ARIZONA CORRECTIONS OFFICER RETIREMENT PLAN

COCHISE COUNTY - DETENTION (525)

ACTUARIAL VALUATION
AS OF JUNE 30, 2020

CONTRIBUTIONS APPLICABLE TO THE
PLAN/FISCAL YEAR ENDING JUNE 30, 2022

FOSTER & FOSTER
ACTUARIES AND CONSULTANTS

VIA E-MAIL

December 2020

Board of Trustees
Arizona Corrections Officer Retirement Plan
Phoenix, AZ

Re: Actuarial Valuation Report as of June 30, 2020 for Cochise County - Detention (525)

Dear Members of the Board:

We are pleased to present to the Board this report of the annual actuarial valuation of the Arizona Corrections Officer Retirement Plan (CORP). The valuation was performed to determine whether the assets and contributions are sufficient to provide the prescribed benefits and to develop the appropriate funding requirements for the applicable plan year.

This report was prepared at the request of the Board and is intended for use by CORP and those designated or approved by the Board. It documents the valuation of the consolidated plan and provides summary information for CORP participating employers. This report may be provided to parties other than CORP only in its entirety and only with the permission of the Board. Foster & Foster is not responsible for the unauthorized use of this report.

The valuation has been conducted in accordance with generally accepted actuarial principles and practices, including the applicable Actuarial Standards of Practice as issued by the Actuarial Standards Board, and reflects laws and regulations issued to date pursuant to the provisions of Title 38, Chapter 5, Article 6 of the Arizona Revised Statutes, as well as applicable federal laws and regulations. In our opinion, the assumptions used in this valuation, as adopted by the Board of Trustees, represent reasonable expectations of anticipated plan experience. Future actuarial measurements may differ significantly from the current measurements presented in this report for a variety of reasons including changes in applicable laws, changes in plan provisions, changes in assumptions, or plan experience differing from expectations. Due to the limited scope of the valuation, we did not perform an analysis of the potential range of such future measurements.

The computed contribution rates shown in the “Contribution Results” section should be considered minimum contribution rates that comply with the Board’s funding policy and Arizona Statutes. Users of this report should be aware that contributions made at that rate do not guarantee benefit security. Given the importance of benefit security to any retirement system, we suggest that contributions to the Plan in excess of those presented in this report be considered.

The funding percentages and unfunded accrued liability as measured based on the actuarial value of assets will differ from similar measures based on the market value of assets. These measures, as provided, are appropriate for determining the adequacy of future contributions, but may not be appropriate for the purpose of settling a portion or all of the Plan’s liabilities.

In conducting the valuation, we have relied on personnel, plan design, and asset information supplied by CORP through June 30, 2020 and the actuarial assumptions and methods described in the Actuarial Assumptions section of this report. While we cannot verify the accuracy of all this information, the supplied information was reviewed for consistency and reasonableness. As a result of this review, we have no reason to doubt the substantial accuracy of the information and believe that it has produced appropriate results. This information, along with any adjustments or modifications, is summarized in various sections of this report.

This valuation assumes the continuing ability of the participating employers to make the contributions necessary to fund this plan. A determination regarding whether or not the participating employers are actually able to do so is outside our scope of expertise. Consequently, we did not perform such an analysis.

The undersigned are familiar with the immediate and long-term aspects of pension valuations and meet the Qualification Standards of the American Academy of Actuaries necessary to render the actuarial opinions contained herein. All sections of this report are considered an integral part of the actuarial opinions.

To our knowledge, no associate of Foster & Foster, Inc. working on valuations of the program has any direct financial interest or indirect material interest in the Arizona Corrections Officer Retirement Plan, nor does anyone at Foster & Foster, Inc. act as a member of the Board of Trustees of the Arizona Corrections Officer Retirement Plan. Thus, there is no relationship existing that might affect our capacity to prepare and certify this actuarial report.

If there are any questions, concerns, or comments about any of the items contained in this report, please contact us at 239-433-5500.

Respectfully Submitted,

Foster & Foster, Inc.

By: ______________________
Bradley R. Heinrichs, FSA, EA, MAAA

By: ______________________
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By: ______________________
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I. SUMMARY OF REPORT

The regular annual actuarial valuation of the Arizona Corrections Officer Retirement Plan for the Cochise County - Detention, performed as of June 30, 2020, has been completed and the results are presented in this Report. The purpose of this valuation is to:

- Compute the liabilities associated with benefits likely to be paid on behalf of current retired and active members. This information is contained in the section entitled "Liability Support."
- Compare accumulated assets with the liabilities to assess the funded condition. This information is contained in the section entitled "Liability Support."
- Compute the employers' recommended contribution rates for the Fiscal Year beginning July 1, 2021. This information is contained in the section entitled "Contribution Results."

1. Key Valuation Results

The funded status as of June 30, 2020 and the employer contribution amounts applicable to the plan/fiscal year ending June 30, 2022 are as follows:

	Tier 1 & Tier 2 Members		
	Pension	**Health**	**Total**
Employer Contribution Rate	31.69%	0.00%	31.69%
Funded Status	50.9%	245.2%	55.2%

2. Comparison of Key Results to Prior Year

The chart below compares the results from this valuation with the results of the prior year's valuation (as of June 30, 2019):

Contribution Rate

	Tier 1 & Tier 2 Members		
Valuation Date	**Pension**	**Health**	**Total**
June 30, 2019	31.37%	0.00%	31.37%
June 30, 2020	31.69%	0.00%	31.69%

Funded Status

	Tier 1 & Tier 2 Members		
Valuation Date	**Pension**	**Health**	**Total**
June 30, 2019	51.5%	250.3%	56.0%
June 30, 2020	50.9%	245.2%	55.2%

3. Reasons for Change

Changes in the results from the prior year's valuation can be illustrated in the following tables along with high-level explanations for the entire Plan below:

Contribution Rate

	Tier 1 & Tier 2	
	Pension	**Health**
Contribution Rate Last Valuation	31.37%	0.00%
Asset Experience	0.41%	0.04%
Payroll Base	(1.35%)	0.02%
Liability Experience	(0.10%)	(0.09%)
COLA	0.00%	0.00%
Assumption/Method Change	1.54%	(0.29%)
Other	(0.18%)	0.32%
Contribution Rate This Valuation	31.69%	0.00%

Funded Status

	Tier 1 & Tier 2	
	Pension	**Health**
Funded Status Last Valuation	51.5%	250.3%
Asset Experience	(0.7%)	(3.4%)
Liability Experience	(1.3%)	(3.0%)
COLA	0.0%	0.0%
Assumption/Method Change	0.0%	0.0%
Other	1.4%	1.3%
Funded Status This Valuation	50.9%	245.2%

Assets Experience – Asset gains and losses (relative to the assumed earnings rate) are smoothed over seven years for Tiers 1 and 2. The return on the market value of assets for the year ending June 30, 2020 was 2.6%. On a smoothed, actuarial value of assets basis, however, the average return was 5.7%. This fell short of the 2019 assumed earnings rate of 7.3%.

Liability Experience – Experience overall was unfavorable, driven by greater than expected salary increases.

Payroll Base – Under the current amortization policy for Tiers 1 and 2, the contribution rate is developed as a level percentage of payroll. The payroll is expected to increase each year in line with the growth assumption (currently 3.00%). To the extent that actual payroll is lower/greater than expected, the contribution rate will increase/decrease as a result.

Assumption / Method Change – The amortization method for Tiers 1 and 2 was updated to use a layered approach. New bases will be amortized on a Level Dollar basis while the 2019 base will continue to be amortized on a Level Percentage of Payroll basis. The payroll growth assumption was decreased to 3.00%.

Other – This is the combination of all other factors that could impact liabilities year-over-year, with the primary sources being changes resulting from an updated understanding of some data components provided by staff and changes in member data.

4. Looking Ahead

The continuing effect of prior asset losses was dampened by the asset smoothing reflected in the actuarial value of assets. There remain unrecognized investment losses that will, in the absence of other gains, put upward pressure on the contribution rate next year.

If the June 30, 2020 pension valuation results were based on the market value of assets instead of the actuarial value of assets, the pension funded percentage for Tiers 1 and 2 would be 47.9% (instead of 50.9%) and the pension employer contribution requirement would be 33.55% of payroll (instead of 31.69%).

5. Conclusion

The funded status for Tiers 1 and 2 will continue to improve if assumptions are met and contributions at least equal to the rates determined for each employer are made to the fund. The recent adoption of a layered amortization approach along with a plan to systematically lower the payroll growth assumption was an excellent step to improve funding and ensure the Plan is on a viable path.

II. CONTRIBUTION RESULTS

Contribution Requirements

Development of Employer Contributions - Tiers 1 & 2 Members				
Valuation Date	June 30, 2020		June 30, 2019	
Applicable to Fiscal Year Ending	2022		2021	
	Rate	**Dollar**	**Rate**	**Dollar**
Pension				
Normal Cost				
Total Normal Cost	14.02%	$242,051	15.65%	$256,408
Employee Cost	(8.41%)	(145,230)	(8.41%)	(137,777)
Employer (Net) Normal Cost	5.61%	96,821	7.24%	118,631
Amortization of Unfunded Liability	26.08%	450,369	24.13%	395,309
Total Employer Cost (Pension)	31.69%	547,190	31.37%	513,940
Health				
Normal Cost	0.29%	$4,930	0.34%	$5,641
Amortization of Unfunded Liability	(0.29%)	(4,930)	(0.34%)	(5,641)
Total Employer Cost (Health)	0.00%	0	0.00%	0
Total Employer Cost (Pension + Health)	**31.69%**	**547,190**	**31.37%**	**513,940**
Total Minimum Contribution Requirement (if applicable)	0.00%		0.00%	
Alternate Contribution Rate (ACR) *	26.08%		24.13%	
Underlying Payroll (as of valuation date)		1,726,875		1,638,248

** The Alternate Contribution Rate is the sum of the positive amortization rates for Tiers 1 & 2 Pension and Health and is charged when retirees return to active status.*

The results above are shown both prior to and after the application of the statutory minimum contribution requirement of 6% of payroll.

Development of Employer Contributions – Tier 3 Members		
Valuation Date	June 30, 2020	June 30, 2019
Applicable to Fiscal Year Ending	2022	2021

Defined Contribution (DC) Retirement Plan

	Rate	**Dollar**	**Rate**	**Dollar**
Tier 3 DC Only				
Employee Cost	7.00%	$ 40,398	7.00%	$ 32,132
Employee Disability Program Cost	0.49%	2,828	0.65%	2,984
Total Employee Cost	**7.49%**	**43,226**	**7.65%**	**35,116**
Employer Cost	5.00%	28,856	5.00%	22,952
Employer Disability Program Cost	0.49%	2,828	0.65%	2,984
Total Employer Cost (before Legacy)	**5.49%**	**31,684**	**5.65%**	**25,936**
ER Legacy Cost of Tiers 1 & 2 Amort of Unfunded Liabilities *	26.08%	150,513	24.13%	110,765
Total Employer Cost	**31.57%**	**182,197**	**29.78%**	**136,701**
Underlying Payroll (as of valuation date)		577,120		459,033

** Pursuant to ARS § 38-891(A), the amortization of positive unfunded liabilities for Tiers 1 & 2 shall be applied to all Tier 3 payroll on a level percent basis. However, while it is statutorily required to present the rates in this manner, these are the minimums where alternate methods for paying down that unfunded liability is at the discretion of each employer. Further, to understand the effects of reform in relation to Tier 3, compare the total rate of Tier 3 before application of those legacy costs.*

Contribution Rate Summary

	Tier 1	Tier 2	Tier 3	
Membership Date On or After	7/1/1986	1/1/2012	7/1/2018	
Available Retirement Plan	DB Plan	DB Plan	DB Plan [1]	DC Plan
Employee Contribution Rate				
CORP DB Rate	8.41%	8.41%	0.00%	
CORP DC Rate [2]				7.00%
CODCRP Disability Program Rate				0.49%
Total EE Contribution Rate	8.41%	8.41%	0.00%	7.49%
Employer Contribution Rate				
CORP DB Normal Cost	5.61%	5.61%	0.00%	
CORP DB Tier 1 & 2 Legacy Cost [3]	26.08%	26.08%	0.00%	26.08%
CORP DC Rate				5.00%
CODCRP Disability Program Rate				0.49%
Total ER Contribution Rate	31.69%	31.69%	0.00%	31.57%

[1] *Applicable to AOC Probation and Surveillance only.*

[2] *Although the default contribution rate is 7%, Tier 3 members in the DC plan may choose an employee contribution rate anywhere between 5% and 40%.*

[3] *Per statute (ARS § 38-891(A), any positive unfunded liability for Tiers 1 and 2 is to be applied to all Tier 3 (DB and DC) payrolls.*

Exhibit summarizes employee and employer contributions based on Statute and the results of June 30, 2020 actuarial valuation. Pension and health components are combined, where applicable.

Impact of Additional Contributions

	Additional Contribution (000s)										
	$0	$100	$200	$300	$400	$500	$600	$700	$800	$900	$1,000
Impact On											
Funded Status 06/30/2020	50.9%	51.6%	52.4%	53.1%	53.8%	54.5%	55.2%	55.9%	56.6%	57.4%	58.1%
FYE 2022 Contribution Rate	31.69%	31.25%	30.81%	30.38%	29.94%	29.50%	29.07%	28.63%	28.19%	27.76%	27.32%

Table shows the hypothetical change in the funded status and contribution rate from the June 30, 2020 actuarial valuation results for Tiers 1 & 2 if an additional contribution of the amount shown had been made to the Fund on June 30, 2020. This illustration can help estimate the impact of contributing additional monies to the fund in the future.

Historical Summary of Employer Rates

			Pension			Health		
	Valuation Date June 30	Fiscal Year Ending June 30	Normal Cost	Unfunded Amortization	Total	Normal Cost	Unfunded Amortization	Total
TIERS 1 & 2	2018	2020	7.15%	18.97%	26.12%	0.24%	(0.24%)	0.00%
	2019	2021	7.24%	24.13%	31.37%	0.34%	(0.34%)	0.00%
	2020	2022	5.61%	26.08%	31.69%	0.29%	(0.29%)	0.00%

III. Liability Support

Liabilities and Funded Ratios by Benefit - Tiers 1 & 2

	June 30, 2020	June 30, 2019
Pension		
Actuarial Present Value of Benefits		
Retirees and Beneficiaries	$ 8,166,101	$ 8,251,034
Vested Members	333,024	225,062
Active Members	7,125,947	6,291,047
Total Actuarial Present Value of Benefits	15,625,072	14,767,143
Actuarial Accrued Liability (AAL)		
All Inactive Members	8,499,125	8,476,096
Active Members	5,465,547	4,503,797
Total Actuarial Accrued Liability	13,964,672	12,979,893
Actuarial Value of Assets (AVA)	7,110,649	6,689,997
Unfunded Actuarial Accrued Liability		
Gross Unfunded Actuarial Accrued Liability	6,854,023	6,289,896
Stabilization Reserve	0	0
Net Unfunded Actuarial Accrued Liability	6,854,023	6,289,896
Funded Ratio (AVA / AAL)	50.9%	51.5%
Health		
Present Value of Benefits		
Retirees and Beneficiaries	$ 169,606	$ 162,652
Active Members	178,576	174,765
Total Present Value of Benefits	348,182	337,417
Actuarial Accrued Liability (AAL)		
All Inactive Members	169,606	162,652
Active Members	146,505	136,904
Total Actuarial Accrued Liability	316,111	299,556
Actuarial Value of Assets (AVA)	775,174	749,876
Unfunded Actuarial Accrued Liability	(459,063)	(450,320)
Funded Ratio (AVA / AAL)	245.2%	250.3%

Derivation of Experience (Gain)/Loss

		Tiers 1 & 2	
		Pension	**Health**
(1)	Unfunded Actuarial Accrued Liability as of June 30, 2019	6,289,896	(450,320)
(2)	Normal Cost Developed in Last Valuation	118,631	5,641
(3)	Actual Contributions	585,531	0
(4)	Expected Interest On (1), (2), and (3)	446,827	(32,462)
(5)	Expected Unfunded Actuarial Accrued Liability as of June 30, 2020 (1)+(2)-(3)+(4)	6,269,823	(477,141)
(6)	Changes to UAAL Due to Assumptions, Methods and Benefits	0	0
(7)	Change to UAAL Due to Actuarial (Gain)/Loss	584,200	18,078
(8)	Unfunded Actuarial Accrued Liability as of June 30, 2020	6,854,023	(459,063)

Amortization of Unfunded Liabilities - Tiers 1 & 2

	Date Established	Outstanding Balance	Years Remaining	Amortization Rate
Pension	06/30/2019	6,257,049	16	23.47%
	06/30/2020	596,974	16	2.61%
	Total	6,854,023		26.08%
Health	06/30/2019	0	19	0.00%
	06/30/2020	(459,063)	20	(1.79%)
	Total	(459,063)		(1.79%)

IV. Asset Support

Statement of Changes in Fiduciary Net Position for Year Ended June 30, 2020

Market Value Basis

	Tiers 1 & 2	
	Pension	Health
Additions		
Contributions		
Member Contributions	$ 46,151,025	$ 0
Employer Contributions	167,010,059	0
Health Insurance Contributions	0	639,397
Total Contributions	213,161,084	639,397
Investment Income		
Net Increase in Fair Value	14,436,837	1,717,282
Interest and Dividends	16,250,842	1,933,060
Other Income	35,823,718	1,367,974
Less Investment Expenses	(12,090,328)	(1,438,161)
Net Investment Income	54,421,069	3,580,155
Transfers In	226,097	0
Total Additions	267,808,250	4,219,552
Deductions		
Distributions to Members		
Benefit Payments	170,102,004	0
Health Insurance Subsidy	0	4,546,349
Refund of Contributions	20,532,931	0
Total Distributions	190,634,935	4,546,349
Administrative Expenses	2,106,260	138,561
Transfers Out	780,939	0
Other	0	0
Total Deductions	193,522,134	4,684,910
Net Increase / (Decrease)	74,286,116	(465,358)
Net Position Held in Trust		
Prior Valuation	1,996,273,344	126,440,064
Beginning of the Year Adjustment	2	(1)
End of the Year	2,070,559,462	125,974,705

Development of Pension Actuarial Value of Assets - Tiers 1 & 2

A. Investment Income	
A1. Actual Investment Income	$ 52,314,809
A2. Expected Amount for Immediate Recognition	146,515,782
A3. Amount Subject to Amortization	(94,200,973)

	Year Ended June 30						
B. Amortization Schedule	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
2020 Experience (A3 / 7)	(13,457,282)	(13,457,282)	(13,457,282)	(13,457,282)	(13,457,282)	(13,457,282)	(13,457,281)
2019 Experience	(5,782,115)	(5,782,115)	(5,782,115)	(5,782,115)	(5,782,115)	(5,782,112)	
2018 Experience	(1,511,828)	(1,511,828)	(1,511,828)	(1,511,828)	(1,511,825)		
2017 Experience	8,429,734	8,429,734	8,429,734	8,429,733			
2016 Experience	(16,290,498)	(16,290,498)	(16,290,497)				
2015 Experience	(9,194,258)	(9,194,260)					
2014 Experience	8,714,004						
Total Amortization	(29,092,243)	(37,806,249)	(28,611,988)	(12,321,492)	(20,751,222)	(19,239,394)	(13,457,281)

C. Actuarial Value of Assets	**Total**	**Employer**
C1. Actuarial Value of Assets, 06/30/2019	2,063,352,240	
C2. Noninvestment Net Cash Flow	21,971,307	
C3. Preliminary Actuarial Value of Assets, 06/30/2020 (A2 + B + C1 + C2)	2,202,747,086	
C4. Market Value of Assets, 06/30/2020	2,070,559,462	6,683,936
C5. Final Actuarial Value of Assets, 06/30/2020 (C3 Within 20% Corridor of C4)	2,202,747,086	7,110,649

D. Rates of Return	
D1. Market Value Rate of Return	2.6%
D2. Actuarial Value Rate of Return	5.7%

Development of Health Actuarial Value of Assets - Tiers 1 & 2

A. Investment Income	
A1. Actual Investment Income	$ 3,441,594
A2. Expected Amount for Immediate Recognition	9,090,033
A3. Amount Subject to Amortization	(5,648,439)

	Year Ended June 30						
B. Amortization Schedule	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
2020 Experience (A3 / 7)	(806,920)	(806,920)	(806,920)	(806,920)	(806,920)	(806,920)	(806,919)
2019 Experience	(382,214)	(382,214)	(382,214)	(382,214)	(382,214)	(382,213)	
2018 Experience	(81,544)	(81,544)	(81,544)	(81,544)	(81,541)		
2017 Experience	574,691	574,691	574,691	574,693			
2016 Experience	(1,140,445)	(1,140,445)	(1,140,442)				
2015 Experience	(623,076)	(623,078)					
2014 Experience	584,154						
Total Amortization	(1,875,354)	(2,459,510)	(1,836,429)	(695,985)	(1,270,675)	(1,189,133)	(806,919)

C. Actuarial Value of Assets	Total	Employer
C1. Actuarial Value of Assets, 06/30/2019	130,925,631	
C2. Noninvestment Net Cash Flow	(3,906,952)	
C3. Preliminary Actuarial Value of Assets, 06/30/2020 (A2 + B + C1 + C2)	134,233,358	
C4. Market Value of Assets, 06/30/2020	125,974,705	727,482
C5. Final Actuarial Value of Assets, 06/30/2020 (C3 Within 20% Corridor of C4)	134,233,358	775,174

D. Rates of Return	
D1. Market Value Rate of Return	2.8%
D2. Actuarial Value Rate of Return	5.6%

V. Member Statistics

Valuation Data Summary – Tiers 1 & 2

	June 30, 2020	June 30, 2019
Actives		
Number	37	42
Average Current Age	38.5	36.8
Average Age at Employment	29.1	28.8
Average Past Service	9.4	8.0
Average Annual Salary	$43,628	$39,006
Actives (transferred)		
Number	1	0
Average Current Age	29.4	N/A
Average Age at Employment	27.3	N/A
Average Past Service	2.1	N/A
Average Annual Salary	$34,502	N/A
Retirees		
Number	32	32
Average Current Age	67.3	66.4
Average Annual Benefit	$18,954	$18,583
Beneficiaries		
Number	6	6
Average Current Age	78.7	77.7
Average Annual Benefit	$11,885	$11,652
Disability Retirees		
Number	0	0
Average Current Age	N/A	N/A
Average Annual Benefit	N/A	N/A
Inactive / Vested		
Number	36	34
Average Current Age	36.3	35.2
Average Accumulated Contributions	$6,758	$5,199
Total Number	112	114
Former Members (transferred)	4	5

Counts and Pay Summary by Service - Tiers 1 & 2

	Past Service									
Age	0-4	5-9	10-14	15-19	20-24	25-29	30+	Total Count	Total Pay	Average Pay
< 25	4	0	0	0	0	0	0	4	146,823	36,706
25 - 29	4	3	0	0	0	0	0	7	247,506	35,358
30 - 34	1	5	2	0	0	0	0	8	335,366	41,921
35 - 39	1	1	0	3	0	0	0	5	258,204	51,641
40 - 44	0	1	0	0	2	0	0	3	171,779	57,260
45 - 49	0	1	1	1	0	0	0	3	142,166	47,389
50 - 54	0	1	1	0	0	0	0	2	81,662	40,831
55 - 59	1	1	1	2	0	0	0	5	220,028	44,006
60 - 64	0	0	0	0	0	0	0	0	0	0
65+	0	0	0	1	0	0	0	1	45,210	45,210
Total	11	13	5	7	2	0	0	38	1,648,744	43,388

VI. Actuarial Assumptions and Methods

Interest Rate

7.30% per year. This is the assumed earnings rate on System assets, compounded annually, net of investment and administrative expenses.

Salary Increases

See table below. This is annual increase for individual member's salary. These rates, which are based on a 2017 experience study using actual plan experience, consist of 3.5% for wage inflation with the remaining portion for merit / seniority increases.

Age	Rate
20	6.5%
25	6.1%
30	5.4%
35	4.7%
40	4.2%
45	4.0%
50	3.9%
55	3.7%
60+	3.5%

Inflation

2.50%.

Tier 3 Compensation Limit

$70,000 for calendar 2020. Assumed increases of 2.00% per year thereafter.

Cost-of-Living Adjustment

1.75%.

Reverse DROP Interest

2.00%.

Mortality Rates

These rates are used to project future decrements from the population due to death.

Active Lives:
PubS-2010 Employee mortality, loaded 125% for males and 115% for females, projected with future mortality improvements reflected generationally using 75% of scale MP-2019. 100% of active deaths are assumed to be in the line of duty.

Inactive Lives
PubS-2010 Healthy Retiree mortality, loaded 125% for males and 115% for females, projected with future mortality improvements reflected generationally using 75% of scale MP-2019.

Beneficiaries:
PubS-2010 Survivor mortality, projected with future mortality improvements reflected generationally using 75% of scale MP-2019.

Disabled Lives:
PubS-2010 Disabled mortality, projected with future mortality improvements reflected generationally using 75% of scale MP-2019.

The mortality assumptions sufficiently accommodate anticipated future mortality improvements.

Retirement

These rates are used to project future decrements from the active population due to retirement. The rates below are based on a 2017 experience study using actual plan experience.

Tier 1 – reaching age 62 before attaining 20 (25 for dispatchers) years of service:
Age-related rates based on age at retirement: 45% per year from age 60 - 74 and 100% assumed at age 75.

Tier 1 – reaching age 62 after attaining 20 (25 for dispatchers) years of service:
Service-related rates based on service at retirement:

Service	Rate
20	30%
21	28%
22	19%
23	17%
24	13%
25-26	26%
27-29	19%
30-31	27%
32-33	40%
34-35	50%
36	60%
37+	100%

Tiers 2 & 3:
Age-related rates based on age at retirement:

Age	Rate
53-54	40%
55	30%
56-57	15%
58-59	30%
60-61	65%
62+	100%

Termination Rate

These rates are used to project future decrements from the active population due to termination. Service-related rates based on service at termination are shown below. The rates below apply to members prior to retirement eligibility and are based on a 2017 experience study using actual plan experience.

Service	Rate
0	23.00%
1	20.00%
2	16.50%
3	14.50%
4	13.00%
5	10.50%
6	9.50%
7	9.00%
8-10	8.50%
11	6.00%
12	5.00%
13	4.50%
14-16	3.00%
17+	2.00%

Disability Rate

These rates are used to project future decrements from the active population due to disability. Sample age-related rates based on age at disability are provided below. These rates are based on a 2017 experience study using actual plan experience. 100% of disablements are assumed to be duty-related.

Age	Rate
20	0.03%
25	0.03%
30	0.03%
35	0.04%
40	0.05%
45	0.06%
50	0.08%
55	0.08%

Marital Status	For active members, 75% of males and 50% of females are assumed to be married. Actual marital status is used, where applicable, for inactive members.
Spouse's Age	Males are assumed to be three years older than females.
Health Care Utilization	For active members, 60% of retirees are expected to utilize retiree health care. Actual utilization is used for inactive members.
Funding Method	Entry Age Normal Cost Method.
Actuarial Asset Method	Method described below. Note that during periods when investment performance exceeds (falls short) of the assumed rate, the actuarial value of assets will tend to be less (greater) than the market value of assets. ***Tiers 1 & 2:*** Each year the assumed investment income is recognized in full while the difference between actual and assumed investment income are smoothed over a 7-year period subject to a 20% corridor around the market value. ***Tier 3:*** Each year the assumed investment income is recognized in full while the difference between actual and assumed investment income are smoothed over a 5-year period subject to a 20% corridor around the market value.
Funding Policy Amortization Method	***Tiers 1 & 2:*** Any positive UAAL (assets less than liabilities) is amortized using a layered approach beginning with the June 30, 2020 valuation, with new amounts determined according to a Level Dollar method over a closed period of 15 years (phased into from current period of at most 30 years). Initial layer from June 30, 2019 valuation continues to be amortized according to a Level Percentage of Payroll method. Any negative UAAL (assets greater than liabilities) is amortized according to a Level Dollar method over an open period of 20 years. ***Tier 3:*** Any positive UAAL (assets less than liabilities) is amortized according to a Level Dollar method over a closed period of 10 years. No amortization is made of any negative UAAL (assets greater than liabilities).
Payroll Growth	3.00% per year. This is annual increase for total employer payroll.

Stabilization Reserve	Beginning with the June 30, 2007 valuation and with each subsequent valuation, if the actuarial value of assets exceeds the actuarial accrued liability, one half of this excess in each year is allocated to a Stabilization Reserve. This Reserve is excluded from the calculation of the employer contribution rates. The Reserve accumulates as long as the plan is overfunded. Once the plan becomes underfunded, the Stabilization Reserve will be used to dampen increases in the employer contribution rates.

Changes to Actuarial Assumptions and Methods Since the Prior Valuation

- The amortization method was changed for Tiers 1 and 2 to use a layered amortization approach.
- The payroll growth assumption was lowered from 3.50% to 3.00%.

VII. DISCUSSION OF RISK

ASOP No. 51, Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions, states that the actuary should identify risks that, in the actuary's professional judgment, may reasonably be anticipated to significantly affect the plan's future financial condition.

Throughout this report, actuarial results are determined under various assumption scenarios. These results are based on the premise that all future plan experience will align with the plan's actuarial assumptions; however, there is no guarantee that actual plan experience will align with the plan's assumptions. Whenever possible, the recommended assumptions in this report reflect conservatism to allow for some margin of unfavorable future plan experience. However, it is still possible that actual plan experience will differ from anticipated experience in an unfavorable manner that will negatively impact the plan's funded position.

Below are examples of ways in which plan experience can deviate from assumptions and the potential impact of that deviation. Typically, this results in an actuarial gain or loss representing the current-year financial impact on the plan's unfunded liability of the experience differing from assumptions; this gain or loss is amortized over a period of time determined by the plan's amortization method. When assumptions are selected that adequately reflect plan experience, gains and losses typically offset one another in the long term, resulting in a relatively low impact on the plan's contribution requirements associated with plan experience. When assumptions are too optimistic, losses can accumulate over time and the plan's amortization payment could potentially grow to an unmanageable level.

- <u>Investment Return</u>: When the rate of return on the Actuarial Value of Assets falls short of the assumption, this produces a loss representing assumed investment earnings that were not realized. Further, it is unlikely that the plan will experience a scenario that matches the assumed return in each year as capital markets can be volatile from year to year. Therefore, contribution amounts can vary in the future.
- <u>Salary Increases</u>: When a plan participant experiences a salary increase that was greater than assumed, this produces a loss representing the cost of an increase in anticipated plan benefits for the participant as compared to the previous year. The total gain or loss associated with salary increases for the plan is the sum of salary gains and losses for all active participants.
- <u>Payroll Growth</u>: The plan's payroll growth assumption, if one is used, causes a predictable annual increase in the plan's amortization payment in order to produce an amortization payment that remains constant as a percentage of payroll if all assumptions are realized. If payroll does not increase according to the plan's payroll growth assumption, the plan's amortization payment can increase significantly as a percentage of payroll even if all assumptions other than the payroll growth assumption are realized.
- <u>Demographic Assumptions:</u> Actuarial results take into account various potential events that could happen to a plan participant, such as retirement, termination, disability, and death. Each of these potential events is assigned a liability based on the likelihood of the event and the financial consequence of the event for the plan. Accordingly, actuarial liabilities reflect a blend of financial consequences associated with various possible outcomes (such as retirement at one of various possible ages). Once the outcome is known (e.g. the participant retires) the liability is adjusted to reflect the known outcome. This adjustment

produces a gain or loss depending on whether the outcome was more or less favorable than other outcomes that could have occurred.

- Contribution risk: This risk results from the potential that actual employer contributions may deviate from actuarially determined contributions, which are determined in accordance with the Board's funding policy. The funding policy is intended to result in contribution requirements that if paid when due, will result in a reasonable expectation that assets will accumulate to be sufficient to pay plan benefits when due. Contribution deficits, particularly large deficits and those that occur repeatedly, increase future contribution requirements and put the plan at risk for not being able to pay plan benefits when due.

Impact of Plan Maturity on Risk

For newer pension plans, most of the participants and associated liabilities are related to active members who have not yet reached retirement age. As pension plans continue in operation and active members reach retirement ages, liabilities begin to shift from being primarily related to active members to being shared amongst active and retired members. Plan maturity is a measure of the extent to which this shift has occurred. It is important to understand that plan maturity can have an impact on risk tolerance and the overall risk characteristics of the plan. For example, plans with a large amount of retired liability do not have as long of a time horizon to recover from losses (such as losses on investments due to lower than expected investment returns) as plans where the majority of the liability is attributable to active members. For this reason, less tolerance for investment risk may be warranted for highly mature plans with a substantial inactive liability. Similarly, mature plans paying substantial retirement benefits resulting in a small positive or net negative cash flow can be more sensitive to near term investment volatility, particularly if the size of the fund is shrinking, which can result in less assets being available for investment in the market.

To assist with determining the maturity of the plan, we have provided some relevant metrics in the table following titled "Plan Maturity Measures and Other Risk Metrics." For a better understanding of the overall Plan and the impact of these risks, please refer to the consolidated CORP valuation report.

Plan Maturity Measures and Other Risk Metrics

	Tiers 1 & 2		
	06/30/2018	**06/30/2019**	**06/30/2020**
Support Ratio			
Total Actives	61	42	38
Total Inactives	59	72	74
Actives / Inactives	103.4%	58.3%	51.4%
Asset Volatility Ratio			
Market Value of Assets (MVA)		6,472,507	6,683,936
Total Annual Payroll		1,638,248	1,648,744
MVA / Total Annual Payroll		395.1%	405.4%
Accrued Liability (AL) Ratio			
Inactive Accrued Liability	6,959,671	8,476,096	8,499,125
Total Accrued Liability	11,831,346	12,979,893	13,964,672
Inactive AL / Total AL	58.8%	65.3%	60.9%
Funded Ratio			
Actuarial Value of Assets (AVA)	6,230,165	6,689,997	7,110,649
Total Accrued Liability	11,831,346	12,979,893	13,964,672
AVA / Total Accrued Liability	52.7%	51.5%	50.9%
Net Cash Flow Ratio			
Net Cash Flow *		47,297	51,323
Market Value of Assets (MVA)		6,472,507	6,683,936
Net Cash Flow / MVA		0.7%	0.8%

* *Determined as total contributions minus benefit payments. Administrative expenses are typically included but are considered part of the net interest rate assumption for this plan.*

VIII. Summary of Current Plan

The following is a summary of the benefit provisions provided in Title 38, Chapter 5, Article 6 of the Arizona Revised Statutes.

Membership	Full-time employees of a participating employer in a designated position, whose customary employment is at least 40 hours each week. Includes employees hired after July 1, 2018 only if they are a judiciary probation or surveillance officer who makes the irrevocable election to participate in the plan.
Benefit Tiers	Benefits differ for members based on their hire date:

Tier	Hire Date
1	Hired before January 1, 2012
2	Hired on or after January 1, 2012 but before July 1, 2018
3	Hired on or after July 1, 2018

Salary	Salary is the amount including base salary, shift and military differential pay, and holiday pay, paid to an employee on a regular payroll basis. For Tier 3 members, salary is limited by statutory cap ($70,000 with adjustments by the Board).
Average Monthly Benefit Salary	***Tier 1:*** One-thirty-sixth of the highest total salary during a period of thirty-six consecutive months of service within the last one hundred twenty months of service. ***Tier 2 & 3:*** One-sixtieth of the highest total salary during a period of sixty consecutive months of service within the last one hundred twenty months of service.
Credited Service	Total periods of service, both from service other State plans and those compensated periods of service for which the member made contributions to the fund.
Normal Retirement Date	***Tier 1:*** First day of the month following attainment of 1) age 62 with 10 years of Credited Service, 2) 20 (25, if dispatcher) years of Credited Service, or 3) age and Credited Service points equal to 80.

Tier 2:
First day of month following the attainment of 1) age 52.5 with 25 years of Credited Service, or 2) age 62 with 10 years of Credited Service.

Tier 3:
First day of month following the attainment of age 55 with 10 years of Credited Service.

Benefit

Tier 1:
2.50% times Credited Service (up to 20 years) times Average Monthly Salary. If Credited Service exceeds 20 years, an additional 2.00% accrual is provided for up to five years. If Credited Service exceeds 25 years, the additional accrual for service in excess of 20 years is increased to 2.50%. Maximum benefit equals 80% of Average Monthly Salary.

Tier 2:
2.50% times Credited Service times Average Monthly Salary (maximum benefit equals 80% of Average Monthly Salary).

Tier 3:
Benefit multiplier (below) times Average Monthly Benefit Salary times Credited Service (maximum benefit of 80% of Average Monthly Benefit Salary):

Credited Service	Benefit Multiplier
10 years, but less than 15	1.25%
15 years, but less than 20	1.50%
20 years, but less than 22	1.75%
22 years, but less than 25	2.00%
25+ years	2.25%

Form of Benefit

For married retirees, an annuity payable for the life of the member with 80% continuing to the eligible spouse upon death. For unmarried retirees, the normal form is a single life annuity.

Early Retirement

Only applicable to Tier 3 members:

Date

Attainment of age 52.5 and 10 years of Credited Service.

Benefit

Actuarial equivalent of Normal Retirement benefit.

Disability Benefit – Duty-Related

Eligibility

Total and permanent disability incurred in performance of duty.

Benefit Amount	The greater of 1) 50% of Average Monthly Salary, and 2) the Normal Retirement pension that the member is entitled to receive.

Disability Benefit – Ordinary

Eligibility	Total and permanent disability not incurred in performance of duty.
Benefit Amount	
Dispatchers	Normal Retirement pension that the member is entitled to receive prorated on Credited Service (maximum 25 years) over 25.
All Others	Normal Retirement pension that the member is entitled to receive prorated on Credited Service (maximum 20 years) over 20.

Pre-Retirement Death Benefit

Payable to Eligible Survivor	Payable to eligible spouse for life; payable to eligible children until adopted, age 18, or age 23 if full-time student.
Service Incurred	100% of Average Monthly Salary
Non-Service Incurred	40% of Average Monthly Salary.
No survivors	Two times member's accumulated contributions.

Vesting (Termination)

Deferred Annuity	***Tier 1*:** For those with 10 or more years of Credited Service, an annuity based on two times member's accumulated contributions, deferred to age 62. Member is not entitled to survivor benefits, benefit increases, or group health insurance subsidy.
Return of Contributions	***Tier 1*:** Lump sum payment of accumulated contributions, plus additional amount based on years of credited service.

Service	Additional % of Contributions
Less than 5 years	0%
5 years	25%
6 years	40%
7 years	55%
8 years	70%
9 years	85%
10+ years	100%

Tiers 2 & 3:
Lump sum payment of accumulated contributions, with interest at rate determined by the Board.

Cost-of-Living Adjustment

Payable to retired member or survivor of retired member

Tiers 1 & 2
Compound cost-of-living adjustment on base benefit. First payment is made on July 1, 2018, with annual adjustments effective every July 1 thereafter.
Cost-of-living adjustment will be based on the average annual percentage change in the Metropolitan Phoenix-Mesa Consumer Price Index published by the United states Department of Labor, Bureau of Statistics. Maximum increase of 2%.

Tier 3
Compound cost-of-living adjustment on base benefit beginning earlier of fist calendar year after the 7th anniversary of retirement or when the retired member reaches 60 years of age.
A cost-of-living adjustment shall be paid on July 1 each year that the funded ratio for members hired on or after July 1, 2018 is 70% or more.

The cost-of-living adjustment will be based on the average annual percentage change in the Metropolitan Phoenix-Mesa Consumer Price Index published by the United States Department of Labor, Bureau of Statistics. The cost-of-living adjustment will not exceed:

- 2%, if funded ratio for members who are hired on or after July 1, 2018 is 90% or more;
- 1.5%, if funded ratio for members who are hired on or after July 1, 2018 is 80-90%;
- 1%, if funded ratio for members who are hired on or after July 1, 2018 is 70-80%.

Reverse Deferred Retirement Option Plan (Reverse DROP):

Eligibility

Tier 1 and eligible for normal pension with at least 24 years of Credited Service (25 years for dispatchers). Must not have been awarded disability pension.

Reverse DROP Date

First day of month immediately following completion of required Credited Service or date not more than 60 consecutive months before the date the member elects to participate in the Reverse DROP, whichever is later.

Benefit Amount	Calculated based on Credited Service and Average Monthly Salary as of the Reverse DROP Date.
Reverse DROP Lump Sum	Accumulated benefit amounts (with interest) from Reverse DROP date to the date the member elected to participate in Reverse DROP. Interest is equal to the yield on five-year Treasury note as of the first day of the month, as published by the Federal Reserve Board.

<u>Post-Retirement Health Insurance Subsidy</u>

Eligibility	Retired member or survivor who elect health coverage provided by the state or participating employer.

Maximum Subsidy Amounts (monthly)

	Member Only	With Dependents
Medicare Eligible	$100	$170
One w/ Medicare	N/A	$215
Not Medicare Eligible	$150	$260

<u>Employee Contributions</u>

Tiers 1 and 2:

Non-dispatchers: 8.41% of salary, or 50/50 split of total employer and employee costs, whichever is lower, until the plan is 100% funded. Minimum contribution of 7.65% of salary.

Dispatchers: 0.45% less than non-dispatcher rate until plan is 100% funded; equal thereafter.

Tier 3:

66.7% of the Normal Cost plus 50% of a level-dollar amortization of unfunded actuarial accrued liability over a closed period not to exceed 10 years.

<u>Employer Contributions</u>

Tiers 1 & 2:

Normal Cost, plus amortization of unfunded actuarial accrued liability over a closed period not to exceed 20 years. Contribution will never be less than 6% of payroll.

Tier 3:

33.3% of the Normal Cost plus 50% of a level-dollar amortization of unfunded actuarial accrued liability over a closed period not to exceed 10 years.

Changes to Benefit Provisions Since the Prior Valuation

None.

IX. ACTUARIAL FUNDING POLICY

The purpose of this Actuarial Funding Policy is to record the funding objectives and policy set by the Board for the Arizona Corrections Officer Retirement Plan. The Board establishes this Funding Policy to help ensure the systematic funding of future benefit payments for members of the Retirement System.

This funding policy was reviewed by the Board annually for several years following initial adoption until the 2017 experience study. Subsequently, it shall be reviewed every five years in conjunction with the experience study, although some adjustments may be warranted sooner to properly reflect Tier 3 benefits and changes to amortization methodology.

Funding Objectives

1. Maintain adequate assets so that current plan assets plus future contributions and investment earnings are sufficient to fund all benefits expected to be paid to members and their beneficiaries.

2. Maintain stability of employer contribution rates, consistent with other funding objectives.

3. Maintain public policy goals of accountability and transparency. Each policy element is clear in intent and effect, and each should allow an assessment of whether, how and when the funding requirements of the plan will be met.

4. Promote intergenerational equity. Each generation of members and employers should incur the cost of benefits for the employees who provides services to them, rather than deferring those costs to future members and employers.

5. Provide a reasonable margin for adverse experience to help offset risks.

6. Continue progress of systematic reduction of the Unfunded Actuarial Accrued Liability (UAAL).

Elements of Actuarial Funding Policy

1. **Actuarial Cost Method**
   a. The Entry Age Normal level percent of pay actuarial cost method of valuation shall be used in determining the Actuarial Accrued Liability (AAL) and Normal Cost. Differences in the past between assumed experience and actual experience ("actuarial gains and losses") shall become part of the AAL. The Normal Cost shall be determined on an individual basis for each active member.

2. **Asset Smoothing Method**
   a. The investment gains or losses of each valuation period, resulting from the difference between the actual investment return and assumed investment return, shall be recognized annually in level amounts over seven years in calculating the Actuarial Value of Assets.

   b. The Actuarial Value of Assets so determined shall be subject to a 20% corridor relative to the Market Value of Assets.

3. Amortization Method

a. The Actuarial Value of Assets are subtracted from the computed AAL. Any unfunded amount is amortized as a level percent of payroll over a closed period. If the Actuarial Value of Assets exceeds the AAL, the excess is amortized over an open period of 20 years and applied as a credit to reduce the Normal Cost otherwise payable.

4. Funding Target

a. The targeted funded ratio shall be 100%.

b. The maximum amortization period shall be 30 years.

c. If the funding ratio is between 100% and 120%, a minimum contribution equal to the Normal Cost will be made.

5. Risk Management

a. Assumption Changes

i. The actuarial assumptions used shall be those last adopted by the PSPRS Board based on the most recent experience study and upon the advice and recommendation of the actuary. In accordance with best practices, the actuary shall conduct an experience study every five years. The results of the study shall be the basis for the actuarial assumption changes recommended to the PSPRS Board.

ii. The actuarial assumptions can be updated during the five-year period if significant plan design changes or other significant events occur, as advised by the actuary.

b. Amortization Method

i. The amortization method, Level Percent Closed, will ensure full payment of the UAAL over a finite, systematically decreasing period not to exceed 30 years. The amortization period will be reviewed once the period reaches 15 years.

c. Risk Measures

i. The following risk measures will be annually determined to provide quantifiable measurements of risk and their movement over time.

1. Classic measures currently determined
   - Funded ratio (assets / liability)
2. UAAL / Total Payroll
   - Measures the risk associated with contribution decreases relative impact on the ability to fund the UAAL. An increase in this measure indicates an increase in contribution risk.
3. Total Liability / Total Payroll
   - Measures the risk associated with the ability to respond to liability experience through adjustments in contributions. An increase in this measure indicates an increase in experience risk.

X. GLOSSARY

Actuarial Accrued Liability – Computed differently under different funding methods, the actuarial accrued liability generally represents the portion of the actuarial present value of benefits attributable to service credit earned (or accrued) as of the valuation date.

Actuarial Present Value of Benefits – Amount which, together with future interest, is expected to be sufficient to pay all benefits to be paid in the future, regardless of when earned, as determined by the application of a particular set of actuarial assumptions; equivalent to the actuarial accrued liability plus the present value of future normal costs attributable to the members.

Actuarial Assumptions – Assumptions as to the occurrence of future events affecting pension costs. These assumptions include rates of investment earnings, changes in salary, rates of mortality, withdrawal, disablement, and retirement as well as statistics related to marriage and family composition.

Actuarial Cost Method – A method of determining the portion of the cost of a pension plan to be allocated to each year; sometimes referred to as the "actuarial funding method." Each cost method allocates a certain portion of the actuarial present value of benefits between the actuarial accrued liability and future normal costs.

Actuarial Equivalence – Series of payments with equal actuarial present values on a given date when valued using the same set of actuarial assumptions.

Actuarial Present Value - The amount of funds required as of a specified date to provide a payment or series of payments in the future. It is determined by discounting future payments at predetermined rates of interest, and by probabilities of payments between the specified date and the expected date of payment.

Actuarial Value of Assets – The value of cash, investments, and other property belonging to the pension plan as used by the actuary for the purpose of the actuarial valuation. This may correspond to market value of assets, or some modification using an asset valuation method to reduce the volatility of asset values.

Asset Gain (Loss) – That portion of the actuarial gain attributable to investment performance above (below) the expected rate of return in the actuarial assumptions.

Amortization – Paying off an interest-discounted amount with periodic payments of interest and (generally) principal, as opposed to paying off with a lump sum payment.

Amortization Payment – That portion of the pension plan contribution designated to pay interest and reduce the outstanding principal balance of unfunded actuarial accrued liability. If the amortization payment is less than the accrued interest on the unfunded actuarial accrued liability the outstanding principal balance will increase.

Assumed Earnings Rate – The interest rate used in developing present values to reflect the time value of money.

Decrements – Events which result in the termination of membership in the system such as retirement, disability, withdrawal, or death.

Entry Age Normal (EAN) Funding Method – A standard actuarial funding method whereby each member's normal costs (service costs) are generally level as a percentage of pay from entry age until retirement. The annual cost of benefits is comprised of the normal cost plus an amortization payment to reduce the UAL.

Experience Gain (Loss) – The difference between actual unfunded actuarial accrued liabilities and anticipated unfunded actuarial accrued liabilities during the period between two valuation dates. It is a measurement of the difference between actual and expected experience, and may be related to investment earnings above (or below) those expected or changes in the liability due to fewer (or greater) than expected numbers of retirements, deaths, disabilities, or withdrawals, or variances in pay increases relative to assumed pay increases. The effect of such gains (or losses) is to decrease (or increase) future costs.

Funded Ratio – A measure of the ratio of the actuarial value of assets to liabilities of the system. Typically, the assets used in the measure are the actuarial value of assets as determined by the asset valuation method. The funded ratio depends not only on the financial strength of the plan but also on the asset valuation method used to determine the assets and on the funding method used to determine the liabilities.

Market Value of Assets (MVA) – The value of assets as they would trade on an open market.

Normal Cost – Computed differently under different funding methods, generally that portion of the actuarial present value of benefits allocated to the current plan year.

Unfunded Actuarial Accrued Liability (UAAL) – The excess of the actuarial accrued liability over the valuation assets; sometimes referred to as "unfunded past service liability". UAL increases each time an actuarial loss occurs and when new benefits are added without being fully funded initially and decreases when actuarial gains occur.