Butler County
Employees' Retirement System

Actuarial Valuation as of January 1, 2020
Actuarially Determined Contribution for 2020

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

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for

Butler County Employees Retirement System

October 27, 2020

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, 2020. The required Employer contribution for Fiscal Year 2020 has been determined based on actual demographic and asset information as of December 31, 2019. 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 2020;
- 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:

	1/1/2019	1/1/2020
Plan Membership		
Active	571	579
Terminated with Deferred Benefits	91	93
Receiving Benefits	612	624
Total Plan Participants[1]	1,274	1,296
Average Valuation Salary (active employees)	$53,980	$55,498
Assets ($ millions)		
Market Value of Assets (MVA)	$193.4	$227.4
Actuarial Value of Assets (AVA)	$209.8	$218.7
Valuation Results ($ millions)		
Actuarial Accrued Liability (AAL)	$232.4	$251.3
Unfunded Actuarial Accrued Liability (UAAL)	$22.6	$32.6
Funding Ratio (AVA/AAL)	90.3%	87.0%
Funding Ratio (MVA/AAL)	83.2%	90.5%
Contributions ($ millions)		
Employer Normal Cost, with Interest	$1.7	$2.6
Amortization of Unfunded Liability	3.7	5.1
Total Employer Contribution	$5.4	$7.7
Employer Contribution as a percentage of payroll	16.4%	22.1%

[1] Does not include non-vested terminations due refunds.

Change in Plan Cost from Prior Valuation

The employer contribution for 2020 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 2019	$5.4	16.4%
Change in Cost Due to:		
Expected Change	0.6	1.8%
Investment Experience during 2019	(0.5)	(1.7%)
Other Experience during 2019	0.1	(0.4%)
Changes in Actuarial Assumptions	2.1	6.0%
Total Change	$2.3	5.7%
County Contribution for 2020	**$7.7**	**22.1%**

- Expected Increase

  The contribution for 2020 was expected to increase versus 2019 primarily due to recognition of prior investment losses, primarily the loss experienced during 2018.

- Investment Experience

  Investment returns were favorable during 2019. However, because only a portion of the 2019 investment gain was recognized, the immediate impact does not reflect the full amount.

- Demographic Experience

  In the aggregate, demographic experience was unfavorable in 2019, serving to slightly increase the cost of the System. However, the contribution rate as a percentage of payroll decreased due to higher payroll.

- Assumption Changes

  Based on the Experience Study finalized in 2019, several changes in assumptions were made, including rates of mortality, retirement, salary increases and termination. The impact of these changes was an increase in cost as shown above.

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 1/1/2020 ($ mm)	Current Return Assumption	2% Lower Per Year
Actuarial Liability	$251.3	$316.3
Plan Assets (smoothed)	218.7	218.7
Unfunded Liability	32.6	97.6
Funding Ratio	87%	69%
Plan Cost	$7.7	$16.6
Total Contribution Rate	22.1%	47.8%

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

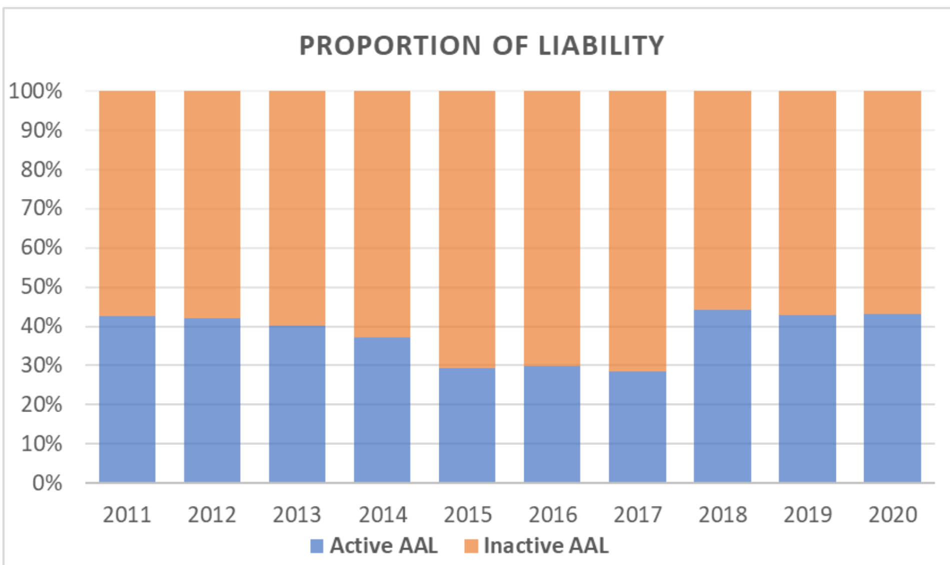
As of 1/1/2020 ($ mm)	Current Mortality Assumption	20% Lower Mortality Rates
Actuarial Liability	$251.3	$268.0
Plan Assets (smoothed)	218.7	218.7
Unfunded Liability	32.6	49.3
Funding Ratio	87%	82%
Plan Cost	$7.7	$9.8
Total Contribution Rate	22.1%	28.2%

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:

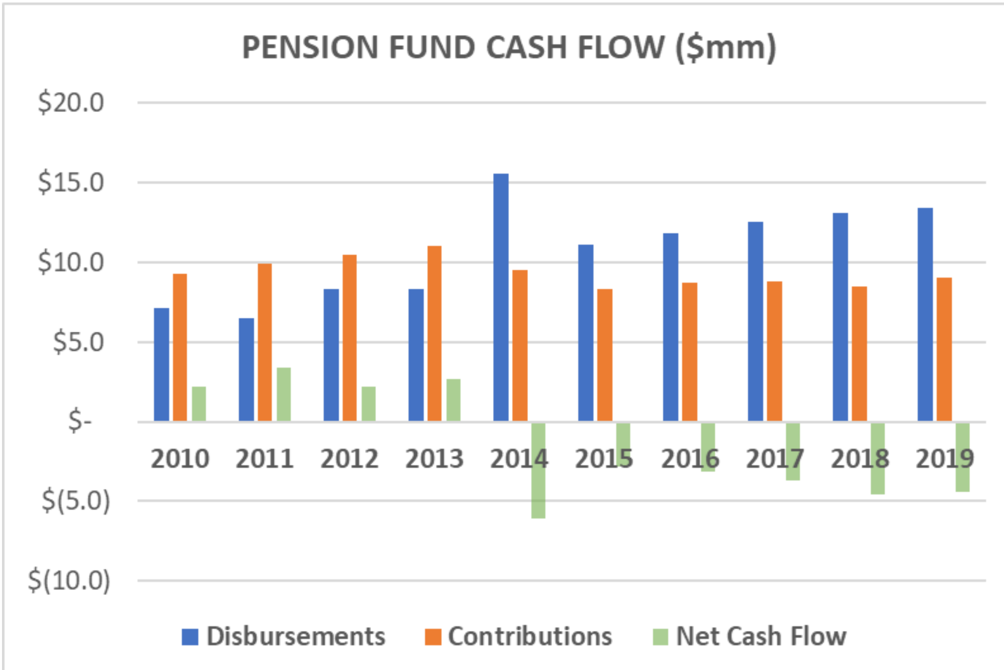
- Higher ratio of assets to payroll, which leads to a greater degree of contribution rate volatility.
- Negative cash flow (benefit payments exceeding contributions), which exacerbates the impact of an economic downturn.
- Greater degree of longevity risk (as illustrated above).
- Higher ratio of Actuarial 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 Plan liability has averaged about 60% inactive over the past decade and this ratio is likely to increase as the System matures in the coming years.

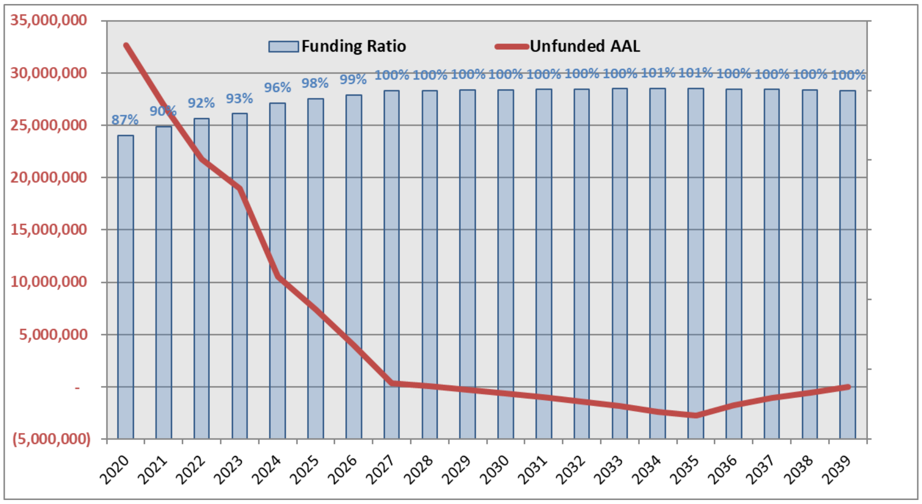
As shown below, the fund has gone from positive cash flow in 2010 – 2013 to negative cash flow (disbursements greater than contributions) in recent years. The level of negative cash flow has not changed significantly since 2014. Investment income is not considered in this illustration.



Future Costs and Funding

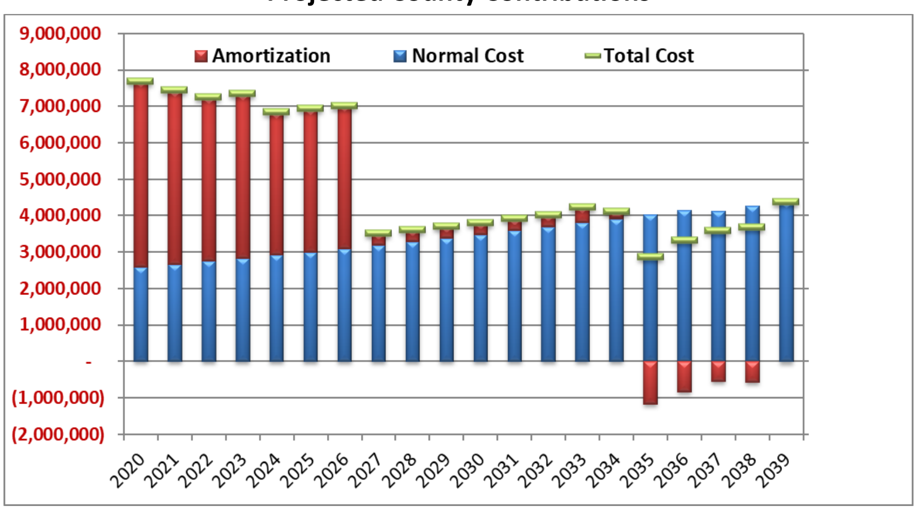
The two graphs below represent the projected funding progress and required contributions over the next two decades. In each projection, only one scenario is shown – that all experience will be exactly as predicted by actuarial assumptions, including 7.25% investment returns each year. **While this precise 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 full funding (funding ratio equal to 100%) within a decade. This is largely due to significant investment gains during 2019, as well as the Board's current amortization policy. However, this projection 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 around $7 to $8 million per year, then decrease by several million dollars as funding approaches 100%. 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

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,

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Section 1: Plan Asset Information

1.1: Comparative Value of Net Assets

		12/31/2018		12/31/2019
ASSETS				
Cash and Short-Term Investments	$	1,900,610	$	2,598,454
Receivables and Prepaids		6,253		143,503
Investments, at fair market value:				
U.S. Government Obligations & Corporate Fixed Income		53,625,700		69,654,951
U.S Treasury Inflation Protected Securities (TIPS)		9,562,994		0
Domestic Common Stock		78,072,599		95,335,524
International Stocks		39,822,160		47,014,426
Real Estate Investment Trusts (REIT)		9,357,518		12,072,800
Invested Cash & Equivalents		841,200		380,153
Accrued Income		238,179		244,949
Total Investments		191,520,350		224,702,803
Total Assets		193,427,213		227,444,760
LIABILITIES				
Accounts Payable		75,476		62,122
Net Assets Held in Trust For Plan Benefits	**$**	**193,351,737**	**$**	**227,382,638**

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

1.2: Comparative Income Statements

		2018		2019
Net Plan Assets, as of January 1	$	209,748,832	$	193,351,737
ADDITIONS				
Member Contributions		3,424,361		3,568,120
Member Contributions (County Share)		2,493		5,822
County Contributions		5,066,887		5,428,088
Investment Income:				
Interest		2,551,865		2,614,400
Dividends		3,153,470		3,298,540
Realized Gain/(Loss)		3,330,305		3,301,787
Unrealized Gain/(Loss)		(20,694,710)		29,484,406
Miscellaneous		35,464		6,771
Total Additions	+$	(3,129,865)	+$	47,707,934
DEDUCTIONS				
Refunds of member contributions		227,380		112,257
Retirement Allowances		12,316,993		12,867,197
Death Benefits		347,232		304,196
Administrative Expenses		156,280		154,379
Investment Expenses		219,345		239,004
Total Deductions	-$	13,267,230	-$	13,677,033
NET INCREASE IN NET PLAN ASSETS		(16,397,095)		34,030,901
Net Plan Assets, as of December 31	**$**	**193,351,737**	**$**	**227,382,638**

1.3: Computation of Actuarial Value of Assets

(1)	Market Value 1/1/2019	$	193,351,737
(2)	Actuarial Value 1/1/2019		209,821,259
(3)	Total Contributions		9,002,030
(4)	Total Disbursements		(13,438,029)
(5)	Expected Return on Market Value		13,857,196
(6)	Expected Market Value 12/31/2019: [(1)+(3)+(4)+(5)]		202,772,934
(7)	Market Value 12/31/2019		227,382,638
(8)	Gain/(Loss): [(7)-(6)]		24,609,704
(9)	Deferral of Gain/(Loss), 2019 (80%)		$19,687,763
	Deferral of Gain/(Loss), 2018 (60%)		(16,130,792)
	Deferral of Gain/(Loss), 2017 (40%)		4,768,691
	Deferral of Gain/(Loss), 2016 (20%)		393,873
	Total Deferred Gain/(Loss)		$8,719,535
(10)	Preliminary Actuarial Value: [(7)-(9)]		218,663,103
(11)	**Final Actuarial Value** **(not less than 80% nor more than 120% of Market Value)**	**$**	**218,663,103**
(12)	Ratio of Actuarial Value to Market Value		96.2%

Approximate Annual Investment Return – AVA basis	6.4%
Approximate Annual Investment Return – MVA basis	20.1%
AVA/Actuarial Accrued Liability	87.0%
MVA/Actuarial Accrued Liability	90.5%

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

1.4: System Assets and Liabilities

ASSETS		
Member Annuity Reserve Account (MARA)	$	53,775,491
County Annuity Reserve Account (CARA)		14,585,643
Retired Members Reserve Account (RMRA)		128,101,985
Unrealized Appreciation of Assets		30,919,519
Current Assets (Market Value) of the Plan	$	227,382,638
Present Value of Future Employer Contributions		71,045,016
Total Assets	$	298,427,654
LIABILITIES		
Actuarial Present Value of:		
Accumulated Plan Benefits (Unit Credit Basis)		
Vested Participants	$	73,973,848
Nonvested Participants		3,059,578
Terminated Vested Benefits		14,749,031
Retired Benefits		128,101,985
Total Present Value of Accumulated Benefits	$	219,884,442
Future Benefit Accruals		78,543,212
Total Liability of the Butler County Employees' Retirement Fund	**$**	**298,427,654**
(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, 2019	$ 50,613,312	$22,527,006	$ 118,770,823	$ 191,911,141
County Appropriations		5,428,088		5,428,088
Member Contributions	3,568,120			3,568,120
Member Purchases		5,822		5,822
Net Investment Income		9,226,981		9,226,981
Investment Expenses		(239,004)		(239,004)
Member Contribution Refunds	(112,257)			(112,257)
Pension Payments			(12,867,197)	(12,867,197)
Death Benefits			(304,196)	(304,196)
Retiree and Death Benefit Transfers	(3,088,253)	(6,304,700)	9,392,953	-
Cost of Living Funding Requirement				-
Administrative Expenses		(154,379)		(154,379)
Miscellaneous				-
Balance Before Interest	50,980,922	30,489,814	114,992,383	196,463,119
Interest Allocated During Year	2,794,569	(11,268,485)	8,473,916	-
Balance Before Actuarial Adjustments	53,775,491	19,221,329	123,466,299	196,463,119
Actuarial Adjustments[1]		(4,635,686)	4,635,686	-
Balance as of December 31, 2019 (Cost Value)	$53,775,491	$14,585,643	$128,101,985	$196,463,119
Unrealized Appreciation/(Depreciation)				30,919,519
Market Value as of December 31, 2019				$227,382,638

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
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%
2019	20.1%	6.4%
5 Year Compound Return	6.8%	5.9%
10 Year Compound Return	8.7%	7.5%

Section 2: Actuarial Computations

2.1: Development of Unfunded Actuarial Liability

	1/1/2019	1/1/2020
Actuarial Accrued Liability		
Active Members	$99,644,075	$108,460,500
Inactive Members:		
Retirees/Beneficiaries	$116,692,876	$126,150,867
Retiree Cost-of-Living	2,077,947	1,951,118
Terminated	13,986,366	14,749,031
Total Inactive	$132,757,189	$142,851,016
Accumulated Deductions	Active: 43,320,860 Inactive: 6,946,986 (liability included above)	Active: 45,875,633 Inactive: 7,899,858 (liability included above)
Total Actuarial Accrued Liability	**$232,401,264**	**$251,311,516**
Actuarial Value of Assets	$209,821,259	$218,663,103
Unfunded Actuarial Accrued Liability	$22,580,005	$32,648,413
Ratio of Assets to Liability	90.3%	87.0%
Total Normal Cost (Beginning of Year)	**$4,346,794**	**$5,343,400**

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
$53,775,491	$128,101,985	$69,434,040	$227,382,638	100%	100%	66%

2.2: Development of Experience Gain/Loss

1	Unfunded actuarial accrued liability as of January 1, 2019	$22,580,005
2	Employer Normal Cost as of December 31, 2019	1,688,549
3	Employer Contributions during 2019	(5,428,088)
4	Interest on the above	1,637,050
5	Expected Change during 2019	(2,102,489)
6	Expected Unfunded Actuarial Liability as of January 1, 2020	$20,477,516
7	Unfunded Actuarial Liability as of January 1, 2020, Before Changes	22,598,630
8	Experience (Gain)/Loss: [(7)-(6)]	2,121,114
9	Impact of Changes in Assumptions	10,049,783
10	Impact of Changes in Methods	0
11	**Unfunded Actuarial Liability as of January 1, 2020**	**$32,648,413**

Experience Gain/Loss by Source

Source	Gain	Loss
Investment Return (smoothed value)		$1,014,916
Salary Increases		609,987
Active Member Retirements		598,508
Active Member Terminations		170,881
Active Member Deaths	(34,200)	
Mortality		78,481
New Entrants		100,499
Miscellaneous	(417,958)	
Total	(452,158)	2,573,272
Net Amount of (Gain)/Loss		**$2,121,114**

2.3: Development of Employer Contribution

Normal Cost	
Gross Normal Cost	$5,343,400
Expected Employee Contributions	(3,034,748)
Interest to End of Year	279,312
End of Year Employer Normal Cost[1]	$2,587,964
Employer Normal Cost Rate (% of Pay)	7.67%

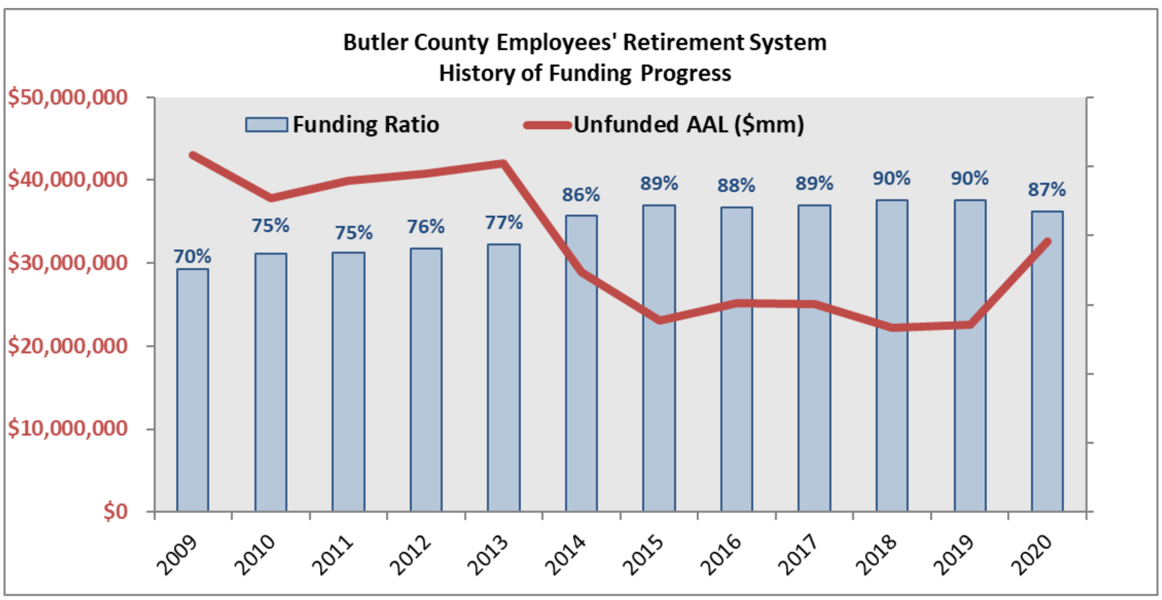
Amortization of Unfunded AAL					
Base	Initial Amount	Date Established	Years Remaining	Remaining Balance	Annual Payment
Combined UAAL as of 12/31/2017	$23,206,495	1/1/2018	7	$19,232,711	$3,599,856
Experience (Gain)	(2,412,402)	1/1/2018	13	(2,217,241)	(269,067)
Method Changes	(4,047,284)	1/1/2018	13	(3,719,862)	(451,412)
Assumption Changes	5,472,315	1/1/2018	13	5,029,607	610,353
Experience Loss	2,239,728	1/1/2019	14	2,152,301	249,807
Experience Loss	2,121,114	1/1/2020	15	2,121,114	236,578
Assumption Changes	10,049,783	1/1/2020	15	10,049,783	1,120,899
			Total	$32,648,413	$5,097,014

Total Required Employer Contribution as of December 31, 2020	**$7,684,978**
Expected Payroll	$34,815,304
Percentage of Expected Payroll[2]	22.07%

[1] Normal Cost (end of year employer amount) under prior assumptions is $1,603,057. Therefore, the total change in contribution from assumptions changes is $2,105,806.
[2] As a percentage of actual 2019 payroll ($30,193,624) for those included in the 2019 valuation, this is 25.45%.

2.4: Schedule of Funding Progress

Actuarial Valuation Date	Actuarial Value of Assets	Actuarial Accrued Liability	Unfunded Actuarial Accrued Liability	Funded Ratio
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%
1/1/2020	218,663,103	251,311,516	32,648,413	87.0%



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	33,719,423	16.1%

Section 3: Demographic Information

3.1: Participant Summary

	1/1/2019			1/1/2020		
Active Participants	**Males**	**Females**	**Total**	**Males**	**Females**	**Total**
Active Participants	259	312	571	262	317	579
Total Compensation	$14,792,547	$16,030,107	$30,822,654	$15,469,540	$16,594,071	$32,063,611
Average Compensation	$57,114	$51,379	$53,980	$57,015	$51,619	$55,570
Average Age	42.7	46.8	44.9	43.4	46.7	45.2
Average Service	10.6	12.1	11.3	10.7	12.1	11.5
	Average Remaining Service		10.2	Average Remaining Service		12.3
Percent male / female	45.4%	54.6%		45.2%	54.8%	

	1/1/2019			1/1/2020		
Inactive Participants	**Males**	**Females**	**Total**	**Males**	**Females**	**Total**
Retired Participants and Beneficiaries	157	455	612	166	459	625
Total Benefit	$338,654	$650,294	$988,948	$365,779	$653,139	$1,015,919
Average Benefit	$2,157	$1,429	$1,616	$2,181	$1,424	$1,625
Average Age	68.8	68.5	68.6	68.9	68.9	68.9
	Average Life Expectancy of Benefit Recipients		18.4	Average Life Expectancy of Benefit Recipients		19.8
Vested Partcipants	29	62	91	31	62	93
Total Benefit	$69,589	$122,080	$191,668	$73,706	$130,931	$204,634
Average Benefit	$2,400	$1,969	$2,106	$2,378	$2,112	$2,200
Average Age	47.9	49.8	49.2	47	49.5	48.7
	Average Life Expectancy of All Inactive Participants		20.6	Average Life Expectancy of All Inactive Participants		21.4

3.2: Data Reconciliation

	Active	Terminated Deferred	Terminated Due Refund	Disabled	Retired	Beneficiary	Total
Number as of 1/1/2019	571	91		13	570	29	1,274
Additions							
a. New entrants	47						47
b. Rehired							
Changes in Status							
a. Terminated Non-Vested	(2)		2				0
b. Refund	(12)	(1)					(13)
c. Terminated Vested	(10)	10					0
d. Death without Beneficiary				(1)	(9)		(10)
e. Death with Beneficiary					(2)	2	0
f. Death with Cashout							
g. Retired	(15)	(7)			22		0
h. Disabled							
i. Data changes (+)							
j. Data changes (-)							
Number as of 1/1/2020	579	93	2	12	581	31	1,298

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	0	0	0	0	0	0	0	0	0	0	0	0
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
20-24	12	3	0	0	0	0	0	0	0	0	0	15
	$ 37,242	$ 48,611	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 39,516
25-29	12	7	18	11	2	0	0	0	0	0	0	50
	$ 48,601	$ 51,318	$ 52,624	$ 52,163	$ 60,071	$ -	$ -	$ -	$ -	$ -	$ -	$ 51,672
30-34	13	5	12	13	11	14	1	0	0	0	0	69
	$ 40,727	$ 46,304	$ 51,640	$ 53,696	$ 54,323	$ 58,664	$ 61,852	$ -	$ -	$ -	$ -	$ 51,586
35-39	8	1	5	11	16	19	9	0	0	0	0	69
	$ 50,878	$ 51,137	$ 51,960	$ 52,447	$ 58,623	$ 58,286	$ 59,055	$ -	$ -	$ -	$ -	$ 56,113
40-44	9	3	10	5	6	13	16	5	1	0	0	68
	$ 43,934	$ 44,690	$ 60,904	$ 52,989	$ 50,973	$ 56,386	$ 62,072	$ 65,208	$ 45,639	$ -	$ -	$ 55,988
45-49	4	5	6	11	8	14	19	14	2	0	0	83
	$ 47,021	$ 51,559	$ 60,065	$ 50,165	$ 54,429	$ 60,005	$ 58,304	$ 57,819	$ 58,778	$ -	$ -	$ 56,246
50-54	9	4	3	7	8	11	20	17	14	5	0	98
	$ 57,409	$ 49,745	$ 45,718	$ 58,720	$ 60,318	$ 65,957	$ 59,232	$ 63,929	$ 64,918	$ 57,650	$ -	$ 60,617
55-59	6	2	4	1	9	11	17	5	5	5	1	66
	$ 43,826	$ 37,207	$ 63,901	$ 26,386	$ 51,889	$ 54,266	$ 55,763	$ 68,307	$ 70,639	$ 58,143	$ 54,281	$ 55,621
60-64	3	2	2	1	5	9	11	6	4	4	0	47
	$ 46,238	$ 59,398	$ 47,027	$ 46,138	$ 57,829	$ 59,264	$ 51,663	$ 58,369	$ 56,971	$ 61,554	$ -	$ 55,592
65+	1	0	0	1	1	1	3	2	1	1	3	14
	$ 39,011	$ -	$ -	$ 27,442	$ 42,217	$ 44,391	$ 68,414	$ 57,255	$ 58,638	$ 63,602	$ 77,070	$ 59,019
TOTAL	77	32	60	61	66	92	96	49	27	15	4	579
	$ 45,551	$ 49,118	$ 54,716	$ 52,074	$ 55,725	$ 58,718	$ 58,338	$ 61,807	$ 63,398	$ 59,252	$ 71,373	$ 55,498

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

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 (7 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, 2020.

The actuarial assumptions below are based on an experience study covering 2014 to 2018, with changes noted. 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 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 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%

* Assumption updated

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

Rates of mortality, retirement, and termination were updated. Salary increase assumptions were also revised since the last 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.