basis		4.87%
	Approximate Annual Investment Return – MVA basis		(5.70%)
	AVA/Actuarial Accrued Liability		92.2%
	MVA/Actuarial Accrued Liability		85.0%

* Employee contributions and benefits assumed to be paid throughout the year.

1.4: System Assets and Liabilities

ASSETS

Member Annuity Reserve Account (MARA)	50,613,312
County Annuity Reserve Account (CARA)	22,527,006
Retired Members Reserve Account (RMRA)	118,770,823
Unrealized Appreciation of Assets	<u>1,440,596</u>
Current Assets (Market Value) of the Plan	193,351,737
Present Value of Future Employer Contributions	72,858,639
Total Assets	\$266,210,376

LIABILITIES

Actuarial Present Value of:

Accumulated Plan Benefits (Unit Credit Basis)	
Vested Participants	62,337,173
Nonvested Participants	2,795,401
Terminated Vested Benefits	13,986,366
<u>Retired Benefits</u>	<u>118,770,823</u>
Total Present Value of Accumulated Benefits	197,889,763
 Future Benefit Accruals	 68,320,613

Total Liability of the Butler County Employees' Retirement Fund (Present Value of Future Benefits)	\$266,210,376
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1.5: Reconciliation of Reserve Balances

	M.A.R.A	C.A.R.A	R.M.R.A	TOTAL
Balance as of January 1, 2018	\$ 48,199,674	\$ 10,701,653	\$ 113,828,671	\$ 172,729,998
County Appropriations		5,066,887		5,066,887
Member Contributions	3,424,361	2,493		3,426,854
Member Purchases				-
Net Investment Income		9,071,103		9,071,103
Investment Expenses		(219,345)		(219,345)
Member Contribution Refunds	(227,380)			(227,380)
Pension Payments			(12,316,993)	(12,316,993)
Death Benefits			(347,232)	(347,232)
Retiree and Death Benefit Transfers	(3,407,030)	(6,272,413)	9,679,443	-
Cost of Living Funding Requirement				-
Administrative Expenses		(156,280)		(156,280)
Miscellaneous				-
Balance Before Interest	47,989,625	33,077,627	110,843,889	191,911,141
Interest Allocated During Year	2,623,687	(10,768,067)	8,144,380	-
Balance Before Actuarial Adjustments	50,613,312	22,309,560	118,988,269	191,911,141
Actuarial Adjustments ¹		217,446	(217,446)	-
Balance as of December 31, 2018 (Cost Value)	\$ 50,613,312	\$22,527,006	\$ 118,770,823	\$ 191,911,141
Unrealized Appreciation/(Depreciation)				1,440,596
Market Value as of December 31, 2018				\$ 193,351,737

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
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%
2018	-5.7%	4.9%
5 Year Compound Return	4.6%	6.3%
10 Year Compound Return	8.7%	7.5%

Section 2: Actuarial Computations

2.1: Development of Unfunded Actuarial Liability

	1/1/2018	1/1/2019
Actuarial Accrued Liability		
Active Members	\$100,315,904	99,644,075
Inactive Members:		
Retirees/Beneficiaries	111,668,836	116,692,876
Retiree Cost-of-Living	2,159,835	2,077,947
<u>Terminated</u>	<u>12,592,188</u>	<u>13,986,366</u>
Total Inactive	126,420,859	132,757,189
Accumulated Deductions	Active: 41,702,086 Inactive: 6,497,588 (liability included above)	Active: 43,320,860 Inactive: 6,946,986 (liability included above)
Total Actuarial Accrued Liability	\$226,736,763	\$232,401,264
Actuarial Value of Assets	\$204,517,640	\$209,821,259
Unfunded Actuarial Accrued Liability	\$22,219,123	\$22,580,005
Ratio of Assets to Liability	90.2%	90.3%
Total Normal Cost (Beginning of Year)	\$4,227,017	\$4,346,794

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
50,613,312	118,770,823	63,017,129	193,351,737	100%	100%	38%

2.2: Development of Experience Gain/Loss

1	Unfunded actuarial accrued liability as of January 1, 2018	\$22,219,123
2	Normal Cost as of January 1, 2018	4,227,017
3	Employer Contributions during 2018	-8,023,208
4	Interest on the above	<u>1,917,345</u>
5	Expected Change during 2018	<u>-1,878,846</u>
6	Expected Unfunded Actuarial Liability as of January 1, 2019	20,340,277
7	Unfunded Actuarial Liability as of January 1, 2019, Before Changes	22,580,005
8	Actuarial (Gain)/Loss: [(7)-(6)]	2,239,728
9	Impact of Changes in Assumptions	0
10	Impact of Changes in Methods	0
11	Unfunded Actuarial Liability as of January 1, 2019	\$22,580,005

Experience Gain/Loss by Source

Source	Gain	Loss
Investment Return		\$4,196,369
Salary Increases	(\$503,945)	
Active Member Retirements		151,852
Active Member Terminations	(47,130)	
Active Member Deaths	(523,099)	
Mortality	(805,836)	
New Entrants		7,110
Miscellaneous	(235,593)	
Total	(\$2,115,603)	4,355,331
Net Amount of (Gain)/Loss		\$2,239,728

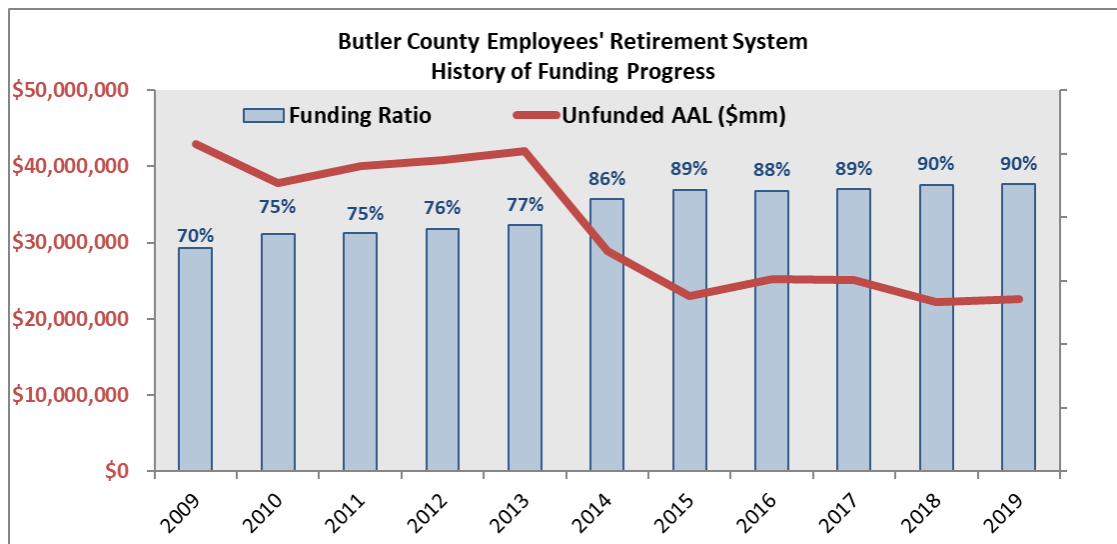
2.3: Development of Employer Contribution

Normal Cost					
Gross Normal Cost					\$4,346,794
Expected Employee Contributions					(2,871,130)
Interest to End of Year					212,885
End of Year Employer Normal Cost					\$1,688,549
Employer Normal Cost Rate (% of Pay)					5.29%
Amortization of Unfunded AAL					
<u>Base</u>	<u>Initial Amount</u>	<u>Date Established</u>	<u>Years Remaining</u>	<u>Remaining Balance</u>	<u>Annual Payment</u>
Combined UAAL as of 12/31/2017	\$23,206,495	1/1/2018	8	\$21,289,108	\$3,599,857
Experience (Gain)/Loss - 2017	(2,412,402)	1/1/2018	14	(2,318,235)	(269,066)
Method Changes	(4,047,284)	1/1/2018	14	(3,889,300)	(451,412)
Assumption Changes	5,472,315	1/1/2018	14	5,258,704	610,353
Experience (Gain)/Loss - 2018	2,239,728	1/1/2019	15	<u>2,239,728</u>	<u>249,807</u>
Total				\$22,580,005	\$3,739,539
Total Required Employer Contribution as of December 31, 2019					\$5,428,088
Expected Payroll					\$33,017,998
Percentage of Expected Payroll ²					16.44%

² As a percentage of actual 2018 payroll (\$31,901,447) for those included in the 2018 valuation, this is 14.27%.

2.4: Schedule of Funding Progress

Actuarial Valuation Date	Actuarial Value of Assets	Actuarial Accrued Liability	Unfunded Actuarial Accrued Liability	Funded Ratio
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%
1/1/2019	209,821,259	232,401,264	22,580,005	90.3%



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
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%
2018	5,066,887	5,066,887	0	31,718,329	16.0%

Section 3: Demographic Information

3.1: Participant Summary

	1/1/2018			1/1/2019		
Active Participants	Males	Females	Total	Males	Females	Total
Active Participants	259	315	574	259	312	571
Total Compensation	\$14,865,240	\$15,780,489	\$30,645,729	\$14,792,547	\$16,030,107	\$30,822,654
Average Compensation	\$57,395	\$50,097	\$53,390	\$57,114	\$51,379	\$53,980
Average Age	42.7	46.6	44.8	42.7	46.8	44.9
Average Service	10.5	12.3	11.5	10.6	12.1	11.3
	Average Remaining Service		10.1	Average Remaining Service		10.2
Percent male / female	45.1%	54.9%		45.4%	54.6%	

	1/1/2018			1/1/2019		
Inactive Participants	Males	Females	Total	Males	Females	Total
Retired Participants and Beneficiaries	156	438	594	157	455	612
Total Benefit	\$310,593	\$598,333	\$908,926	\$338,654	\$650,294	\$988,948
Average Benefit	\$1,991	\$1,363	\$1,528	\$2,157	\$1,429	\$1,616
Average Age	68.4	67.8	68.0	68.8	68.5	68.6
	Average Life Expectancy of Benefit Recipients		19.0	Average Life Expectancy of Benefit Recipients		18.4
Vested Participants	24	64	88	29	62	91
Total Benefit	\$50,312	\$121,707	\$172,020	\$69,589	\$122,080	\$191,668
Average Benefit	\$2,096	\$1,902	\$1,955	\$2,400	\$1,969	\$2,106
Average Age	47.5	50.3	49.5	47.9	49.8	49.2
	Average Life Expectancy of All Inactive Participants		20.9	Average Life Expectancy of All Inactive Participants		20.6

3.2: Data Reconciliation

	Active	Terminated Deferred	Terminated Due Refund	Disabled	Retired	Beneficiary	Total
Number as of 1/1/2018	574	88		14	554	26	1,256
Additions							
a. New entrants	39						39
b. Rehired							0
Changes in Status							
a. Terminated Non-Vested							
b. Refund	-12	-1					-13
c. Terminated Vested	-11	11					0
d. Death without Beneficiary				-1	-4		-5
e. Death with Beneficiary					-4	4	0
f. Death with Cashout	-2				-1		-3
g. Retired	-17	-7			24		0
h. Disabled							0
i. Data changes (+)					1		1
j. Data changes (-)						-1	-1
Number as of 1/1/2019	571	91		13	570	29	1,274

3.3: Distribution of Active Participants

BY AGE AND SERVICE AS OF JANUARY 1, 2019										
-----Completed Years of Service from Date of Hire-----										
Nearest Age	<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	9	6	4	1	0	0	0	0	0	20
avg sal.	\$31,073	\$34,944	\$47,415	\$41,671						\$36,032
25 – 29	9	9	31	12	0	0	0	0	0	61
avg sal.	\$44,117	\$44,986	\$50,643	\$55,926						\$49,885
30 – 34	2	1	19	33	12	1	0	0	0	68
avg sal.	\$40,937	\$59,232	\$49,331	\$54,269	\$52,295	\$48,117				\$52,131
35 – 39	2	3	12	23	17	6	0	0	0	63
avg sal.	\$24,003	\$45,368	\$48,849	\$57,504	\$55,658	\$61,100				\$54,058
40 – 44	4	6	14	14	10	20	5	0	0	73
avg sal.	\$40,391	\$40,455	\$57,197	\$50,845	\$62,022	\$63,102	\$59,915			\$56,147
45 – 49	4	5	5	17	18	26	13	6	2	96
avg sal.	\$45,246	\$40,520	\$68,526	\$54,109	\$60,577	\$55,228	\$60,284	\$71,398	\$46,246	\$57,051
50 – 54	6	3	8	9	8	17	18	10	7	86
avg sal.	\$40,106	\$50,336	\$49,204	\$56,867	\$53,421	\$58,549	\$61,095	\$63,643	\$58,001	\$56,534
55 – 59	1	3	3	15	11	21	4	2	4	64
avg sal.	\$30,583	\$32,797	\$42,394	\$52,178	\$50,879	\$52,495	\$55,928	\$83,492	\$60,559	\$52,091
60 – 64	0	1	3	4	4	5	3	5	6	31
avg sal.		\$91,601	\$44,678	\$54,744	\$61,560	\$53,713	\$60,033	\$50,587	\$67,960	\$58,071
>64	0	0	1	1	0	3	1	0	3	9
avg sal.			\$26,579	\$40,797		\$72,692	\$41,630		\$69,912	\$59,647
Total	37	37	100	129	80	99	44	23	22	571
avg sal.	\$38,388	\$43,141	\$51,079	\$54,358	\$56,470	\$57,546	\$59,737	\$64,554	\$61,738	\$53,980

3.4: Membership History

Actuarial Valuation Date	Active and Terminated Vested Members			Retired Members and Beneficiaries		
	Male	Female	Total	Male	Female	Total
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
1/1/2019	288	374	662	157	455	612

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.

Change in Plan Provisions since Prior Valuation

There have been no changes in plan provisions since the prior valuation.

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

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 calculation of the Actuarial Value of Assets is shown in Section 1.3.

Changes in Actuarial Methods since Prior Valuation

None

5.2: Actuarial Assumptions

Valuation Date All assets and liabilities are computed as of January 1, 2019.

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 $100\% - (\text{age} - 30) \times 3\frac{1}{3}\%$, 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 $100\% - (\text{age} - 30) \times 3\frac{1}{3}\%$
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

None

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.