

# Wyoming Paid Firemen's Retirement Fund Plan B

Actuarial Valuation Report  
for the Year Beginning January 1, 2019



April 18, 2019

Board of Trustees

**Wyoming Paid Firemen's Retirement Fund Plan B**

6101 Yellowstone Road

Suite 500

Cheyenne, WY 82002

Dear Board of Trustees:

**Subject: Actuarial Valuation as of January 1, 2019**

We are pleased to present the report of the actuarial valuation of the Wyoming Paid Firemen's Retirement Fund Plan B ("the Fund") for the plan year commencing January 1, 2019. This report describes the current actuarial condition of the Fund, determines the calculated employer contribution rate (the actuarially determined contribution rate), and analyzes changes in this contribution rate for the prior year. Valuations are prepared annually, as of January 1, the first day of the Fund's plan year.

This report was prepared at the request of the Board and is intended for use by the Retirement System and those designated or approved by the Board. This report may be provided to parties other than the System only in its entirety and only with the permission of the Board. GRS is not responsible for unauthorized use of this report.

**Financing objectives and funding policy**

The employer and employee contribution rates are specified in the statute. The purposes of the valuation are to measure the System's funding progress and to determine whether or not the statutory contribution is sufficient to meet the obligations of the Fund. This report should not be relied on for any purpose other than the purposes described herein. Determinations of financial results, associated with the benefits described in this report, for purposes other than those identified above may be significantly different.

This valuation assumed the continuing ability of the plan sponsor to make the contributions necessary to fund this plan. A determination regarding whether or not the plan sponsor is actually able to do so is outside our scope of expertise and was not performed.

### **Progress toward realization of financing objectives**

The funded ratio (the ratio of the actuarial value of assets to the actuarial accrued liability) is a standard measure of a plan's funded status. The funded ratio, based upon the assumption of no further cost-of-living adjustment increases, as of January 1, 2019 is 92.94%. As of January 1, 2018, this funded ratio, based on the assumption of no future COLAs and the actuarial value of assets, was 95.92%. On a market value of assets basis, the funded ratio decreased from 96.71% as of January 1, 2018 to 86.85% as of January 1, 2019. 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.

### **Benefit provisions**

The benefit provisions reflected in this valuation are those which were in effect on January 1, 2019. W.S. 9-3-454 prohibits benefit changes, including cost-of-living increases, unless the funded ratio stays above 100% plus a margin for adverse experience throughout the life of the benefit change. Therefore, this valuation does not include any liability for future cost-of-living increases.

Effective July 1, 2019 the employee contribution rate will increase from 9.245% to 9.745% and the employer contribution rate will increase from 12.00% to 13.00%. The employee contribution rate will continue to increase by 0.50% on July 1 each subsequent year until it reaches the ultimate rate of 11.245% on July 1, 2022 and the employer contribution rate will continue to increase 1.00% on July 1 each subsequent year until it reaches the ultimate rate of 16.00% on July 1, 2022.

The benefit provisions are summarized in Appendix B of the report.

### **Assumptions and methods**

Actuarial assumptions and methods are set by the Board, based upon recommendations made by the plan's actuary. The current assumptions used in the actuarial valuation were adopted by the Board effective August 23, 2017 and were first utilized with the January 1, 2018 valuation report. For a detailed description of the experience related to these assumptions, as well as the rationale for any changes, please see our latest Wyoming Retirement System Actuarial Experience Study Report. Our experience study report was dated January 10, 2018 and it covered the five-year investigation period ending December 31, 2016. All actuarial assumptions used in this report are reasonable for the purposes of this valuation.

The results of the 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 amounts and funding periods. The actuarial calculations presented in the report are intended to provide information for rational decision making.



### **Assumptions and Methods (continued)**

The 12.00% employer contribution and the 9.245% employee contribution and subsequent increases are the rates that comply with State 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.

The employer contribution requirement in Table 1 of this report is determined using the actuarial assumptions and methods disclosed in Appendix A of this report. This report includes risk metrics in Appendix C but does not include a more robust 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.

All assumptions and methods are described in Appendix A of our report.

### **Data**

Member data for retired, active and inactive members was supplied as of January 1, 2019 by the System's staff. We did not audit this data, but we did apply a number of tests to the data, and we concluded that it was reasonable and consistent with the prior year's data.

Asset and financial information as of January 1, 2019 was prepared by the Wyoming Retirement System and is the responsibility of management. Eide Bailly, LLP provided us the asset and financial information and will opine on Wyoming Retirement System's statements.

We relied on the System's staff for the accuracy and completeness of the information.

### **Plan experience**

As part of each valuation, we examine the Fund's experience relative to the assumptions. Experience in a given year will deviate from the assumptions and a gain occurs if the liabilities grow slower than the assumption set anticipates, and a loss occurs if the liabilities grow faster. This past fiscal year the Fund had a total experience loss of approximately \$5.3 million primarily due to investment experience. The aggregate results of these analyses are disclosed in Tables 4 and 5 under Section III of the report.

**Actuarial certification**

All of the tables contained in this actuarial valuation report were prepared by Gabriel, Roeder, Smith & Company. Historical information for years prior to 2010 was prepared by the prior actuarial firm and was not subjected to our actuarial review.

We certify that the information presented herein is accurate and fairly portrays the actuarial position of the System as of January 1, 2019.

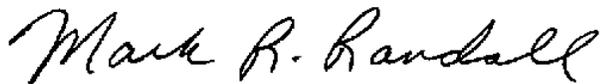
All of our work conforms with generally accepted actuarial principles and practices, and with the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, our calculations also comply with the requirements of state law and, where applicable, the Internal Revenue Code and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

The undersigned are independent actuaries and consultants.

Mark Randall and Leslie Thompson are Enrolled Actuaries and Mark Randall, Leslie Thompson, and Paul Wood are Members of the American Academy of Actuaries, and all three meet all the Qualification Standards of the American Academy of Actuaries.

Finally, all of the undersigned are experienced in performing valuations for large public retirement systems.

Respectfully submitted,  
**Gabriel, Roeder, Smith & Company**



Mark R. Randall, FCA, EA, MAAA  
Chief Executive Officer



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



Paul T. Wood, ASA, FCA, MAAA  
Consultant

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# SECTION I

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## EXECUTIVE SUMMARY

## Executive Summary

Item	January 1, 2019	January 1, 2018
	No COLA	No COLA
1. Contributions:		
a. Total normal cost	22.85%	22.78%
b. Employee contributions*	(9.495%)	(9.245%)
c. Other expected contributions	0.00%	0.00%
d. Net employer normal cost	13.36%	13.54%
e. Amortization payment	2.71%	1.35%
f. Administrative expenses	0.51%	0.48%
g. Required contribution	16.58%	15.37%
h. Statutory**	(12.50%)	(12.00%)
i. Shortfall/(surplus)	4.08%	3.37%
2. Funding Elements:		
a. Market value of assets (MVA)	\$141,313,723	\$146,017,848
b. Actuarial value of assets (AVA)	\$151,224,958	\$144,816,308
c. Actuarial accrued liability (AAL)	\$162,716,621	\$150,981,756
d. Unfunded/(overfunded) actuarial accrued liability	\$11,491,663	\$6,165,448
3. Contributions and Ratios:		
a. Annual required contribution	\$4,760,014	\$4,221,146
b. Actual contributions	N/A	3,356,547
i. Employer	N/A	3,356,417
ii. Other	N/A	130
c. Percentage contributed	N/A	79.52%
d. Funded ratio on an actuarial basis (AVA/AAL)	92.94%	95.92%
e. Funded ratio on a market basis (MVA/AAL)	86.85%	96.71%
f. Projected valuation payroll	\$28,729,092	\$27,481,361

\*January 1, 2019 employee contribution rate of 9.495% is the average of 9.245% effective January 1, 2019 to June 30, 2019 and 9.745% effective July 1, 2019 to December 31, 2019

\*\*January 1, 2019 employer contribution rate of 12.50% is the average of 12.00% effective January 1, 2019 to June 30, 2019 and 13.00% effective July 1, 2019 to December 31, 2019

# SECTION II

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## DISCUSSION

## Contribution Requirements

- Exhibits throughout this report are based primarily, unless stated otherwise, on the assumption of no future cost-of-living adjustments (COLAs).
- W.S. 9-3-454 prohibits benefit changes, including cost-of-living increases, unless the funded ratio stays above 100% plus a margin for adverse experience throughout the life of the benefit change. The actuarial value funded ratio is 92.94% and the market value funded ratio is 86.85%.
- Effective July 1, 2019 the employee contribution rate will increase from 9.245% to 9.745% and the employer contribution rate will increase from 12.00% to 13.00%. The employee contribution rate will continue to increase by 0.50% on July 1 each subsequent year until it reaches the ultimate rate of 11.245% on July 1, 2022 and the employer contribution rate will continue to increase 1.00% on July 1 each subsequent year until it reaches the ultimate rate of 16.00% on July 1, 2022.
- There were no changes to the actuarial assumptions or methods since the prior valuation. For a detailed description of the experience related to these assumptions, please see our latest Wyoming Retirement System Actuarial Experience Study Report.
- The amortization payment is based upon the following assumptions:
  - The funding period is based on a 30-year closed period for the initial base as of January 1, 2018 and 20-year closed period layers for future gains and losses
  - Amortization payment amounts are calculated in such a way that they will increase as a level percentage of payroll
  - Total payroll increases are assumed at 2.50% per year
  - Future growth in the number of active members is not reflected in the annual valuation
- The analysis of the changes in contribution rates is shown in Table 5 under Section III of the report

## Calculation of Contribution Rates

The funds available to pay benefits come from two sources, contributions and investment income on those contributions (the majority of the funds available to pay benefits typically come from investment income). The Fund receives contributions from two sources, employer contributions and member contributions, which are both determined as a percentage of pay. As shown in Table 1 under Section III of the report, the employer contribution rate has three components:

- The normal cost percentage (NC%)
- The amortization percentage (UAAL%)
- The administrative expenses

The NC% is the theoretical amount which would be required to pay the members' benefits if this amount had been contributed from each member's entry date and if the fund's experience exactly followed the actuarial assumptions. The NC% is shown in Table 3 under Section III of the report.

The actuarial accrued liability (AAL) is the difference between (i) the actuarial present value of all future benefits for all current participants of the fund, including active, inactive and retired members, and (ii) the actuarial present value of future normal costs. Thus the AAL represents the liability associated with past years. The unfunded actuarial accrued liability (UAAL) is the difference between the AAL and the actuarial value of assets (AVA). It is the shortfall/excess between the liability associated with prior years (the AAL) and the assets actually accumulated (the AVA). This shortfall/excess can arise from several sources, including actuarial gains and losses which are caused by differences between actual experience and the plan's assumptions, changes to the plan's actuarial assumptions, and amendments to the benefit provisions.

The UAAL% is the amount required to fund this difference. It is the amount, expressed as a level percentage of payroll, necessary to amortize the UAAL. Amortization bases are established each year and amortized based on the Board's policy. The Board's policy consists of amortizing the unfunded liability as of January 1, 2018, over a closed 30 year period with each subsequent amortization base created as a result of year to year experience changes over individual 20 year closed periods. The Executive Summary shows the UAAL%, called Amortization Payment, compared to that of last year. Assumed administrative expenses are the average of the prior two years, with each year projected at 2.5% to the valuation date.

The calculated rate is used in determining the contributions necessary to meet the Actuarially Determined Contribution for the twelve-month period beginning January 1, 2019. Note, however, that the blended employer contribution is set at 12.50% of payroll. Therefore, the contribution will be less than the Actuarially Determined Contribution. This is detailed in the Executive Summary.

## Financial Data and Experience

As of January 1, 2019, the Fund has a total market value of \$141 million. Financial information was received from Eide Bailly, LLP.

Table 7 under Section III of the report shows a reconciliation of the market values between the beginning and end of 2018.

During 2018, the total investment return on the market value of assets (MVA), as reported by Meketa Investment Group, Inc., was (3.52%), and is shown in Table 10 under Section III of the report.

In determining the contribution rates and funded status of the Fund, an actuarial value of assets (AVA) is used rather than the market value of assets. The actuarial value of assets is based on the market value of assets with a five-year phase-in of actual investment return in excess of (or less than) expected investment income. Expected investment income is determined using the assumed investment return rate and the market value of assets (adjusted for receipts and disbursements during the year). The returns are computed net of investment expenses. An adjustment is made if the actuarial value is not within 20% of the Market Value. For any year following a year in which the 20% of market value adjustment was applied, the actuarial value is determined as if the adjustment was not applied in the previous year.

The development of the AVA is shown in Table 9 under Section III of the report. The AVA is \$151 million. The AVA is 107.0% of the MVA as of December 31, 2018, compared to 99.2% last year. The difference between the AVA and the MVA is the deferred gains and losses. As of January 1, 2018, the total deferred gain was \$1.2 million. As of January 1, 2019, the total deferred loss was \$9.9 million.

In addition to the market return, Table 10 also shows the return on the actuarial value of assets for the Fund. For 2018, this return was 4.08%. Since this return is less than the assumed 7.00% investment return, an actuarial loss occurred, increasing the unfunded actuarial accrued liabilities of the Fund by \$4.0 million.

## Member Data

Member data as of January 1, 2019, was supplied electronically by the Fund's staff. While we did not audit this data, we did perform various tests to ensure that it was internally consistent, consistent with the prior year's data, and was reasonable overall.

Table 15 under Section III of the report shows the number of members by category (active, inactive, retired, etc.) along with member statistics. Tables 16 through 28 show summaries of certain historical data and include membership statistics.

Total active member payroll increased 4.54% last year, compared with a 6.55% decrease the prior year.

Of the 365 active participants, 74 are eligible or will become eligible for normal retirement in 2019.

The average of the final average salaries for participants who retired or became disabled this year is \$84,821.

Changes in payroll are significant because the methodology used in the valuation to amortize the unfunded actuarial accrued liability assumes a growing payroll into the future. If the payroll does not grow at the assumed 2.50% per year average, then the current amortization payments may be understated and the funding position of the Fund will not strengthen as assumed over time. Higher than expected payroll growth, however, has the opposite effect of this and the funded position of the Fund should trend to 100%. Please note that the Plan remains below a 100% funded ratio this year.

## Benefit Provisions

Appendix B of the report includes a more detailed summary of the benefit provisions for the Fund. A brief summary is as follows:

- *Normal Retirement Eligibility*
  - Age 50 with at least four years of service.
- *Normal Retirement Benefit*
  - 2.80% of final average salary, maximum 25 years or 70%.
- *Normal Form of Payment*
  - Monthly benefit for life with a lump-sum death benefit equal to the excess (if any) of the employee contributions over the total benefits received.
- *Employee Contributions* are required
  - 9.245% of pay, effective July 1, 2014.
- *Post-retirement Cost-of-Living Adjustments (COLAs)*
  - W.S. 9-3-454 prohibits benefit changes, including cost-of-living increases, unless the funded ratio stays above 100% plus a margin for adverse experience throughout the life of the benefit change.

Pursuant to Enrolled Act No. 59 and Board action, effective July 1, 2019 the employee contribution rate will increase from 9.245% to 9.745% and the employer contribution rate will increase from 12.00% to 13.00%. The employee contribution rate will continue to increase by 0.50% on July 1 each subsequent year until it reaches the ultimate rate of 11.245% on July 1, 2022 and the employer contribution rate will continue to increase 1.00% on July 1 each subsequent year until it reaches the ultimate rate of 16.00% on July 1, 2022.

## Actuarial Methods and Assumptions

Appendix A of the report includes a summary of the actuarial assumptions and methods used in this valuation. A few highlights are listed as follows:

- Costs are determined using the Entry Age Normal actuarial cost method, calculated as a level percentage of payroll.
- The unfunded actuarial accrued liability is amortized over an effective 24 year closed period as a level percent of payroll. Future valuations will include additional amortization layers on a closed 20 year basis.
- The assumed annual investment return rate is 7.00%, with assumed inflation of 2.25%.
- Aggregate payroll is assumed to increase at 2.50% per year.
- Inactive vested participants are assumed to retire at age 0 or on the valuation date if over age 50.
- No benefit data is available for members entitled to deferred benefits. The present value of benefits expected to be paid to vested inactive non-retired members is approximated using the data provided.

The average future lifetime for current pensioners is 25.3 years.

The actuarial assumptions and methods were reviewed in detail as part of the 2017 Experience Study covering the five year period ending December 31, 2016. Please see Appendix A for a summary of the new assumptions.

## **GASB and Funding Progress**

Governmental Accounting Standards Board Statement Number 67 (GASB 67) contains certain accounting requirements for the Fund. Schedules, notes and required supplementary information are provided under separate cover.

## **SECTION III**

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### **SUPPORTING EXHIBITS**

**Table 1A**  
**Calculation of Annual Required Contribution Rate**  
**(Assumes No Future Cost-Of-Living Increases)**

Item	January 1, 2019	January 1, 2018
1. Projected valuation payroll	\$28,729,092	\$27,481,361
2. Present value of future pay	\$280,716,165	\$273,520,720
3. Employer normal cost rate	13.36%	13.54%
4. Actuarial accrued liability for active members		
a. Present value of future benefits for active members	\$146,748,112	\$140,469,559
b. Less: present value of future employer normal costs	(31,466,464)	(34,964,012)
c. Less: present value of future employee contributions	(30,395,314)	(25,286,990)
d. Actuarial accrued liability	\$84,886,334	\$80,218,557
5. Total actuarial accrued liability for:		
a. Retirees and beneficiaries	\$65,114,370	\$60,000,928
b. Disabled members	4,415,755	4,454,495
c. Inactive members	8,300,162	6,307,776
d. Active members (Item 4d)	84,886,334	80,218,557
e. Total	\$162,716,621	\$150,981,756
6. Actuarial value of assets (Table 9)	\$151,224,958	\$144,816,308
7. Unfunded actuarial accrued liability (UAAL) (Item 5e - Item 6)	\$11,491,663	\$6,165,448
8. Effective UAAL amortization period	24 years	30 years
9. Assumed payroll growth rate	2.50%	2.50%
10. Employer Contribution requirement		
a. UAAL amortization payment as % of pay	2.71%	1.35%
b. Employer normal cost	13.36%	13.54%
c. Administrative expense	0.51%	0.48%
d. Contribution requirement (a + b + c)	16.58%	15.37%

**Table 1B**  
**Calculation of UAAL Amortization Payment**  
**(Assumes No Future Cost-Of-Living Increases)**

UAAL as of January 1, 2019		\$11,491,663		
Total Prior Remaining Amortization Bases as of January 1, 2019		6,214,055		
<b>2019 Amortization Base as of January 1, 2019</b>		<b>\$5,277,608</b>		
<b>2019 Payment (20 years, level percent of pay amortization)</b>		<b>\$398,218</b>		
<b>As of January 1, 2019</b>				
<b>Base Year</b>	<b>Initial Base</b>	<b>Remaining Base</b>	<b>Years Remaining</b>	<b>Amortization Payment</b>
2019	\$ 5,277,608	\$ 5,277,608	20	\$ 398,218
2018	6,165,448	6,214,055	29	379,491
<b>Total</b>		<b>\$ 11,491,663</b>		<b>\$ 777,709</b>

**Table 2**  
**Cost Breakdown**  
**(Assumes No Future Cost-Of-Living Increases)**

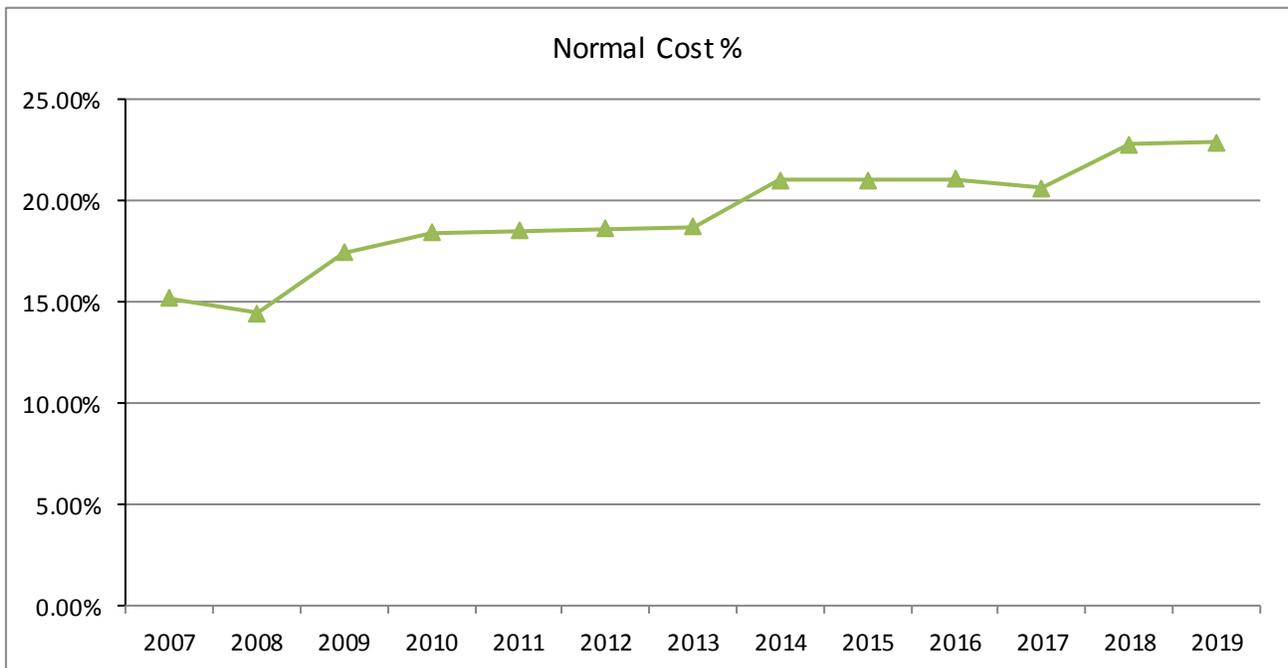
Item	Present Value of Future Normal Costs (1)	Actuarial Accrued Liabilities (2)	Total Present Value of Benefits (3) = (1) + (2)
Age and service allowances based on total service and disability benefits likely to be rendered by present active members	\$49,266,818	\$80,647,397	\$129,914,215
Death-in-service benefits likely to be paid on behalf of present active members (employer financed portion)	1,609,510	967,735	2,577,245
Separation benefits (refunds of contributions and deferred allowances) likely to be paid to present active members	10,985,450	3,271,202	14,256,652
Benefits likely to be paid to vested inactive members	0	8,086,405	8,086,405
Benefits to be paid to members due refunds	0	213,757	213,757
Benefits to be paid to current retirees, disabled members, beneficiaries, and future beneficiaries of current retirees	0	69,530,125	69,530,125
<b>Total</b>	<b>\$61,861,778</b>	<b>\$162,716,621</b>	<b>\$224,578,399</b>
Actuarial value of assets	0	151,224,958	151,224,958
Liabilities to be covered by future contributions	\$61,861,778	\$11,491,663	\$73,353,441

## Table 3

### History of Total Normal Cost

(Assumes No Future Cost-Of-Living Increases)

Fiscal Year Ending December 31 (1)	Normal Cost as Percent of Payroll (2)
2007	15.18%
2008	14.41%
2009	17.40%
2010	18.42%
2011	18.49%
2012	18.58%
2013	18.71%
2014	20.97%
2015	20.99%
2016	21.03%
2017	20.59%
2018	22.78%
2019	22.85%



**Table 4**  
**Calculation of Total Actuarial Gain/(Loss)**  
**(Assumes No Future Cost-Of-Living Increases)**

Item	January 1, 2019
1. Derivation of Experience Gain/(Loss)	
a. Unfunded actuarial accrued liability (UAAL) - previous valuation	\$6,165,448
b. Normal cost (NC) for fiscal year ending December 31, 2018	6,259,734
c. Expected administrative expenses for fiscal year ending December 31, 2018	131,900
d. Actuarially determined contribution for fiscal year ending December 31, 2018	6,761,869
e. Interest accrual:	
(i) For whole year on (a)	431,581
(ii) For half year on (b) + (c) - (d)	(12,739)
(iii) Total interest: (e)(i) + (e)(ii)	418,842
f. Change in UAAL due to programming change	-
g. Change in UAAL due to assumption change	-
h. Expected UAAL current year: (a) + (b) + (c) - (d) + (e)(iii) + (f) + (g)	6,214,055
i. Actual UAAL current year	11,491,663
j. Experience gain/(loss): (h) - (i)	(5,277,608)
k. Experience gain/(loss) as a % of actuarial accrued liability	-3.24%
2. Approximate portion of gain/(loss) due to investments (at actuarial value)	(\$3,994,331)
3. Approximate portion of gain/(loss) due to contributions and administrative expenses higher or lower than expected	(\$863,594)
4. Approximate amount of gain/(loss) due to liabilities: (1)(j) - (2) - (3)	(\$419,684)
a. Age & service retirements	(\$161,072)
b. Disability retirements	149,240
c. Death-in-service	88,938
d. Withdrawal from employment	111,477
e. Rehires	-
f. Pay increases	(338,425)
g. Death after retirement	(202,677)
h. Other	(67,164)
i. Other as a % of actuarial accrued liability	-0.04%

## Table 5

### Change in Calculated Contribution Rate Since the Prior Valuation (Assumes No Future Cost-Of-Living Increases)

Item	January 1, 2019
1. Calculated contribution rate as of January 1, 2018	15.37%
2. Change in contribution rate during year	
a. Change in employer normal cost	-0.18%
c. Actuarial (gain) loss from investments on actuarial value of assets	1.07%
d. Actuarial (gain) loss from liability sources and administrative expenses	0.14%
e. Difference between contributions made and required contributions	0.23%
f. Effect of payroll growing (faster)/slower than assumption	-0.05%
h. Other changes	0.00%
i. Total change	1.21%
3. Calculated contribution rate as of January 1, 2019	16.58%

## Table 6

### Statement of Plan Net Assets

Assets at Market Value		
Item	FYE 2018	FYE 2017
1. Cash and Cash Equivalents (Operating Cash)	\$11,530,142	\$9,463,374
2. Receivables		
a. Employer contributions	\$293,810	\$223,895
b. Employee contributions	226,357	172,492
c. Securities sold	1,028,811	642,148
d. Accrued interest and dividends	370,037	215,526
e. Currency contract receivable	30,727,749	33,202,133
f. Other	-	81,014
g. Rebate and fee income receivable	-	-
h. Total receivables	<u>\$32,646,764</u>	<u>\$34,537,208</u>
3. Investments, at Fair Value	\$139,453,200	\$145,872,182
4. Liabilities		
a. Benefits and refunds payable	(\$33,050)	(\$4,414)
b. Accrued payroll taxes and deductions	-	-
c. Securities purchased	(2,203,134)	(855,168)
d. Administrative and consulting fees payable	(394,459)	(304,921)
e. Currency contract payable	(30,831,853)	(33,363,528)
f. Securities lending collateral	<u>(8,853,887)</u>	<u>(9,326,885)</u>
g. Total liabilities	(\$42,316,383)	(\$43,854,916)
5. Total Market Value of Assets Available for Benefits	\$141,313,723	\$146,017,848

**Table 7**  
**Reconciliation of Plan Net Assets**

Assets at Market Value		
Item	FYE 2018	FYE 2017
A. Market Value of Assets at Beginning of Year	\$146,017,848	\$127,487,027
B. Contribution Income:		
1. Contributions		
a. Employee	\$2,585,185	\$2,490,436
b. Employer	3,356,417	3,224,560
c. Other	236,817	288,851
d. Total	\$6,178,419	\$6,003,847
2. Investment Income		
a. Interest, dividends, and other income	\$2,534,995	\$2,515,380
b. Net appreciation	(6,706,176)	16,545,581
c. Investment expenses	(1,058,912)	(1,258,122)
d. Net investment income	(\$5,230,093)	\$17,802,839
3. Securities Lending		
a. Gross income	\$226,861	\$120,969
b. Deductions	(194,577)	(85,471)
c. Net investment income	\$32,284	\$35,498
4. Benefits and Refunds		
a. Refunds	(\$64,091)	(\$120,137)
b. Regular monthly benefits	(5,474,014)	(5,054,595)
c. Total	(\$5,538,105)	(\$5,174,732)
5. Administrative and Miscellaneous Expenses	(\$146,630)	(\$136,631)
C. Market Value of Assets at End of Year	\$141,313,723	\$146,017,848

**Table 8**  
**Progress of Fund Through December 31, 2018**

Plan Year Ending December 31	Employer Contributions*	Employee Contributions*	Administrative Expenses	Net Investment Income**	Benefit Payments	Transfers	Actuarial Value of Assets
Total	\$ 44,315,375	\$ 30,651,714	\$ (973,452)	\$ 81,714,396	\$ (36,163,335)	\$ -	
2001	\$ 1,191,603	\$ 244,783	\$ (9,170)	\$ 3,364,254	\$ (229,960)	\$ -	\$ 36,241,771
2002	1,233,700	616,850	(12,003)	(43,020)	(283,033)	-	37,754,265
2003	1,396,498	882,653	(7,567)	2,930,176	(275,060)	-	42,680,965
2004	1,704,986	871,595	(9,424)	1,749,206	(317,416)	-	46,679,912
2005	1,834,792	916,633	(15,911)	2,903,414	(419,341)	-	51,899,499
2006	1,997,106	978,240	(14,430)	4,709,483	(512,555)	-	59,057,343
2007	2,217,964	1,129,783	(17,014)	6,490,577	(651,489)	-	68,227,164
2008	2,330,110	1,441,056	(25,147)	(8,775,824)	(865,599)	-	62,331,759
2009	2,490,830	1,847,639	(27,732)	10,778,950	(1,264,158)	-	76,157,288
2010	2,638,781	1,850,089	(32,796)	2,830,428	(1,680,856)	-	81,762,934
2011	2,713,265	1,921,682	(52,758)	1,834,542	(2,049,604)	-	86,130,061
2012	2,832,064	1,997,810	(67,187)	2,984,749	(2,629,118)	-	91,248,379
2013	3,052,778	2,159,773	(96,660)	10,245,079	(2,916,180)	-	103,693,169
2014	3,449,526	2,414,435	(88,678)	9,007,936	(3,153,284)	-	115,323,104
2015	3,273,668	2,924,752	(95,882)	6,857,784	(3,787,302)	-	124,496,124
2016	3,370,961	2,858,418	(117,832)	8,258,467	(4,415,543)	-	134,450,595
2017	3,230,196	2,773,651	(136,631)	9,673,229	(5,174,732)	-	144,816,308
2018	3,356,547	2,821,872	(146,630)	5,914,966	(5,538,105)	-	151,224,958

\* Employer contributions include other funding sources and employee contributions may include member redeposits and member service purchase contributions

\*\* Net of investment expenses

**Table 9**  
**Development of Actuarial Value of Assets**

Item	FYE 2018	FYE 2017
1. Actuarial value of assets, beginning of year (before corridor)	\$144,816,308	\$134,450,595
2. Market value, end of year	\$141,313,723	\$146,017,848
3. Market value, beginning of year	\$146,017,848	\$127,487,027
4. Non-investment/administrative net cash flow:		
a. Employee contributions	\$2,585,185	\$2,490,436
b. Employer contributions	3,356,417	3,224,560
c. Other contributions	236,817	288,851
d. Refund of employee accounts	(64,091)	(120,137)
e. Retirement benefits	(5,474,014)	(5,054,595)
f. Administrative expenses	(146,630)	(136,631)
g. Total net cash flow: [sum of (4a) through (4f)]	\$493,684	\$692,484
5. Investments and securities lending:		
a. Interest and dividends on investments	\$2,534,995	\$2,515,380
b. Gross income from securities lending	226,861	120,969
c. Fees and expenses	(1,253,489)	(1,343,593)
d. Total net income: [sum of (5a) through (5c)]	\$1,508,367	\$1,292,756
6. Investment income:		
a. Actual market return: (2) - (3) - (4g) - (5d)	(\$6,706,176)	\$16,545,581
b. Assumed rate of return	7.00%	7.75%
c. Assumed amount of return	8,729,869	8,613,822
d. Amount subject to phase-in: (6a) - (6c)	(\$15,436,045)	\$7,931,759
7. Phase-in recognition of investment income:		
a. Current year: 0.20 * (6d)	(\$3,087,209)	\$1,586,352
b. First prior year	1,586,352	(135,850)
c. Second prior year	(135,850)	(2,049,755)
d. Third prior year	(2,049,755)	(636,808)
e. Fourth prior year	(636,808)	1,002,712
f. Total recognition	(\$4,323,270)	(\$233,349)
<b>8. Actuarial value of assets, end of year</b>		
a. Preliminary actuarial value of assets, end of year: (1) + (4g) + (5d) + (6c) + (7f)	\$151,224,958	\$144,816,308
b. Upper corridor limit: 120% * (2)	169,576,468	175,221,418
c. Lower corridor limit: 80% * (2)	113,050,978	116,814,278
d. Actuarial value of assets, end of year	\$151,224,958	\$144,816,308
9. Difference between market and actuarial value of assets	(\$9,911,235)	\$1,201,540
<b>10. Actuarial rate of return</b>	4.08%	7.18%
<b>11. Market rate of return*</b>	-3.52%	14.20%
<b>12. Ratio of actuarial value to market value of assets</b>	107.01%	99.18%

\* Current year market rate of return is based on unaudited data and is supplied by the plan's investment consultant.

## Table 10

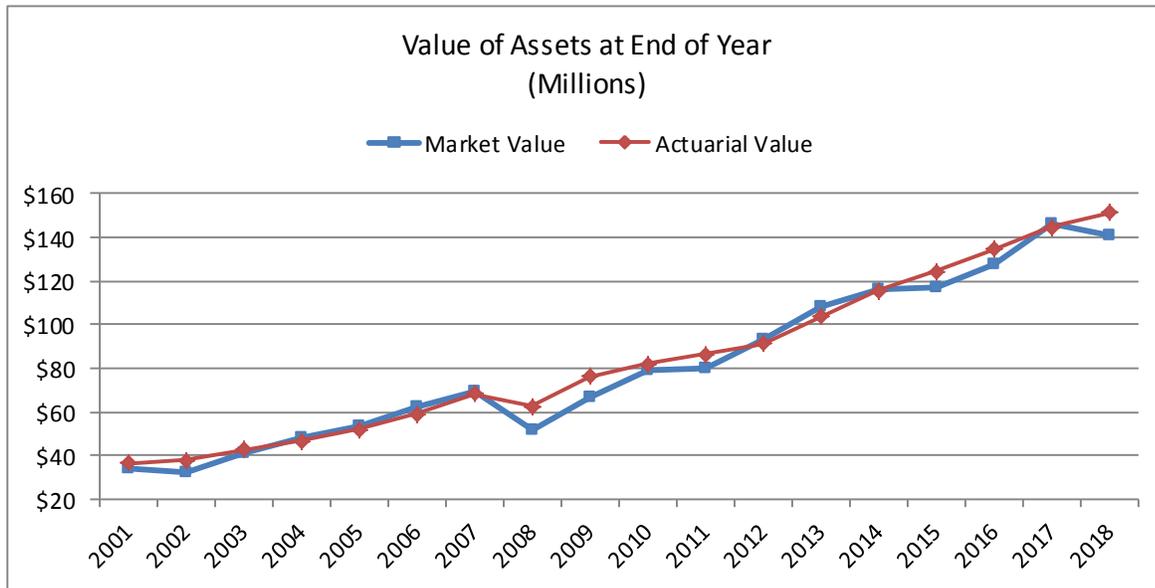
### History of Investment Returns

Plan Year (1)	Market Value (2)	Actuarial Value (3)
2000	-0.99%	16.60%
2001	-4.47%	10.42%
2002	-9.29%	-0.12%
2003	21.00%	7.56%
2004	11.54%	3.99%
2005	8.22%	6.07%
2006	12.63%	8.87%
2007	7.44%	10.75%
2008	-29.63%	-12.60%
2009	23.72%	16.88%
2010	13.80%	3.65%
2011	-0.90%	2.21%
2012	14.05%	3.42%
2013	13.53%	11.09%
2014	4.70%	8.58%
2015	-0.26%	5.89%
2016	7.60%	6.59%
2017	14.20%	7.18%
2018	-3.52%	4.08%

**Average returns:**

Last five years:	4.38%	6.45%
Last ten years:	8.39%	6.88%

The market returns above are gross of investment expenses and were provided by the plan's investment consultant. The actuarial returns above are based on the financial information provided by the plan's auditors.



**Table 11**  
**Solvency Test**

Valuation Date January 1	Total Active Member Contributions (1)	Inactive and Pensioner Liability (2)	Employer Financed Active Accrued Liability (3)	Actuarial Value of Assets	Percentage of Liabilities Covered by Assets		
					(1)	(2)	(3)
2004	\$4,500,000	\$4,214,000	\$25,966,000	\$42,681,000	100%	100%	130.8%
2005	5,229,000	5,625,000	29,915,000	46,680,000	100%	100%	119.8%
2006	5,924,000	7,117,000	34,112,000	51,900,000	100%	100%	113.9%
2007	6,704,000	9,264,000	38,699,000	59,057,000	100%	100%	111.3%
2008	7,444,000	11,374,000	45,657,000	68,227,000	100%	100%	108.2%
2009	8,327,862	15,729,000	40,532,000	62,331,759	100%	100%	94.4%
2010	9,543,358	18,438,067	37,566,664	76,157,288	100%	100%	128.2%
2011	10,789,060	22,028,593	37,849,461	81,762,934	100%	100%	129.3%
2012	11,510,781	29,263,818	37,989,048	86,130,061	100%	100%	119.4%
2013	12,908,873	32,550,608	40,004,972	91,248,379	100%	100%	114.5%
2014	14,398,244	36,922,600	53,303,854	103,693,169	100%	100%	98.3%
2015	16,382,165	41,354,425	57,416,118	115,323,104	100%	100%	100.3%
2016	17,297,744	50,930,231	57,713,394	124,496,124	100%	100%	97.5%
2017	18,889,625	57,946,138	58,399,093	134,450,595	100%	100%	98.7%
2018	20,129,035	70,763,199	60,089,522	144,816,308	100%	100%	89.7%
2019	21,030,599	77,830,287	63,855,735	151,224,958	100%	100%	82.0%

*Effective January 1, 2010, liabilities are calculated assuming no future cost-of-living increases.*

**Table 12**  
**Schedule of Funding Progress**

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Valuation Date January 1	Actuarial Value of Assets	Actuarial Accrued Liability (AAL)	Unfunded AAL (UAAL) [(3) - (2)]	Funded Ratio [(2)/(3)]	Covered Payroll	UAAL as a Percentage of Covered Payroll [(4)/(6)]
2001	\$31,680,261	\$18,951,300	(\$12,728,961)	167.17%	\$10,917,600	-116.59%
2002	36,241,771	23,805,700	(12,436,071)	152.24%	12,811,600	-97.07%
2003	37,754,265	30,673,200	(7,081,065)	123.09%	13,633,500	-51.94%
2004	42,680,965	34,680,000	(8,000,965)	123.07%	14,244,400	-56.17%
2005	46,679,912	40,769,400	(5,910,512)	114.50%	14,647,900	-40.35%
2006	51,899,499	47,153,000	(4,746,499)	110.07%	15,527,800	-30.57%
2007	59,057,343	54,666,500	(4,390,843)	108.03%	17,273,900	-25.42%
2008	68,227,164	64,474,700	(3,752,464)	105.82%	20,053,800	-18.71%
2009	62,331,759	75,270,800	12,939,041	82.81%	22,865,300	56.59%
2010	76,157,288	65,548,088	(10,609,200)	116.19%	22,211,586	-47.76%
2011	81,762,934	70,667,114	(11,095,820)	115.70%	22,517,176	-49.28%
2012	86,130,061	78,763,646	(7,366,415)	109.35%	22,678,277	-32.48%
2013	91,248,379	85,464,453	(5,783,926)	106.77%	24,210,827	-23.89%
2014	103,693,169	104,624,698	931,529	99.11%	25,596,043	3.64%
2015	115,323,104	115,152,708	(170,396)	100.15%	27,090,867	-0.63%
2016	124,496,124	125,941,369	1,445,245	98.85%	27,512,076	5.25%
2017	134,450,595	135,234,856	784,261	99.42%	29,408,598	2.67%
2018	144,816,308	150,981,756	6,165,448	95.92%	27,481,361	22.44%
2019	151,224,958	162,716,621	11,491,663	92.94%	28,729,092	40.00%

*Effective January 1, 2010, liabilities are calculated assuming no future cost-of-living increases.*

**Table 13**

**Schedule of Contributions from the Employer(s) and Other Contributing Entities**

(1)	(2)	(3)	(4)	(5)	(6)
Fiscal Year Ending December 31	Actuarially Determined Contribution		Employer Contributions*		Percentage of Actuarially Determined Contribution Contributed [(5)/(3)]
	% of Payroll	Amount	% of Payroll	Amount	
2004	16.62%	\$2,367,900	11.97%	\$1,704,986	72.00%
2005	10.74%	1,572,900	12.53%	1,834,792	116.65%
2006	11.46%	1,780,100	12.86%	1,997,106	112.19%
2007	13.26%	2,289,900	12.84%	2,217,964	96.86%
2008	12.47%	2,501,600	11.62%	2,330,110	93.14%
2009	16.43%	3,756,684	10.89%	2,490,830	66.30%
2010	7.49%	1,663,392	11.54%	2,638,781	158.64%
2011	7.50%	1,688,788	12.05%	2,713,265	160.66%
2012	8.55%	1,937,521	12.49%	2,832,064	146.17%
2013	9.20%	2,227,008	12.61%	3,052,778	137.08%
2014	12.80%	3,273,329	13.48%	3,449,526	105.38%
2015	12.10%	3,275,448	12.08%	3,273,668	99.95%
2016	12.44%	3,420,716	12.25%	3,370,961	98.55%
2017	11.89%	3,496,053	10.98%	3,230,196	92.40%
2018	15.37%	4,221,146	11.41%	3,356,547	79.52%
2019	16.58%	4,760,014	-	-	-

*Effective January 1, 2010, liabilities are calculated assuming no future cost-of-living increases.*

\*Includes other funding sources but excludes member redeposits and member service purchase contributions.

**Table 14**  
**Reconciliation of Participant Data**

	Active Participants	Vested Former Participants	Retired Participants	Disabled	Beneficiaries	Participants Due Refunds	Total
<b>Number as of January 1, 2018</b>	<b>363</b>	<b>39</b>	<b>100</b>	<b>15</b>	<b>13</b>	<b>25</b>	<b>555</b>
New participants	27	-	-	-	-	1	28
Vested terminations	(13)	13	-	-	-	-	-
Retirements	(8)	(3)	11	-	-	-	-
Disability	-	-	-	-	-	-	-
Deceased with beneficiary	-	-	(1)	-	1	-	-
Deceased without beneficiary	-	-	-	-	(1)	-	(1)
Due refunds	(4)	-	-	-	-	4	-
Lump sum payoffs	(1)	-	-	-	-	-	(1)
Rehires/return to active	1	-	(1)	-	-	-	-
Certain period expired	-	-	-	-	-	-	-
Reclassifications	-	-	-	-	-	-	-
Data corrections	-	-	-	-	-	-	-
<b>Number as of January 1, 2019</b>	<b>365</b>	<b>49</b>	<b>109</b>	<b>15</b>	<b>13</b>	<b>30</b>	<b>581</b>

## Table 15

### Demographic Statistics

	January 1		Change
	2019	2018	
<u>Active Participants</u>			
Number	365	363	0.6%
<i>Vested</i>	285	292	
<i>Not vested</i>	80	71	
Average age (years)	40.36	40.27	0.2%
Average service (years)	10.77	10.73	0.4%
Average entry age (years)	29.59	29.54	0.2%
Total payroll*	\$28,729,092	\$27,481,361	4.5%
Average payroll*	\$78,710	\$75,706	4.0%
Total employee contributions	\$21,030,599	\$20,129,035	4.5%
Average employee contributions	\$57,618	\$55,452	3.9%
<u>Vested Former Participants</u>			
Number	49	39	25.6%
Average age (years)	42.37	42.72	-0.8%
Total employee contributions	\$2,317,715	\$1,431,716	61.9%
Average employee contributions	\$47,300	\$36,711	28.8%
<u>Service Retirees</u>			
Number	109	100	9.0%
Average age (years)	59.63	59.24	0.7%
Total annual benefits	\$4,908,308	\$4,493,322	9.2%
Average annual benefit	\$45,030	\$44,933	0.2%
<u>Disability Retirees</u>			
Number	15	15	0.0%
Average age (years)	54.97	53.97	1.9%
Total annual benefits	\$398,958	\$398,958	0.0%
Average annual benefit	\$26,597	\$26,597	0.0%
<u>Beneficiaries</u>			
Number	13	13	0.0%
Average age (years)	57.48	56.89	1.0%
Total annual benefits	\$345,446	\$345,414	0.0%
Average annual benefit	\$26,573	\$26,570	0.0%
<u>Participants Due Refunds</u>			
Number	30	25	20.0%
Total Refunds Due	\$213,757	\$161,712	32.2%

\* Projected payroll for the upcoming valuation year

## Table 16

### Distribution of Male Active Members by Age and by Years of Service

Average Age = 40.3      Average Service = 10.8

Age Last Birthday		Whole Years of Service at Valuation Date							Totals
		0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	
<b>Less than 20</b>	Count	-	-	-	-	-	-	-	-
	Avg. Salary	-	-	-	-	-	-	-	-
<b>20-24</b>	Count	10	1	-	-	-	-	-	11
	Avg. Salary	\$47,490	*	-	-	-	-	-	\$48,400
<b>25-29</b>	Count	35	8	-	-	-	-	-	43
	Avg. Salary	58,049	\$70,086	-	-	-	-	-	60,288
<b>30-34</b>	Count	17	23	9	1	-	-	-	50
	Avg. Salary	58,220	73,228	\$80,753	*	-	-	-	69,731
<b>35-39</b>	Count	13	24	26	12	-	-	-	75
	Avg. Salary	55,177	76,204	82,213	\$91,592	-	-	-	77,104
<b>40-44</b>	Count	4	11	11	37	4	-	-	67
	Avg. Salary	56,611	74,780	78,363	88,647	\$86,586	-	-	82,646
<b>45-49</b>	Count	4	7	6	23	16	3	-	59
	Avg. Salary	68,904	76,040	83,029	86,470	\$90,867	*	-	85,820
<b>50-54</b>	Count	1	6	3	10	9	3	-	32
	Avg. Salary	*	77,484	*	86,191	91,681	*	-	85,265
<b>55-59</b>	Count	6	-	2	1	2	1	1	13
	Avg. Salary	87,678	-	*	*	*	*	*	90,024
<b>60-64</b>	Count	-	-	3	-	-	1	-	4
	Avg. Salary	-	-	*	-	-	*	-	81,242
<b>65-69</b>	Count	-	-	-	-	-	-	-	-
	Avg. Salary	-	-	-	-	-	-	-	-
<b>70 &amp; Over</b>	Count	-	-	-	-	-	-	-	-
	Avg. Salary	-	-	-	-	-	-	-	-
<b>Totals</b>	Count	<b>90</b>	<b>80</b>	<b>60</b>	<b>84</b>	<b>31</b>	<b>8</b>	<b>1</b>	<b>354</b>
	Avg. Salary	<b>\$58,814</b>	<b>\$74,388</b>	<b>\$80,492</b>	<b>\$88,197</b>	<b>\$89,793</b>	<b>\$102,668</b>	<b>*</b>	<b>\$76,889</b>

*Average Salary represents annualized salary earned in 2018 and is not shown for cells with counts less than or equal to three participants*

## Table 17

### Distribution of Female Active Members by Age and by Years of Service

Average Age = 44.0      Average Service = 8.3

Age Last Birthday		Whole Years of Service at Valuation Date							Totals
		0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	
<b>Less than 20</b>	Count	-	-	-	-	-	-	-	-
	Avg. Salary	-	-	-	-	-	-	-	-
<b>20-24</b>	Count	-	-	-	-	-	-	-	-
	Avg. Salary	-	-	-	-	-	-	-	-
<b>25-29</b>	Count	-	-	-	-	-	-	-	-
	Avg. Salary	-	-	-	-	-	-	-	-
<b>30-34</b>	Count	1	-	-	-	-	-	-	1
	Avg. Salary	*	-	-	-	-	-	-	*
<b>35-39</b>	Count	1	3	-	1	-	-	-	5
	Avg. Salary	*	*	-	*	-	-	-	\$69,702
<b>40-44</b>	Count	-	1	1	-	-	-	-	2
	Avg. Salary	-	*	*	-	-	-	-	*
<b>45-49</b>	Count	-	-	-	-	-	-	-	-
	Avg. Salary	-	-	-	-	-	-	-	-
<b>50-54</b>	Count	-	-	-	-	-	-	-	-
	Avg. Salary	-	-	-	-	-	-	-	-
<b>55-59</b>	Count	-	3	-	-	-	-	-	3
	Avg. Salary	-	*	-	-	-	-	-	*
<b>60-64</b>	Count	-	-	-	-	-	-	-	-
	Avg. Salary	-	-	-	-	-	-	-	-
<b>65-69</b>	Count	-	-	-	-	-	-	-	-
	Avg. Salary	-	-	-	-	-	-	-	-
<b>70 &amp; Over</b>	Count	-	-	-	-	-	-	-	-
	Avg. Salary	-	-	-	-	-	-	-	-
<b>Totals</b>	Count	<b>2</b>	<b>7</b>	<b>1</b>	<b>1</b>	-	-	-	<b>11</b>
	Avg. Salary	<b>*</b>	<b>\$74,114</b>	<b>*</b>	<b>*</b>	-	-	-	<b>\$73,621</b>

*Average Salary represents annualized salary earned in 2018 and is not shown for cells with counts less than or equal to three participants*

## Table 18

### Distribution of Total Active Members by Age and by Years of Service

Average Age = 40.4      Average Service = 10.8

Age Last Birthday		Whole Years of Service at Valuation Date							Totals
		0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	
<b>Less than 20</b>	Count	-	-	-	-	-	-	-	-
	Avg. Salary	-	-	-	-	-	-	-	-
<b>20-24</b>	Count	10	1	-	-	-	-	-	11
	Avg. Salary	\$47,490	*	-	-	-	-	-	\$48,400
<b>25-29</b>	Count	35	8	-	-	-	-	-	43
	Avg. Salary	58,049	\$70,086	-	-	-	-	-	60,288
<b>30-34</b>	Count	18	23	9	1	-	-	-	51
	Avg. Salary	58,168	73,228	\$80,753	*	-	-	-	69,487
<b>35-39</b>	Count	14	27	26	13	-	-	-	80
	Avg. Salary	56,023	75,147	82,213	\$90,809	-	-	-	76,642
<b>40-44</b>	Count	4	12	12	37	4	-	-	69
	Avg. Salary	56,611	75,471	78,942	88,647	\$86,586	-	-	82,691
<b>45-49</b>	Count	4	7	6	23	16	3	-	59
	Avg. Salary	68,904	76,040	83,029	86,470	\$90,867	*	-	85,820
<b>50-54</b>	Count	1	6	3	10	9	3	-	32
	Avg. Salary	*	77,484	*	86,191	91,681	*	-	85,265
<b>55-59</b>	Count	6	3	2	1	2	1	1	16
	Avg. Salary	87,678	*	*	*	*	*	*	87,872
<b>60-64</b>	Count	-	-	3	-	-	1	-	4
	Avg. Salary	-	-	*	-	-	*	-	81,242
<b>65-69</b>	Count	-	-	-	-	-	-	-	-
	Avg. Salary	-	-	-	-	-	-	-	-
<b>70 &amp; Over</b>	Count	-	-	-	-	-	-	-	-
	Avg. Salary	-	-	-	-	-	-	-	-
<b>Totals</b>	Count	<b>92</b>	<b>87</b>	<b>61</b>	<b>85</b>	<b>31</b>	<b>8</b>	<b>1</b>	<b>365</b>
	Avg. Salary	<b>\$58,887</b>	<b>\$74,366</b>	<b>\$80,571</b>	<b>\$88,117</b>	<b>\$89,793</b>	<b>\$102,668</b>	<b>*</b>	<b>\$76,790</b>

*Average Salary represents annualized salary earned in 2018 and is not shown for cells with counts less than or equal to three participants*

## Table 19

### Distribution of Male Deferred Members by Age and by Years of Service

Average Age = 42.5      Average Service = 10.2

Age Last Birthday	Whole Years of Service at Valuation Date							Totals
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	
Less than 20	-	-	-	-	-	-	-	-
20-24	-	-	-	-	-	-	-	-
25-29	-	-	1	-	-	-	-	1
30-34	-	2	4	-	-	-	-	6
35-39	-	1	8	3	-	-	-	12
40-44	-	-	5	2	2	-	-	9
45-49	-	2	5	6	2	1	1	17
50-54	-	-	1	-	-	-	-	1
55-59	-	-	-	-	-	-	-	-
60-64	-	-	-	-	1	-	-	1
65-69	-	-	-	1	-	-	-	1
70 & Over	-	-	-	-	-	-	-	-
<b>Totals</b>	-	<b>5</b>	<b>24</b>	<b>12</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>48</b>

## Table 20

### Distribution of Female Deferred Members by Age and by Years of Service

Average Age = 36.2      Average Service = 5.0

Age Last Birthday	Whole Years of Service at Valuation Date							Totals
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	
Less than 20	-	-	-	-	-	-	-	Total
20-24	-	-	-	-	-	-	-	-
25-29	-	-	-	-	-	-	-	-
30-34	-	-	-	-	-	-	-	-
35-39	-	1	-	-	-	-	-	1
40-44	-	-	-	-	-	-	-	-
45-49	-	-	-	-	-	-	-	-
50-54	-	-	-	-	-	-	-	-
55-59	-	-	-	-	-	-	-	-
60-64	-	-	-	-	-	-	-	-
65-69	-	-	-	-	-	-	-	-
70 & Over	-	-	-	-	-	-	-	-
<b>Totals</b>	-	<b>1</b>	-	-	-	-	-	<b>1</b>

## Table 21

### Distribution of Total Deferred Members by Age and by Years of Service

Average Age = 42.4      Average Service = 10.1

Age Last Birthday	Whole Years of Service at Valuation Date							Totals
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	
Less than 20	-	-	-	-	-	-	-	-
20-24	-	-	-	-	-	-	-	-
25-29	-	-	1	-	-	-	-	1
30-34	-	2	4	-	-	-	-	6
35-39	-	1	8	3	-	-	-	13
40-44	-	1	5	2	2	-	-	9
45-49	-	2	5	6	2	1	1	17
50-54	-	-	1	-	-	-	-	1
55-59	-	-	-	-	-	-	-	-
60-64	-	-	-	-	1	-	-	1
65-69	-	-	-	1	-	-	-	1
70 & Over	-	-	-	-	-	-	-	-
<b>Totals</b>	-	<b>6</b>	<b>24</b>	<b>12</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>49</b>

**Table 22**

**Schedule of Pension Recipients Added to and Removed from Rolls**

Fiscal Year Ending December 31	Added to Rolls*		Removed from Rolls		Total		Percent Increase in Annual Pension Benefits	Average Annual Pension Benefit
	Count	Annual	Count	Annual	Count	Annual		
		Pension Benefits		Pension Benefits		Pension Benefits		
2008	8	N/A	1	N/A	35	\$957,366	50.19%	\$27,353
2009	11	\$496,899	1	\$16,148	45	1,438,117	50.22%	31,958
2010	10	383,726	0	0	55	1,821,843	26.68%	33,124
2011	12	535,099	0	0	67	2,356,942	29.37%	35,178
2012	7	278,412	0	0	74	2,635,354	11.81%	35,613
2013	7	274,075	0	0	81	2,909,429	10.40%	35,919
2014	11	481,088	2	71,846	90	3,318,671	14.07%	36,874
2015	11	631,130	1	13,610	100	3,936,191	18.61%	39,362
2016	15	726,211	0	0	115	4,662,401	18.45%	40,543
2017	14	587,654	1	12,361	128	5,237,694	12.34%	40,919
2018	12	475,307	3	60,290	137	5,652,712	7.92%	41,261

\* Includes cost-of-living increases

**Table 23**  
**Pensioners by Option Code**

Option Code*	Count			Monthly Benefit		
	Male	Female	Total	Male	Female	Total
1	24	1	25	\$81,452	\$2,471	\$83,922
2	56	-	56	192,144	-	192,144
3	23	1	24	91,169	2,610	93,779
4	12	-	12	43,281	-	43,281
5	7	-	7	29,145	-	29,145
<b>Total</b>	<b>122</b>	<b>2</b>	<b>124</b>	<b>\$437,191</b>	<b>\$5,081</b>	<b>\$442,272</b>
<b>Beneficiaries</b>	<b>-</b>	<b>13</b>	<b>13</b>	<b>-</b>	<b>\$28,787</b>	<b>\$28,787</b>
<b>Grand Total</b>	<b>122</b>	<b>15</b>	<b>137</b>	<b>\$437,191</b>	<b>\$33,868</b>	<b>\$471,059</b>

\* See optional forms of payment in Appendix

## Table 24

### Pensioners by Monthly Benefit and Option Code

Males	Option Code					
Benefit Amount	1	2	3	4	5	Total
Under \$200	-	-	-	-	-	-
\$200-\$399	-	-	-	-	-	-
\$400-\$599	-	1	-	-	-	1
\$600-\$799	-	-	-	-	-	-
\$800-\$999	1	1	-	-	-	2
\$1,000-\$1,499	2	5	1	-	-	8
\$1,500-\$1,999	2	6	1	-	-	9
\$2,000-\$2,499	7	4	1	1	1	14
\$2,500 & over	12	39	20	11	6	88
<b>Total</b>	<b>24</b>	<b>56</b>	<b>23</b>	<b>12</b>	<b>7</b>	<b>122</b>
Females						
Benefit Amount	1	2	3	4	5	Total
Under \$200	-	-	-	-	-	-
\$200-\$399	-	-	-	-	-	-
\$400-\$599	-	-	-	-	-	-
\$600-\$799	-	-	-	-	1	1
\$800-\$999	-	-	-	-	-	-
\$1,000-\$1,499	-	-	-	-	1	1
\$1,500-\$1,999	-	-	-	-	4	4
\$2,000-\$2,499	1	-	-	-	3	4
\$2,500 & over	-	-	1	-	4	5
<b>Total</b>	<b>1</b>	<b>-</b>	<b>1</b>	<b>-</b>	<b>13</b>	<b>15</b>
Males & Females						
Benefit Amount	1	2	3	4	5	Total
Under \$200	-	-	-	-	-	-
\$200-\$399	-	-	-	-	-	-
\$400-\$599	-	1	-	-	-	1
\$600-\$799	-	-	-	-	1	1
\$800-\$999	1	1	-	-	-	2
\$1,000-\$1,499	2	5	1	-	1	9
\$1,500-\$1,999	2	6	1	-	4	13
\$2,000-\$2,499	8	4	1	1	4	18
\$2,500 & over	12	39	21	11	10	93
<b>Total</b>	<b>25</b>	<b>56</b>	<b>24</b>	<b>12</b>	<b>20</b>	<b>137</b>

**Table 25**  
**Pensioners by Age and Option Code**

Average Age Male = 59.1      Average Age Female = 57.6      Average Age Total = 58.9

Males	Option Code					
Age Last Birthday	1	2	3	4	5	Total
Under 50	1	2	2	-	-	5
50-54	4	13	2	3	1	23
55-59	9	20	4	2	2	37
60-64	6	16	10	5	3	40
65-69	3	4	5	2	1	15
70-74	1	1	-	-	-	2
75-79	-	-	-	-	-	-
80-84	-	-	-	-	-	-
85 & over	-	-	-	-	-	-
<b>Total</b>	<b>24</b>	<b>56</b>	<b>23</b>	<b>12</b>	<b>7</b>	<b>122</b>
Females						
Age Last Birthday	1	2	3	4	5	Total
Under 50	-	-	-	-	3	3
50-54	-	-	-	-	2	2
55-59	1	-	1	-	3	5
60-64	-	-	-	-	3	3
65-69	-	-	-	-	-	-
70-74	-	-	-	-	1	1
75-79	-	-	-	-	1	1
80-84	-	-	-	-	-	-
85 & over	-	-	-	-	-	-
<b>Total</b>	<b>1</b>	<b>-</b>	<b>1</b>	<b>-</b>	<b>13</b>	<b>15</b>
Males & Females						
Age Last Birthday	1	2	3	4	5	Total
Under 50	1	2	2	-	3	8
50-54	4	13	2	3	3	25
55-59	10	20	5	2	5	42
60-64	6	16	10	5	6	43
65-69	3	4	5	2	1	15
70-74	1	1	-	-	1	3
75-79	-	-	-	-	1	1
80-84	-	-	-	-	-	-
85 & over	-	-	-	-	-	-
<b>Total</b>	<b>25</b>	<b>56</b>	<b>24</b>	<b>12</b>	<b>20</b>	<b>137</b>

## Table 26

### Pensions Awarded in 2018 by Option Code

Average Age = 53.5

Males & Females	Option Code					
Benefit Amount	1	2	3	4	5	Total
Under \$200	-	-	-	-	-	-
\$200-\$399	-	-	-	-	-	-
\$400-\$599	-	-	-	-	-	-
\$600-\$799	-	-	-	-	1	1
\$800-\$999	-	-	-	-	-	-
\$1,000-\$1,499	1	1	-	-	-	2
\$1,500-\$1,999	-	-	-	-	-	-
\$2,000-\$2,499	-	1	-	-	-	1
\$2,500 & over	-	7	-	1	-	8
<b>Total</b>	<b>1</b>	<b>9</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>12</b>
<b>Males &amp; Females</b>						
Age Last Birthday	1	2	3	4	5	Total
Under 50	-	-	-	-	-	-
50-54	-	6	-	1	-	7
55-59	-	2	-	-	1	3
60-64	1	1	-	-	-	2
65-69	-	-	-	-	-	-
70-74	-	-	-	-	-	-
75-79	-	-	-	-	-	-
80-84	-	-	-	-	-	-
85 & over	-	-	-	-	-	-
<b>Total</b>	<b>1</b>	<b>9</b>	<b>-</b>	<b>1</b>	<b>1</b>	<b>12</b>

## Table 27

### Retirees and Disabled Members by Service at Retirement and Years Since Retirement

(Average Monthly Benefit)

Average Service at Retirement = 21.5      Average Years Since Retirement = 6.9

Service at Retirement		Years Elapsed Since Retirement							Totals
		0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	
<b>Less than 5</b>	Count	-	1	2	-	-	1	-	4
	Avg. Benefit	-	\$2,071	\$1,202	-	-	\$2,192	-	\$1,667
<b>5-9</b>	Count	5	2	1	-	-	-	-	8
	Avg. Benefit	\$1,625	2,078	1,484	-	-	-	-	1,721
<b>10-14</b>	Count	6	1	4	-	1	-	-	12
	Avg. Benefit	1,734	1,381	2,116	-	\$1,452	-	-	1,809
<b>15-19</b>	Count	5	4	2	4	-	-	-	15
	Avg. Benefit	3,093	2,642	1,564	\$1,834	-	-	-	2,433
<b>20-24</b>	Count	13	5	7	-	-	-	-	25
	Avg. Benefit	4,557	2,950	2,614	-	-	-	-	3,691
<b>25-29</b>	Count	22	22	8	-	-	-	-	52
	Avg. Benefit	5,177	4,093	3,820	-	-	-	-	4,509
<b>30-34</b>	Count	4	4	-	-	-	-	-	8
	Avg. Benefit	4,759	4,458	-	-	-	-	-	4,608
<b>35 &amp; Over</b>	Count	-	-	-	-	-	-	-	-
	Avg. Benefit	-	-	-	-	-	-	-	-
<b>Totals</b>	Count	<b>55</b>	<b>39</b>	<b>24</b>	<b>4</b>	<b>1</b>	<b>1</b>	-	<b>124</b>
	Avg. Benefit	<b>\$4,112</b>	<b>\$3,610</b>	<b>\$2,681</b>	<b>\$1,834</b>	<b>\$1,452</b>	<b>\$2,192</b>	-	<b>\$3,567</b>

## Table 28

### Retirees and Disabled Members by Year of Retirement

January 1, 2019 Total = 124

Year of Retirement	Count	Year of Retirement	Count
Under 1960	-	1989	-
1960	-	1990	-
1961	-	1991	1
1962	-	1992	-
1963	-	1993	-
1964	-	1994	1
1965	-	1995	-
1966	-	1996	-
1967	-	1997	-
1968	-	1998	-
1969	-	1999	1
1970	-	2000	1
1971	-	2001	2
1972	-	2002	-
1973	-	2003	-
1974	-	2004	7
1975	-	2005	3
1976	-	2006	3
1977	-	2007	3
1978	-	2008	7
1979	-	2009	10
1980	-	2010	8
1981	-	2011	12
1982	-	2012	4
1983	-	2013	6
1984	-	2014	8
1985	-	2015	10
1986	-	2016	14
1987	-	2017	12
1988	-	2018*	11

*\*May include retirements as of January 1, 2019*

**Table 29**  
**Thirty Year Projected Benefit Payments**

<b>Year Ending December 31</b>	<b>Actives</b>	<b>Retirees*</b>	<b>Total</b>
<b>2019</b>	\$ 287,941	\$ 5,733,707	\$ 6,021,648
<b>2020</b>	805,457	5,790,355	6,595,811
<b>2021</b>	1,342,545	5,858,748	7,201,293
<b>2022</b>	1,910,608	5,911,763	7,822,371
<b>2023</b>	2,557,709	5,951,466	8,509,175
<b>2024</b>	3,285,593	6,029,797	9,315,390
<b>2025</b>	4,102,447	6,011,275	10,113,722
<b>2026</b>	4,942,346	5,983,979	10,926,325
<b>2027</b>	5,793,245	5,954,803	11,748,048
<b>2028</b>	6,741,889	5,963,963	12,705,852
<b>2029</b>	7,856,342	5,970,992	13,827,335
<b>2030</b>	9,082,922	5,969,810	15,052,732
<b>2031</b>	10,307,350	5,957,966	16,265,316
<b>2032</b>	11,462,659	5,942,119	17,404,779
<b>2033</b>	12,616,140	5,894,150	18,510,290
<b>2034</b>	13,815,059	5,836,480	19,651,539
<b>2035</b>	15,072,362	5,762,011	20,834,372
<b>2036</b>	16,347,064	5,696,576	22,043,640
<b>2037</b>	17,579,674	5,641,311	23,220,986
<b>2038</b>	18,659,412	5,555,059	24,214,472
<b>2039</b>	19,726,293	5,462,422	25,188,715
<b>2040</b>	20,849,062	5,355,235	26,204,297
<b>2041</b>	21,860,818	5,238,237	27,099,055
<b>2042</b>	22,776,983	5,112,784	27,889,767
<b>2043</b>	23,580,851	4,978,473	28,559,325
<b>2044</b>	24,268,838	4,835,027	29,103,865
<b>2045</b>	24,804,399	4,682,294	29,486,694
<b>2046</b>	25,233,584	4,520,298	29,753,881
<b>2047</b>	25,558,963	4,349,271	29,908,234
<b>2048</b>	25,742,002	4,169,664	29,911,667

\* Includes Disabled Members, Beneficiaries, and Deferred Vested Members. Retirement benefit payments for deferred vested members are assumed to commence at age 50.

## **APPENDIX A**

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### **SUMMARY OF ACTUARIAL ASSUMPTIONS AND METHODS**

## Summary of Actuarial Assumptions and Methods

The following methods and assumptions were used in preparing the January 1, 2019 actuarial valuation report.

### 1. Valuation Date

The valuation date for any given year is January 1<sup>st</sup>, the first day 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.

### 2. Actuarial Cost Method

The actuarial valuation uses the Entry Age Normal (EAN) actuarial cost method, amortized as a level percentage of payroll. Under this method, the employer contribution rate is the sum of (i) the employer normal cost rate, and (ii) the rate that will amortize the unfunded actuarial accrued liability (UAAL) or the surplus amount.

- a. The valuation is prepared on the projected benefit basis, under which the present value, at the investment return rate assumed to be earned in the future (currently 7.00%), of each participant's expected benefit payable at retirement or death is determined, based on his/her age, service, sex and compensation. 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 his/her terminating with a service, disability, or survivor's benefit. Future salary increases are also anticipated. The present value of the expected benefits payable for 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 Fund on account of the present group of participants and beneficiaries.
- b. The employer contributions required to support the benefits of the Fund are determined using a level funding approach, and consist of a normal cost contribution and a unfunded accrued liability contribution.
- c. The normal cost contribution is determined using the "entry age normal" actuarial 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 his/her anticipated covered service, would be required to meet the cost of all benefits payable on his/her behalf based on the benefits provisions applicable for the individual member.
- d. The unfunded accrued liability contributions are determined by subtracting the actuarial value of assets from the actuarial accrued liability. Amortization bases are established each year and amortized based on the Board's policy. The Board's policy consists of amortizing the unfunded liability as of January 1, 2018, over a closed 30 year period with each subsequent amortization base created as a result of year to year experience changes over individual 20 year closed periods. The current year amortization base is

determined by taking the current unfunded liability less the outstanding amounts of prior year bases.

3. Actuarial Value of Assets

The actuarial value of assets is based on the market value of assets with a five-year phase-in of actual investment return in excess of (less than) expected investment income. Expected investment income is determined using the assumed investment return rate and the market value of assets (adjusted for receipts and disbursements during the year). The returns are computed net of investment expenses. An adjustment is made if the actuarial value is not within 20% of the Market Value. For any year following a year in which the 20% of market value adjustment was applied, the actuarial value is determined as if the adjustment was not applied in the previous year.

4. Economic Assumptions

a. Investment return

7.00% per year, compounded annually, composed of an assumed 2.25% inflation rate and a 4.75% net real rate of return. This rate represents the assumed return, net of investment expenses.

b. Salary increase rate

Age	Rate
20	7.50%
25	7.00%
30	7.00%
35	6.50%
40	5.50%
45	5.00%
50	5.00%
55	4.75%
60	4.50%

c. Payroll growth rate

In the amortization of the unfunded actuarial accrued liability, payroll is assumed to increase 2.50% per year. This increase rate is solely due to the effect of inflation on salaries, with no allowance for future membership growth.

d. Cost-of-Living adjustment

No cost-of-living adjustment is assumed since the policy for providing the benefit requires Board approval to make the recommendation to the Joint Appropriations Committee and the funded level of the plan shows a cost-of-living requirement would not be permitted.

5. Demographic Assumptions

a. Rates Before Retirement

Healthy Pre-Retirement Mortality:

RP-2014 Mortality Table for Healthy Employees, fully generational, projected with Scale MP-2017

Males: No set back with a multiplier of 100%

Females: No set back with a multiplier of 100%

Healthy Post-Retirement Mortality:

RP-2014 Mortality Table for Healthy Annuitants, fully generational, projected with Scale MP-2017

Males: No set back with a multiplier of 100%

Females: No set back with a multiplier of 88%

Disabled Mortality

RP-2014 Disabled Mortality Table, fully generational, projected with Scale MP-2017

Males: No set back with a multiplier of 100%

Females: No set back with a multiplier of 100%

Age	Pre-Retirement		Post-Retirement		Disabled	
	Projected to 2019 using Scale MP-2017					
	Male	Female	Male	Female	Male	Female
20	0.04%	0.02%	0.04%	0.01%	0.05%	0.02%
25	0.05%	0.02%	0.06%	0.03%	0.20%	0.09%
30	0.05%	0.02%	0.09%	0.06%	0.51%	0.24%
35	0.06%	0.03%	0.13%	0.09%	0.92%	0.45%
40	0.07%	0.04%	0.19%	0.14%	1.32%	0.68%
45	0.09%	0.06%	0.27%	0.18%	1.63%	0.90%
50	0.16%	0.11%	0.38%	0.24%	1.92%	1.15%
55	0.27%	0.17%	0.55%	0.32%	2.26%	1.45%
60	0.47%	0.25%	0.78%	0.47%	2.67%	1.74%
65	0.83%	0.36%	1.11%	0.70%	3.18%	2.05%
70	1.35%	0.60%	1.63%	1.08%	3.92%	2.69%
75			2.56%	1.76%	5.18%	3.91%
80			4.27%	2.96%	7.31%	5.88%
85			7.44%	5.18%	10.87%	8.80%
90			13.11%	9.20%	16.69%	12.94%
95			21.02%	15.32%	23.77%	19.05%
100			30.49%	23.34%	31.73%	27.24%

100% of active deaths and disabilities are assumed to be duty-related.

b. Disability and Withdrawal

Age	Disability		Withdrawal	
	Male	Female	Ultimate	
			Male	Female
20	0.02%	0.02%	12.00%	12.00%
25	0.02%	0.02%	9.00%	9.00%
30	0.02%	0.02%	4.00%	4.00%
35	0.15%	0.15%	3.00%	3.00%
40	0.34%	0.34%	2.50%	2.50%
45	0.52%	0.52%	2.00%	2.00%
50	0.66%	0.66%	2.00%	2.00%
55	1.45%	1.45%	0.50%	0.50%
60	1.60%	1.60%	0.50%	0.50%

c. Retirement Rates

Age	Rate
50	20.0%
51	10.0%
52	10.0%
53	10.0%
54	10.0%
55	20.0%
56	25.0%
57	25.0%
58	15.0%
59	15.0%
60	25.0%
61	50.0%
62	100.0%

6. Other Assumptions

- a. Percent married: 1 of employees are assumed to be married. (No beneficiaries other than the spouse assumed.)
- b. 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.
- c. Percent electing annuity on death (when eligible): All of the spouses of vested, married participants are assumed to elect an annuity.
- d. Percent electing deferred termination benefit: Vested terminating members are assumed to elect a refund or a deferred benefit, whichever is more valuable at the time of termination.

- e. Assumed age for commencement of deferred benefits: Members electing to receive a deferred benefit are assumed to commence receipt at the first age at which unreduced benefits are available, which for this plan is age 50.
- f. No benefit amount data is available for members entitled to deferred benefits. The benefit is estimated using the final average compensation and service provided by WRS.
- g. There will be no recoveries once disabled. We assume all disabled members are totally disabled.
- h. Administrative expenses: Assumed to be the average of the prior two years, with each year projected at 2.5% to the valuation date.
- i. Pay increase timing: Beginning of (fiscal) year. This is equivalent to assuming that reported pay represents amount paid to members during the year ended on the valuation date.
- j. Decrement timing: Decrements of all types are assumed to occur mid-year.
- k. 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.
- l. Incidence of Contributions: Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in the report, and the actual payroll payable at the time contributions are made.
- m. Benefit Service: All members are assumed to accrue one year of service each year.

## **APPENDIX B**

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### **SUMMARY OF PLAN PROVISIONS**

## Summary of Plan Provisions

<b>Covered Members</b>	Any person who is employed by the Wyoming Paid Firemen Retirement Fund Plan B for members hired on or after July 1, 1981.
<b>Final Average Salary</b>	Employee's average annual salary for the highest paid three continuous years of service.
<b>Service Retirement</b>	
Eligibility	Age 50 with four or more years of service.
Monthly Benefit	2.80% of employee's highest three-year average salary for each year of credited service, with a max of 25 years or 70%.
Vesting	Any employee who has left employment with four or more years of service, and who has not withdrawn accumulated contributions, is eligible to receive the above benefit or can elect to receive a lump-sum refund of contributions without interest. An employee who terminates with less than four years of service is only eligible for the lump-sum benefit.
<b>Disability Retirement</b>	
Eligibility	No age or service eligibility requirements. Partial or total disability resulting from an individual and specific act, the type of which would normally occur only while employed as an employee, or as otherwise defined under W.S. 15-5-405.
Monthly Benefit	50.0% of Final Average Salary.

## Pre-retirement Death Benefit

Eligibility	No age or service requirements.
Monthly Benefit	50% of member's final actual salary, payable to the surviving spouse or eligible dependent child.

## Post-retirement Death Benefit

Monthly Benefit	On the death of a member, inactive member, retired member, or survivor the excess of the accumulated member contributions over all pension payments made are payable as a death benefit.
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## Contributions

Employee	9.245% of salary. Effective July 1, 2019 the rate will increase to 9.745% and continue to increase by 0.50% on July 1 each subsequent year until it reaches the ultimate rate of 11.245% on July 1, 2022. The employer may subsidize all or part of the employee contributions.
Employer	12.00% of salary. Effective July 1, 2019 the rate will increase to 13.00% and continue to increase by 1.00% on July 1 each subsequent year until it reaches the ultimate rate of 16.00% on July 1, 2022.
Interest	None.

## Cost-of-Living Improvements

W.S. 9-3-454 prohibits benefit changes, including cost-of-living increases, unless the funded ratio stays above 100% plus a margin for adverse experience throughout the life of the benefit change.

## Optional Forms of Payment

Option 1 (normal form)	Monthly benefit for life with a lump-sum death benefit equal to the excess (if any) of the employee contributions over the total benefits received.
Option 2	Monthly benefit for life. Upon death, 100% of the benefit continues to be paid to the beneficiary.
Option 3	Monthly benefit for life. Upon death, 50% of the benefit continues to be paid to the beneficiary.
Option 4	Monthly benefit for life with a guarantee of 120 monthly payments
Option 5	The largest possible monthly benefit payable for life with no lump-sum death benefit.

## **APPENDIX C**

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### **RISKS ASSOCIATED WITH MEASURING THE ACCRUED LIABILITY AND ACTUARIALLY DETERMINED CONTRIBUTION**

## 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.

The computed contribution rate shown on page 13 may be considered as a minimum contribution rate that complies with the Board's funding policy. The timely receipt of the actuarially determined contributions is critical to support the financial health of the plan. Users of this report should be aware that contributions made at the actuarially determined 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:

	<u>January 1, 2019</u>	<u>January 1, 2018</u>
Ratio of the market value of assets to total payroll	4.9	5.3
Ratio of actuarial accrued liability to payroll	5.7	5.5
Ratio of actives to retirees and beneficiaries	2.7	2.8
Ratio of net cash flows to market value of assets	0%	0%
Duration of the actuarial accrued liability	14.1	14.1

### 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.

### 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