Wyoming Paid Firemen's Retirement Fund Plan A

Actuarial Valuation Report
for the Year Beginning January 1, 2019

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April 18, 2019

Board of Trustees
Wyoming Paid Firemen's Retirement Fund Plan A
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 A ("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 amount (the actuarially determined contribution amount), and analyzes changes in this contribution amount from 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.

The plan is in sever peril. No contributions have been made to this plan for many years. If no further contribution are made, the fund is expected to be exhausted prior to having all benefit payments made.

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 3% cost-of-living adjustment increases, as of January 1, 2019 is 46.09%. As of January 1, 2018, this funded ratio, based on the assumption of 3.0% COLAs and the actuarial value of assets, was 51.03%. On a market value of assets basis, the funded ratio decreased from 50.88% as of January 1, 2018 to 42.81% 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. There were no changes in the benefit provisions since the prior valuation.

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 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 $18.2 million primarily due to investment experience and contributions less than expected. The aggregate result of this analysis is disclosed in Table 3 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 Actuari`al 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

Mark R. Randall, FCA, EA, MAAA
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SECTION I

EXECUTIVE SUMMARY

Executive Summary

Item	January 1, 2019		January 1, 2018
	3.0% COLA	0.0% COLA	3.0% COLA
1. Contributions:			
a. Total normal cost	$10,210	$6,516	$22,220
b. Employee contributions	-	-	-
c. Other expected contributions	-	-	-
d. Net employer normal cost	$10,210	$6,516	$22,220
e. Amortization payment	16,850,987	8,892,741	15,455,249
f. Administrative expenses	113,200	113,200	119,900
g. Required contributions	$16,974,397	$9,012,457	$15,597,369
h. Statutory contributions	-	-	-
i. Shortfall/(surplus)	$16,974,397	$9,012,457	$15,597,369
2. Funding Elements:			
a. Market value of assets (MVA)	$97,220,978	$97,220,978	$116,692,552
b. Actuarial value of assets (AVA)	$104,673,993	$104,673,993	$117,019,469
c. Actuarial accrued liability (AAL)	$227,100,614	$169,281,975	$229,327,120
d. Unfunded/(overfunded) AAL (UAAL)	$122,426,621	$64,607,982	$112,307,651
3. Contributions and Ratios:			
a. Annual required contribution	$16,974,397	$9,012,457	$15,597,369
b. Actual contributions			
i. Employer	-	-	-
ii. Other	-	-	-
c. Percentage contributed	-	-	-
d. Funded ratio on an actuarial basis (AVA/AAL)	46.09%	61.83%	51.03%
e. Funded ratio on a market basis (MVA/AAL)	42.81%	57.43%	50.88%
f. Projected payroll	$65,621	$65,621	$134,155

SECTION II

DISCUSSION

Contribution Requirements

- Exhibits throughout this report are based primarily, unless stated otherwise, on the assumption of 3.00% cost-of-living adjustment increases (COLAs).
- The current funding policy of no member or employer contributions is not expected to sustain the plan over the long term with the current level of benefits. Over time, either additional funding will be needed or the current benefit expectations will have to be reduced.
- There were no changes to the benefit provisions since the prior valuation.
- There were no changes to the actuarial assumptions of 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:
  - 10-year open funding period
  - Amortization payment amounts are calculated to remain level
- The unfunded accrued liability increased from $112 million to $122 million.

Calculation of Contribution Amounts

The valuation determines the contribution requirement for the year. There is no scheduled funding for Plan A. The employer calculated contribution has three components:

- The normal cost (NC)
- The amortization of the (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 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 dollar amount, necessary to amortize the UAAL. This amortization is over a period of 10 years beginning January 1, 2019. 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 contributions are necessary to meet the Actuarially Determined Contribution for the twelve-month period beginning January 1, 2019.

Financial Data and Experience

As of January 1, 2019, the Fund has a total market value of $97 million. Financial information was received from Eide Bailly, LLP.

Table 5 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%), as shown in Tables 7 and 8 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 7 under Section III of the report. The AVA as of January 1, 2019 is $105 million. The AVA is 107.67% of the MVA as of January 1, 2019, compared to 100.28% last year. The difference between the AVA and the MVA is the deferred gains and losses. As of January 1, 2018, the total deferred loss was $0.3 million. As of January 1, 2019, the total deferred loss was $7.5 million.

In addition to the market return, Table 7 also shows the return on the actuarial value of assets for the Fund. For 2018, this return was 3.25%. Because this is less than the assumed 7.00% investment return for the prior year, an actuarial loss occurred, increasing the unfunded actuarial accrued liabilities of the Fund by $4.1 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 13 under Section III of the report shows the number of members by category (active, inactive, retired, etc.) along with member statistics. Tables 14 through 22 show summaries of certain historical data and include membership statistics.

The total payroll shown on the statistical tables is the amount that was supplied by the Fund, annualized, if necessary.

The one active participant is eligible or will become eligible for normal retirement in 2019.

Benefit Provisions

Appendix B of the report includes a more detailed summary of the benefit provisions for the Fund. Effective July 1, 1981, this plan was closed to new entrants. A brief summary is as follows:

- *Normal Retirement Eligibility*
    - At least 20 years of service.
- *Normal Retirement Benefit*
    - 75.0% of the maximum salary for a fireman first class for the first 20 years of service plus 1.5% of the maximum salary for a fireman first class for each year in excess of 20 years
- *Normal Form of Payment* is a 100% Joint & Survivor Annuity
- *Employee Contributions*
    - None are required
- *Post-retirement cost-of-living adjustments (COLAs)* may be granted each year at a rate of 0.03.

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

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 dollar amount.
- The unfunded actuarial accrued liability is amortized over an open 10 year period as a level dollar amount.
- The assumed annual investment return rate is 7.00%, with assumed inflation of 2.25%.
- Payroll is assumed to increase at 0.00% per year.
- Inactive vested participants are assumed to retire 20 years after the participant's date of hire.
- 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 15.1 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

SUPPORTING EXHIBITS

Table 1

Calculation of Annual Required Contribution

(Assumes 3.00% Annual Cost-Of-Living Increases)

Item			January 1, 2019	January 1, 2018
1.	Projected valuation payroll		$65,621	$134,155
2.	Present value of future pay		$33,066	$67,602
3.	Employer normal cost		$10,210	$22,220
4.	Actuarial accrued liability for active members			
	a.	Present value of future benefits for active members	$1,251,945	$2,555,939
	b.	Less: present value of future employer normal costs	(9,870)	(21,481)
	c.	Less: present value of future employee contributions	-	-
	d.	Actuarial accrued liability	$1,242,075	$2,534,458
5.	Total actuarial accrued liability for:			
	a.	Retirees and beneficiaries	$215,075,975	$216,078,160
	b.	Disabled members	10,781,020	10,712,958
	c.	Inactive members	1,544	1,544
	d.	Active members (Item 4d)	1,242,075	2,534,458
	e.	Total	$227,100,614	$229,327,120
6.	Actuarial value of assets (Table 7)		$104,673,993	$117,019,469
7.	Unfunded actuarial accrued liability (UAAL) (Item 5e - Item 6)		$122,426,621	$112,307,651
8.	Effecive UAAL amortization period		10 years	10 years
9.	Assumed payroll growth rate		0.00%	0.00%
10.	Employer contribution requirement			
	a.	UAAL amortization payment	$16,850,987	$15,455,249
	b.	Employer normal cost	10,210	22,220
	c.	Administrative expense	113,200	119,900
	d.	Contribution requirement (a + b + c)	$16,974,397	$15,597,369

Table 2

Cost Breakdown

(Assumes 3.00% Annual 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	$8,245	$1,243,700	$1,251,945
Death-in-service benefits likely to be paid on behalf of present active members (employer financed portion)	288	(288)	0
Separation benefits (refunds of contributions and deferred allowances) likely to be paid to present active members	1,337	(1,337)	0
Benefits likely to be paid to vested inactive members	0	0	0
Benefits to be paid to members due refunds	0	1,544	1,544
Benefits to be paid to current retirees, disabled members, beneficiaries, and future beneficiaries of current retirees	0	225,856,995	225,856,995
Total	$9,870	$227,100,614	$227,110,484
Actuarial value of assets	0	104,673,993	104,673,993
Liabilities to be covered by future contributions	$9,870	$122,426,621	$122,436,491

Table 3

Calculation of Total Actuarial Gain/(Loss)

(Assumes 3.00% Annual Cost-Of-Living Increases)

Item	January 1, 2019
1. Derivation of Experience Gain/(Loss)	
a. Unfunded actuarial accrued liability (UAAL) - previous valuation	$112,307,651
b. Normal cost (NC) for fiscal year ending December 31, 2018	22,220
c. Expected administrative expenses for fiscal year ending December 31, 2018	119,900
d. Actuarially determined contribution for fiscal year ending December 31, 2018	15,600,317
e. Interest accrual:	
(i) For whole year on (a)	7,861,536
(ii) For half year on (b) + (c) - (d)	(531,886)
(iii) Total interest: (e)(i) + (e)(ii)	7,329,649
f. Change in UAAL due to plan changes	-
g. Change in UAAL due to assumption change	-
h. Expected UAAL current year: (a) + (b) + (c) - (d) + (e)(iii) + (f) + (g)	104,179,103
i. Actual UAAL current year	122,426,621
j. Experience gain/(loss): (h) - (i)	(18,247,518)
k. Experience gain/(loss) as a % of actuarial accrued liability	-8.03%
2. Approximate Portion of Gain/(Loss) Due to Investments (at Actuarial Value)	($4,098,755)
3. Approximate Portion of Gain/(Loss) Due to Contributions and Administrative Expenses higher or lower than Expected	($16,119,850)
4. Approximate Portion of Gain/(Loss) Due to Liabilities: (1)(j) - (2) - (3)	$1,971,088
a. Age & service retirements	$339,161
b. Disability retirements	-
c. Death-in-service	-
d. Withdrawal from employment	-
e. Pay increases	-
f. Death after retirement	1,796,799
g. Other	(164,872)
h. Other as a % of actuarial accrued liability	-0.07%

Table 4

Statement of Plan Net Assets

Assets at Market Value		
Item	**FYE 2018**	**FYE 2017**
1. Cash and Cash Equivalents (Operating Cash)	$7,813,676	$8,244,842
2. Receivables		
a. Buy backs	$0	$0
b. Securities sold	711,048	511,239
c. Accrued interest and dividends	255,204	172,892
d. Currency contract receivable	21,237,039	26,433,472
e. Other	-	64,498
f. Rebate and fee income receivable	-	-
g. Total receivables	$22,203,291	$27,182,101
3. Investments, at Fair Value	$96,427,614	$116,175,713
4. Liabilities		
a. Benefits and refunds payable	$0	$0
b. Accrued payroll taxes and deductions	-	-
c. Securities purchased	(1,522,664)	(680,832)
d. Administrative and consulting fees payable	(272,713)	(241,823)
e. Currency contract payable	(21,308,990)	(26,561,964)
f. Securities lending collateral	(6,119,236)	(7,425,485)
g. Total liabilities	($29,223,603)	($34,910,104)
5. Total Market Value of Assets Available for Benefits	$97,220,978	$116,692,552

Table 5

Reconciliation of Plan Net Assets

Assets at Market Value		
Item	**FYE 2018**	**FYE 2017**
A. Market Value of Assets at Beginning of Year	$116,692,552	$116,866,234
B. Contribution Income:		
1. Contributions		
a. Employee	-	-
b. Employer	-	-
c. Other	-	-
d. Total	-	-
2. Investment Income		
a. Interest, dividends, and other income	$1,889,580	$2,160,013
b. Net appreciation	(4,732,384)	14,203,144
c. Investment expenses	(761,453)	(1,041,267)
d. Net investment income	($3,604,257)	$15,321,890
3. Securities Lending		
a. Gross income	$167,388	$101,281
b. Deductions	(143,410)	(71,182)
c. Net investment income	$23,978	$30,099
4. Benefits and Refunds		
a. Refunds	-	-
b. Regular monthly benefits	($15,788,064)	($15,410,878)
c. Total	($15,788,064)	($15,410,878)
5. Administrative and Miscellaneous Expenses	($103,231)	($114,793)
C. Market Value of Assets at End of Year	$97,220,978	$116,692,552

Table 6

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	$242,988	-	($1,216,104)	$116,521,125	($234,260,359)	-	
2000	-	-	-	-	-	-	$194,656,466
2001	-	-	($14,593)	$20,640,626	($7,901,445)	-	207,381,054
2002	-	-	(21,417)	(4,596,047)	(9,834,829)	-	192,928,800
2003	-	-	(8,834)	17,679,772	(10,717,703)	-	199,882,000
2004	-	-	(11,415)	3,646,859	(11,420,772)	-	192,096,700
2005	-	-	(17,582)	8,097,392	(11,858,914)	-	188,317,600
2006	-	-	(32,161)	14,989,755	(12,151,691)	-	191,123,500
2007	-	-	(43,747)	21,976,808	(12,468,812)	-	200,587,700
2008	-	-	(59,024)	(25,042,154)	(12,858,106)	-	162,628,400
2009	-	-	(60,827)	560,236	(13,279,752)	-	178,577,966
2010	-	-	(64,054)	3,155,329	(13,631,269)	-	168,037,972
2011	-	-	(91,234)	(703,688)	(13,872,314)	-	153,370,736
2012	$242,988	-	(102,094)	(102,851)	(14,227,330)	-	139,181,449
2013	-	-	(129,937)	16,221,592	(14,355,873)	-	140,917,231
2014	-	-	(115,406)	11,867,901	(14,581,980)	-	138,087,746
2015	-	-	(109,462)	7,622,723	(14,824,715)	-	130,776,292
2016	-	-	(116,293)	8,851,158	(15,075,912)	-	124,435,245
2017	-	-	(114,793)	8,109,895	(15,410,878)	-	117,019,469
2018	-	-	(103,231)	3,545,819	(15,788,064)	-	104,673,993

* Includes other funding sources

** Net of investment expenses

Table 7

Development of Actuarial Value of Assets

Item	FYE 2018	FYE 2017
1. Actuarial value of assets, beginning of year (before corridor)	$117,019,469	$124,435,245
2. Market value, end of year	$97,220,978	$116,692,552
3. Market value, beginning of year	$116,692,552	$116,866,234
4. Non-investment/administrative net cash flow:		
a. Employee contributions	$0	$0
b. Employer contributions	-	-
c. Other contributions	-	-
d. Refund of employee accounts	-	-
e. Retirement benefits	(15,788,064)	(15,410,878)
f. Administrative expenses	(103,231)	(114,793)
g. Total net cash flow: [sum of (4a) through (4f)]	($15,891,295)	($15,525,671)
5. Investments and securities lending:		
a. Interest and dividends on investments	$1,889,580	$2,160,013
b. Gross income from securities lending	167,388	101,281
c. Fees and expenses	(904,863)	(1,112,449)
d. Total net income: [sum of (5a) through (5c)]	$1,152,105	$1,148,845
6. Investment income:		
a. Actual market return: (2) - (3) - (4g) - (5d)	($4,732,384)	$14,203,144
b. Assumed rate of return	7.00%	7.75%
c. Assumed amount of return	6,469,585	7,317,894
d. Amount subject to phase-in: (6a) - (6c)	($11,201,969)	$6,885,250
7. Phase-in recognition of investment income:		
a. Current year: 0.20 * (6d)	($2,240,394)	$1,377,050
b. First prior year	1,377,050	(172,858)
c. Second prior year	(172,858)	(2,276,883)
d. Third prior year	(2,276,883)	(762,786)
e. Fourth prior year	(762,786)	1,478,633
f. Total recognition	($4,075,871)	($356,844)
8. Actuarial value of assets, end of year		
a. Preliminary actuarial value of assets, end of year: (1) + (4g) + (5d) + (6c) + (7f)	$104,673,993	$117,019,469
b. Upper corridor limit: 120% * (2)	116,665,174	140,031,062
c. Lower corridor limit: 80% * (2)	77,776,782	93,354,042
d. Actuarial value of assets, end of year	$104,673,993	$117,019,469
9. Difference between market and actuarial value of assets	($7,453,015)	($326,917)
10. Actuarial rate of return	3.25%	6.95%
11. Market rate of return*	-3.52%	14.20%
12. Ratio of actuarial value to market value of assets	107.67%	100.28%

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

Table 8

History of Investment Returns

Plan Year	Market Value	Actuarial Value
(1)	(2)	(3)
2000	-0.99%	16.60%
2001	-4.47%	10.82%
2002	-9.29%	-2.27%
2003	21.00%	9.43%
2004	11.54%	1.88%
2005	8.22%	4.35%
2006	12.63%	8.23%
2007	7.44%	11.89%
2008	-29.63%	-12.90%
2009	23.72%	18.78%
2010	13.80%	1.84%
2011	-0.90%	-0.44%
2012	14.05%	-0.07%
2013	13.53%	12.29%
2014	4.70%	8.89%
2015	-0.26%	5.84%
2016	7.60%	7.19%
2017	14.20%	6.95%
2018	-3.52%	3.25%
Average returns:		
Last five years:	4.38%	6.41%
Last ten years:	8.39%	6.31%

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

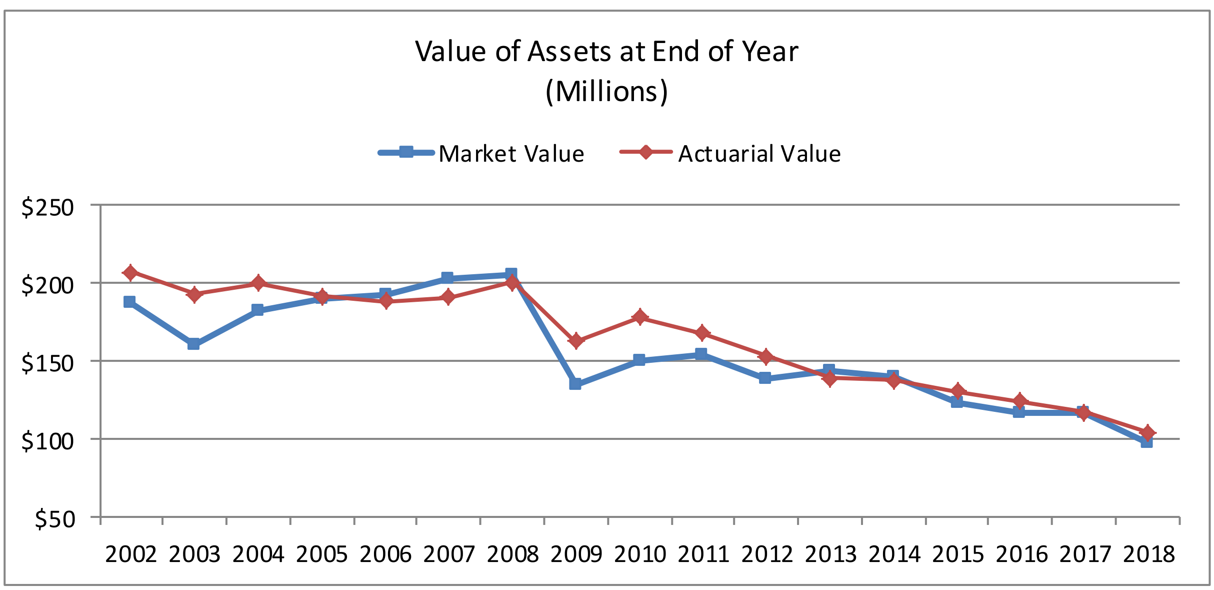

Table 9

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	$1,095,000	$162,675,000	$17,820,000	$199,882,000	100%	100%	204.3%
2005	1,471,000	167,299,000	16,877,000	192,097,000	100%	100%	138.2%
2006	1,271,000	171,300,000	17,881,000	188,318,000	100%	100%	105.8%
2007	1,076,000	174,599,000	12,278,000	191,123,000	100%	100%	125.8%
2008	938,000	176,480,000	10,950,000	200,587,700	100%	100%	211.6%
2009	513,619	179,393,300	12,599,000	162,628,400	100%	90.4%	0%
2010	408,160	184,570,961	10,885,759	178,577,966	100%	96.5%	0%
2011	259,464	189,063,504	6,882,584	168,037,972	100%	88.7%	0%
2012	226,353	189,373,457	6,085,396	153,370,736	100%	80.9%	0%
2013	226,353	188,732,687	6,240,155	139,181,449	100%	73.6%	0%
2014	96,203	203,198,729	2,960,335	140,917,231	100%	69.3%	0%
2015	96,203	202,384,610	2,735,286	138,087,746	100%	68.2%	0%
2016	96,203	201,512,413	3,081,171	130,776,292	100%	64.8%	0%
2017	79,264	202,702,321	3,171,327	124,435,245	100%	61.3%	0%
2018	47,296	226,792,662	2,487,162	117,019,469	100%	51.6%	0%
2019	19,354	225,858,539	1,222,721	104,673,993	100%	46.3%	0%

Table 10

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)]
2003	$192,928,800	$212,222,700	$19,293,900	90.91%	$1,928,206	1,000.61%
2004	199,882,000	181,290,000	(18,592,000)	110.26%	1,520,768	(1,222.54%)
2005	192,096,700	185,647,000	(6,449,700)	103.47%	1,471,750	(438.23%)
2006	188,317,600	187,452,000	(865,600)	100.46%	1,271,170	(68.09%)
2007	191,123,500	187,953,100	(3,170,400)	101.69%	1,076,419	(294.53%)
2008	200,587,700	188,367,800	(12,219,900)	106.49%	937,915	(1,302.88%)
2009	162,628,400	192,506,400	29,878,000	84.48%	762,233	3,917.80%
2010	178,577,966	195,864,880	17,286,914	91.17%	860,343	2,009.30%
2011	168,037,972	196,205,552	28,167,580	85.64%	551,862	5,104.09%
2012	153,370,736	195,685,206	42,314,470	78.38%	481,271	8,792.22%
2013	139,181,449	195,199,195	56,017,746	71.30%	486,270	11,519.88%
2014	140,917,231	206,255,267	65,338,036	68.32%	198,404	32,931.75%
2015	138,087,746	205,216,099	67,128,353	67.29%	179,486	37,400.39%
2016	130,776,292	204,689,787	73,913,495	63.89%	195,221	37,861.53%
2017	124,435,245	205,952,912	81,517,667	60.42%	195,221	41,756.70%
2018	117,019,469	229,327,120	112,307,651	51.03%	134,155	83,714.95%
2019	104,673,993	227,100,614	122,426,621	46.09%	65,621	186,567.47%

Table 11

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
	% of Payroll	Amount	% of Payroll	Amount	[(5)/(3)]
2004	145.71%	$2,215,900	0.00%	$0	0.00%
2005	33.58%	494,200	0.00%	0	0.00%
2006	19.21%	244,200	0.00%	0	0.00%
2007	24.31%	261,700	0.00%	0	0.00%
2008	28.62%	268,400	0.00%	0	0.00%
2009	604.70%	4,609,216	0.00%	0	0.00%
2010	324.95%	2,795,684	0.00%	0	0.00%
2011	774.69%	4,275,217	0.00%	0	0.00%
2012	1308.39%	6,296,901	50.49%	242,988	3.86%
2013	1703.66%	8,284,395	0.00%	0	0.00%
2014	4767.08%	9,458,093	0.00%	0	0.00%
2015	5412.52%	9,714,697	0.00%	0	0.00%
2016	5462.41%	10,663,740	0.00%	0	0.00%
2017	6010.84%	11,734,389	0.00%	0	0.00%
2018	11626.39%	15,597,369	0.00%	0	0.00%
2019	25867.50%	16,974,397			

* Employer contributions were suspended in 1997. The employer contribution for 2012 reflects recoupment from a plan audit.

Table 12

Reconciliation of Participant Data

	Active Participants	Vested Former Participants	Retired Participants	Disableds	Beneficiaries	Participants Due Refunds	Total
Number as of January 1, 2018	**2**	**-**	**200**	**14**	**67**	**1**	**284**
New participants	-	-	-	-	-	-	-
Vested terminations	-	-	-	-	-	-	-
Retirements	(1)	-	1	-	-	-	-
Disability	-	-	-	-	-	-	-
Deceased with beneficiary	-	-	(3)	-	3	-	-
Deceased without beneficiary	-	-	(1)	-	(5)	-	(6)
Due refunds	-	-	-	-	-	-	-
Lump sum payoffs	-	-	-	-	-	-	-
Rehires/return to active	-	-	-	-	-	-	-
Certain period expired	-	-	-	-	-	-	-
Reclassifications	-	-	-	-	-	-	-
Data corrections	-	-	-	-	-	-	-
Number as of January 1, 2019	**1**	**-**	**197**	**14**	**65**	**1**	**278**

Table 13

Demographic Statistics

	January 1		
	2019	**2018**	**Change**
Active Participants			
Number	1	2	-50.0%
Vested	*1*	*2*	
Not Vested	*0*	*0*	
Average age (years)	62.78	60.99	2.9%
Average service (years)	41.64	39.92	4.3%
Average entry age (years)	21.14	21.07	0.3%
Total payroll*	$65,621	$134,155	-51.1%
Average payroll*	$65,621	$67,077	-2.2%
Total employee contributions	$19,354	$47,296	-59.1%
Average employee contributions	$19,354	$23,648	-18.2%
Vested Former Participants			
Number	0	0	
Average age (years)	0.00	0.00	
Total employee contributions	$0	$0	
Average employee contributions	$0	$0	
Service Retirees			
Number	197	200	-1.5%
Average age (years)	71.03	70.18	1.2%
Total annual benefits	$11,670,259	$11,490,559	1.6%
Average annual benefit	$59,240	$57,453	3.1%
Disability Retirees			
Number	14	14	0.0%
Average age (years)	74.16	73.16	1.4%
Total annual benefits	$775,815	$753,219	3.0%
Average annual benefit	$55,415	$53,801	3.0%
Beneficiaries			
Number	65	67	-3.0%
Average age (years)	75.59	74.52	1.4%
Total annual benefits	$3,454,683	$3,414,629	1.2%
Average annual benefit	$53,149	$50,965	4.3%
Participants Due Refunds			
Number	1	1	0.0%
Total Refunds Due	$1,544	$1,544	0.0%

* Projected top-paid firefighter first class salaries for the upcoming valuation year

Table 14

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

Average Age = 62.8 Average Service = 41.6

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

Average Salary represents annualized top-paid firefighter first class salary for 2018 and is not shown for cells with counts less than or equal to three participants

Table 15

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

Average Age = 0.0 Average Service = 0.0

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

Average Salary represents annualized top-paid firefighter first class salary for 2018 and is not shown for cells with counts less than or equal to three participants

Table 16

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

Average Age = 62.8 Average Service = 41.6

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

Average Salary represents annualized top-paid firefighter first class salary for 2018 and is not shown for cells with counts less than or equal to three participants

Table 17

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 Pension Benefits	Count	Annual Pension Benefits	Count	Annual Pension Benefits		
2008	7	N/A	6	N/A	308	$13,081,594	3.39%	$42,473
2009	7	$717,462	8	$326,086	307	13,472,970	2.99%	43,886
2010	6	740,209	9	399,019	304	13,814,160	2.53%	45,441
2011	7	767,782	12	579,402	299	14,002,540	1.36%	46,831
2012	3	481,949	7	308,184	295	14,176,304	1.24%	46,831
2013	10	935,977	13	635,129	292	14,477,152	2.12%	49,579
2014	4	578,284	7	351,046	289	14,704,390	1.57%	50,880
2015	7	820,788	14	665,571	282	14,859,607	1.06%	52,694
2016	3	618,031	3	180,254	282	15,297,384	2.95%	54,246
2017	6	737,535	7	376,512	281	15,658,407	2.36%	55,724
2018	4	698,064	9	455,714	276	15,900,757	1.55%	57,611

* Includes cost-of-living increases

Table 18

Pensioners by Monthly Benefit and Status

Males			
Benefit Amount	**Beneficiaries**	**Retirees and Disabled Members**	**Total**
Under $200	-	-	-
$200-$399	-	-	-
$400-$599	-	-	-
$600-$799	-	-	-
$800-$999	-	-	-
$1,000-$1,499	-	-	-
$1,500-$1,999	-	-	-
$2,000-$2,499	-	10	10
$2,500 & over	-	201	201
Total	**-**	**211**	**211**
Females			
Benefit Amount	**Beneficiaries**	**Retirees and Disabled Members**	**Total**
Under $200	-	-	-
$200-$399	1	-	1
$400-$599	-	-	-
$600-$799	-	-	-
$800-$999	1	-	1
$1,000-$1,499	3	-	3
$1,500-$1,999	-	-	-
$2,000-$2,499	2	-	2
$2,500 & over	58	-	58
Total	**65**	**-**	**65**
Males & Females			
Benefit Amount	**Beneficiaries**	**Retirees and Disabled Members**	**Total**
Under $200	-	-	-
$200-$399	1	-	1
$400-$599	-	-	-
$600-$799	-	-	-
$800-$999	1	-	1
$1,000-$1,499	3	-	3
$1,500-$1,999	-	-	-
$2,000-$2,499	2	10	12
$2,500 & over	58	201	259
Total	**65**	**211**	**276**

Table 19

Pensioners by Age and Status

Average Age Male = 71.2   Average Age Female = 75.6   Average Age Total = 72.3

Males			
Age Last Birthday	**Beneficiaries**	**Retirees and Disabled Members**	**Total**
Under 50	-	-	-
50-54	-	-	-
55-59	-	5	5
60-64	-	61	61
65-69	-	42	42
70-74	-	40	40
75-79	-	26	26
80-84	-	16	16
85 & over	-	21	21
Total	**-**	**211**	**211**

Females			
Age Last Birthday	**Beneficiaries**	**Retirees and Disabled Members**	**Total**
Under 50	-	-	-
50-54	1	-	1
55-59	7	-	7
60-64	4	-	4
65-69	9	-	9
70-74	7	-	7
75-79	10	-	10
80-84	14	-	14
85 & over	13	-	13
Total	**65**	**-**	**65**

Males & Females			
Age Last Birthday	**Beneficiaries**	**Retirees and Disabled Members**	**Total**
Under 50	-	-	-
50-54	1	-	1
55-59	7	5	12
60-64	4	61	65
65-69	9	42	51
70-74	7	40	47
75-79	10	26	36
80-84	14	16	30
85 & over	13	21	34
Total	**65**	**211**	**276**

Table 20

Pensions Awarded in 2018 by Status

Average Age = 71.2

Males & Females			
Benefit Amount	**Beneficiaries**	**Retirees and Disabled Members**	**Total**
Under $200	-	-	-
$200-$399	-	-	-
$400-$599	-	-	-
$600-$799	-	-	-
$800-$999	-	-	-
$1,000-$1,499	-	-	-
$1,500-$1,999	-	-	-
$2,000-$2,499	-	-	-
$2,500 & over	3	1	4
Total	**3**	**1**	**4**

Males & Females			
Age Last Birthday	**Beneficiaries**	**Retirees and Disabled Members**	**Total**
Under 50	-	-	-
50-54	-	-	-
55-59	1	-	1
60-64	-	1	1
65-69	-	-	-
70-74	-	-	-
75-79	-	-	-
80-84	-	-	-
85 & over	2	-	2
Total	**3**	**1**	**4**

Table 21

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

(Average Benefit)

Average Service at Retirement = 23.2 Average Years Since Retirement = 22.0

Service at Retirement		Years Elapsed Since Retirement							
		0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	Totals
Less than 5	Count	-	-	-	-	-	-	-	-
	Avg. Benefit	-	-	-	-	-	-	-	-
5-9	Count	-	-	-	-	1	-	-	1
	Avg. Benefit	-	-	-	-	$2,005	-	-	$2,005
10-14	Count	-	-	1	6	4	1	2	14
	Avg. Benefit	-	-	$2,341	$2,618	3,182	$2,053	$2,492	2,701
15-19	Count	-	-	-	3	4	-	2	9
	Avg. Benefit	-	-	-	3,580	4,750	-	4,458	4,295
20-24	Count	-	-	8	39	22	16	27	112
	Avg. Benefit	-	-	4,568	4,875	4,613	4,621	4,665	4,715
25-29	Count	-	2	14	17	6	7	3	49
	Avg. Benefit	-	$5,420	5,640	5,565	5,927	6,036	4,953	5,655
30-34	Count	1	8	-	6	3	1	2	21
	Avg. Benefit	$5,084	6,498	-	6,089	5,523	2,498	5,058	5,847
35 & Over	Count	1	2	-	1	1	-	-	5
	Avg. Benefit	5,565	7,198	-	5,472	$5,350	-	-	6,157
Totals	Count	**2**	**12**	**23**	**72**	**41**	**25**	**36**	**211**
	Avg. Benefit	**$5,325**	**$6,435**	**$5,124**	**$4,905**	**$4,700**	**$4,830**	**$4,579**	**$4,916**

Table 22

Pensioners by Year of Retirement

January 1, 2019 Total = 211

Year of Retirement	Count
Under 1961	-
1961	-
1962	-
1963	-
1964	-
1965	-
1966	-
1967	-
1968	-
1969	-
1970	1
1971	3
1972	1
1973	1
1974	-
1975	2
1976	-
1977	4
1978	2
1979	1
1980	1
1981	-
1982	1
1983	1
1984	2
1985	5
1986	1
1987	7
1988	3
1989	8

Year of Retirement	Count
1990	7
1991	4
1992	5
1993	1
1994	6
1995	9
1996	4
1997	8
1998	13
1999	18
2000	16
2001	16
2002	12
2003	11
2004	8
2005	7
2006	4
2007	3
2008	1
2009	3
2010	4
2011	1
2012	-
2013	3
2014	1
2015	-
2016	-
2017	1
2018*	1

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

Table 23

Thirty Year Projected Benefit Payments

Year Ending December 31	Actives	Retirees*	Total
2019	$ 35,948	$ 16,072,579	$ 16,108,527
2020	72,971	16,396,711	16,469,682
2021	75,148	16,691,425	16,766,573
2022	77,382	16,955,294	17,032,675
2023	79,669	17,188,350	17,268,020
2024	82,010	17,390,946	17,472,956
2025	84,402	17,563,551	17,647,953
2026	86,843	17,706,647	17,793,490
2027	89,328	17,820,589	17,909,917
2028	91,853	17,905,472	17,997,326
2029	94,412	17,961,018	18,055,430
2030	96,997	17,986,520	18,083,517
2031	99,597	17,980,909	18,080,506
2032	102,201	17,942,759	18,044,960
2033	104,794	17,870,322	17,975,116
2034	107,356	17,761,623	17,868,979
2035	109,867	17,614,504	17,724,371
2036	112,298	17,426,794	17,539,092
2037	114,616	17,196,426	17,311,042
2038	116,783	16,921,405	17,038,188
2039	118,752	16,600,032	16,718,784
2040	120,468	16,231,088	16,351,556
2041	121,869	15,813,875	15,935,744
2042	122,885	15,348,329	15,471,214
2043	123,436	14,834,980	14,958,416
2044	123,437	14,274,874	14,398,311
2045	122,800	13,669,725	13,792,525
2046	121,435	13,022,365	13,143,800
2047	119,261	12,336,703	12,455,964
2048	116,220	11,617,751	11,733,971

* Includes Disabled Members, Beneficiaries, and Deferred Vested Members. Retirement benefit payments for deferred vested members are assumed to commence at the first age at which unreduced benefits are available.

Appendix A

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 1st, 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 dollar amount. Under this method, the employer contribution amount is the sum of (i) the employer normal cost amount, and (ii) the amount that will amortize the unfunded actuarial accrued liability (UAAL).

   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 0.07), 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. 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 amount of employer contribution which, if applied to 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 and amortizing the result over 10 years from the valuation date, as a level dollar amount.

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, with interest, dividends, and other income recognized immediately. 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:
4.50% per year

c. Payroll growth rate:
In the amortization of the unfunded actuarial accrued liability, payroll is not assumed to increase. The assumed payroll growth in a closed plan is 0%.

d. Cost-of-living adjustment:
3.00% per year

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%

b. Disability and withdrawal

Age	Disability		Withdrawal	
			Ultimate	
	Male	Female	Male	Female
20	0.03%	0.03%	12.00%	12.00%
25	0.03%	0.03%	8.00%	8.00%
30	0.03%	0.03%	5.00%	5.00%
35	0.19%	0.19%	3.00%	3.00%
40	0.42%	0.42%	1.00%	1.00%
45	0.65%	0.65%	1.00%	1.00%
50	0.82%	0.82%	1.00%	1.00%
55	1.81%	1.81%	0.50%	0.50%
60	2.00%	2.00%	0.50%	0.50%

c. Retirement Rates

Age	Rate	Age	Rate
50	20%	57	25%
51	25%	58	25%
52	25%	59	25%
53	25%	60	100%
54	25%	61	100%
55	25%	62	100%
56	25%		

6. Other Assumptions

a. Percent married: 100% 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 20 years after hire date.

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.

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. Benefit Service: All members are assumed to accrue one year of service each year.

Appendix B

Summary of Plan Provisions

Summary of Plan Provisions

Covered Members	Any person who is a member of Wyoming Paid Firemen's Retirement Fund Plan A. This plan only covers members hired prior to July 1, 1981.
Fireman First Class	The highest salary grade which a fireman can obtain within his department without any promotion in rank. The term specifically excludes chiefs, officers, engineers, fire equipment operators, secretaries, mechanics, inspectors and all other specialized grades, ratings and ranks.
Form of Payment	Monthly benefit for life. Upon death, 100% of the benefit continues to be paid to the beneficiary.
Service Retirement	
Eligibility	20 or more years of service.
Monthly Benefit	75.0% of the maximum salary for a fireman first class for 20 years of service plus 1.5% of the maximum salary for a fireman first class for each year of service in excess of 20 years.
Vesting	Any employee who has left the service with at least 10 years of service, and who has not withdrawn accumulated contributions, is eligible to receive a monthly benefit of 3.75% of final average salary per year of service payable upon the 20^{th} anniversary of employment, or can elect to receive a lump-sum refund of 99.5% of contributions. An employee who terminates with less than ten years of service is only eligible for the lump-sum benefit.
Disability Retirement	
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. 15-5-204.
Monthly Benefit	75.0% of the maximum salary for a fireman first class for 20 years of service plus 1.5% of the maximum salary for a fireman first class for each year of service in excess of 20 years.

Pre-retirement Death Benefit

Eligibility	No age or service requirements.
Monthly Benefit	75.0% of the maximum salary for a fireman first class for 20 years of service plus 1.5% of the maximum salary for a fireman first class for each year of service in excess of 20 years.

Contributions

Employee	None
Employer	None
Interest	None

Cost-of-Living Improvements 3.0% per year, applied annually following the one-year anniversary of retirement. In the event the most current actuarial valuation indicates the market value of assets is greater than 115% of the actuarial value of liabilities, the Board may elect to grant up to a 5.0% increase if the System's actuary determines such an increase to be actuarially sound.

APPENDIX C

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. The lack of contributions puts this plan in funding peril;
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:

	January 1, 2019	January 1, 2018
Ratio of net cash flows to market value of assets	-16%	-13%
Duration of the actuarial accrued liability	11.3	11.5

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