ARKANSAS STATE HIGHWAY EMPLOYEES RETIREMENT SYSTEM (ASHERS)

ACTUARIAL VALUATION
AS OF JUNE 30, 2019

Osborn, Carreiro & Associates, Inc.

ACTUARIES ● CONSULTANTS ● ANALYSTS
124 West Capitol Avenue, Suite 1690
Little Rock, AR 72201 (501)376-8043

Osborn, Carreiro & Associates, Inc.

ACTUARIES ● CONSULTANTS ● ANALYSTS

One Union National Plaza, Suite 1690
124 West Capitol Avenue
Little Rock, Arkansas 72201
(501)376-8043 fax (501)376-7847

December 10, 2019

Board of Trustees
Arkansas State Highway Employees
Retirement System (ASHERS)
P. O. Box 2261
Little Rock, AR 72203

RE: Actuarial Valuation as of June 30, 2019

Ladies and Gentlemen:

This report presents the results of our actuarial valuation of the assets and liabilities of the Arkansas State Highway Employees Retirement System (ASHERS) as of June 30, 2019. This valuation determines the contributions for the 2019-20 Plan Year (July 1, 2019 to June 30, 2020). The primary purposes of the valuation report are to determine the adequacy of the current employer contribution rate, to describe the current financial condition of ASHERS, and to analyze changes in the condition of the system.

This report together with the GASB report and the information presented in person to the board should be considered together as the complete report.

Actuarial Status of Plan

The funded status of the plan slipped from 83.51% to 81.21% this year. This is the ratio of the actuarial liabilities of the plan to the actuarial value (smoothed) assets. This was mostly due to the investment losses that occurred during the fiscal year and retirements that were at a higher rate than expected. This is detailed in the report. There was an increase in the funded status and a reduction in the 30-year payoff of unfunded actuarial accrued liabilities that is reflected in this report due to the changes in legislation during the 2019 regular session. The funding period is now 53.2 years based on current contributions. The total contribution rate would be about 24.7% (compared to the current 21.9%) to meet the 30-year payoff of unfunded actuarial accrued liabilities. This gap between calculated and actual contribution is about 1.3% of payroll less than it was last year.

Accounting Information

A separate report with the reporting standard of GASB Statement 67 and 68 based on the same assumptions and methods will be sent under separate cover.

Organization of Report

Following this cover letter and a table of contents, there is an Executive Summary of the results of the valuation as well as a discussion of the highlights. The Exhibits then show the details of the calculations. The Appendices then disclose the plan provisions and assumptions used.

Statement of Qualifications

This report has been prepared by actuaries who have experience valuing public employee retirement systems, with the undersigned taking the primary responsibility. To the best of our knowledge, this report is complete and accurate and was completed in accordance with standards of practice promulgated by the Actuarial Standards Board and in conformance with applicable Arkansas law. The actuaries are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained in this report.

The actuaries know of no significant conflicts of interest with the plan sponsor. We have previously disclosed that we also serve the Bureau of Legislative Research by preparing reports for the Joint Retirement Committee. We do not view this relationship as a significant conflict of interest.

We look forward to discussing this report with you in detail. Please let us know if you have any questions or comments.

Sincerely,

Jody Carreiro

Jody Carreiro, FCA, ASA, EA, MAAA
Actuary

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EXECUTIVE SUMMARY

A brief summary of the more important figures developed in this valuation, with comparable results from prior reports, follows:

	6/30/2017	6/30/2018	6/30/2019
Number in Plan			
a) Active Members	3,308	3,343	3,379
b) Members in DROP	355	369	366
c) Members Receiving Benefits	3,379	3,436	3,579
d) Inactive Members	217	211	269
Market Value of Assets	$ 1,354,321,200	$ 1,472,472,865	$ 1,386,076,598
Actuarial Value of Assets	$ 1,439,516,380	$ 1,424,240,080	$ 1,410,043,327
Actuarial Accrued Liability	$ 1,669,107,926	$ 1,705,400,905	$ 1,736,380,825
Unfunded Actuarial Accrued Liability	$ 229,591,546	$ 281,160,825	$ 326,337,498
Funded Percentage (Based on Actuarial Assets)	86.24%	83.51%	81.21%
Funded Percentage (Based on Market Value of Assets)	81.14%	86.34%	79.83%
Contribution Rates for the year beginning On the Valuation Date			
Employee	6.00%	6.00%	6.50%
Employer	12.90%	12.90%	14.90%
Total	18.90%	18.90%	21.40%
Needed to Fund UAAL in 30 years	21.05%	23.31%	24.67%
Years to Fund at Current Contribution	77.6 years	Infinite	53.2 years

Discussion

Introduction

The results of the June 30, 2019 actuarial valuation of the Arkansas State Highway Employees Retirement System (ASHERS) performed by Osborn, Carreiro & Associates, Inc. are summarized in this report. The purpose of any actuarial valuation is to provide an estimate of how well the employer is meeting its emerging pension liabilities.

We have relied on the employee data and asset information provided by the staff of ASHERS. While not auditing or verifying the data at the source, we have performed such tests for consistency and reasonableness as has been deemed necessary to be satisfied with the appropriateness of using the data supplied. There were no significant adjustments made to the data that was supplied by staff. We did remove the seasonal workers that were included in the file we received.

Executive Summary

The Executive Summary on the preceding page provides the reader with key results of this valuation report. This provides a single page with the most discussed items that are developed later in the report.

Funded Status

The Funded Status of the plan is typically first discussed in terms of the Funded Percentage. The Funded Percentage is 81.21% as of the valuation date compared with 83.51% last year. This reduction from last year is mainly due to a loss to actuarial value of assets as discussed later. Although the goal is always to be at least 100% funded, a funded percentage over 80% is often considered a positive sign of health for the plan.

The Funded Status of a plan is more than just a measurement of the Funded Percentage. We also need to consider whether the contribution policy will provide funding for the long term. As you know, the funding policy of ASHERS is currently part of state law. Beginning July 1, 2019, the employees contribute 6.5% and the employer contributes 14.9% of pay for a total 21.4% of pay. There are also contributions that arise from Tier II DROP (6% employee, 6.9% employer).

Exhibit 2 of the report develops a couple of contribution levels for comparison. A 30-year amortization of unfunded accrued liabilities is an old standard that is still relevant to state law. That contribution level is 24.67% of payroll compared to the 21.40% (ultimately 21.90%) of payroll currently contributed. This means that the plan would not be fully funded over the next 30 years at the current contribution rate.

Discussion (Continued)

We also developed in Exhibit 2 the rate necessary to fund the unfunded accrued liability over 18 years. This is a timetable that has been discussed more recently. This is a timetable where the payments to reduce the unfunded will be at least large enough so the projected unfunded does not increase in the early years. This is also referred to as negative amortization. The contribution level to fund the plan over 18 years is 28.31% of payroll.

The ultimate question about contribution policy is whether or not the current policy will ever fully fund the benefits promised. Also in Exhibit 2, we calculated the years necessary to fund the unfunded accrued liability using the current contributions available. As shown there, this amount decreased from infinite to 53.2 years. In other words, the plan should be sustained with the new contribution level.

Changes in Assets during the Year

The financial information provided to us is summarized in Exhibit 3 of the report. As you will note, the estimated yield for the last fiscal year was 0.32% net of investment expenses, 7.68% below the assumed rate of return. This compares with 15.68% for the previous year. This is using the standard mid-year average yield formula which is typically going to be a little different than a time weighted return often reported by investment advisors.

The actuarial value of assets, sometimes called smoothed value, takes the return in excess (or below) of the expected return of 8% and smooths it over 4 years. That is, only 25% of that loss is recognized in the year it is earned. The rate of return on the actuarial value of assets for this fiscal year was only 5.57%. As you will see in Exhibit 3, there is about $24 million of net investment losses to be recognized in future years.

Actuarial Gains and Losses

The actuarial gains and losses by source are developed on page 10 of the report. Besides the loss on investment return, there is a loss on the development of the liabilities. This is primarily due to retirement rates greater than those expected in the valuation assumptions. Finally, there was an actuarial gain due to the changes made during the legislative session. Together, these resulted in an actuarial loss of about $33 million (1.93% of liabilities) in this fiscal year.

There were legislative changes made this year. The COLA was discontinued for the health care offset, the amount of interest paid on return of contributions was lowered and the increases in employee and employer contributions were implemented. These are all recognized in the valuation report. The result of the changes was a 1.13% of payroll reduction in the 30-year amortization of unfunded liability. The true benefit of the increased contributions is not a reduction in the unfunded actuarial accrued liabilities but in the fact that they will be paid down more quickly.

Discussion (Continued)

History of Cash Flows

We have continued showing the History of Cash Flow chart as part of Exhibit 3 (page 15). The primary result of this page is that the external cash flows out of the plan is about 7.2%, an expected increase from the past few years. This is a measurement of the cash flows in and out of the plan before adding investment income. A level of 7% means that most of the investment income expected (7% out of 8%) is immediately going out of the plan. The way to improve this measurement is to increase the amounts coming into the plan and/or decrease the amount coming out of the plan. The increased contributions in fiscal 2020 is projected to reduce that back below 7% in 2020.

EXHIBIT 1
COSTS AND LIABILITIES

ACTUARIAL PRESENT VALUE OF FUTURE BENEFITS

			6/30/2018		6/30/2019
A.	Active Members				
	1. Retirement Benefits	$	413,469,595	$	392,976,304
	2. Disability Benefits		49,315,018		49,279,882
	3. Death Benefits		3,258,787		3,134,520
	4. Deferred Termination Benefits		14,781,709		14,532,925
	5. Refunds of Contributions		1,944,258		1,892,541
	6. Total Active Members	$	482,769,368	$	461,816,172
B.	Deferred Retirement Option Plan (DROP)				
	1. Future DROP deposits and retirement benefits	$	175,576,594	$	181,243,020
	2. Expected Payouts of current DROP Deposits		183,836,550		194,376,904
	3. Total DROP Members	$	359,413,144	$	375,619,924
C.	Inactive Members				
	1. Vested terminations	$	6,469,403	$	6,881,041
	2. Non-vested terminations		1,285,465		1,409,782
	3. Total Inactive Members	$	7,754,868	$	8,290,823
D.	Retired Members Receiving Benefits				
	1. Service retirements	$	854,843,412	$	896,492,642
	2. Disability retirements		80,862,921		78,516,156
	3. Beneficiaries		63,213,160		64,311,398
	4 Total Retired Members	$	998,919,492	$	1,039,320,196
E.	Total Actuarial Present Value of Future Benefits (A6 + B3 + C3 + D4)	$	1,848,856,872	$	1,885,047,115

EXHIBIT 1 (continued)

ANALYSIS OF NORMAL COST

		6/30/2018	6/30/2019
A.	Normal Cost (to fund current Active Members) (Percentage of Payroll)		
1.	Retirement Benefits	8.39%	8.02%
2.	Disability Benefits	1.82%	1.85%
3.	Death Benefits	0.13%	0.12%
4.	Deferred Termination Benefits	1.03%	1.13%
5.	Refunds of Contributions	0.62%	0.61%
6.	Total Normal Cost	11.99%	11.73%
B.	Present Value of Future Normal Costs		
1.	Annualized salaries (excludes DROPs)	$ 144,111,392	$ 144,750,560
2.	Projected payroll for upcoming fiscal year	153,112,009	154,451,494
3.	Present value of future salaries	1,166,442,186	1,169,313,818
4.	Dollar Value of Normal Cost (A6 X B2)	18,358,130	18,117,160
5.	Present Value of Future Normal Costs (A6 X B3)	139,856,418	137,160,511

EXHIBIT 1 (continued)

DEVELOPMENT OF UNFUNDED ACTUARIAL LIABILITY

			6/30/2018		6/30/2019
A.	Actuarial Accrued Liabilities – Active Members				
	1. Present Value of future benefits	$	482,769,368	$	461,816,172
	2. Less Present Value of future normal costs		139,856,418		137,160,511
	3. Accrued Liability - Actives	$	342,912,950	$	324,655,661
B.	Actuarial Accrued Liabilities – DROP Members				
	1. Present Value of future benefits	$	359,413,144	$	375,619,924
	2. Less present value of future Tier II Contributions		3,599,549		11,505,779
	3. Accrued Liability - DROP	$	355,813,595	$	364,114,145
C.	Actuarial Accrued Liabilities – Inactive Members	$	7,754,868	$	8,290,823
D.	Actuarial Accrued Liabilities – Retired Members	$	998,919,492	$	1,039,320,196
E.	Total Actuarial Accrued Liabilities (A3 + B3 +C + D)	$	1,705,400,905	$	1,736,380,825
F.	Actuarial Value of Assets (Developed in Exhibit 3)		1,424,240,080		1,410,043,327
G.	Unfunded Actuarial Accrued Liability (E – F)	$	281,160,825	$	326,337,498

EXHIBIT 1 (continued)

Actual Versus Expected Actuarial Assets

		6/30/2018	6/30/2019
1.	Actuarial assets, beginning of year	$ 1,439,516,379	$ 1,424,240,080
2.	Total contributions during year	28,457,460	28,531,322
3.	Benefits paid during year	(113,476,915)	(117,889,214)
4.	Refunds paid during year	(2,270,815)	(1,523,052)
5.	Assumed net investment income at 8%		
	a. Beginning of year assets	115,161,310	113,939,206
	b. Contributions	1,138,298	1,141,253
	c. Benefits	(4,539,077)	(4,715,569)
	d. Refunds	(90,832)	(60,922)
	e. Total	$ 111,669,699	$ 110,303,968
6.	Expected actuarial assets, end of year (Sum of items 1 through 5)	1,463,895,807	1,443,663,104
7.	Actuarial Value of Assets, end of year	1,424,240,080	1,410,043,327
8.	Asset gain/(loss) for year (7 – 6)	(39,655,727)	(33,619,777)
9.	Asset gain/(loss) as a percentage of end of year assets (8 / 7)	(2.78%)	(2.38%)

EXHIBIT 1 (continued)

ACTUARIAL GAIN OR LOSS FOR THE YEAR

			6/30/2018		6/30/2019
A.	Calculation of actuarial gain or loss				
1.	Unfunded actuarial liability (UAAL), previous year	$	229,591,546	$	281,160,825
2.	Normal cost for the year		17,619,121		18,358,130
3.	Contributions for the year		(28,457,459)		(28,531,322)
4.	Interest at 8.0%				
	a. On UAAL	$	18,367,324	$	22,492,866
	b. On normal cost		704,765		734,325
	c. On contributions		(1,138,298)		(1,141,253)
	d. Total	$	17,933,791	$	22,085,938
5.	Expected UAAL (sum of items 1 – 4)		236,686,998		293,073,571
6.	Actual UAAL		281,160,825		326,337,498
7.	Gain (loss) for the year (item 5 – item 6)	$	(44,473,826)	$	(33,263,927)
B.	Source of gains and losses				
8.	a. Asset gain (loss) for the year	$	(39,655,727)	$	(33,619,777)
	b. Gain (loss) from change in assumption		0		0
	c. Gain (loss) from change in method		0		0
	d. Gain (loss) from Legislative change		0		20,413,261
	e. Actuarial gain (loss) from liability experience (7 – 8a – 8b – 8c - 8d)		(4,818,099)		(20,057,411)
	f. Total Gain (loss) for the year (8a + 8b + 8c + 8d + 8e)	$	(44,473,826)	$	(33,263,927)
9.	Total Actuarial Accrued Liabilities (end of year)	$	1,705,400,905	$	1,736,380,825
10.	Gain (loss) components as a percentage of Actuarial Accrued Liabilities				
	a. Asset gain (loss) for the year		(2.33%)		(1.94%)
	b. Gain (loss) from change in assumption		0.00%		0.00%
	c. Gain (loss) from change in method		0.00%		0.00%
	d. Gain (loss) from Legislative change		0.00%		1.18%
	e. Actuarial gain (loss) from liability experience		(0.28%)		(1.16%)
	f. Total Gain (loss) for the year		(2.61%)		(1.92%)

EXHIBIT 2

DEVELOPMENT OF CONTRIBUTION RATES

		6/30/2018	6/30/2019
A.	Expected Contributions		
1.	Annualized salaries (excludes DROPs)	$ 144,111,392	$ 144,750,560
2.	Projected payroll for upcoming fiscal year	153,112,009	154,451,494
3.	Current Employee Contribution Rate	6.00%	6.50%
4.	Current Employer Contribution Rate	12.90%	14.90%
5.	Total Contribution Rate	18.90%	21.40%
6.	Contribution in Dollars (A2 X A5)	28,938,170	33,052,620
7.	Expected Contribution from Tier II DROP	514,665	718,598
8.	Total Expected Contributions	29,452,835	33,771,218
B.	Unfunded Actuarial Accrued Liability	$ 281,160,825	$ 326,337,498
C.	Calculation of 30-year Payoff Rate		
1.	30-year Amortization of UAAL at mid-year	$ 17,849,415	$ 20,707,504
2.	Less Expected Tier II Contributions	514,665	718,598
3.	Contribution Needed to meet goal (C1 – C2)	17,334,750	19,988,906
4.	C3 as percentage of payroll (C3/A2)	11.32%	12.94%
5.	Normal Cost	11.99%	11.73%
6.	Total Contribution Needed to meet goal	23.31%	24.67%
D.	Calculation of 18-year Payoff Rate		
1.	18-year Amortization of UAAL at mid-year	$ 23,596,917	$ 26,322,414
2.	Less Expected Tier II Contributions	514,665	718,598
3.	Contribution Needed to meet goal (D1 – D2)	23,082,252	25,603,816
4.	D3 as percentage of payroll (D3/A2)	15.08%	16.59%
5.	Normal Cost	11.99%	11.73%
6.	Total Contribution Needed to meet goal	27.07%	28.31%
E.	Calculation of Funding Period		
1.	Total Expected Contributions (A8) *	$ 29,452,835	$ 34,543,475
2.	Amount needed to pay Normal Cost	18,358,130	18,117,160
3.	Amount remaining to payoff UAAL (E1 – E2)	11,094,705	16,426,315
4.	Years to fund UAAL using amount in E3 Based on 3% payroll growth	Infinite	53.2 years

EXHIBIT 3

SUMMARY OF FINANCIAL INFORMATION

(Items D-E determined by Osborn, Carreiro and Associates, Inc.)

	Plan Year Ended		
	6/30/2017	6/30/2018	6/30/2019
A. INCOME			
1. Contributions			
Employee	$ 9,143,408	$ 9,163,176	$ 9,249,680
State	19,175,401	19,294,283	19,281,642
Other	0	0	4,600
2. Investment Income			
Interest/Dividends	24,625,498	25,900,021	26,213,069
Realized Gain (+ URG for 16-17)	116,623,355	141,998,366	45,093,676
Unrealized Gain	-	45,856,544	(58,086,291)
Investment Expense	(8,081,509)	(8,257,292)	(8,661,421)
Net Investment Income	133,167,344	205,497,639	4,559,025
3. Adjustment to Previous Year	0	0	1,443
TOTAL INCOME	$ 161,486,153	$ 233,955,098	$ 33,096,390
B. EXPENSES			
1. Administrative	$ 130,076	$ 55,703	$ 80,391
2. Refunds	2,029,791	2,270,815	1,523,052
3. Benefit Payments	109,874,806	113,476,915	117,889,214
TOTAL EXPENSES	$ 112,034,673	$ 115,803,433	$ 119,492,657

EXHIBIT 3 (Continued)

		6/30/2017	6/30/2018	6/30/2019
C. ASSETS (Market)				
1. Short Term				
	Cash	$ 278,692	$ 657,885	$ 1,507,373
	Money Market	74,574,787	169,273,146	91,969,742
2. Corporate Bonds		187,109,301	224,783,236	134,079,475
3. Common Stocks		1,026,234,099	1,020,024,248	932,042,013
4. U.S. Government agency obligations		80,821,738	58,331,725	168,570,794
5. Net Securities Lending		0	0	94,961
6. Receivables				
	Member contributions	204,201	245,653	226,133
	State contributions	1,328,447	427,411	383,543
	Interest and dividends	1,578,058	1,718,016	2,486,984
	Miscellaneous	8,493,577	5,636,506	62,702,630
7. Liabilities		(26,301,700)	(8,624,961)	(7,987,050)
TOTAL ASSETS		$ 1,354,321,200	$ 1,472,472,865	$ 1,386,076,598
D. RATIO OF ASSETS TO ANNUAL EXPENSES:		12.09	12.72	11.60
E. INVESTMENT RETURN:				
	Gross	11.22%	16.36%	0.93%
	Net of Investment Expense	10.53%	15.68%	0.32%
	Return on Actuarial Value of Assets:	5.39%	5.17%	5.57%

EXHIBIT 3 (Continued)

	7/1/2017	7/1/2018	7/1/2019
F. DEVELOPMENT OF ACTUARIAL VALUE OF ASSETS			
1. Investment income for year	$ 133,167,344	$ 205,497,639	$ 4,559,025
2. Expenses and fees for year	130,076	55,703	74,348
3. Actual net investment income	133,037,268	205,441,936	4,484,677
4. Market Value (beginning of year)	1,304,869,720	1,354,321,200	1,472,472,865
5. Contributions during year	28,318,809	28,457,459	28,531,322
6. Benefits paid during year	111,904,597	115,747,730	119,412,266
7. Expected investment income at 8%			
Market Value	104,389,578	108,345,696	117,797,829
Contributions	1,132,752	1,138,298	1,141,253
Benefits	4,476,184	4,629,909	4,776,491
Total	101,046,146	104,854,085	114,162,591
8. Investment gain for year	31,991,122	100,587,851	(109,677,914)
9. Deferral of investment gain			
Current year (75%)	23,993,342	75,440,888	(82,258,436)
Current year – 1 (50%)	(86,407,328)	15,995,561	50,293,926
Current year – 2 (25%)	(22,781,193)	(43,203,664)	7,997,781
Total	(85,195,179)	48,232,785	(23,966,729)
10. Market value (end of year)	1,354,321,200	1,472,872,865	1,386,076,598
11. Preliminary AVA (end of year) (10) – (9)	1,439,516,379	1,424,240,080	1,410,043,327
12. Final AVA within 20% corridor	$ 1,439,516,379	$ 1,424,240,080	$ 1,410,043,327

EXHIBIT 3 (Continued)

HISTORY OF CASH FLOW

Year Ending June 30	Contributions for the Year	Expenditures During the Year: Benefit Payments	Refund of Contributions	Expenses	Total	External Cash Flow for the Year	Market Value of Assets	External Cash Flow as Percent of Market Value
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1997	21,897,263	(23,593,197)	(902,144)	(1,274,552)	(25,770,613)	(3,873,350)	629,060,314	(0.6%)
1998	20,633,572	(26,568,398)	(1,136,696)	(1,443,527)	(29,148,321)	(8,514,749)	758,971,958	(1.1%)
1999	21,460,290	(27,868,587)	(1,218,372)	(1,776,862)	(30,863,821)	(9,403,531)	870,332,321	(1.1%)
2000	20,635,998	(32,437,078)	(860,532)	(2,231,766)	(35,529,375)	(14,893,377)	1,020,171,033	(1.5%)
2001	21,319,262	(35,505,451)	(1,134,443)	(3,179,023)	(39,818,918)	(18,499,656)	998,671,310	(1.9%)
2002	23,395,271	(40,606,836)	(658,917)	(3,545,184)	(44810,937)	(21,415,666)	875,304,832	(2.4%)
2003	23,656,596	(48,128,153)	(907,236)	(4,056,463)	(53,091,851)	(29,435,255)	891,122,027	(3.3%)
2004	23,623,171	(51,764,755)	(604,562)	(3,736,002)	(56,105,319)	(32,482,148)	981,026,764	(3.3%)
2005	23,814,179	(53,952,761)	(974,389)	(4,157,579)	(59,084,730)	(35,270,551)	1,041,898,315	(3.4%)
2006	23,956,626	(57,570,547)	(790,218)	(4,295,209)	(62,655,974)	(38,699,348)	1,098,788,670	(3.5%)
2007	23,742,542	(62,317,277)	(1,243,841)	(4,458,889)	(68,020,007)	(44,277,465)	1,186,151,377	(3.7%)
2008	24,286,799	(65,483,982)	(1,154,502)	(4,584,201)	(71,222,685)	(46,935,886)	1,242,354,294	(3.8%)
2009	24,730,528	(69,635,808)	(861,725)	(4,726,929)	(75,224,462)	(50,493,934)	994,466,871	(5.1%)
2010	26,691,696	(73,650,896)	(803,288)	(4,176,401)	(78,630,585)	(51,938,889)	1,052,235,399	(4.9%)
2011	26,574,184	(77,553,673)	(960,668)	(5,253,653)	(83,767,994)	(57,193,810)	1,298,501,306	(4.4%)
2012	26,521,075	(82,216,303)	(912,512)	(5,861,735)	(88,990,550)	(62,469,475)	1,230,012,388	(5.1%)
2013	26,712,669	(89,037,077)	(1,084,539)	(6,542,055)	(96,663,601)	(69,950,932)	1,326,032,436	(5.3%)
2014	27,499,336	(93,712,721)	(1,741,876)	(6,650,036)	(102,104,633)	(74,605,297)	1,492,232,422	(5.0%)
2015	28,197,463	(100,328,585)	(1,917,221)	(7,883,940)	(110,129,746)	(81,932,283)	1,443,476,293	(5.7%)
2016	28,611,588	(105,056,553)	(1,699,287)	(8,127,098)	(114,882,938)	(86,271,350)	1,304,869,720	(6.6%)
2017	28,318,809	(109,874,806)	(2,029,791)	(8,211,585)	(120,116,182)	(91,797,373)	1,354,321,200	(6.8%)
2018	28,457,459	(113,476,915)	(2,270,815)	(8,312,995)	(124,060,725)	(95,603,266)	1,472,472,865	(6.5%)
2019	28,531,322	(117,889,214)	(1,523,052)	(8,741,812)	(128,154,078)	(99,622,756)	1,386,076,598	(7.2%)
2020 est	*33,771,218*	*(120,000,000)*	*(2,000,000)*	*(8,500,000)*	*(130,500,000)*	*(96,728,782)*	*1,400,000,000*	*(6.9%)*

Column (2) includes employee and employer contributions, as well as any account reinstatement receipts during the year.
Column (5) includes both administrative and investment expenses.
Column (7) = Column (2) + Column (6)

EXHIBIT 4

EMPLOYEE PROFILE

Employee data needed for the valuation was obtained from the records furnished by the system. The following table shows a detailed breakdown of the included participants and salaries by age and years of actual ASHERS credited service. This does not include reciprocal service which determines eligibility.

All Actives – Actual Service

		Years of Service							
Age		0-4.9	5-9.9	10-14.9	15-19.9	20-24.9	25-29.9	Over 30	Total
Under 25	Count	298	19	-	-	-	-	-	317
	Salary	8,602,431	694,384	-	-	-	-	-	9,296,815
25-29	Count	218	111	10	-	-	-	-	339
	Salary	7,358,456	4,803,763	437,442	-	-	-	-	12,599,661
30-34	Count	152	99	69	15	-	-	-	335
	Salary	5,090,265	4,628,357	3,804,379	763,318	-	-	-	14,286,319
35-39	Count	148	71	83	95	9	-	-	406
	Salary	4,905,617	3,065,830	4,222,340	5,614,310	414,320	-	-	18,222,417
40-44	Count	132	78	72	99	46	5	-	432
	Salary	4,304,404	3,330,646	3,343,601	6,188,349	2,606,576	268,883	-	20,042,459
45-49	Count	133	67	70	73	68	50	5	466
	Salary	4,799,474	3,000,982	3,250,683	4,157,542	4,210,945	3,440,197	251,295	23,111,118
50-54	Count	132	76	64	74	54	70	7	477
	Salary	4,278,506	3,277,280	2,846,782	3,754,973	2,606,584	4,871,522	416,327	22,051,974
55-59	Count	98	76	56	73	65	44	7	419
	Salary	3,170,599	3,022,798	2,251,792	3,311,775	3,308,392	2,646,167	373,943	18,085,466
60-64	Count	48	46	36	24	2	3	2	161
	Salary	1,601,016	1,655,670	1,439,474	1,045,610	81,348	110,947	161,259	6,095,324
65-69	Count	13	5	2	1	-	-	2	23
	Salary	360,383	183,807	71,769	56,652	-	-	144,356	816,967
70 & Over	Count	2	1	-	1	-	-	-	4
	Salary	69,170	32,352	-	40,518	-	-	-	142,040
Total	Count	1,374	649	462	455	244	172	23	3,379
	Salary	44,540,321	27,695,869	21,668,262	24,933,047	13,228,165	11,337,716	1,347,180	144,750,560

Average Attained Age: 42.6 years
Average Actual Service: 9.6 years
Average Salary: $ 42,892

EXHIBIT 4

RETIREE PROFILE

Retiree data needed for the valuation was obtained from the records furnished by the administrator. The following table shows a detailed breakdown of the included retirees and beneficiaries by age and years since retirement. Benefits listed are annual amounts of annuities paid monthly.

All Regular Retirees Receiving Annuities

		Years since Retirement							
Age		0-.9	1-1.9	2-2.9	3-3.9	4-4.9	5-9.9	Over 10	Total
Under 45	Count	-	-	-	-	-	-	-	-
	Benefit	-	-	-	-	-	-	-	-
45-49	Count	2	2	-	-	-	-	-	4
	Benefit	69,683	54,348	-	-	-	-	-	124,031
50-54	Count	9	9	2	5	5	7	-	37
	Benefit	301,675	327,271	71,637	178,221	186,103	188,309	-	1,2253,216
55-59	Count	20	20	21	15	20	35	6	137
	Benefit	547,118	724,517	730,675	474,895	803,744	1,442,180	171,513	4,894,642
60-64	Count	59	52	49	32	36	141	50	419
	Benefit	1,770,219	1,195,410	1,394,116	1,219,308	1,400,694	5,359,759	1,921,991	14,261,497
65-69	Count	44	43	45	37	67	260	177	673
	Benefit	972,910	1,007,214	1,158,334	783,208	1,860,724	8,584,216	7,120,640	21,487,246
70-74	Count	4	5	6	8	17	184	316	540
	Benefit	10,624	109,938	110,538	124,555	233,212	5,261,792	12,522,424	18,373,083
75-79	Count	-	-	-	1	1	18	353	373
	Benefit	-	-	-	3,806	9,707	211,574	13,091,347	13,316,434
80-84	Count	-	-	-	-	3	2	260	265
	Benefit	-	-	-	-	9,363	6,408	9,769,838	9,785,609
85 & Over	Count	-	-	-	-	-	1	214	215
	Benefit	-	-	-	-	-	3,008	6,722,396	6,725,404
Total	Count	138	131	123	98	149	648	1,376	2,663
	Benefit	3,672,229	3,418,698	3,465,300	2,783,993	4,503,547	21,057,246	51,320,149	90,221,162

Average Attained Age: 71.7 years
Average Years since Retirement: 11.9 years
Average Annual Benefit: $33,880

EXHIBIT 4

DISABLED PROFILE

Retiree data needed for the valuation was obtained from the records furnished by the administrator. The following table shows a detailed breakdown of the included retirees and beneficiaries by age and years since retirement. Benefits listed are annual amounts of annuities paid monthly.

All Disability Retirees Receiving Annuities

		Years since Retirement							
Age		0-.9	1-1.9	2-2.9	3-3.9	4-4.9	5-9.9	Over 10	Total
Under 45	Count	-	1	3	1	-	3	1	9
	Benefit	-	4,388	20,185	10,776	-	26,082	7,862	69,293
45-49	Count	1	2	1	-	5	5	4	18
	Benefit	4,767	24,812	11,337	-	76,927	92,828	30,722	241,393
50-54	Count	3	5	5	4	5	14	13	49
	Benefit	49,958	77,498	44,916	45,689	76,443	223,641	218,121	736,266
55-59	Count	1	6	4	7	5	24	20	67
	Benefit	3,483	79,859	19,436	149,798	65,541	395,564	320,409	1,034,090
60-64	Count	-	3	7	4	5	21	42	82
	Benefit	-	25,767	75,877	52,313	46,045	355,977	629,131	1,185,110
65-69	Count	-	-	-	4	1	28	54	87
	Benefit	-	-	-	32,303	15,219	359,285	1,097,447	1,504,254
70-74	Count	-	-	-	-	-	2	62	64
	Benefit	-	-	-	-	-	10,294	1,254,425	1,264,722
75-79	Count	-	-	-	-	-	-	27	27
	Benefit	-	-	-	-	-	-	676,301	676,301
80-84	Count	-	-	-	-	-	-	16	16
	Benefit	-	-	-	-	-	-	375,356	375,356
85 & Over	Count	-	-	-	-	-	-	7	7
	Benefit	-	-	-	-	-	-	150,769	150,769
Total	Count	5	17	20	20	21	97	246	426
	Benefit	58,208	212,324	171,751	290,879	280,175	1,463,674	4,760,543	7,237,554

Average Attained Age:	64.2 years
Average Years since Retirement:	13.0 years
Average Annual Benefit:	$16,990

EXHIBIT 4

SURVIVOR PROFILE

Retiree data needed for the valuation was obtained from the records furnished by the administrator. The following table shows a detailed breakdown of the included retirees and beneficiaries by age and years since retirement. Benefits listed are annual amounts of annuities paid monthly.

All Survivors Receiving Annuities

		Years since Retirement							
Age		0-.9	1-1.9	2-2.9	3-3.9	4-4.9	5-9.9	Over 10	Total
Under 45	Count	3	1	-	3	3	7	1	18
	Benefit	39,420	14,393	-	27,260	23,259	64,095	1,880	170,307
45-49	Count	1	2	-	1	1	1	2	8
	Benefit	3,150	27,781	-	7,578	8,752	31,073	22,222	100,556
50-54	Count	3	-	2	3	2	3	2	15
	Benefit	85,011	-	26,339	61,611	59,972	20,498	21,811	275,242
55-59	Count	4	1	1	2	4	12	8	32
	Benefit	37,435	2,473	6,236	29,540	35,779	166,112	84,767	362,342
60-64	Count	5	5	5	5	4	28	13	65
	Benefit	158,421	93,597	84,063	53,497	23,125	446,911	163,651	1,023,265
65-69	Count	3	6	6	6	6	13	21	61
	Benefit	47,601	87,768	113,210	80,595	69,110	158,587	286,468	843,339
70-74	Count	4	9	5	4	7	17	24	67
	Benefit	71,360	66,556	63,853	69,399	97,235	298,893	389,959	1,057,255
75-79	Count	6	6	5	9	6	19	33	84
	Benefit	132,329	147,860	72,411	85,721	134,752	369,830	502,062	1,444,965
80-84	Count	3	4	3	4	1	18	28	61
	Benefit	21,038	69,887	75,617	85,116	16,304	369,764	476,653	1,114,379
85 & Over	Count	-	1	4	1	2	23	48	79
	Benefit	-	7,741	85,271	20,120	53,382	498,148	702,588	1,367,250
Total	Count	32	32	31	38	36	141	180	490
	Benefit	595,765	518,056	527,000	520,437	521,670	2,423,911	2,652,061	7,758,900

Average Attained Age: 72.3 years
Average Years since Retirement: 9.7 years
Average Annual Benefit: $15,834

EXHIBIT 4

DROP PROFILE

Retiree data needed for the valuation was obtained from the records furnished by the administrator. The following table shows a detailed breakdown of the included retirees and beneficiaries by age and years since retirement. Benefits listed are annual amounts of the current DROP deposits paid monthly.

All Current DROP Participants

		Years since Retirement							
Age		0-.9	1-1.9	2-2.9	3-3.9	4-4.9	5-9.9	Over 10	Total
Under 45	Count	-	-	-	-	-	-	-	-
	Benefit	-	-	-	-	-	-	-	-
45-49	Count	4	3	1	-	-	-	-	8
	Benefit	143,507	106,669	40,104	-	-	-	-	290,280
50-54	Count	18	20	10	10	7	3	-	68
	Benefit	794,525	860,372	365,598	407,688	235,318	94,627	-	2,758,128
55-59	Count	9	25	23	22	21	22	3	125
	Benefit	294,652	929,880	947,068	946,036	812,394	796,472	85,932	4,812,434
60-64	Count	36	20	22	13	13	12	11	127
	Benefit	813,298	489,344	514,452	408,996	432,180	457,847	400,376	3,516,493
65-69	Count	11	9	4	6	6	-	-	36
	Benefit	121,825	84,166	62,875	80,055	109,979	-	-	458,900
70-74	Count	-	-	-	1	1	-	-	2
	Benefit	-	-	-	2,772	11,418	-	-	14,190
75-79	Count	-	-	-	-	-	-	-	-
	Benefit	-	-	-	-	-	-	-	-
80-84	Count	-	-	-	-	-	-	-	-
	Benefit	-	-	-	-	-	-	-	-
85 & Over	Count	-	-	-	-	-	-	-	-
	Benefit	-	-	-	-	-	-	-	-
Total	Count	78	77	60	52	48	37	14	366
	Benefit	2,167,807	2,470,431	1,930,097	1,845,547	1,601,289	1,348,946	486,308	11,850,425

Average Attained Age:	59.1 years
Average Years since Retirement:	3.1 years
Average Annual Benefit:	$32,378

APPENDIX 1

PRINCIPAL PROVISIONS OF THE PLAN

EFFECTIVE DATE:	July 1, 1949.
EMPLOYEE:	Employees of the Arkansas State Highway System.
EMPLOYER:	Arkansas State Highway System.
PLAN YEAR:	July 1 to June 30.
PARTICIPATION:	Immediate upon full-time employment.
EMPLOYER CONTRIBUTIONS:	The State contributes 14.90% (beginning 7/1/2019, previously 12.90%) of the total payroll earnings of members, excluding DROP participants. The State does not contribute for members in the Tier I portion of DROP and contributes 6.9% of payroll for members in the Tier II portion of DROP.
EMPLOYEE CONTRIBUTIONS:	1. Each Member must contribute 6.5% (for 2019-2020, 7% thereafter) of his annual Compensation while in the service of the Employer. During participation in the Tier I portion of DROP a member's contributions are suspended. 2. Within certain terms, conditions, and limitations, a Member voluntarily may make additional contributions in order to obtain creditable service for prior service.
COMPENSATION:	The total remuneration earned by an employee for services rendered during any consecutive twelve (12) months or fraction thereof.
FINAL AVERAGE COMPENSATION:	Average compensation over 36 consecutive months that produces the highest average.
CREDITED SERVICE:	Completed years and days of service since date of hire.
RECIPROCAL SERVICE:	Service completed in any reciprocal state system as defined by law. Used to determine eligibility for benefits.

Appendix 1 (Continued)

NORMAL RETIREMENT:

Eligibility: Earliest of the following:

(a) Completion of 28 years of creditable service,
(b) Age 60 and 20 years of creditable service,
(c) Age 62 and 15 years of creditable service,
(d) Age 65 and 5 years of creditable service.

Benefit Formula: Years of credited service times 2.2% of Final Average Compensation, plus post-retirement health care supplements. The minimum annual normal retirement benefit is $1,800. The health care supplements are depended on years of service at retirement, the benefits are provided as follows:

(a) For members who retired before or on June 30, 2009: $1,500 health care offset amount will be provided.

(b) For members who retire after June 30, 2009:
1. With less than 10 years of accrued service: No health care offset amount will be provided.

2. With 10 or more years of accrued service but less than 15 years of accrued service at retirement: $900 health care offset amount will be provided.

3. With 15 or more years of accrued service but less than 20 years of accrued service at retirement: $1,200 health care offset amount will be provided.

4. With 20 or more years of accrued service at retirement: $1,500 health care offset amount will be provided.

For members who retire after June 30, 2013 the health care offset is prorated for any service earned with a reciprocal retirement system.

Appendix 1 (Continued)

Normal Form:	Monthly benefit for life of Member plus, upon death, a refund of the excess (if any) of (i) the Member's accumulated contribution account at time of retirement over (ii) the total annuity payments received.
Optional Form:	Option A: 10 years certain or life, or Option B: Joint & 50% contingent survivor, with a pop up to the life only amount if the joint pensioner predeceases the member.

DEFERRED RETIREMENT OPTION PLAN (DROP):

Eligibility:	Earliest of the following: (a) Completion of 30 years of creditable service, (b) Age 60 and 20 years of creditable service, (c) Age 62 and 15 years of creditable service, (d) Age 65 and 5 years of creditable service.
Benefit:	Active members eligible for normal retirement are eligible to participate in the DROP program while continuing active employment. During DROP, the member will receive the regular retiree cost of living adjustments. A member can remain in DROP to the later of age 65 or the completion of five years of participation in DROP. DROP is divided into Tier I and Tier II. Tier I consists of the first five years of DROP participation, while Tier II is the remaining period. In Tier I, 90% of the retirement annuity will be deposited in the DROP account, whereas in Tier II, 79% of the retirement annuity will be deposited. The DROP account is credited with interest in Tier I and Tier II (as set by the Board, currently 6%). Furthermore, the member and employer contributions cease during DROP until the member enters Tier II; during Tier II participation, the member contributes 6.00% of their total payroll earnings and the employer contributes 6.90%. At actual retirement, the member will receive the DROP balance and commence receiving the regular annuity payments.

Appendix 1 (Continued)

EARLY RETIREMENT:

Eligibility:	Age 55 with 5 or more years of creditable service.
Benefit:	Normal retirement benefit earned to the date of retirement, reduced .8% for each of the first 60 months and .3% for each of the next 60 months that the early retirement date precedes the normal retirement date. The minimum annual early retirement benefit is $1,800.

DISABILITY BENEFITS:

Benefit:

1. Less than 1 Year of Creditable Service: Refund of member contributions without interest.
2. At least 1 Year of Creditable Service: Refund of member contributions with interest. Interest credits are currently 3% per annum.
3. At least 5 or more Years of Creditable Service: If he leaves his contribution account on deposit, a monthly annuity payable to the member for life based upon his years of creditable service and commencing upon disability.

TERMINATION OF SERVICE:

1. Less than 1 Year of Creditable Service: Refund of member contributions without interest.
2. At least 1 Year of Creditable Service: Refund of member contributions with interest. Interest credits are currently 3% per annum.
3. At least 5 or more Years of Creditable Service: If he leaves his contribution account on deposit, a monthly annuity payable to the member for life based upon his years of creditable service and commencing upon eligibility for retirement.

Appendix 1 (Continued)

DEATH BEFORE RETIREMENT:

1. Less than 1 Year of Creditable Service: Refund of member contributions without interest.

2. At least 1 Year of Creditable Service: Refund of member contributions with interest.

3. At least 5 Years of Creditable Service: If the beneficiary leaves the Member's contribution account on deposit, an annuity payable under either Option A or B as elected by the beneficiary and commencing at the time the Member would have become eligible for retirement.

   (a) Option A: A reduced annuity payable for 10 years in an amount equal to what the member would have received under retirement Option A.
   (b) Option B: An annuity payable for the life of the beneficiary in an amount equal to 50% of what the member would have received under retirement Option B.

4. An additional death benefit equal to $15,000.

DEATH AFTER RETIREMENT:

If no option was elected, refund of the excess (if any) of (i) the Member's accumulated account (including interest) at retirement over (ii) the total annuity payments received. If an option is elected, death benefits are payable in accordance with such option.

An additional lump sum death benefit of $7,500 is provided for retirees (not beneficiaries).

Appendix 1 (Continued)

AUTOMATIC POST RETIREMENT INCREASES:

Effective July 1 2017, the benefit increase will be the lesser of 3% or the percentage change in the Consumer Price Index for Urban Wage Earners and Clerical Workers as determined by the United States Department of Labor over the one-year period ending in the December immediately preceding the date of which the redetermined amount is being calculated. However, the redetermined amount of the benefit to be paid shall not be less than the redetermined amount of the benefit paid in the preceding year.

Previously, benefits increase by 1 1/2% of the base benefit each year after June 30, 1976 through June 30, 1978, by 3% of the base benefit each year after June 30, 1978, through June 30, 1995, and by 3% of the previous year's benefit each year after June 30, 1995 for those who are retired for at least one year on the July 1 determination date. This benefit was limited by the Consumer Price Index until June 30, 1999. Effective July 1, 1999, the benefit increase is 3% with no ties to the Consumer Price Index.

Effective July 1, 2019, the amount of the health care offset described above is not eligible for a cost of living increase. All cost of living increases granted before July 1, 2019 on the health care offset remain in place.

APPENDIX 2

LEGISLATED PLAN CHANGES ENACTED BY THE LEGISLATURE OF THE STATE OF ARKANSAS

YEAR: 1991

1. ACT 198 — Provide a one-time payment equal to 3.0% of the July 1, 1991 annualized annuity for members retired on or prior to January 1, 1990.

2. ACT 243 — Permit members to accrue more than 35 years of creditable service. (Retroactively applied).

3. ACT 245 — Effective July 1, 1991, increase annuities by the sum of $50 per month for members receiving benefits prior to, on, or subsequent to July 1, 1991. The increase is also added to the base annuity.

4. ACT 246 — Effective July 1, 1991, increase the benefit formula multiplier to 2.06% of average compensation times number of years of creditable service.

5. ACT 380 — 4.0% ad hoc increase payable on July 1, 1991 for those members retired on June 1, 1991, based on benefit payable on June 1, 1991. The increase is also added to the base annuity.

6. ACT 381 — Benefits from reciprocal retirement systems are to be based on the highest final average salary at the time of retirement. (Retroactively applied).

YEAR: 1993

1. ACT 929 — 2.9% ad hoc increase payable on July 1, 1993 for those members retired on June 1, 1993, based on benefits payable June 1, 1993. The increase is also added to the base annuity.

2. ACT 930 — Effective July 1, 1993, the average compensation is based on a forty-eight (48) month averaging period. (Previously sixty (60) months.)

YEAR: 1995

1. ACT 407 — Cost of living increase up to 3% of the member's previous year's benefit for those members retired for at least twelve full months after the effective date of each increase. Increases are effective July 1 and will be limited to the lesser of 3% or the Consumer Price Index but may not result in a decrease in benefits otherwise payable.

Appendix 2 (Continued)

YEAR: 1997			
	1.	ACT 1067	Creates an active member death benefit of 10 years certain and life. Five years of service eligibility for benefit.
	2.	ACT 1089	Creates a $15,000 death benefit for active and vested-terminated members.
	3.	ACT 1073	Creates a DROP program for active members eligible for normal retirement.
	4.	ACT 386	Increases the multiplier from 2.06% to 2.10%. Grants 2.0% ad hoc to retirees.
	5.	ACT 349	Changes 48-month FAE to 36 months. Grants 2.2% ad hoc to retirees.
	6.	ACT 347	Changes 10-year vesting requirement to 5 years.
YEAR: 1999			
	1.	ACT 311	Increases the $50 per month supplement to $125 per month to current and future retirees.
	2.	ACT 1325	Active members can retire with full benefit if they have 28 years of creditable service.
	3.	ACT 335	Cost of living increase will be 3% and is not limited by the Consumer Price Index.
YEAR: 2001			
	1.	ACT 482	Provides $7,500 lump sum death benefit for retirees (not beneficiaries).
	2.	ACT 539	Increases the multiplier from 2.1% to 2.2%. Grant 4.8% ad hoc to retirees.
	3.	ACT	Crediting 8% to the DROP account by taking a Board action.
YEAR: 2003			
	1.	ACT 776	Allows members who enter DROP prior to age 60 to remain in DROP until age 65, beyond the five-year limit previously set. During this time, known as Tier II DROP, 79% of the retirement annuity will be deposited in the DROP account. Furthermore, the member contributes 6.00% of their total payroll earnings and the employer contributes 6.90%.
	2.	ACT 205	Changes the factors used for determining optional forms of payment to actuarially equivalent factors. Current retirees had their benefits increased to reflect the new factors effective July 1, 2003.

Appendix 2 (Continued)

YEAR: 2009

1. HB 1177 — Changes from 5 years vesting requirement to 10 years vesting requirement on health care coverage. Prorated the $125 per month health care supplements as follows:

   a. With less than 10 years of service at retirement: No health care supplements.

   b. With 10 or more years of service but less than 15 years of service at retirement: $75/month (or 60% of $125/month).

   c. With 15 or more years of service but less than 20 years of service at retirement: $100/month (or 80% of $125/month).

   d. With 20 or more years of service at retirement: $125/month (or100% of $125/month).

YEAR: 2011

1. HB 1213 — Establishes the cost for purchasing service credit as the actuarial equivalent cost. The actuarial cost is the increase in the liability associated with adding the additional service credit. This applies to all types of service credit including: military service, service with another State agency, and reinstatement of forfeited service.

YEAR: 2013

1. HB 1224 — Prorates the Health Care Offset paid by the Arkansas State Highway Employees Retirement System (ASHERS), for members who also have service in a reciprocal retirement system.

2. HB 1225 — Excludes lump sum termination payments (accrued leave, compensation, etc.) from inclusion in the Average Compensation and credited service used in the determination of retirement benefits paid by the Arkansas State Highway Employees Retirement System (ASHERS).

YEAR: 2017

1. ACT 610 — Cost of living increase will be the lesser of 3% or the percentage change in the Consumer Price Index for Urban Wage Earners and Clerical Workers as determined by the United States Department of Labor over the one-year period ending in the December immediately preceding the date of which the redetermined amount is being calculated. However, the redetermined amount of the benefit to be paid shall not be less than the redetermined amount of the benefit paid in the preceding year.

Appendix 2 (Continued)

2. ACT 461 — A member of the Arkansas State Highway Employees' Retirement System may purchase creditable service in the retirement system, without interest, for a period not to exceed five years of service for active service by the member in the United States Armed Forces if the member (1) has five years of actual service in the system as of August 20, 2015; and (2) shows that he or she relied upon the ten-year service time requirement before applying to purchase military service credit under this ACT. The purchase of military service credit under this ACT shall be made in the form of a cash payment or automatic payroll deductions for period not to exceed three years.

YEAR: 2019

1. ACT 294 — Effective July 1, 2019, the amount of the health care offset (also called supplement) is not eligible for a cost of living increase. All cost of living increases granted before July 1, 2019 on the health care offset remain in place.

2. ACT 295 — Effective July 1, 2019, the employee contribution maximum is 7% of compensation. This can only increase by 0.5% per year, so the rate beginning July 1, 2019 will be 6.5% and the rate beginning July 1, 2020 will be 7.0% of compensation. The employer rate increased to a maximum of 14.9% and that increase was effective July 1, 2019.

APPENDIX 3

ACTUARIAL COST METHODS AND ASSUMPTIONS

INVESTMENT YIELD RATE: 8.0% per annum, compounded annually. (Effective June 30,1997) The expected rate of return on pension plan investments for the purpose of GASB is 7.50%.

MORTALITY:

a. Healthy Post-retirement (Effective June 30, 2015)

Male: RP-2000 Combined Healthy for males with Blue Collar adjustments, scaled at 105% with no setback. Generational mortality improvements in accordance with Scale AA from the table's base year of 2000 (both before and after the measurement date)

Female: RP-2000 Combined Healthy for females with Blue Collar adjustments, scaled at 100% with no setback. Generational mortality improvements in accordance with Scale AA from the table's base year of 2000 (both before and after the measurement date)

b. Disabled Post-retirement (Effective June 30, 2015)

Male: RP-2000 Combined Healthy for males with Blue Collar adjustments, scaled at 105% with three-year set-forward. Generational mortality improvements in accordance with Scale AA from the table's base year of 2000 (both before and after the measurement date), minimum 3% rate of mortality at all ages

Female: RP-2000 Combined Healthy for females with Blue Collar adjustments, scaled at 100% with three-year set-forward. Generational mortality improvements in accordance with Scale AA from the table's base year of 2000 (both before and after the measurement date), minimum 3% rate of mortality at all ages

c. Healthy Pre-retirement (Effective June 30, 2015)

Male: RP-2000 Combined Healthy for males with Blue Collar adjustments, scaled at 70% with no setback. Generational mortality improvements in accordance with Scale AA from the table's base year of 2000 (both before and after the measurement date)

Female: RP-2000 Combined Healthy for females with Blue Collar adjustments, scaled at 70% with no setback. Generational mortality improvements in accordance with Scale AA from the table's base year of 2000 (both before and after the measurement date)

Appendix 3 (Continued)

RETIREMENT RATES (Effective June 30, 2015):

The following probabilities of retirement were assumed for members eligible to retire:

	Early Retirement Rate	Normal Retirement Rate	
Age	Males and Females	Males	Females
48		5.0%	5.0%
49		5.0%	5.0%
50		6.5%	5.0%
51		8.0%	6.0%
52		9.5%	7.0%
53		11.0%	8.0%
54		12.5%	9.0%
55	1.0%	14.0%	10.0%
56	1.0%	15.5%	15.0%
57	2.0%	20.0%	15.0%
58	2.0%	25.0%	25.0%
59	3.0%	25.0%	25.0%
60	3.0%	15.0%	15.0%
61	8.0%	20.0%	20.0%
62	20.0%	45.0%	45.0%
63	20.0%	25.0%	25.0%
64	15.0%	25.0%	25.0%
65		40.0%	40.0%
66		40.0%	40.0%
67		40.0%	40.0%
68		40.0%	40.0%
69		40.0%	40.0%
70		100.0%	100.0%

Appendix 3 (Continued)

DISABILITY RATES (Effective June 30, 2009):

Rates based on the experience of other large public sector retirement systems through age 82; thereafter, Non-Disabled Mortality is assumed.

Age	Rates of Decrement Due to Disability
20	.00192
25	.00192
30	.00192
35	.00192
40	.00480
45	.00624
50	.01176
55	.02136
60	.03384
65	.03984

WITHDRAWAL RATES (for causes other than death, disability, or retirement)
(Effective June 30, 2015):

Select and ultimate rates are used based on age and service. Sample rates are shown.

Probability of Decrement Due to Withdrawal

Years of Service

Male Members

Age	0	1	2	3	4	5+
20	.3712	.2536	.1697	.1180	.1150	.1043
30	.2925	.1998	.1313	.0862	.0756	.0578
40	.2193	.1538	.1024	.0646	.0477	.0261
50	.1628	.1242	.0894	.0582	.0368	.0159
60	.1342	.1238	.1033	.0748	.0462	.0302

Female Members

Age	0	1	2	3	4	5+
20	.4028	.3008	.2168	.1509	.1047	.0761
30	.2819	.2118	.1542	.1093	.0765	.0571
40	.1980	.1483	.1073	.0752	.0514	.0366
50	.1715	.1250	.0863	.0550	.0336	.0171
60	.1985	.1391	.0896	.0481	.0230	.0007

Appendix 3 (Continued)

SALARY SCALES (Effective June 30, 2015):

Future compensation is assumed to increase by an inflation (growth) increase rate of 2.5% plus a productivity component of 1.00%, and plus a step-rate/promotional component based on service. Rates are illustrated below:

Years of Service	Step-rate/ Promotional Component	Total Salary Scale
0	7.00%	10.50%
1	7.00%	10.50%
2	7.00%	10.50%
3	2.00%	5.50%
4	1.25%	4.75%
5-13	0.75%	4.25%
14-17	0.50%	4.00%
18-19	0.25%	3.75%
20+	0.00%	3.50%

FUTURE INCREASE IN TOTAL PAYROLL (Effective June 30, 2015):

3.0% per annum. Used for purposes of funding the Unfunded Actuarial Accrued Liability.

COST OF LIVING INCREASE (Effective June 30, 2017):

All benefit in pay status are assumed to be increased by 2.25% annually.

PROVISION FOR EXPENSE (Effective June 30, 1997):

The assumed investment return rate represents the anticipated net rate of return after payment of all administrative and investment expenses.

ELECTION RATES (Effective June 30, 2004):

After their initial vesting, members are assumed to elect the greater value of their deferred annuity or a refund of their account balances. 100% of non-vested members are assumed to take a refund.

ELECTION OF DROP ENTRY (Effective June 30, 2015):

100% of participants who are eligible to enter DROP are assumed to elect to participate in DROP, except as noted below. Members who elect into DROP are assumed to retire at the normal retirement patterns. Members who first become eligible to DROP prior to age 60 (at 30 years of service) are assumed to enter DROP after attaining 31 years of service. Members past their first eligibility are assumed to enter DROP immediately.

Appendix 3 (Continued)

INTERCREDITING RATE ON DROP ACCOUNTS (Effective June 30, 2012):

6.0% interest credit on DROP accounts.

DROP ACCOUNTS PAYOUT PERIOD (Effective June 30, 2015):

It is assumed that members who participate in DROP will receive their DROP accounts in equal installments over a 10-year period.

ASSET VALUATION METHOD (Adopted June 30, 2015):

The actuarial value of assets is equal to the market value of assets less a four-year phase-in of the excess (shortfall) between expected investment return and actual income with the resulting value not being less than 80% or more than 120% of the market value of assets.

The actuarial value of assets was marked to the market for June 30, 2012 valuation. This was done to prevent an expected divergence away from the market value of assets.

ACTUARIAL COST METHOD:

The funding period required to amortize the unfunded actuarial accrued liability (UAAL) is determined using the Entry Age Actuarial Cost Method.

The Individual Entry Age Normal actuarial cost method assigns the Plan's total unfunded liabilities (the actuarial present value of future benefits less the actuarial value of assets) to various periods. The unfunded actuarial accrued liability is assigned to years prior to the valuation, and the normal cost is assigned to the year following the valuation. The remaining costs are the normal costs for future years. Then each year's contribution is composed of (i) that year's normal cost, plus (ii) a payment used to reduce the unfunded actuarial accrued liability.

The normal contribution is determined using the Entry Age Normal method. Under this method, a calculation is made to determine the rate of contribution which, if applied to the compensation of each individual member during the entire period of anticipated covered service (prior to DROP entry), would be required to meet the cost of all benefits payable on his behalf. The salary-weighted average of these rates is the normal cost rate. This calculation reflects the plan provisions that apply to each individual member. The employer normal cost rate is equal to (i) the normal cost rate, minus (ii) the member contribution rate.

The actuarial accrued liability is the difference between the total present value of future benefits and the actuarial present value of future normal costs. The unfunded actuarial accrued liability (UAAL) is the excess of the actuarial accrued liability over the actuarial value of assets.

Appendix 3 (Continued)

Since the State statutes governing the System establish the current employee and State contribution rates, the actuarial valuation determines the number of years required to amortize (or fund) the UAAL on a level percentage of payroll basis, taking into account the payroll growth assumption and the normal cost expressed as a percent of pay. Because of this amortization procedure, any change in the unfunded actuarial accrued liability due to (i) actuarial gains and losses, (ii) changes in actuarial assumptions, or (iii) amendments, affects the funding period.

FUNDING OF UNFUNDED ACTUARIAL ACCRUED LIABILITY:

The total normal cost for benefits provided by the System is 11.73% of payroll, which is 9.67% of payroll less than the total contributions scheduled for the year under current law (14.90% from Employer plus 6.5% from employees). This remaining 9.67% of payroll along with any contributions received on behalf of members in Tier II of DROP are assumed to be utilized to fund the unfunded actuarial accrued liability over a period of years in the future, assuming that total payroll is increased by 3.0% per year. The calculation is detailed in Exhibit 2 of this report.

APPENDIX 4

DEFINITION OF ACTUARIAL TERMS

ACTUARIAL ACCRUED LIABILITY:

The present value of benefits payable in the future less the present value of future normal costs for present members.

ACTUARIAL VALUE OF ASSETS:

The market value of assets of the System adjusted to recognize investment earnings above or below the investment return assumption uniformly over a five-year period.

ACTUARIAL ASSUMPTIONS:

Assumptions as to future experience under the System. Assumptions include future fund earnings rates, rates of future salary increases, and rates of death (both before and after retirement), disability, retirement, and withdrawal.

ACTUARIALLY DETERMINED:

Values which have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.

ACTUARIAL GAIN OR ACTUARIAL LOSS:

A measure of the difference between actual experience and assumed experience of the System. The actuarial assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, actuarial liabilities emerge which may be the same as forecasted or they may be larger or smaller than projected. Actuarial gains are due to favorable experience, i.e., the System's assets earn more than projected, salaries do not increase as fast as assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results that produce actuarial liabilities which are larger than projected. Actuarial gains will shorten the time required for funding of the unfunded actuarial accrued liability while actuarial losses will lengthen the funding period.

ACTUARIAL LIABILITIES:

The actuarially determined present value of future benefits to be provided by the System. There are separate actuarially determined present values for retired members and non-retired members. When applied to active members, benefits which will be earned through future service and future salary increases are taken into account.

APPENDIX 4 (Continued)

DEFINED BENEFITS:

Benefits which are defined by a specific formula applied to a specific member's compensation and/or specific years of service. The amount of the benefit is not a function of contributions or actual earnings on those contributions.

FUTURE BENEFITS:

Benefits specified in the law which will become payable at some time in the future when the member satisfies the requirement to receive such benefits.

FUTURE CONTRIBUTIONS:

Contributions to be made by the member or the State in the future, as required by the law.

FUNDING PERIOD:

The number of years in the future that will be required to fund (i.e., pay off or eliminate) the unfunded actuarial accrued liability, based on the actuarial assumptions and assuming no future actuarial gains or losses.

NORMAL COST:

The average annual actuarial cost of the benefits provided by the System for the current employees.

PRESENT VALUE:

The actuarially determined lump sum value as of the valuation date of a series of payments to be made in the future, where the lump sum value is equal to the sum of the discounted value of each future payment. The discounted value of each payment is the product of (a) the amount of the payment, (b) the probability that the payment will be made (based on the current actuarial assumptions as to the future experience), and (c) the time value of money (based on the current assumed interest rate).

UNFUNDED ACTUARIAL ACCRUED LIABILITY:

That portion of the actuarial accrued liability (including the present value of benefits presently being paid to retired members and the value of any miscellaneous liabilities) that exceeds the value of current assets.

FUNDED RATIO:

The ratio of the actuarial value of assets to the actuarial accrued liability. The funding ratio is a measure of the funded status of the plan.