

**Butler County
Employees' Retirement System**

**Actuarial Valuation as of January 1, 2021
Actuarially Determined Contribution for 2021**



Prepared by:

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for

Butler County Employees Retirement System

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October 26, 2021

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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, 2021. The required Employer contribution for Fiscal Year 2021 has been determined based on actual demographic and asset information as of December 31, 2020. Financial reporting information under GASB Statements 67 and 68 is presented in a separate report. Information for years prior to 2019 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 2021;
- 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:

	1/1/2020	1/1/2021
Plan Membership		
Active	579	588
Terminated with Deferred Benefits	93	96
<u>Receiving Benefits</u>	<u>624</u>	<u>628</u>
Total Plan Participants ¹	1,296	1,312
Average Valuation Salary (active employees)	\$55,498	\$55,097
Assets (\$ millions)		
Market Value of Assets (MVA)	\$227.4	\$245.1
Actuarial Value of Assets (AVA)	\$218.7	\$234.5
Valuation Results (\$ millions)		
Actuarial Accrued Liability (AAL)	\$251.3	\$270.0
Unfunded Actuarial Accrued Liability (UAAL)	\$32.6	\$35.5
Funding Ratio (AVA/AAL)	87.0%	86.8%
Funding Ratio (MVA/AAL)	90.5%	90.8%
Contributions (\$ millions)		
Employer Normal Cost, with Interest	\$2.6	\$2.9
<u>Amortization of Unfunded Liability</u>	<u>5.1</u>	<u>4.5</u>
Total Employer Contribution	\$7.7	\$7.4
Employer Contribution as a percentage of payroll	22.1%	21.2%

¹ Does not include non-vested terminations due refunds.

Change in Plan Cost from Prior Valuation

The employer contribution for 2021 has increased since the prior year.

The table and discussion below summarize the impact of experience and other changes 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 2020	\$7.7	22.1%
Change in Cost Due to:		
Expected Change	(0.4)	(1.7%)
Investment Experience during 2020	(0.1)	(0.2%)
Other Experience during 2020	(0.2)	(0.2%)
Changes in Actuarial Assumptions	1.6	4.6%
<u>Change in Amortization for pre-2018</u>	<u>(1.2)</u>	<u>(3.4%)</u>
Total Change	(\$0.3)	(0.9%)
County Contribution for 2021	\$7.4	21.2%

- Expected Increase

The contribution for 2021 was expected to decrease versus 2020 primarily due to recognition of prior investment gains.

- Investment Experience

Investment returns were favorable during 2020. However, because only a portion of this investment gain was recognized, the immediate impact does not reflect the full amount.

- Demographic Experience

In the aggregate, demographic experience was close to expected, but did result in a lower than expected normal cost.

- Assumption Changes

The expected investment return assumption was decreased from 7.25% to 6.90%.

- Other Changes

The pre-2018 amortization base (\$17 million remaining) was re-amortized over 10 years (increased from 6 years).

The net effect of these factors was a decrease 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 1/1/2021 (\$ mm)	Current Return Assumption	2% Lower Per Year
Actuarial Liability	\$270.0	\$343.5
Plan Assets (smoothed)	234.5	234.5
Unfunded Liability	\$35.5	\$109.0
Funding Ratio	87%	68%
Plan Cost	\$7.4	\$17.1
Total Contribution Rate	21.2%	48.9%

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

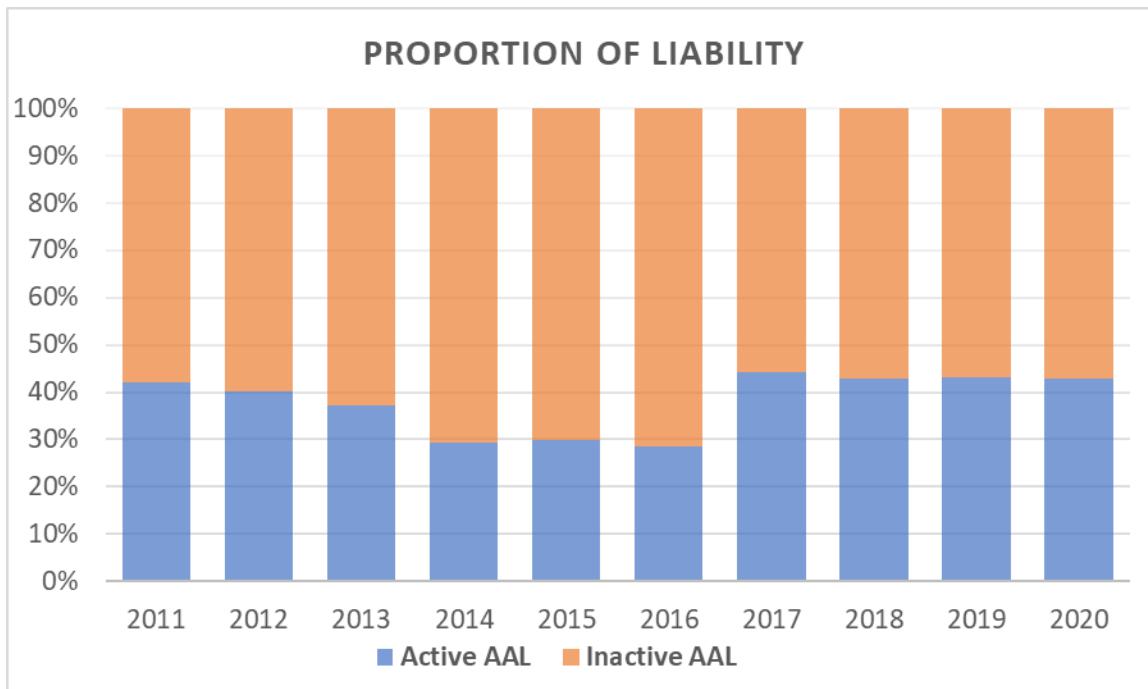
As of 1/1/2021 (\$ mm)	Current Mortality Assumption	20% Lower Mortality Rates
Actuarial Liability	\$270.0	\$279.3
Plan Assets (smoothed)	234.5	234.5
Unfunded Liability	\$35.5	\$44.8
Funding Ratio	87%	84%
Plan Cost	\$7.4	\$8.5
Total Contribution Rate	21.2%	24.5%

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:

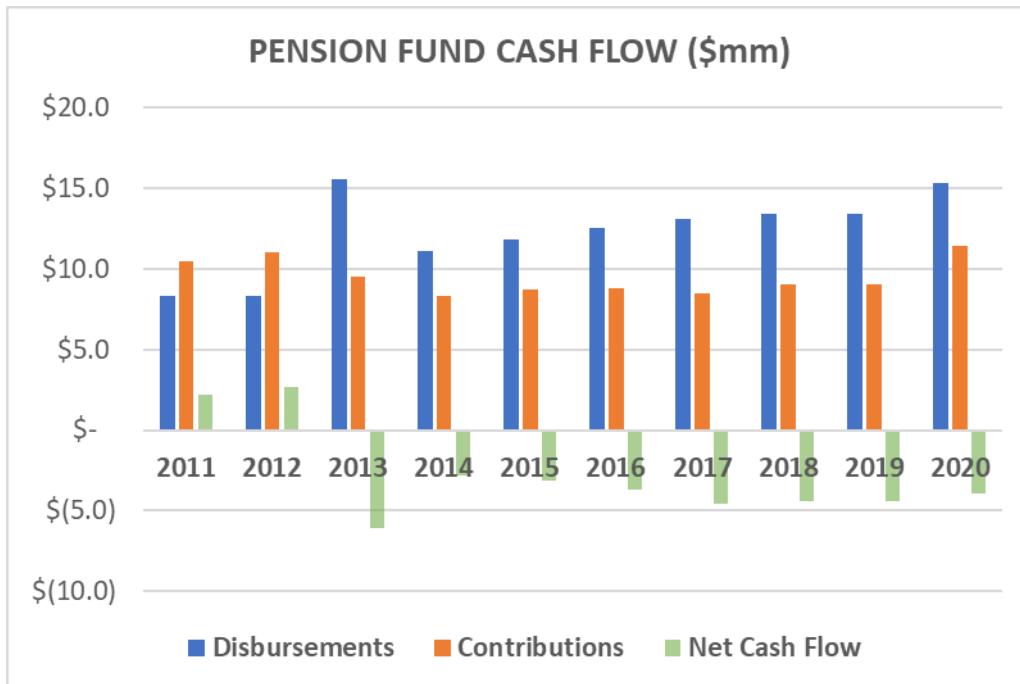
- Higher ratio of assets to payroll, which leads to a greater degree of contribution rate volatility.
- Negative cash flow (benefit payments exceeding contributions), which exacerbates the impact of an economic downturn.
- Greater degree of longevity risk (as illustrated above).
- Higher ratio of Actuarial 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. Each year shown is measured as of December 31.



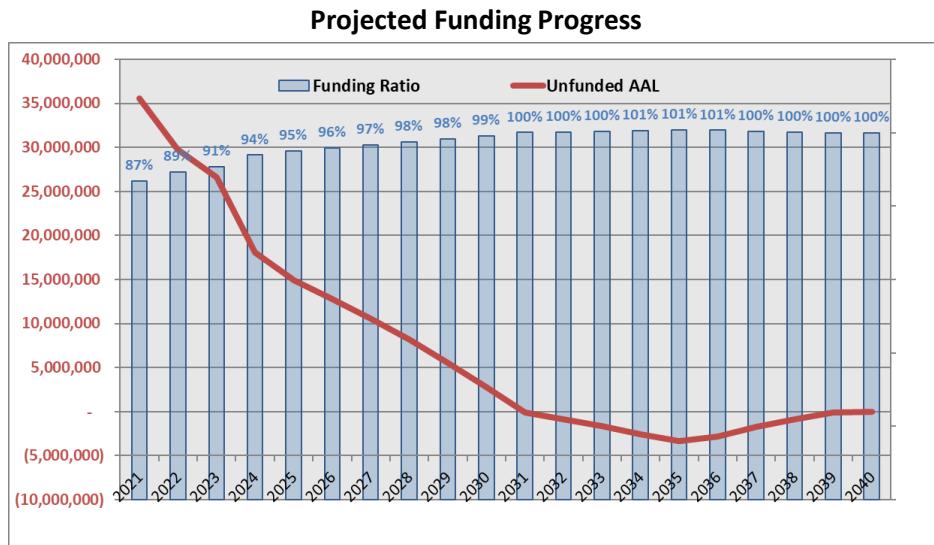
The Plan liability has averaged about 57% inactive over the past decade and this ratio is likely to increase as the System matures in the coming years.

As shown below, the fund has gone from positive cash flow before 2013 to negative cash flow (disbursements greater than contributions) in recent years. The level of negative cash flow has not changed significantly since 2014. Investment income is not considered in this illustration.

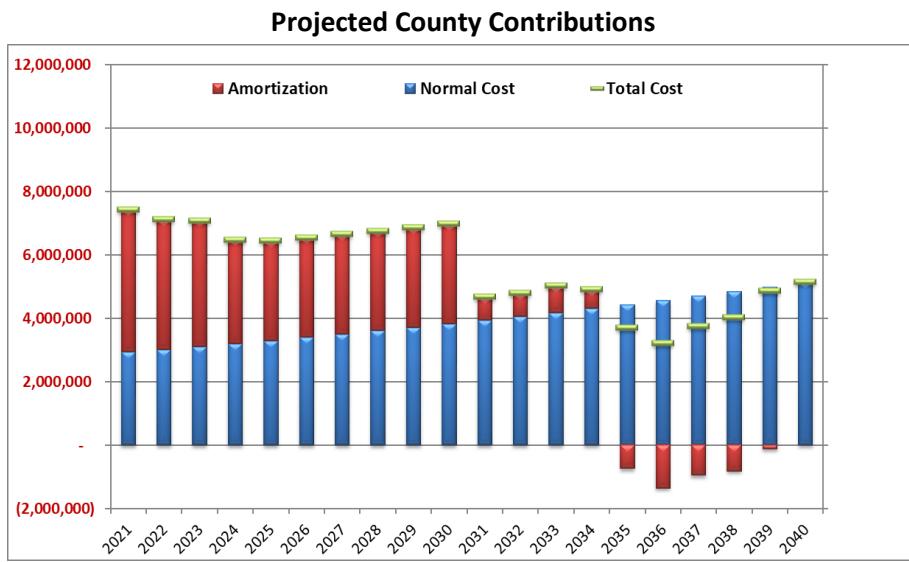


Future Costs and Funding

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 6.90% 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 significant reductions in the unfunded actuarial liability. This is largely due to significant investment gains during 2019 and 2020, as well as the Board's current amortization policy. However, this projection 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 remain around \$7 million per year, then decrease by several million dollars in 2031. 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 and other changes over that time frame.

Actuarial Certification

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 Consultant & Actuary

Section 1: Plan Asset Information

1.1: Comparative Value of Net Assets

	12/31/2019	12/31/2020
<u>ASSETS</u>		
Cash and Short-Term Investments	\$ 2,598,454	\$ 2,123,527
Receivables and Prepays	143,503	181,501
Investments, at fair market value:		
U.S. Government Obligations & Corporate Fixed Income	69,654,951	74,394,628
U.S Treasury Inflation Protected Securities (TIPS)	0	0
Domestic Common Stock	95,335,524	104,347,432
International Stocks	47,014,426	52,042,505
Real Estate Investment Trusts (REIT)	12,072,800	11,509,558
Invested Cash & Equivalents	380,153	341,664
Accrued Income	244,949	197,765
Total Investments	<hr/> 224,702,803	<hr/> 245,138,580
Total Assets	227,444,760	245,138,580
<u>LIABILITIES</u>		
Accounts Payable	62,122	60,551
Net Assets Held in Trust For Plan Benefits	\$ 227,382,638	\$ 245,078,029

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

1.2: Comparative Income Statements

	<u>2019</u>	<u>2020</u>
Net Plan Assets, as of January 1	\$ 193,351,737	\$ 227,382,638
<u>ADDITIONS</u>		
Member Contributions	3,568,120	3,748,395
Member Contributions (County Share)	5,822	815
County Contributions	5,428,088	7,684,978
Investment Income:		
Interest	2,614,400	2,388,166
Dividends	3,298,540	2,969,673
Realized Gain/(Loss)	3,301,787	3,521,993
Unrealized Gain/(Loss)	29,484,406	12,929,391
Miscellaneous	6,771	30,792
Total Additions	+\$ 47,707,934	+\$ 33,274,203
<u>DEDUCTIONS</u>		
Refunds of member contributions	112,257	316,509
Retirement Allowances	12,867,197	13,522,722
Death Benefits	304,196	1,382,613
Administrative Expenses	154,379	125,158
Investment Expenses	239,004	231,810
Total Deductions	-\$ 13,677,033	-\$ 15,578,812
<u>NET INCREASE IN NET PLAN ASSETS</u>		
Net Plan Assets, as of December 31	\$ 34,030,901	\$ 17,695,391
	\$ 227,382,638	\$ 245,078,029

1.3: Computation of Actuarial Value of Assets

(1)	Market Value 1/1/2020	\$ 227,382,638
(2)	Actuarial Value 1/1/2020	218,663,103
(3)	Total Contributions	11,434,188
(4)	Total Disbursements	(15,347,002)
(5)	Expected Return on Market Value	16,345,883
(6)	Expected Market Value 12/31/2020: [(1)+(3)+(4)+(5)]	239,815,707
(7)	Market Value 12/31/2020	245,078,029
(8)	Gain/(Loss): [(7)-(6)]	5,262,322
(9)	Deferral of Gain/(Loss), 2020 (80%)	4,209,857
	Deferral of Gain/(Loss), 2019 (60%)	14,765,822
	Deferral of Gain/(Loss), 2018 (40%)	(10,753,862)
	<u>Deferral of Gain/(Loss), 2017 (20%)</u>	<u>2,384,346</u>
	Total Deferred Gain/(Loss)	\$ 10,606,163
(10)	Preliminary Actuarial Value: [(7)-(9)]	234,471,866
(11)	Final Actuarial Value (not less than 80% nor more than 120% of Market Value)	\$ 234,471,866
(12)	Ratio of Actuarial Value to Market Value	95.7%
	Approximate Annual Investment Return – AVA basis	9.1%
	Approximate Annual Investment Return – MVA basis	9.6%
	AVA/Actuarial Accrued Liability	86.8%
	MVA/Actuarial Accrued Liability	90.8%

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

1.4: System Assets and Liabilities

ASSETS

Member Annuity Reserve Account (MARA)	\$ 56,276,010
County Annuity Reserve Account (CARA)	7,115,168
Retired Members Reserve Account (RMRA)	137,837,940
Unrealized Appreciation of Assets	43,848,911
Current Assets (Market Value) of the Plan	\$ 245,078,029
Present Value of Future Employer Contributions	75,386,585
Total Assets	\$320,464,614

LIABILITIES

Actuarial Present Value of:

Accumulated Plan Benefits (Unit Credit Basis)	
Vested Participants	\$80,380,879
Nonvested Participants	3,195,608
Terminated Vested Benefits	16,211,661
<u>Retired Benefits</u>	<u>137,837,940</u>
Total Present Value of Accumulated Benefits	\$237,626,088
Future Benefit Accruals	82,838,526
Total Liability of the Butler County Employees' Retirement Fund (Present Value of Future Benefits)	\$320,464,614

1.5: Reconciliation of Reserve Balances

	M.A.R.A.	C.A.R.A.	R.M.R.A.	TOTAL
Balance as of January 1, 2020	\$53,775,491	\$14,585,643	\$128,101,985	\$196,463,119
County Appropriations		7,684,978		7,684,978
Member Contributions	3,748,395			3,748,395
Member Purchases		815		815
Net Investment Income		8,910,623		8,910,623
Investment Expenses		(231,810)		(231,810)
Member Contribution Refunds	(316,509)			(316,509)
Pension Payments			(13,522,722)	(13,522,722)
Death Benefits			(1,382,613)	(1,382,613)
Retiree and Death Benefit Transfers	(3,851,413)	(7,558,655)	11,410,068	-
Cost of Living Funding Requirement				-
Administrative Expenses		(125,158)		(125,158)
Miscellaneous				-
Balance Before Interest	53,355,964	23,266,436	124,606,718	201,229,118
Interest Allocated During Year	2,920,046	(12,080,736)	9,160,690	-
Balance Before Actuarial Adjustments	56,276,010	11,185,700	133,767,408	201,229,118
Actuarial Adjustments ¹		(4,070,532)	4,070,532	-
Balance as of December 31, 2020 (Cost Value)	\$56,276,010	\$7,115,168	\$137,837,940	\$201,229,118
Unrealized Appreciation/(Depreciation)				43,848,911
Market Value as of December 31, 2020				\$245,078,029

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
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%
2019	20.1%	6.4%
2020	9.6%	9.1%
5 Year Compound Return	8.9%	6.5%
10 Year Compound Return	8.3%	7.8%

Section 2: Actuarial Computations

2.1: Development of Unfunded Actuarial Liability

	1/1/2020	1/1/2021	
Actuarial Accrued Liability	7.25%		6.90%
Active Members	\$108,460,500	\$110,341,319	\$115,980,730
Inactive Members:			
Retirees/Beneficiaries	\$126,150,867	\$132,161,748	\$135,949,135
Retiree Cost-of-Living	1,951,118	1,842,737	1,888,805
<u>Terminated</u>	<u>14,749,031</u>	<u>15,349,502</u>	<u>16,211,661</u>
Total Inactive	\$142,851,016	\$149,353,987	\$154,049,601
Accumulated Deductions	Active: \$45,875,633 Inactive: \$7,899,858 (liability included above)	Active: \$48,076,118 Inactive: \$8,199,892 (liability included above)	
Total Actuarial Accrued Liability	\$251,311,516	\$259,695,306	\$270,030,331
Actuarial Value of Assets	\$218,663,103	\$234,471,866	\$234,471,866
Unfunded Actuarial Accrued Liability	\$32,648,413	\$25,223,440	\$35,558,465
Ratio of Assets to Liability	87.0%	90.3%	86.8%
Total Normal Cost (Beginning of Year)	\$5,343,400	\$5,260,296	\$5,697,296

Solvency Test

Valuation Date	(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
12/31/2017	\$48,199,674	\$113,828,671	\$64,708,418	\$209,748,832	100%	100%	74%
12/31/2018	50,613,312	118,770,823	63,017,129	193,351,737	100%	100%	38%
12/31/2019	53,775,491	128,101,985	69,434,040	227,382,638	100%	100%	66%
12/31/2020	56,276,010	137,837,940	75,916,381	245,078,029	100%	100%	67%

2.2: Development of Experience Gain/Loss

1	Unfunded actuarial accrued liability as of January 1, 2020	\$32,648,413
2	Employer Normal Cost as of December 31, 2020	2,587,964
3	Employer Contributions during 2020	(7,684,978)
4	Interest on the above	2,367,010
5	Expected Change during 2020	(2,730,004)
6	Expected Unfunded Actuarial Liability as of January 1, 2021	29,918,409
7	Unfunded Actuarial Liability as of January 1, 2021, Before Changes	25,223,440
8	Experience (Gain)/Loss: [(7)-(6)]	(4,694,969)
9	Impact of Changes in Assumptions	10,335,025
10	Impact of Changes in Methods	0
11	Unfunded Actuarial Liability as of January 1, 2021	\$35,558,465

Experience Gain/Loss by Source

Source	Gain	Loss
Investment Return (smoothed value)	(\$4,891,859)	
Salary Increases	(470,347)	
Active Member Retirements	(103,001)	
Active Member Terminations		19,693
Active Member Deaths		730,741
Retiree Mortality	(107,402)	
New Entrants		84,503
Miscellaneous		62,396
Total	(\$5,572,609)	\$877,640
Net Amount of (Gain)/Loss		(\$4,694,969)

2.3: Development of Employer Contribution

Normal Cost

Gross Normal Cost	\$5,697,296
Expected Employee Contributions	(3,057,884)
<u>Interest to End of Year</u>	<u>289,376</u>
End of Year Employer Normal Cost	\$2,928,788
Employer Normal Cost Rate (% of Pay)	8.62%

Amortization of Unfunded AAL

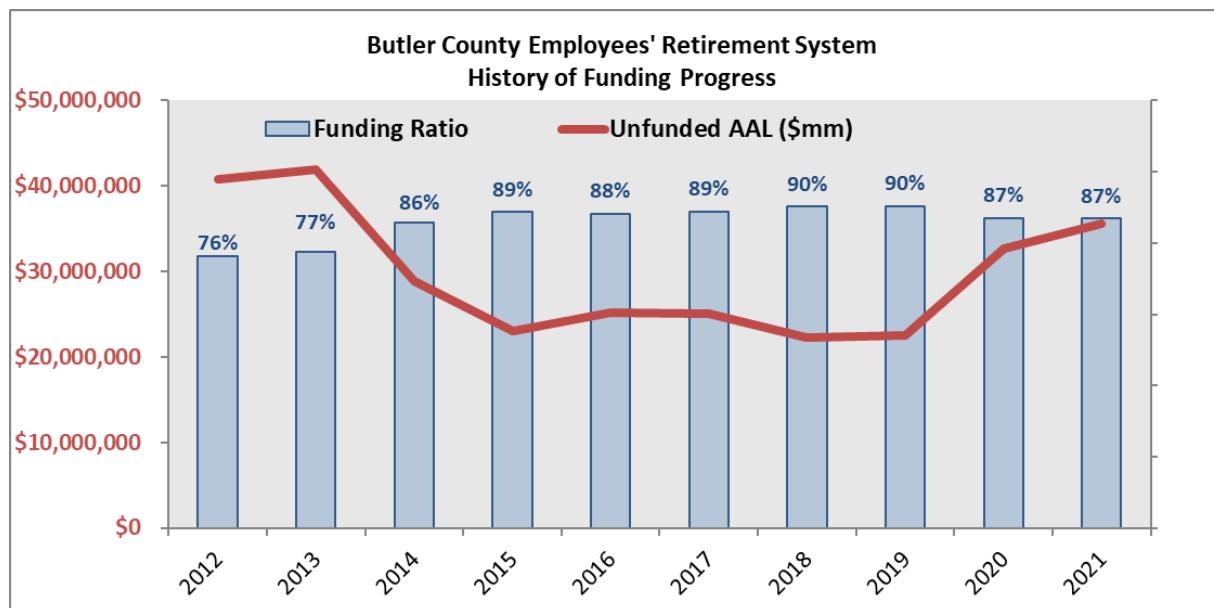
<u>Base</u>	<u>Initial Amount</u>	<u>Date Established</u>	<u>Years Remaining</u>	<u>Remaining Balance</u>	<u>Annual Payment</u>
Combined UAAL as of 12/31/2017	\$23,206,495	1/1/2018	10 ¹	\$17,027,227	\$2,413,100
Experience (Gain)	(2,412,402)	1/1/2018	12	(2,108,924)	(264,105)
Method Changes	(4,047,284)	1/1/2018	12	(3,538,140)	(443,088)
Assumption Changes	5,472,315	1/1/2018	12	4,783,901	599,097
Experience Loss	2,239,728	1/1/2019	13	2,058,536	244,911
Experience Loss	2,121,114	1/1/2020	14	2,038,317	231,675
Assumption Changes	10,049,783	1/1/2020	14	9,657,493	1,097,672
Experience Gain	(4,694,967)	1/1/2020	15	(4,694,967)	(512,231)
Assumption Changes	10,335,025	1/1/2020	15	<u>10,335,025</u>	<u>1,127,574</u>
			Total	\$35,558,465	\$4,494,605
Total Required Employer Contribution as of December 31, 2021					\$7,423,393
Expected Payroll					\$35,080,719
Percentage of Expected Payroll ²					21.16%

¹ Was 7 years as of 12/31/2019. 10 years reflects change in funding policy.

² As a percentage of actual 2020 payroll (\$30,530,338) for those included in the 2020 valuation, this is 24.31%.

2.4: Schedule of Funding Progress

Actuarial Valuation Date	Actuarial Value of Assets	Actuarial Accrued Liability	Unfunded Actuarial Accrued Liability	Funded Ratio
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%
1/1/2020	218,663,103	251,311,516	32,648,413	87.0%
1/1/2021	234,471,866	270,030,331	35,558,465	86.8%



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
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%
2019	5,428,088	5,428,088	0	31,901,447	17.0%
2020	7,684,978	7,684,978	0	33,719,426	22.8%

Section 3: Demographic Information

3.1: Participant Summary

		1/1/2020			1/1/2021		
Active Participants	Males	Females	Total	Males	Females	Total	
Active Participants	262	317	579	269	319	588	
Total Compensation	\$15,469,540	\$16,594,071	\$32,063,611	\$16,057,730	\$16,339,401	\$32,397,131	
Average Compensation	\$57,015	\$51,619	\$55,570	\$59,694	\$51,221	\$55,097	
Average Age	43.4	46.7	45.2	43.5	47.0	45.4	
Average Service	10.7	12.1	11.5	10.6	11.9	11.3	
Average Remaining Service			12.3	Average Remaining Service		12.3	
Percent male / female	45.2%	54.8%		45.7%	54.3%		

		1/1/2020			1/1/2021		
Inactive Participants	Males	Females	Total	Males	Females	Total	
Retired Participants and Beneficiaries	166	459	625	170	459	629	
Total Benefit	\$365,779	\$653,139	\$1,015,919	\$387,998	\$685,755	\$1,073,752	
Average Benefit	\$2,181	\$1,424	\$1,625	\$2,282	\$1,494	\$1,707	
Average Age	68.9	68.9	68.9	69.4	69.4	69.4	
Average Life Expectancy of Benefit Recipients			19.8	Average Life Expectancy of Benefit Recipients		19.1	
Vested Participants	31	62	93	31	65	96	
Total Benefit	\$73,706	\$130,931	\$204,634	\$74,801	\$138,041	\$212,842	
Average Benefit	\$2,378	\$2,112	\$2,200	2,413	2,124	2,217	
Average Age	47.0	49.5	48.7	47.9	49.0	48.6	
Average Life Expectancy of All Inactive Participants			21.4	Average Life Expectancy of All Inactive Participants		21.6	

3.2: Data Reconciliation

	Active	Terminated Deferred	Terminated Due Refund	Disabled	Retired	Beneficiary	Total
Number as of 1/1/2020	579	93	2	12	581	31	1,298
Additions							
a. New entrants	46						46
b. Rehired	1	-1					0
Changes in Status							
a. Terminated Non-Vested							0
b. Refund Paid	-12	-2	-2				-16
c. Terminated Vested	-9	9					0
d. Death without Beneficiary				-1	-10	-1	-12
e. Death with Beneficiary					-1	1	0
f. Death with Cashout	-2	-1			-2		-5
g. Retired	-15	-3			18		0
h. Disabled							0
i. Data changes (+)		1					1
j. Data changes (-)							0
Number as of 1/1/2021	588	96	0	11	586	31	1,312

3.3: Distribution of Active Participants

SERVICE	0-1	2	3-4	5-6	7-9	10-14	15-19	20-24	25-29	30-34	OVER 35	TOTALS
AGE												
0-19	2											2
Avg Sal	\$33,280											\$33,280
20-24	14	1	2									17
Avg Sal	\$35,133	\$35,224	\$37,446									\$35,411
25-29	11	6	10	13	2							42
Avg Sal	\$39,235	\$57,331	\$49,775	\$48,942	\$50,073							\$47,850
30-34	14	7	10	16	12	8						67
Avg Sal	\$38,282	\$47,981	\$52,200	\$56,449	\$54,483	\$58,036						\$50,971
35-39	8	4	5	13	16	27	7					80
Avg Sal	\$41,777	\$52,262	\$47,209	\$51,591	\$52,568	\$60,527	\$60,299					\$54,342
40-44	11	3	6	9	9	12	15	5				70
Avg Sal	\$44,488	\$47,488	\$47,567	\$61,346	\$57,128	\$60,354	\$63,526	\$65,557				\$56,978
45-49	3	2	9	5	10	9	18	15	4			75
Avg Sal	\$54,883	\$50,395	\$55,862	\$48,285	\$52,995	\$60,917	\$61,535	\$66,975	\$53,345			\$58,846
50-54	7	6	7	6	11	11	19	21	12	5		105
Avg Sal	\$58,611	\$55,514	\$51,188	\$57,367	\$58,469	\$64,120	\$56,970	\$63,781	\$69,688	\$60,846		\$60,540
55-59	6	2	4	2	5	11	13	6	5	6		60
Avg Sal	\$48,698	\$34,219	\$58,809	\$34,841	\$55,983	\$56,900	\$52,677	\$69,720	\$82,248	\$57,345		\$57,163
60-64	4	1	4	2	2	13	12	7	4	5	1	55
Avg Sal	\$34,516	\$57,783	\$52,326	\$37,455	\$52,760	\$56,537	\$51,244	\$59,942	\$49,829	\$62,646	\$56,664	\$53,169
65+		1		2	1	1	3	4	1	1	1	15
Avg Sal		\$39,820		\$33,674	\$84,791	\$43,810	\$70,808	\$52,747	\$46,620	\$65,587	\$72,358	\$56,250
TOTAL	78	33	57	68	68	92	87	58	26	17	2	586
Avg Sal	\$42,156	\$50,500	\$51,258	\$52,350	\$55,184	\$59,576	\$58,359	\$64,150	\$65,647	\$60,419	\$64,511	\$55,172

3.4: Membership History

Actuarial Valuation Date	Active and Terminated Vested Members			Retired Members and Beneficiaries		
	Male	Female	Total	Male	Female	Total
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
1/1/2020	293	379	672	167	457	624
1/1/2021	300	384	684	170	458	628

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	10 years as of 12/31/2020
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, 2020.

The actuarial assumptions below are based on an experience study covering 2014 to 2018. The next study will cover experience through 2023.

Rate of Investment Return/
Discount Rate The annual rate of return on all Plan assets is assumed to be 6.90%, net of investment and administrative expenses. (Prior Assumption: 7.25%)

Inflation The cost of living as measured by the Consumer Price Index (CPI) will increase at the rate of 2.75% per year.

Increases in Pay Salaries are assumed to increase by inflation, plus a percentage based on years of service: 0 – 4 years: 8.00%, 5+ years: 0.50%

Member Mortality Rates of mortality are specified by the Pub2010G(BM) tables with generational projections using Scale SSA (updated annually). 50% is applied for pre-retirement deaths.

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

Age	Male	Female
55	40.0%	48.0%
56	8.0%	9.6%
57	8.8%	10.6%
58	9.7%	11.6%
59	10.6%	12.7%
60	11.7%	14.0%
61	12.9%	15.5%
62	14.2%	17.0%
63	15.6%	18.7%
64	17.1%	20.5%
65	18.9%	22.7%
66	20.7%	24.8%
67	22.8%	27.4%
68	25.1%	30.1%
69	27.6%	33.1%
70-74	10.0%	12.0%
75+	100%	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.

Service	Male	Female
0	10.0%	7.5%
1	9.0%	6.8%
2	8.1%	6.1%
3	7.3%	5.5%
4	6.6%	4.9%
5	5.9%	4.4%
6	5.3%	4.0%
7	4.8%	3.6%
8	4.3%	3.2%
9	3.9%	2.9%
10	3.5%	2.6%
11	3.1%	2.4%
12	2.8%	2.1%
13	2.5%	1.9%
14	2.3%	1.7%
15+	2.1%	1.5%

*

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 return on investments was revised since the last valuation, as noted above.

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.