Adams County Retirement Plan

ACTUARIAL VALUATION REPORT

as of January 1, 2019

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May 13, 2019

Ms. Debbie Haines, CEBS
Executive Director
Adams County
4430 South Adams County Parkway, Suite C3406
Brighton, CO 80601-8202

Re: Actuarial Valuation of the Adams County Retirement Plan as of January 1, 2019

Dear Debbie:

We are pleased to present our Report on the actuarial valuation of the Adams County Retirement Plan as of January 1, 2019.

This Report presents the results of the January 1, 2019 actuarial valuation of the Adams County Retirement Plan. The Report describes the current actuarial condition of the Adams County Retirement Plan, determines the Actuarially Determined Contribution (ADC), and analyzes changes in these required rates.

We certify that the information included herein and contained in our January 1, 2019 Actuarial Valuation Report is accurate and fairly presents the actuarial position of the Adams County Retirement Plan as of the valuation date.

All of our work conforms with generally accepted actuarial principles and practices, and to the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, our calculations also comply with the requirements of, where applicable, the Internal Revenue Code, ERISA, and the Statements of the Governmental Accounting Standards Board.

The valuation was based upon information, furnished by the Plan, concerning Plan benefits, financial transactions, active members, terminated members, retirees and beneficiaries. We checked for internal and year-to-year consistency, but did not audit the data. This report and these calculations are not intended as legal or accounting advice, and we would recommend review by legal counsel for the compliance of these calculations with all relevant agreements.

The valuation results summarized in this report involve actuarial calculations that require assumptions about future events for the Pension Plan. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following:

- plan experience differing from that anticipated by the economic or demographic assumptions;
- changes in economic or demographic assumptions;
- increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status) and;
- changes in plan provisions or applicable law.

The 9.00% employer and employee contribution are the rates that comply with law. Due to the many factors affecting a retirement system, users of this report should be aware that contributions made at that rate do not necessarily guarantee long-term benefit security.

This report does not include a detailed assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment. We encourage a review and assessment of investment and other significant risks that may have a material effect on the plan's financial condition.

We believe that the assumptions and methods used in this report are reasonable and appropriate for the purpose for which they have been used. However, other assumptions and methods could also be reasonable and could result in materially different results. In addition, because it is not possible or practical to consider every possible contingency, we may use summary information, estimates or simplifications of calculations to facilitate the modeling of future events. We may also exclude factors or data that are deemed to be immaterial.

Certification

The undersigned are independent actuaries and consultants. Leslie Thompson and Paul Wood are actuaries and meet the Qualification Standards of the American Academy of Actuaries. Both of the undersigned are experienced in performing valuations for large public retirement systems.

Respectfully submitted,
Gabriel, Roeder, Smith & Company

Leslie L Thompson

Leslie Thompson, FSA, FCA, EA, MAAA
Senior Consultant

Paul T Wood

Paul Wood, ASA, FCA, MAAA
Consultant

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SECTION A

EXECUTIVE SUMMARY

Executive Summary

Valuations are prepared annually, as of January 1 of each year, the first day of the fiscal year. The primary purposes of the valuation report are to measure the plan's liabilities, to determine the required contribution rate and to analyze changes in the Adams County Retirement Plan's actuarial position.

In addition, the report provides summaries of the member data, financial data, plan provisions, and actuarial assumptions and methods.

Financing Objectives

The Adams County Retirement Plan is supported by member contributions, employer contributions, and net earnings on the investments of the fund. Contribution rates are set in ordinance, currently at 9.00% for members and employers.

Beginning in 2018, the County began making an additional contribution to the Plan, pursuant to an agreement between the County and the Plan; such contributions shall not be less than $2 million per year and will continue until the Plan reaches a specified funding level on a market and actuarial basis. The contribution is based on a reallocation of at least 0.314 mills of the County's total mill levy.

The combined member and employer contributions are intended to be sufficient to pay the normal cost and to amortize the Unfunded Actuarial Accrued Liability (UAAL) over a period of 30 years from the valuation date. Consideration should be given to increasing the contributions to the Plan in order to achieve full funding in a period shorter than 30 years.

Progress toward Realization of Financing Objectives

The UAAL/(surplus) and the funded ratio (ratio of the actuarial value of assets to the actuarial accrued liability) illustrate the progress toward the realization of certain financing objectives. Based on the actuarial valuation as of January 1, 2019, the Plan has an unfunded liability of $239.69 million and a funded ratio of 52.6%. The funded ratio decreased from 53.6% to 52.6% and the Net Employer Actuarially Determined Contribution increased, from 15.21% of pay, to 15.49% of pay.

The net employer Actuarially Determined Contribution as a percentage of pay for the year beginning January 1, 2019 is 15.49%. The expected County contribution is 9.00% of pay which creates a contribution shortfall of 6.49% of pay. This compares to a shortfall in the prior year of 6.21% of pay.

The recent amendments to lower future benefit accruals help to decrease the future cost of the plan. The normal cost decreased from 10.03% of pay to 9.81% of pay. Projections indicate an improvement in funded status over time. However, projections are built on assumptions from which experience may vary over time. Ongoing monitoring of the funded levels of the plan is recommended.

Experience During the Year

The plan experienced a liability loss of $4.29 million during fiscal year 2018. This loss was largely due to salary increases that were higher than expected.

The plan experienced an actuarial asset loss of $6.44 million during fiscal year 2018. This loss was due to the actuarial value of assets earning a return less than the assumed 7.25% return. The net overall result of the liability loss and the actuarial asset loss was an unfunded liability $10.73 million greater than expected at January 1, 2019.

There was also a loss due to a contribution shortfall of $8.0 million. This contribution shortfall decreased the funded ratio by 1.18% and increased the Actuarially Determined Contribution by 0.35% of pay. Asset and Liability losses also contributed to an increase in the actuarially determined contribution. However, there was a larger than expected increase in the total payroll. The net result of all these effects was an increase in the actuarially determined contribution from 15.21% of pay to 15.49% of pay.

Assumptions and methods

There have been no changes in assumptions since the prior valuation. The assumptions have been selected by the Adams County Board of Retirement based upon the actuary's analysis and recommendations from the 2018 Experience Study.

The actuarial assumptions are summarized in Section G of our report.

The results of any actuarial valuation are dependent upon the actuarial assumptions used. Actual results can and almost certainly will differ, as actual experience deviates from the assumptions. Even seemingly minor changes in the assumptions can materially change the liabilities, calculated contribution rates and funding periods. The actuarial calculations presented in this Report are intended to provide information for rational decision making.

Benefit Provisions

All of the benefit provisions reflected in this valuation are those which were in effect on January 1, 2019. There have been no changes to the benefit provisions since the prior valuation.

The benefit provisions are summarized in Section D of our Report.

Data

Adams County staff supplied data for retired, active and inactive members as of January 1, 2019. We did not audit this data, but we did apply a number of tests to the data, and we have concluded that the data is reasonable and consistent with the prior year's data. Adams County staff also supplied asset data as of January 1, 2019.

Financial Position

Due mostly to asset losses, the funded ratio on an actuarial value of assets basis declined from January 1, 2018 to January 1, 2019. The funded ratio on a market value basis also declined.

Exhibit A.1 Funded Status Summary ($ in millions)		
Valuation Date	**January 1, 2019**	**January 1, 2018**
Accrued Liability	$505.34	$484.19
Actuarial Value of Assets (smoothed)	265.66	259.30
Unfunded Accrued Liability	$239.69	$224.89
Funded Ratio (AVA basis)	52.6%	53.6%
Market Value of Assets	$248.84	$262.77
Unfunded Accrued Liability	$256.50	$221.42
Funded Ratio (MVA basis)	49.2%	54.3%
Market Value Rate of Return	(3.1%)	13.4%
Actuarial Value Rate of Return	4.7%	7.8%

The funded status alone is not appropriate for assessing the need for future contributions. The funded status is also not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations.

Financial Position (continued)

Investment losses increased the Total Actuarially Determined Contribution by roughly 0.39%. Liability losses increased the Total Actuarially Determined Contribution by approximately 0.25%. The Employer Net Actuarially Determined Contribution of 15.21% of pay for Fiscal Year 2018 and 15.49% of pay for Fiscal Year 2019 are based on contributions being made throughout the year, consistent with the funding policy of the Plan.

Exhibit A.2
Contribution Summary
All Numbers Reported Middle of Year, Percent of Pay

Fiscal Year Beginning	January 1, 2019	January 1, 2018
Total Normal Cost	9.81%	10.03%
Amortization of UAL	14.09%	13.61%
Assumed Expenses	0.59%	0.57%
Total Actuarially Determined Contribution	24.49%	24.21%
Estimated Member Contribution	9.00%	9.00%
Net Annual Required Contribution Mid-Year	15.49%	15.21%
Estimated County Contribution	9.00%	9.00%
Contribution Shortfall	6.49%	6.21%

Benefit changes were made as of January 1, 2014 which decrease the rate of benefits accrued for all service after January 1, 2014, both for current members and future members. The lower benefit accruals helped decrease the normal cost rate from 10.29% in 2014 to 9.81% this year and will have the effect of continuing to decrease the normal cost rate over time.

Executive Summary

Exhibit A.3 Adams County Retirement Plan Executive Summary		
	January 1, 2019	**January 1, 2018**
1. **Actuarially Determined Contribution**		
a. Total	$ 33,227,604	$ 30,815,610
b. Net Employer Contribution	21,014,878	19,360,970
c. Net Employer %	15.49%	15.21%
2. **Funded Status**		
a. Actuarial Accrued Liability	$ 505,342,712	$ 484,193,980
b. Actuarial Value of Assets (AVA)	265,656,097	259,301,061
c. Unfunded Liability (AVA-basis)	239,686,615	224,892,919
d. Funded Ratio (AVA-basis)	52.6%	53.6%
e. Market Value of Assets (MVA)	$ 248,844,713	$ 262,772,171
f. Unfunded Liability (MVA-basis)	256,497,999	221,421,809
g. Funded Ratio (MVA-basis)	49.2%	54.3%
3. **Summary of Census Data**		
a. Actives		
i. Counts	2,127	2,057
ii. Total Annual Projected Compensation	$ 135,696,959	$ 127,273,779
iii. Average Projected Compensation	63,797	61,873
iv. Average Age	42.6	42.8
v. Average Service	7.7	8.2
b. Members with Refunds Due Counts	141	132
c. Deferred Vested Member Counts	200	187
d. Retired Member Counts	1,018	958
e. Beneficiary Counts	114	102
f. Disabled Retiree Counts	45	47
g. Total Members Included in Valuation	3,645	3,483

SECTION B

VALUATION RESULTS

Actuarial Accrued Liability

Exhibit B.1 Adams County Retirement Plan Actuarial Valuation Results Actuarial Accrued Liability		
	January 1, 2019	**January 1, 2018**
1. **Active Members**		
a. Retirement Benefits	$ 185,844,763	$ 190,099,917
b. Withdrawal Benefits	1,186,326	(668,371)
c. Refund Benefits	(5,103,304)	(2,974,705)
d. Disability Benefits	4,920,228	4,809,633
e. Death Benefits	2,593,712	2,534,022
f. Total	$ 189,441,725	$ 193,800,496
2. **Members with Deferred Benefits**	$ 15,967,729	$ 15,464,348
3. **Members Receiving Benefits**	$ 299,933,258	$ 274,929,136
4. **Total**	$ 505,342,712	$ 484,193,980
5. **Actuarial Value of Assets**	$ 265,656,097	$ 259,301,061
6. **Unfunded Actuarial Accrued Liability**	$ 239,686,615	$ 224,892,919

Normal Cost

Exhibit B.2 Adams County Retirement Plan Actuarial Valuation Results Normal Cost		
	January 1, 2019	**January 1, 2018**
1. **Total Dollar Normal Cost**		
a. Retirement Benefits	$ 8,460,606	$ 8,209,322
b. Withdrawal Benefits	4,201,322	3,964,808
c. Disability Benefits	401,454	372,352
d. Death Benefits	246,442	224,590
e. Total	$ 13,309,824	$ 12,771,072
2. **Normal Cost as a Percentage of Pay**	9.81%	10.03%
3. **Normal Cost as a Percentage of Pay by Tier**		
a. Tier 1	13.58%	13.57%
b. Tier 2	11.20%	11.39%
c. Tier 3	7.76%	7.57%

Present Value of Projected Benefits

Exhibit B.3 Adams County Retirement Plan Actuarial Valuation Results Present Value of Projected Benefits		
	January 1, 2019	**January 1, 2018**
1. **Active Members**		
a. Retirement Benefits	$ 245,203,569	$ 248,329,856
b. Withdrawal Benefits	28,895,441	27,807,959
c. Disability Benefits	7,702,212	7,413,630
d. Death Benefits	4,408,114	4,215,316
e. Total	$ 286,209,336	$ 287,766,761
2. **Members with Deferred Benefits**	$ 15,967,729	$ 15,464,348
3. **Members Receiving Benefits**	$ 299,933,258	$ 274,929,136
4. **Total**	$ 602,110,323	$ 578,160,245

Actuarially Determined Contribution

Exhibit B.4
Adams County Retirement Plan
Development of the Actuarially Determined Contribution

Fiscal Year Beginning	January 1, 2019		January 1, 2018	
	Dollar	Percent of Pay	Dollar	Percent of Pay
1. Total Normal Cost	$ 13,309,824	9.81%	$ 12,771,072	10.03%
2. Amortization of Unfunded Actuarial Accrued Liability Over 30 Years	19,121,780	14.09%	17,324,538	13.61%
3. Assumed Administrative Expenses	796,000	0.59%	720,000	0.57%
4. Actuarially Determined Contribution (ADC)	$ 33,227,604	24.49%	$ 30,815,610	24.21%
5. Estimated Member Contribution	12,212,726	9.00%	11,454,640	9.00%
6. Net ADC Mid-Year	$ 21,014,878	15.49%	$ 19,360,970	15.21%
7. Estimated County Contribution Mid-Year	12,212,726	9.00%	11,454,640	9.00%
8. Contribution Shortfall	$ 8,802,152	6.49%	$ 7,906,330	6.21%
9. Annual Projected Payroll	$ 135,696,959		$127,273,779	

Plan Experience

Exhibit B.5 Adams County Retirement Plan Plan Experience for Fiscal Year 2018		
Liabilities		
1.	Actuarial Accrued Liability at January 1, 2018	$ 484,193,980
2.	Normal Cost for Fiscal Year 2018	12,771,072
3.	Benefit Payments during Fiscal Year 2018	30,374,892
4.	Interest on Items 1-3 to End of Year	34,465,925
5.	Change in Actuarial Accrued Liability Due to Assumption Changes	-
6.	Change in Actuarial Accrued Liability Due to Provision Changes	-
7.	Expected Actuarial Accrued Liability at January 1, 2019	501,056,085
8.	Actual Actuarial Accrued Liability at January 1, 2019	505,342,712
9.	Liability Gain/(Loss)	(4,286,627)
Assets		
10.	Actuarial Value of Assets at January 1, 2018	$ 259,301,061
11.	Benefit Payments and Expenses during Fiscal Year 2018	31,288,074
12.	Contributions during Fiscal Year 2018	25,497,150
13.	Interest on Items 10-12 to End of Year	18,589,406
14.	Expected Actuarial Value of Assets at January 1, 2019	272,099,543
15.	Actual Actuarial Value of Assets at January 1, 2019	265,656,097
16.	Asset Gain/(Loss)	(6,443,446)
Total		
17.	Total Gain/(Loss)	**$ (10,730,073)**

Plan Experience By Source

Exhibit B.6 Adams County Retirement Plan Plan Experience for Fiscal Year 2018 Gain/(Loss) by Source		
1. Asset Gain/(Loss)	$	(6,443,446)
2. Liability Gain/(Loss)		
a. Salary Gain/(Loss)	$	(2,524,442)
b. New Members and Rehire Gain/(Loss)	$	(716,490)
c. Withdrawal Gain/(Loss)	$	(28,046)
d. Disability Gain/(Loss)	$	(100,526)
e. Retirement Gain/(Loss)	$	(465,785)
f. Annuitant Mortality Gain/(Loss)	$	(779,825)
g. LTD to Disability Retirement	$	357,729
j. Other Demographic	$	(29,242)
k. Total	$	(4,286,627)
3. Total Gain/(Loss)	$	(10,730,073)

SECTION C

PLAN ASSETS

Statement of Plan Net Assets

Exhibit C.1
Adams County Retirement Plan
Statement of Plan Net Assets

	December 31, 2018	December 31, 2017
Assets		
Investments, at fair value:		
Cash	$ 198,245	$ 24,706
Money Market Funds	5,257,754	6,604,433
Public Equity	93,502,437	107,150,049
Private Equity	12,189,028	11,525,402
Floating Rate Debt	28,654,649	24,117,437
Fixed Rate Debt	29,677,270	34,610,904
Low Volatility	24,739,850	25,293,673
Real Estate Funds	43,957,475	41,244,936
Liquid Real Assets	10,818,017	12,220,329
Total cash and investments	$ 248,994,725	$ 262,791,869
Receivables:		
Dividends and Interest	33,973	139,248
Other Assets:		
Prepaid insurance for retirees	-	-
Total assets	$ 249,028,698	$ 262,931,117
Liabilities and net assets held in trust for benefits		
Accrued liabilities	183,985	158,946
Total payables	$ 183,985	$ 158,946
Net assets held in trust for pension benefits	$ 248,844,713	$ 262,772,171

Statement of Changes in Plan Net Assets

Exhibit C.2
Adams County Retirement Plan
Statement of Changes in Plan Net Assets

		Year Ended December 31, 2018		Year Ended December 31, 2017
Additions to Net Assets Attributed to:				
Contributions:				
Employer contributions	$	11,634,301	$	10,954,633
Plan Members contributions		11,634,301		10,954,633
Plan Members for Purchase of service		228,548		95,525
Mill Levy Revenue		2,000,000		-
Total contributions	$	25,497,150	$	22,004,791
Investment Income:				
Net appreciation in fair value of investments	$	(11,060,695)	$	28,899,633
Interest		1,284,039		1,179,403
Dividends		3,278,662		2,900,208
Other		316		165
Total Investment Income	$	(6,497,678)	$	32,979,409
Less Investment expense		(1,638,856)		(1,647,690)
Net investment income	$	(8,136,534)	$	31,331,719
Total additions	$	17,360,616	$	53,336,510
Deductions to Net Assets Attributed to:				
Benefit payments	$	27,017,192	$	25,057,619
Refunds		3,357,700		2,328,219
Administrative expenses		913,182		636,159
Total deductions	$	31,288,074	$	28,021,997
Change in net assets		(13,927,458)		25,314,513
Net assets held in trust for benefits:				
Beginning of year		262,772,171		237,457,658
End of year	$	248,844,713	$	262,772,171

Actuarial Value of Assets

Exhibit C.3
Adams County Retirement Plan
Development of the Actuarial Value of Assets

Item					Year Ending December 31, 2018
1. Actuarial value of assets, at beginning of year (prior to corridor)				$	259,301,061
2. Market value of assets, at beginning of year				$	262,772,171
3. Net new investments					
a. Contributions received for prior plan year				$	25,497,150
b. Benefits paid and administrative expenses					(31,288,074)
c. Net				$	(5,790,924)
4. Market value of assets, at end of year				$	248,844,713
5. Net MVA earnings [(4) - (2) - (3c)]				$	(8,136,534)
6. Assumed investment return rate					7.25%
7. Expected return [(6)*(2)+(6)*(3c)/2]				$	18,841,061
8. Excess return [(5) - (7)]				$	(26,977,595)
9. Expected actuarial value of assets as of December 31, 2018 [(1) + (3c) + (7)]				$	272,351,198
10. Deferred amounts for fiscal year ending December 31,					
Year	Gain/(Loss)	20% Recognized This Year	Percent Deferred		Amount Deferred
a. 2018	$ (26,977,595)	$ (5,395,519)	80%	$	(21,582,076)
b. 2017	13,748,040	2,749,608	60%		8,248,824
c. 2016	1,973,036	394,607	40%		789,215
d. 2015	(21,336,739)	(4,267,348)	20%		(4,267,347)
e. 2014	(882,249)	(176,449)	0%		-
f. Total	$ (33,475,507)	$ (6,695,101)		$	(16,811,384)
11. Asset gain/(loss) to be recognized as of December 31, 2018				$	(6,695,101)
12. 80% of Market Value				$	199,075,770
13. 120% of Market Value				$	298,613,656
14. Actuarial value of assets [(Item 9 + Item 11), but not more than Item 13 or less than Item 12]				$	265,656,097

Annual Rates of Investment Return

Exhibit C.4 Average Annual Rates of Investment Return				
Fiscal Year Ended December 31,	Actuarial Value		Market Value	
	Annual	Cumulative	Annual	Cumulative
1995	12.1 %	10.7 %	22.9 %	10.1 %
1996	11.6	10.9	12.0	10.4
1997	13.0	11.3	17.0	11.5
1998	12.2	11.4	9.0	11.1
1999	12.0	11.5	4.0	10.2
2000	8.7	11.2	2.6	9.4
2001	6.2	10.7	(1.6)	8.2
2002	(4.5)	9.2	(10.9)	6.3
2003	9.7	9.2	22.4	7.6
2004	4.3	8.8	11.0	7.8
2005	4.4	8.5	6.2	7.7
2006	7.6	8.5	14.2	8.1
2007	11.1	8.6	8.2	8.1
2008	(7.9)	7.6	(26.2)	5.7
2009	11.6	7.8	12.5	6.1
2010	1.9	7.5	9.5	6.3
2011	(0.1)	7.1	(0.5)	5.9
2012	0.4	6.8	12.1	6.2
2013	9.3	6.9	14.1	6.6
2014	8.7	6.9	7.1	6.6
2015	6.4	6.8	(1.7)	6.1
2016	7.2	6.6	8.4	6.0
2017	7.8	6.5	13.4	6.6
2018	4.7	6.5	(3.1)	6.2

SECTION D

SUMMARY OF BENEFIT PROVISIONS

Summary of Benefit Provisions

Based on the Plan Originally effective July 1, 1968 and amended and restated effective January 1, 2018

Participation

Membership in the Retirement Plan is automatic upon the first day of Covered Employment. You are in Covered Employment when you are (1) an elected or appointed County official or deputy, or staff of such person, (2) an employee of an Employer who is in a regular position regularly scheduled to work or budgeted for at least 30 hours each week, or (3) an employee of the Retirement Board who meets these requirements. Any employee of the Retirement Board who meets these requirements is considered an employee of the County for purposes of the Plan.

You are not eligible to participate in the Retirement Plan if you are (1) an employee in a position regularly scheduled to work or budgeted for less than 30 hours each week, (2) a leased employee, (3) an independent contractor, or (4) in a position that does not meet the criteria in the above paragraph, such as a position designated as temporary, seasonal, provisional, regular part-time scheduled to work less than 30 hours per week, project designated full-time, project designated part-time, or an election judge.

Member Contributions

Effective January 1, 2015, each member contributes 9.00% of compensation on a monthly basis. Interest on contributions is credited at a rate of 3.0% per annum compounded monthly.

Contribution Accumulation means the total of the member Pre-2014 Contribution Accumulation and Post-2013 Contribution Accumulation. The Pre-2014 Contribution Accumulation means the total of the member contributions to the retirement fund prior to January 1, 2014, plus interest. The Post-2013 Contribution Accumulation means the total of the member contributions to the retirement fund on or after January 1, 2014, plus interest. The Contribution Accumulation does not include any amounts paid to purchase previous service credit.

After December 31, 1983 member contributions are picked up and paid by the County as provided in Code Section 414(h).

County Contributions

The County will match member contributions.

Credited Service

All service completed during the elapsed time from the member's date of employment, excluding any breaks in service, to the member's date of termination on the basis of 1/365th year for each day of employment after January 1, 1965, provided an employee joined the plan on the first date eligible. Service prior to January 1, 1970 will be included (up to five years) provided the employee became a Member on the first date of eligibility.

Service is credited while a member is on long-term disability or is eligible for disability benefits from Social Security, even if the member does not receive disability benefits from Social Security because they are reduced to zero due to other disability benefits received. No credited service will be granted if the member chooses to receive a lump-sum payment from the Employer's LTD plan unless the member qualifies for disability benefits from Social Security (regardless of whether or not the member actually receives Social Security disability benefits).

Service Purchase

Eligible members may purchase additional years of service credit for any full-time, non-vested previous employment with any public or private employer in the United States, subject to certain restrictions.

Classification of Tiers

- *Tier 1* - Members hired prior to January 1, 2005
- *Tier 2* - Members hired on or after January 1, 2005 but before January 1, 2010
- *Tier 3* - Members hired on or after January 1, 2010

Compensation

Compensation is the total regular compensation paid to the member, reflecting the normal regular salary or hourly wage rate, before any payroll deductions for income tax, Social Security, group insurance, or any other purpose, excluding bonuses, extra pay, overtime pay, workers' compensation, single-sum payments received in lieu of accrued vacation and sick leave upon termination of employment or during the course of employment, required contributions by the County under this Plan, or for Social Security, group insurance, retainers' fees under contract, or the like, but including compensation deferred under Sections 125, 403(b), 414(h), or 457 of the Internal Revenue Code.

<u>Final Average Monthly Compensation</u>

- *Tier 1 - Members hired prior to January 1, 2005:*

  Average of the highest 36 consecutive calendar months of compensation during the last 120 months of employment.

- *Tier 2 - Members hired on or after January 1, 2005 but before January 1, 2010:*

  Average of the highest 60 consecutive calendar months of compensation during the last 120 months of employment.

<u>Career Compensation</u>

- *Tier 3 - Members hired on or after January 1, 2010:*

  Pensionable Compensation from date of participation to retirement.

- *Tiers 1 & 2 - Members hired prior to January 1, 2010:*

  Pensionable Compensation from January 1, 2014 to retirement.

<u>Career Monthly Compensation</u>

Career Compensation divided by Credited Service accrued during the period. If hired before January 1, 2010 and become disabled before January 1, 2014, special calculations apply. For members with a qualified military leave of absence, career compensation will include compensation credited at a rate that would have been in effect during the leave.

<u>Accrued Benefit</u> (Monthly)

Effective January 1, 2014, the accrued benefit for Tier 1 and Tier 2 members is composed of “Component A” benefit plus a “Component B” benefit. Component A shall mean the benefit attributable to service credit earned prior to January 1, 2014. Component B shall mean the benefit attributable to service credit earned on or after January 1, 2014.

Tiers 1 & 2 - Members hired prior to January 1, 2010:

- *Component A Benefit:*

  2.5% of Final Average Monthly Compensation multiplied by Credited Service prior to January 1, 2014 including purchased service.

- *Component B Benefit:*

  Greater of 1.75% of Career Compensation divided by 12, or 1.75% of Career Monthly Compensation times Credited Service earned on or after January 1, 2014.

<u>Accrued Benefit</u> (Monthly) (continued)

Tier 3 - Members hired on or after January 1, 2010:

- 1.75% of Career Compensation divided by 12 or 1.75% of Career Monthly Compensation times Credited Service, if greater.

The minimum monthly accrued benefit for all members is $25 per month per year of Credited Service.

<u>Vested Accrued Benefit</u>

Eligibility:

Five years of Credited Service for all Tiers. Tier 3 formerly required ten years of Credited Service.

Benefit:

100% of the Accrued Benefit determined as of the date of termination. The benefit may be reduced if payment commences before the Normal Retirement Date or the Special Early Retirement Date.

<u>Normal Retirement</u>

Eligibility:

Attainment of age 65.

Benefit:

Accrued Benefit up to a maximum of 80% of the member's average monthly compensation during any consecutive 12-month period in which the member receives their highest average monthly compensation.

Regular Early Retirement

Eligibility:

- *Tier 1 - Members hired prior to January 1, 2005:*

  Attainment of age 55 and 5 years of Credited Service.

- *Tiers 2 & 3 - Members hired on or after January 1, 2005:*

  Attainment of age 55 and 10 years of Credited Service.

Benefit:

- *Tier 1 - Members hired prior to January 1, 2005:*

  Vested Accrued Benefit determined as of the Early Retirement Date, reduced by 1/6 of 1% for each of the first 36 months and 1/4 of 1% for each additional month payments commence prior to the Normal Retirement Date.

- *Tiers 2 & 3 - Members hired on or after January 1, 2005:*

  Vested Accrued Benefit determined as of the Early Retirement Date, reduced by 1/3 of 1% for each of the first 36 months and 5/12 of 1% for each additional month payments commence prior to the Normal Retirement Date.

Special Early Retirement

Eligibility:

- *Tier 1 - Members hired prior to January 1, 2005:*

  Attainment of any age and age plus credited service equals 70 or more at termination.

- *Tier 2 - Members hired on or after January 1, 2005 and prior to January 1, 2010:*

  Attainment of age 50 and age plus credited service equals 70 or more at termination.

- *Tier 3 - Members hired on or after January 1, 2010:*

  Attainment of age 55 and age plus credited service equals 80 or more at termination.

Benefit:

Vested Accrued Benefit determined as of the Special Early Retirement Date, unreduced for early payment.

Disability Retirement

Eligibility:

Total and permanent disability. Member qualifies for disability under the County's long-term disability plan or under Title II of the Social Security Act.

Benefit:

Normal Retirement Benefit considering annual rate of compensation at disability and Credited Service that would have accumulated if employment had continued uninterrupted to the later of the Normal Retirement Date, or the date that the County's long-term disability benefits end. The Component A Benefit will be based on Credited Service attributable to the period ending on December 31, 2013 (including any period through December 31, 2013 while the member was disabled), and the Average Monthly Compensation when the member became disabled. The Component B Benefit will be based on Credited Service attributable to the period beginning on January 1, 2014 and ending on retirement or the date payments under the Employer's LTD plan end, whichever is later (including the period on or after January 1, 2014 while the member was disabled), and the Career Monthly Compensation when the member became disabled.

Benefits commence at Normal Retirement Date, or if later, the first day of the month after payments cease under the County's long-term disability insurance contract.

Termination Benefit

Eligibility:

Members with less than five years of Credited Service receive a refund of the member's contributions. Members who have completed at least five years of Credited Service are eligible to receive their Vested Accrued Benefit payable at Normal Retirement Date.

Benefit:

Vested Accrued Benefit determined as of the date of termination but not less than the actuarial equivalent value, determined as of the benefit commencement date, of the Accumulated Contributions as of the Normal Retirement Date.

Refund of Accumulated Contributions

Upon termination prior to any type of retirement, in lieu of a monthly pension benefit, the member may elect to receive a refund of a percentage of the Pre-2014 accumulated contributions (excluding service purchase contributions) according to the following schedule, plus 100% of the Post-2013 accumulated contributions:

	Percent Vested of Pre-2014 Contributions Accumulated At Termination		
Completed Years of Service	Hired Prior to 1/1/2005	Hired 2005-2010	Hired on or after January 1, 2010
Less Than 5	100%	100%	100%
5	110%	100%	100%
6	125%	110%	100%
7	140%	120%	100%
8	155%	130%	100%
9	170%	140%	100%
10	185%	150%	100%
11	200%	160%	100%
12	200%	170%	100%
13	200%	180%	100%
14	200%	190%	100%
15 or more	200%	200%	100%

Pre-Retirement Death Benefit

- *Member is single:*

  Beneficiary receives two times member's accumulated contributions at date of death (excluding service purchase contributions).

- *Member is married:*

  Spouse receives two times member's accumulated contributions at date of death (excluding service purchase contributions); or

  A monthly benefit equal to 60% of the member's vested accrued benefit, commencing the first day of the month after the member's death or age 50 (55 for Terminated Vested Members) whichever is later.

Normal Form

- *Tier 1* - 10-year certain and life

- *Tier 2* - 10-year certain and life

- *Tier 3* - Single life annuity

Optional Forms

- 100% joint and survivor annuity
- 50% joint and survivor annuity
- 66-2/3% last survivor annuity
- 100% joint and survivor annuity with pop up
- 50% joint and survivor annuity with pop up
- For members in Tier 1 and Tier 2 only: Single life annuity
- For members in Tier 3 only: 10-year certain and life

Optional Form Conversion Factors

Optional annuity forms are actuarially equivalent based on 7.25% interest and the 1983 Group Annuity Mortality table blended 50% male and 50% female.

Payment Date

Benefits are paid on the first day of the month following eligibility for receipt.

Rehires

Effective January 1, 2017, any employee who terminates employment and is reemployed and was otherwise entitled to the Rule of 70 (with or without a minimum age of 50), and who is reemployed on or after January 1, 2017, shall be eligible for a Special Early Retirement (a) with respect to the portion of such employee's accrued benefit attributable to Credited Service earned prior to the period of reemployment when the sum of his age plus service (including purchase of service) equals 70 or more and he is not employed by any Employer as an employee, and (b) with respect to the portion of such employee's accrued benefit attributable to Credited Service earned after the period of reemployment when the sum of his age plus service (including purchase of service) equals 80 or more and he is not employed by any Employer as an employee, if the Rule of 80 date is not earlier than the date the employee would have been eligible for a Special Early Retirement if the employee had remained in-service since December 31, 2016.

SECTION E

SUMMARY OF PARTICIPANT DATA

Summary of Census Data

Exhibit E.1 Adams County Retirement Plan Summary of Census Data		
	January 1, 2019	**January 1, 2018**
1. **Active Members**		
a. Counts		
Tier 1	443	509
Tier 2	306	331
Tier 3	1,378	1,217
Total	2,127	2,057
b. Annual Projected Compensation	$ 135,696,959	$ 127,273,779
c. Average Annual Compensation	$ 63,797	$ 61,873
d. Average Age	42.6	42.8
e. Average Service	7.7	8.2
f. Accumulated Member Contributions with Interest	$ 81,450,418	$ 79,409,759
2. **NonVested Members with Refunds Due**		
a. Counts	141	132
b. Amount of Refunds Due	$ 983,194	$ 898,044
3. **Deferred Vested Members***		
a. Counts	200	187
b. Annual Deferred Benefits	$ 2,704,329	$ 2,575,861
c. Average Benefit	$ 13,522	$ 13,775
4. **Retired Members**		
a. Counts	1,018	958
b. Annual Benefits	$ 25,675,296	$ 23,461,169
c. Average Benefit	$ 25,221	$ 24,490
5. **Beneficiaries**		
a. Counts	114	102
b. Annual Benefits	$ 1,737,652	$ 1,443,592
c. Average Benefit	$ 15,243	$ 14,153
6. **Disabled Retirees**		
a. Counts	45	47
b. Annual Benefits	$ 736,510	$ 783,857
c. Average Benefit	$ 16,367	$ 16,678
7. Total Members Included in Valuation	3,645	3,483

*Includes 25 deferred disableds in 2019 and in 2018.

Summary of Changes in Participant Status

Exhibit E.2
Summary of Changes in Participant Status
During Fiscal Year 2018

	Active Members	With Deferred Benefits[1]	With Refunds Due	Retirees	Disabled Retirees	Beneficiaries	Total
As of January 1, 2018	2,057	187	132	958	47	102	3,483
Age retirements	(70)	(6)		76			0
Disability retirements		(3)			3		0
Deferred disability	(3)	3					0
Deaths	(5)			(18)	(5)	(4)	(32)
Vested terminations	(26)	26					0
Rehires	1		(1)				0
Cashouts	(117)	(7)	(86)				(210)
Expiration of benefits							
Terminated nonvested with refunds due	(96)		96				0
New beneficiary or Alternate Payee				2		16	18
New entrants during the year[2]	386						386
Data correction							
Net change	70	13	9	60	(2)	12	162
As of January 1, 2019	2,127	200	141	1,018	45	114	3,645

[1] Includes 25 deferred disabled members at January 1, 2019

[2] Includes 34 members hired and terminated in 2018 with refunds due.

Active Member Counts by Age and Service

Exhibit E.3 Active Member Counts by Age and Service as of January 1, 2019								
Age	**Service**							
	0-4	**5-9**	**10-14**	**15-19**	**20-24**	**25-29**	**Over 30**	**Total**
Under 20	3	0	0	0	0	0	0	3
20-24	78	0	0	0	0	0	0	78
25-29	235	13	2	0	0	0	0	250
30-34	237	67	14	1	0	0	0	319
35-39	168	58	71	20	0	0	0	317
40-44	107	53	64	44	9	0	0	277
45-49	89	44	49	62	23	4	0	271
50-54	81	39	41	57	25	10	4	257
55-59	64	25	29	31	14	10	13	186
60-64	29	24	21	23	12	10	6	125
65-69	8	3	7	7	3	3	3	34
Over 70	4	1	1	1	0	1	2	10
Total	1,103	327	299	246	86	38	28	2,127

Active Member Average Salary by Age and Service

Exhibit E.4
Active Member Average Salary at Valuation Date by Age and Service[1]

Age	Service							
	0-4	5-9	10-14	15-19	20-24	25-29	Over 30	Total
Under 20								
20-24	$42,752							$42,752
25-29	48,399	$57,227						48,949
30-34	51,099	69,516	$72,423					55,963
35-39	52,321	65,175	70,111	$74,417				60,051
40-44	53,288	71,377	79,511	78,662	$71,755			67,438
45-49	53,757	65,792	66,789	75,505	80,229			65,711
50-54	50,313	69,345	69,959	77,916	75,382	$84,092		66,881
55-59	54,176	59,484	62,543	64,259	72,238	78,334	80,589	62,379
60-64	59,600	63,732	61,745	60,746	76,926	76,416	81,663	65,032
65-69	47,362		69,670	69,948				62,951
Over 70								44,747
Total	$50,878	$66,698	$70,135	$73,464	$75,671	$79,236	$81,051	$60,536

[1] Average Salary not shown if group contains less than five members

Exhibit E.5 10-Year Projected Benefit Payments (Closed Group)			
Fiscal Year Ended December 31,	**Actives**	**Inactives**	**Total**
2019	$ 2,108,915	$28,444,487	$ 30,553,402
2020	4,026,608	28,282,003	32,308,611
2021	5,903,923	28,094,099	33,998,022
2022	7,807,412	27,997,103	35,804,515
2023	9,606,557	27,734,616	37,341,173
2024	11,618,354	27,416,719	39,035,073
2025	13,645,740	27,095,450	40,741,190
2026	15,726,950	26,724,105	42,451,055
2027	17,822,140	26,344,714	44,166,854
2028	19,926,909	25,922,144	45,849,053

Exhibit E.6 History of Refunds	
Fiscal Year Ended December 31,	**Refund Amount**
2006	$ 1,225,048
2007	1,187,708
2008	1,220,911
2009	1,043,307
2010	910,161
2011	1,761,213
2012	1,870,042
2013	2,029,377
2014	3,253,473
2015	3,086,203
2016	2,989,507
2017	2,328,219
2018	3,357,700

SECTION F

HISTORICAL SCHEDULES

Schedule of Funding Progress

Exhibit F.1 Adams County Retirement Plan Schedule of Funding Progress						
Actuarial Valuation Date	**Actuarial Value of Assets**	**Actuarial Accrued Liability (AAL)**	**Unfunded AAL (UAAL)**	**Funded Ratio**	**Covered Payroll**	**UAAL as a Percentage of Covered Payroll**
(1)	(2)	(3)	(4)=(3)-(2)	(5)=(2)/(3)	(6)	(7)=(4)/(6)
1/1/2010	$ 200,975,215	$ 340,984,767	$ 140,009,552	58.9%	$ 98,982,060	141.4%
1/1/2011	204,666,912	356,275,436	151,608,524	57.4%	95,737,553	158.4%
1/1/2012	201,712,397	371,702,160	169,785,105	54.3%	94,160,223	180.3%
1/1/2013	199,076,191	386,835,357	187,759,166	51.5%	96,443,158	194.7%
1/1/2014	214,140,815	379,802,962	165,662,147	56.4%	102,088,234	162.3%
1/1/2015	227,350,888	398,075,505	170,724,617	57.1%	107,861,819	158.3%
1/1/2016	235,725,998	419,358,970	183,632,972	56.2%	113,995,220	161.1%
1/1/2017	246,434,159	440,035,366	193,601,207	56.0%	120,573,734	160.6%
1/1/2018	259,301,061	484,193,980	224,892,919	53.6%	127,273,779	176.7%
1/1/2019	265,656,097	505,342,712	239,686,615	52.6%	135,696,959	176.6%

Schedule of Employer Contributions

Exhibit F.2
Adams County Retirement Plan
Schedule of Employer Contributions

Fiscal Year Ended December 31,	Actuarially Determined Contribution	Actual County Contribution *	Percentage Contributed
2006	$ 10,110,243	$ 5,175,320	51.2%
2007	11,320,501	5,740,166	50.7%
2008	11,542,116	6,445,284	55.8%
2009	16,237,097	7,048,276	43.4%
2010	16,856,144	7,153,366	42.4%
2011	17,559,138	7,235,764	41.2%
2012	18,762,499	7,533,395	40.2%
2013	19,659,013	8,289,767	42.2%
2014	15,406,279	8,964,812	58.2%
2015	15,254,244	9,709,230	63.6%
2016	15,858,211	10,316,491	65.1%
2017	16,276,851	10,954,633	67.3%
2018	19,360,970	13,634,301	70.4%
2019	21,014,878	TBD	TBD

*County Contribution includes $2,000,000 in mill levy revenue for fiscal year 2018.

Supplementary Information

Exhibit F.3 Adams County Retirement Plan Supplementary Information	
Valuation Date	January 1, 2019
Actuarial Cost Method	Entry Age Normal
Amortization Method	Level Dollar Open
Remaining Amortization Periods	30 Years
Asset Valuation Method	5-Year Smoothed Market
Actuarial Assumptions:	
Investment Rate of Return	7.25%
Projected Salary Increases	Service-based increases from 3.5% to 6.10%
Inflation	2.50%
Cost of Living Adjustments	N/A

SECTION G

ACTUARIAL ASSUMPTIONS AND METHODS

Summary of Actuarial Methods and Assumptions

I. Valuation Date

The valuation date is January 1st of each plan year. This is the date as of which the actuarial present value of future benefits and the actuarial value of assets are determined.

II. Actuarial Cost Method

The actuarial valuation uses the Entry Age Normal actuarial cost method. Under this method, the employer contribution rate is the sum of (i) the employer normal cost rate, and (ii) a rate that will amortize the unfunded actuarial liability.

1. The valuation is prepared on the projected benefit basis. The present value of each participant's expected benefit payable at retirement or termination is determined, based on age, service, sex, compensation, and the interest rate assumed to be earned in the future (7.25%). The calculations take into account the probability of a participant's death or termination of employment prior to becoming eligible for a benefit, as well as the possibility of terminating with a service benefit. Future salary increases are also anticipated. The present value of the expected benefits payable on account of the active participants is added to the present value of the expected future payments to retired participants and beneficiaries to obtain the present value of all expected benefits payable from the Plan on account of the present group of participants and beneficiaries.

2. The employer contributions required to support the benefits of the Plan are determined following a level funding approach, and consist of a normal cost contribution and an accrued liability contribution.

3. The normal contribution is determined using the Entry Age Normal cost method. Under this method, a calculation is made to determine the average uniform and constant percentage rate of employer contribution which, if applied to the compensation of each new participant during the entire period of anticipated covered service, would be required in addition to the contributions of the participant to meet the cost of all benefits payable on their behalf.

4. The unfunded accrued liability contributions are determined by subtracting the actuarial value of assets from the actuarial accrued liability and amortizing the result over 30 years from the valuation date as a level dollar. It is assumed that payments are made throughout the year.

III. Actuarial Value of Assets

The actuarial value of assets is based on recognizing gains and losses over a five-year period where gains and losses are determined by comparing the projected market value of assets (based on the prior year's market value of assets, cash flows during the year and expected investment returns on those amounts) to the current year's market value of assets. The actuarial value of assets must be between 80% and 120% of market value.

IV. Actuarial Assumptions

A. Economic Assumptions

1. Investment return: 7.25% per annum, compounded annually, composed of an assumed 2.50% inflation rate and a 4.75% real rate of return. This rate represents the assumed return, net of all investment expenses.

2. Salary increase rate: Inflation rate of 2.50%, plus productivity component of 1.00%, plus step-rate/ promotional component as shown (adopted May 2018).

Completed Years of Service	Percentage Increase in Salary		
	Merit	**Wage Inflation**	**Total**
0	2.60 %	3.50 %	6.10 %
5	2.30	3.50	5.80
10	2.00	3.50	5.50
15	1.50	3.50	5.00
20	0.20	3.50	3.70
25	0.15	3.50	3.65
30	0.00	3.50	3.50
35	0.00	3.50	3.50
40	0.00	3.50	3.50

3. Wage inflation: 3.50%

4. Payroll growth: 3.50%

B. Demographic Assumptions

1. Mortality rates (pre- and post-retirement) – The valuation assumes fully generational mortality. The base mortality table used is the RP-2014 Blue Collar Healthy Annuitant Generational Mortality Table. Future mortality improvements are assumed each year using the Ultimate MP Scale. The following are sample rates for 2019 (adopted May 2018):

Sample Attained Ages	Probability of Death Pre-Retirement	
	Men	Women
20	0.05 %	0.02 %
25	0.06	0.02
30	0.06	0.02
35	0.06	0.03
40	0.08	0.04
45	0.12	0.07
50	0.21	0.12
55	0.34	0.18
60	0.58	0.26
65	1.02	0.39
70	1.64	0.66
75	2.65	1.12
80	4.28	1.88
85	8.01	4.77
90	14.12	10.26

Sample Attained Ages	Probability of Death Post-Retirement	
	Men	Women
20	0.05 %	0.02 %
25	0.07	0.03
30	0.09	0.04
35	0.13	0.07
40	0.18	0.11
45	0.26	0.18
50	0.39	0.27
55	0.57	0.38
60	0.80	0.55
65	1.20	0.83
70	1.87	1.33
75	3.00	2.18
80	4.93	3.63
85	8.26	6.18
90	13.97	10.68

2. Mortality rates (post-disablement) – RP-2014 Disabled Male and Female No Collar Mortality Table. Future mortality improvements are assumed each year using the Ultimate MP Scale. Sample rates shown below (adopted May 2018):

Sample Attained Ages	Probability of Death Post-Disability	
	Men	Women
20	0.05 %	0.02 %
25	0.20	0.09
30	0.49	0.23
35	0.85	0.42
40	1.26	0.65
45	1.66	0.91
50	2.01	1.18
55	2.30	1.42
60	2.60	1.66
65	3.10	2.02
70	3.95	2.71
75	5.31	3.95
80	7.50	5.87
85	11.09	8.70
90	16.93	12.76

3. Disability rates. Sample rates shown below (adopted May 2018):

Sample Attained Ages	Probability of Disablement Next Year	
	Men	Women
25	0.02 %	0.02 %
30	0.03	0.03
35	0.05	0.05
40	0.08	0.08
45	0.13	0.13
50	0.22	0.22
55	0.42	0.42
60	0.60	0.60

4. Termination rates (for causes other than death, disability or retirement): Termination rates are based on service. Termination rates are not applied after a member becomes eligible for a retirement benefit. Rates at selected ages are shown (adopted May 2018):

Completed Years of Service	Probability of Termination Next Year	
	Men	Women
0	12.00 %	12.00 %
5	9.00	9.00
10	6.00	6.00
15	4.00	4.00
20	2.00	2.00
25	1.00	1.00
30	1.00	1.00
35	1.00	1.00

5. Retirement rates (adopted May 2018).

	Tier 1		Tier 2		Tier 3	
Age	**Age-based**	**Rule-based**	**Age-based**	**Rule-based**	**Age-based**	**Rule-based**
< 46	12.00%	12.00%				
46	12.00%	12.00%				
47	12.00%	12.00%				
48	12.00%	12.00%				
49	12.00%	12.00%				
50	15.00%	15.00%		20.00%		
51	15.00%	15.00%		15.00%		
52	15.00%	15.00%		15.00%		
53	15.00%	15.00%		15.00%		
54	15.00%	15.00%		15.00%		
55	15.00%	15.00%	15.00%	15.00%	15.00%	25.00%
56	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%
57	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%
58	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%
59	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%
60	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%
61	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%
62	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%
63	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%
64	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%
65	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%
66	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%
67	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%
68	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%
69	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%
70	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%
71	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%
72	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%
73	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%
74	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%
75	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

C. Expense Loading. Based on the prior three year average, rounded to the nearest $1,000.

Year	Noninvestment Expenses		
2016	$837,324		
2017	636,159		
2018	913,182		
	$2,386,665	÷ 3 =	$795,555

Average	$795,555
Loading	$796,000

D. Other Assumptions

1. Percent married: 85% of employees are assumed to be married.

2. Age difference: Male members are assumed to be three years older than their spouses, and female members are assumed to be three years younger than their spouses.

3. Cost of living adjustment: None.

4. Optional forms: Members are assumed to elect the normal form of benefit.

5. Vested terminating members are assumed to elect a refund or a deferred benefit, whichever is more valuable at the time of termination.

6. Current and future deferred vested participants are assumed to retire at the earlier of age 55 or the age they meet special early retirement eligibility. Deferred disabled participants are assumed to commence benefits at age 60.

7. Pay increase timing: Middle of year.

8. Decrement timing: Decrements of all types are assumed to occur mid-year.

9. Eligibility testing: Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.

10. Decrement relativity: Decrement rates are used directly, without adjustment for multiple decrement table effects.

11. Incidence of Contributions: Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made.

SECTION G

RISKS ASSOCIATED WITH MEASURING THE ACCRUED LIABILITY

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

The determination of the accrued liability and the actuarially determined contribution requires the use of assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the actuarially determined contribution that result from the differences between actual experience and the actuarial assumptions.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions due to changing conditions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the plan's future financial condition include:

1. Investment risk – actual investment returns may differ from the expected returns;
2. Asset/Liability mismatch – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
3. Contribution risk – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. Salary and Payroll risk – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. Longevity risk – members may live longer or shorter than expected and receive pensions for a period of time other than assumed;
6. Other demographic risks – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

The computed contribution rate shown on Exhibit B.4 may be considered as a minimum contribution rate that complies with the Board's policy. Actual contributions are set by statute. The timely receipt of the contributions is critical to support the financial health of the plan. Users of this report should be aware that contributions made at the statutory rate do not necessarily guarantee benefit security.

Plan Maturity Measures

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Generally accepted plan maturity measures include the following:

	January 1, 2019	January 1, 2018
Ratio of the market value of assets to total payroll	1.8	2.1
Ratio of actuarial accrued liability to payroll	3.7	3.8
Ratio of actives to retirees and beneficiaries	1.8	1.9
Ratio of net cash flows to market value of assets	-2%	-2%
Duration of the actuarial accrued liability	11.7	11.7

Ratio of Market Value of Assets to Payroll

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 4.0 times the payroll, a return on assets 5% different than assumed would equal 20% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.

Ratio of Actuarial Accrued Liability to Payroll

The relationship between actuarial accrued liability and payroll is a useful indicator of the potential volatility of contributions for a fully funded plan. A funding policy that targets a funded ratio of 100% is expected to result in the ratio of assets to payroll and the ratio of liability to payroll converging over time.

The ratio of liability to payroll may also be used as a measure of sensitivity of the liability itself. For example, if the actuarial accrued liability is 5.5 times the payroll, a change in liability 2% other than assumed would equal 11% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

Ratio of Actives to Retirees and Beneficiaries

A young plan with many active members and few retirees will have a high ratio of active to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

Ratio of Net Cash Flow to Market Value of Assets

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means existing funds are being used to make payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

Duration of Actuarial Accrued Liability

The duration of the actuarial accrued liability may be used to approximate the sensitivity to a 1% change in the assumed rate of return. For example, duration of 10 indicates that the liability would increase approximately 10% if the assumed rate of return were lowered 1%.

Additional Risk Assessment

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability