ARKANSAS STATE HIGHWAY EMPLOYEES RETIREMENT SYSTEM (ASHERS)

ACTUARIAL VALUATION
AS OF JUNE 30, 2022

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

October 7, 2022

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, 2022

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, 2022. This valuation determines the contributions for the 2022-23 Plan Year (July 1, 2022 to June 30, 2023). 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 replaces and corrects the report dated September 27, 2022.

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 decreased from 88.88% to 86.20% this year (about 80% on a market value basis). This is the ratio of the actuarial value (smoothed) assets to the actuarial accrued liabilities of the plan. This was mostly due to the large investment loss that occurred during the fiscal year. This is detailed in the report. The funding period has increased to 18.1 years based on current contributions. The total contribution rate for fiscal 2023 is projected to be well above the 30-year and near the 18-year period to fully fund the unfunded actuarial accrued liabilities.

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.

Assumptions

There were no changes in plan provisions or assumptions reflected in this valuation. The last change in assumptions was reflected in the June 30, 2021 actuarial valuation.

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

TABLE OF CONTENTS

EXECUTIVE SUMMARY

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

	6/30/2020	6/30/2021	6/30/2022
Number in Plan			
a) Active Members	3,358	3,367	3,277
b) Members in DROP	356	306	285
c) Members Receiving Benefits	3,483	3,535	3,586
d) Inactive Members	271	294	335
Market Value of Assets	$ 1,407,173,769	$ 1,715,093,810	$ 1,468,838,071
Actuarial Value of Assets	$ 1,434,541,444	$ 1,585,450,507	$ 1,577,072,265
Actuarial Accrued Liability	$ 1,742,061,623	$ 1,783,900,358	$ 1,829,588,526
Unfunded Actuarial Accrued Liability	$ 307,520,179	$ 198,449,851	$ 252,516,261
Funded Percentage (Based on Actuarial Assets)	82.35%	88.88%	86.20%
Funded Percentage (Based on Market Value of Assets)	80.78%	96.14%	80.28%
Contribution Rates for the year beginning On the Valuation Date			
Employee	7.00%	7.00%	7.00%
Employer	14.90%	14.90%	14.90%
Total	21.90%	21.90%	21.90%
Needed to Fund UAAL in 30 years	23.59%	16.95%	18.79%
Needed to Fund UAAL in 18 years	27.54%	19.44%	21.93%
Years to Fund at Current Contribution	39.5 years	12.5 years	18.1 years

Discussion

Introduction

The results of the June 30, 2022 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 86.20% as of the valuation date compared with 88.88% last year. This decrease 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, 2020, the employees contribute 7.0% and the employer contributes 14.9% of pay for a total 21.9% of pay. Beginning July 1, 2021, the employer contributions are 14.9% for all members on DROP.

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 18.79% of payroll compared to the 21.90% of payroll currently contributed. This means that the plan would be fully funded in less than 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 we have discussed in recent years. 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. This also makes the funding better align with the active worklife. The contribution level to fund the plan over 18 years is 21.93% 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 fully fund the unfunded accrued liability using the current contributions available. As shown there, this amount decreased from 53.2 (2019) to 39.5 (2020) to 12.5 (2021) and is 18.1 years in the current valuation. In other words, the plan should be well sustained with the current contribution levels.

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 -9.47% net of investment expenses, 16.97% below the assumed rate of return. This compares with 29.24% 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 gain is recognized in the year it is earned. The rate of return on the actuarial value of assets for this fiscal year was 5.17%. As you will see in Exhibit 3, there is about $108 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 small loss on the development of the liabilities. Together, these resulted in an actuarial loss of about $47 million (2.56% of liabilities) in this fiscal year.

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 just 6.6%. This increase over last year, is due to the investment loss. But, it is a reduction from previous years due to the new additional contributions, assumption changes, and legislative changes. This is a measurement of the cash flows in and out of the plan before adding investment income. A level of 6% means that most of the investment income expected (6.6% out of 7.5%) 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 amounts going out of the plan.

Legislative Changes

There were no legislative changes that were included to change the plan provisions for this valuation report.

EXHIBIT 1
COSTS AND LIABILITIES

ACTUARIAL PRESENT VALUE OF FUTURE BENEFITS

		6/30/2021	6/30/2022
A.	Active Members		
	1. Retirement Benefits	$ 402,420,928	$ 398,866,359
	2. Disability Benefits	51,366,508	52,138,997
	3. Death Benefits	2,616,765	2,607,431
	4. Deferred Termination Benefits	16,031,102	16,441,485
	5. Refunds of Contributions	3,562,194	3,652,562
	6. Total Active Members	$ 475,997,498	$ 473,706,834
B.	Deferred Retirement Option Plan (DROP)		
	1. Future DROP deposits and retirement benefits	$ 143,566,255	$ 146,546,393
	2. Expected Payouts of current DROP Deposits	225,377,548	236,949,191
	3. Total DROP Members	$ 368,943,803	$ 383,495,584
C.	Inactive Members		
	1. Vested terminations	$ 10,374,446	$ 9,355,731
	2. Non-vested terminations	1,882,604	2,770,247
	3. Total Inactive Members	$ 12,257,050	$ 12,125,978
D.	Retired Members Receiving Benefits		
	1. Service retirements	$ 944,126,358	$ 976,298,577
	2. Disability retirements	75,205,695	76,831,990
	3. Beneficiaries	72,716,802	76,254,578
	4 Total Retired Members	$ 1,092,048,855	$ 1,129,385,145
E.	Total Actuarial Present Value of Future Benefits (A6 + B3 + C3 + D4)	$ 1,949,247,206	$ 1,998,713,541

EXHIBIT 1 (continued)

ANALYSIS OF NORMAL COST

		6/30/2021	6/30/2022
A.	Normal Cost (to fund current Active Members) (Percentage of Payroll)		
	1. Retirement Benefits	7.83%	7.88%
	2. Disability Benefits	1.81%	1.81%
	3. Death Benefits	0.09%	0.09%
	4. Deferred Termination Benefits	1.42%	1.40%
	5. Refunds of Contributions	0.57%	0.57%
	6. Total Normal Cost	11.72%	11.75%
B.	Present Value of Future Normal Costs		
	1. Annualized salaries (excludes DROPs)	$ 164,696,825	$ 158,782,858
	2. Projected payroll for upcoming fiscal year	165,298,590	167,483,300
	3. Present value of future salaries	1,235,964,500	1,259,288,054
	4. Dollar Value of Normal Cost (A6 X B2)	19,371,421	19,679,288
	5. Present Value of Future Normal Costs (A6 X B3)	144,855,039	147,966,346

EXHIBIT 1 (continued)

DEVELOPMENT OF UNFUNDED ACTUARIAL LIABILITY

			6/30/2021		6/30/2022
A.	Actuarial Accrued Liabilities – Active Members				
	1. Present Value of future benefits	$	475,997,498	$	473,706,834
	2. Less Present Value of future normal costs		144,855,039		147,966,346
	3. Accrued Liability – Actives	$	331,142,459	$	325,740,488
B.	Actuarial Accrued Liabilities – DROP Members				
	1. Present Value of future benefits	$	368,943,803	$	383,495,584
	2. Less present value future DROP Contributions		20,491,809		21,158,669
	3. Accrued Liability – DROP	$	348,451,994	$	362,336,915
C.	Actuarial Accrued Liabilities – Inactive Members	$	12,257,050	$	12,125,978
D.	Actuarial Accrued Liabilities – Retired Members	$	1,092,048,855	$	1,129,385,145
E.	Total Actuarial Accrued Liabilities (A3 + B3 +C + D)	$	1,783,900,358	$	1,829,588,526
F.	Actuarial Value of Assets (Developed in Exhibit 3)		1,585,450,507		1,577,072,265
G.	Unfunded Actuarial Accrued Liability (E – F)	$	198,449,851	$	252,516,261

EXHIBIT 1 (continued)

Actual Versus Expected Actuarial Assets

		6/30/2021	6/30/2022
1.	Actuarial assets, beginning of year	$ 1,434,541,444	$ 1,585,165,788
2.	Total contributions during year	35,519,843	39,927,660
3.	Benefits paid during year	(123,684,368)	(125,578,090)
4.	Refunds paid during year	(2,052,337)	(2,357,761)
5.	Assumed net investment income at 7.5% Before 7/1/2022 it was 8.0%		
	a. Beginning of year assets	114,763,316	118,908,788
	b. Contributions	1,420,794	1,497,287
	c. Benefits	(4,947,375)	(4,709,178)
	d. Refunds	(82,093)	(88,416)
	e. Total	$ 111,154,642	$ 115,608,481
6.	Expected actuarial assets, end of year (Sum of items 1 through 5)	1,455,479,224	1,613,050,797
7.	Actuarial Value of Assets, end of year	1,585,450,507	1,577,072,265
8.	Asset gain/(loss) for year (7 – 6)	129,971,283	(35,978,531)
9.	Asset gain/(loss) as a percentage of end of year assets (8 / 7)	8.20%	(2.28)%

EXHIBIT 1 (continued)

ACTUARIAL GAIN OR LOSS FOR THE YEAR

			6/30/2021		6/30/2022
A.	Calculation of actuarial gain or loss				
1.	Unfunded actuarial liability (UAAL), previous year	$	307,520,179	$	198,449,851
2.	Normal cost for the year		18,808,164		19,371,421
3.	Contributions for the year		(35,519,843)		(39,927,660)
4.	Interest at 7.5% (8.0% for previous year)				
	a. On UAAL	$	24,601,614	$	14,883,739
	b. On normal cost		752,327		726,428
	c. On contributions		(1,420,794)		(1,497,287)
	d. Total	$	23,933,147	$	23,933,147
5.	Expected UAAL (sum of items 1 – 4)		314,741,647		192,006,492
6.	Actual UAAL		198,449,851		252,516,261
7.	Gain (loss) for the year (item 5 – item 6)	$	116,291,796	$	(60,509,769)
B.	Source of gains and losses				
8.	a. Asset gain (loss) for the year	$	129,971,283	$	(35,978,531)
	b. Gain (loss) from change in assumption		15,094,440		0
	c. Gain (loss) from change in method/discount		(81,820,693)		0
	d. Gain (loss) from Legislative change		21,617,039		0
	e. Actuarial gain (loss) from liability experience (7 – 8a – 8b – 8c - 8d)		31,429,727		(24,531,238)
	f. Total Gain (loss) for the year (8a + 8b + 8c + 8d + 8e)	$	116,291,796	$	(60,509,769)
9.	Total Actuarial Accrued Liabilities (end of year)	$	1,783,900,358	$	1,829,588,526
10.	Gain (loss) components as a percentage of Actuarial Accrued Liabilities				
	a. Asset gain (loss) for the year		7.29%		-1.97%
	b. Gain (loss) from change in assumption		0.85%		0.00%
	c. Gain (loss) from change in method		-4.59%		0.00%
	d. Gain (loss) from Legislative change		1.21%		0.00%
	e. Actuarial gain (loss) from liability experience		1.76%		-1.34%
	f. Total Gain (loss) for the year		6.52%		-3.31%

EXHIBIT 2

DEVELOPMENT OF CONTRIBUTION RATES

			6/30/2021		6/30/2022
A.	Expected Contributions				
	1. Annualized salaries (excludes DROPs)	$	164,696,825	$	158,782,858
	2. Projected payroll for upcoming fiscal year		165,298,590		167,483,300
	3. Current Employee Contribution Rate		7.00%		7.00%
	4. Current Employer Contribution Rate		14.90%		14.90%
	5. Total Contribution Rate		21.90%		21.90%
	6. Contribution in Dollars (A2 X A5)		36,200,391		36,678,843
	7. Expected Contribution from DROP Salary		3,285,657		3,379,034
	8. Total Expected Contributions		39,486,048		40,057,877
B.	Unfunded Actuarial Accrued Liability	$	198,449,851	$	252,516,261
C.	Calculation of 30-year Payoff Rate				
	1. 30-year Amortization of UAAL at mid-year	$	11,924,810	$	15,173,650
	2. Less Expected DROP Contributions		3,285,657		3,379,034
	3. Contribution Needed to meet goal (C1 – C2)		8,639,153		11,794,616
	4. C3 as percentage of payroll (C3/A2)		5.23%		7.04%
	5. Normal Cost		11.72%		11.75%
	6. Total Contribution Needed to meet goal		16.95%		18.79%
D.	Calculation of 18-year Payoff Rate				
	1. 18-year Amortization of UAAL at mid-year	$	16,054,121	$	20,427,965
	2. Less Expected DROP Contributions		3,285,657		3,379,034
	3. Contribution Needed to meet goal (D1 – D2)		12,768,464		17,048,931
	4. D3 as percentage of payroll (D3/A2)		7.72%		10.18%
	5. Normal Cost		11.72%		11.75%
	6. Total Contribution Needed to meet goal		19.44%		21.93%
E.	Calculation of Funding Period				
	1. Total Expected Contributions (A8)	$	39,486,048	$	40,057,877
	2. Amount needed to pay Normal Cost		19,372,995		19,679,288
	3. Amount remaining to payoff UAAL (E1 – E2)		20,113,054		20,378,589
	4. Years to fund UAAL using amount in E3 Based on 3% payroll growth		12.5 years		18.1 years

EXHIBIT 3

SUMMARY OF FINANCIAL INFORMATION

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

	Plan Year Ended		
	6/30/2020	6/30/2021	6/30/2022
A. INCOME			
1. Contributions			
Employee	$ 10,265,552	$ 11,428,100	$ 11,935,011
State	23,208,655	24,091,743	27,992,649
Other	2,137	0	0
2. Investment Income			
Interest/Dividends	24,791,862	18,641,176	21,051,049
Realized Gain	75,980,389	202,131,149	129,989,849
Unrealized Gain	18,374,253	186,131,046	(300,064,292)
Investment Expense	(8,604,886)	(8,660,539)	(9,102,394)
Net Investment Income	110,541,618	398,242,832	(158,125,788)
3. Adjustment to Previous Year	0	0	0
TOTAL INCOME	$ 144,017,962	$ 433,762,675	$ (118,198,128)
B. EXPENSES			
1. Administrative	$ 131,153	$ 105,929	$ 121,760
2. Refunds	1,974,259	2,054,337	2,357,761
3. Benefit Payments	120,815,379	123,682,368	125,578,090
TOTAL EXPENSES	$ 122,920,791	$ 125,842,634	$ 128,057,611

EXHIBIT 3 (Continued)

	6/30/2020	6/30/2021	6/30/2022
C. ASSETS (Market)			
1. Short Term			
Cash	$ 657,842	$ 318,111	$ 418,006
Money Market	184,365,252	244,075,629	297,021,004
2. Corporate Bonds	126,909,543	105,956,774	105,605,469
3. Common Stocks	856,753,103	1,118,762,865	743,917,220
4. U.S. Government agency obligations	235,736,224	244,312,244	319,262,191
5. Net Securities Lending	5,954	89,370	(35,745)
6. Receivables			
Member contributions	300,150	376,919	456,704
State contributions	613,176	857,450	1,019,675
Interest and dividends	2,358,543	1,295,933	2,128,001
Miscellaneous	28,687	156,138	102,071
7. Liabilities	(554,705)	(1,107,623)	(1,056,525)
TOTAL ASSETS	$ 1,407,173,769	$ 1,715,093,810	$ 1,468,838,071
D. RATIO OF ASSETS TO ANNUAL EXPENSES:	11.45	13.63	11.47
E. INVESTMENT RETURN:			
Gross	8.91%	29.97%	(8.94)%
Net of Investment Expense	8.24%	29.24%	(9.47)%
Return on Actuarial Value of Assets:	8.35%	12.94%	5.17%

EXHIBIT 3 (Continued)

	7/1/2020	7/1/2021	7/1/2022
F. DEVELOPMENT OF ACTUARIAL VALUE OF ASSETS			
1. Investment income for year	$ 110,541,618	$ 398,230,408	$ (158,125,788)
1b. Adjustment for change in discount		(81,820,693)	0
2. Expenses and fees for year	129,016	93,505	121,760
3. Actual net investment income	110,412,602	316,316,210	(158,247,548)
4. Market Value (beginning of year)	1,386,076,598	1,407,173,769	1,715,093,810
5. Contributions during year	33,474,207	35,519,843	39,927,660
6. Benefits paid during year	122,789,638	125,736,705	127,935,851
7. Expected investment income at 7.5% (8% before 2022)			
Market Value	110,886,128	112,573,902	128,632,036
Contributions	1,338,968	1,420,794	1,497,287
Benefits	4,911,586	5,029,468	4,797,594
Total	107,313,510	108,965,228	125,331,729
8. Investment gain for year	3,099,092	207,350,982	(283,579,277)
9. Deferral of investment gain			
Current year (75%)	2,324,319	155,513,236	(212,684,458)
Current year – 1 (50%)	(54,838,957)	1,549,546	103,675,491
Current year – 2 (25%)	25,146,963	(27,419,479)	774,773
Total	(27,367,675)	129,643,304	(108,234,194)
10. Market value (end of year)	1,407,173,769	1,715,093,810	1,468,838,071
11. Preliminary AVA (end of year) (10) – (9)	1,434,541,444	1,585,450,507	1,577,072,265
12. Final AVA within 20% corridor	$ 1,434,541,444	$ 1,585,450,507	$ 1,577,072,265

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	33,474,207	(120,815,379)	(1,974,259)	(8,733,902)	(131,523,540)	(98,049,333)	1,407,173,769	(7.0%)
2021	35,519,843	(123,682,368)	(2,054,337)	(8,766,468)	(134,503,173)	(98,983,330)	1,715,093,810	(5.8%)
2022	39,927,660	(125,578,090)	(2,357,761)	(9,224,154)	(137,160,005)	(97,232,345)	1,468,838,071	(6.6%)

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)

<u>EXHIBIT 4</u>

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	316	3						319
	Salary	10,619,708	122,304						10,742,012
25-29	Count	237	106	3					346
	Salary	10,199,227	5,037,083	139,448					15,375,758
30-34	Count	193	109	41	2				345
	Salary	7,744,202	5,750,887	2,309,134	74,935				15,879,158
35-39	Count	144	87	91	48	5			375
	Salary	5,704,155	4,501,091	6,154,016	2,943,241	335,381			19,637,884
40-44	Count	124	87	64	89	62	5		431
	Salary	4,812,247	4,209,026	3,382,004	5,716,355	4,052,292	279,136		22,451,060
45-49	Count	130	82	47	65	76	36		436
	Salary	5,250,897	4,081,056	2,609,050	4,033,849	5,559,338	2,632,970		24,167,160
50-54	Count	106	71	64	66	40	47	3	397
	Salary	3,989,290	3,332,084	3,390,613	3,690,391	2,593,046	3,530,672	286,755	20,812,851
55-59	Count	113	68	59	63	53	55		411
	Salary	4,569,158	3,095,810	3,006,040	3,207,591	3,005,949	3,370,266		20,254,814
60-64	Count	57	45	48	27	2	1		180
	Salary	2,189,870	2,066,685	2,173,301	1,270,481	116,440	95,730		7,912,507
65-69	Count	18	10	1			1		30
	Salary	760,916	413,804	37,371			86,065		1,298,156
70 & Over	Count	5	1	1					7
	Salary	161,914	53,169	36,415					251,498
Total	Count	1,443	669	419	360	238	145	3	3,277
	Salary	56,001,584	32,662,999	23,237,392	0,936,843	15,662,446	9,994,839	286,755	158,782,858

Average Attained Age: 42.4 years
Average Actual Service: 8.8 years
Average Salary: $ 48,251

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		1					3
	Benefit	83,496		39,591					123,087
50-54	Count	15	9	7	3	3	3		40
	Benefit	699,248	409,443	288,280	102,307	83,299	128,556		1,711,133
55-59	Count	29	24	21	15	10	37	3	139
	Benefit	953,298	1,055,441	756,149	502,205	422,798	1,392,720	58,089	5,140,700
60-64	Count	52	72	30	17	26	124	41	362
	Benefit	1,371,342	2,211,164	1,075,431	543,100	894,276	4,786,653	1,678,498	12,560,464
65-69	Count	40	45	42	80	67	229	170	673
	Benefit	758,694	968,157	907,407	2,317,193	1,730574	7,739,874	7,026,732	21,448,631
70-74	Count	4	6	5	10	18	197	380	620
	Benefit	40,985	53,602	68,677	94,516	270,711	5,358,438	15,487,462	21,374,391
75-79	Count			1	2	2	25	362	392
	Benefit			4,431	4,590	68,886	362,608	13,792,347	14,232,862
80-84	Count			1			3	236	240
	Benefit			12,090			8,436	9,048,931	9,069,457
85 & Over	Count						2	174	176
	Benefit						6,356	6,794,470	6,800,826
Total	Count	142	156	108	127	126	620	1,366	2,645
	Benefit	3,907,063	4,697,807	3,152,056	3,563,911	3,470,544	19,783,641	53,886,529	92,461,551

Average Attained Age:	71.5 years
Average Years since Retirement:	11.7 years
Average Annual Benefit:	$34,957

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	2	1				2	1	6
	Benefit	58,032	10,155				14,985	5,073	88,245
45-49	Count	2	1			1	7	4	15
	Benefit	23,864	30,911			4,635	88,932	47,063	195,405
50-54	Count	3	2	2	4	2	9	8	30
	Benefit	84,227	35,110	17,571	49,762	17,306	136,153	134,804	474,933
55-59	Count	3	3	4	4	8	30	16	68
	Benefit	64,017	36,393	45,973	75,351	140,139	444,328	257,130	1,063,331
60-64	Count	2	5	5	1	5	24	41	83
	Benefit	11,442	52,603	77,536	5,094	39,562	325,921	726,606	1,238,764
65-69	Count		1				26	54	81
	Benefit		4,833				324,543	979,436	1,308,812
70-74	Count						4	64	68
	Benefit						46,253	1,262,394	1,308,647
75-79	Count							38	38
	Benefit							798,857	798,857
80-84	Count							16	16
	Benefit							401,136	401,136
85 & Over	Count							6	6
	Benefit							168,977	168,977
Total	Count	12	13	11	9	16	102	248	411
	Benefit	241,582	170,005	141,080	130,207	201,642	1,381,115	4,781,476	7,047,107

Average Attained Age: 65.3 years
Average Years since Retirement: 13.7 years
Average Annual Benefit: $17,146

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	6	5	1		1	4		17
	Benefit	89,921	86,151	1,549		15,484	29,746		222,851
45-49	Count	3	6		2	2	1	2	16
	Benefit	49,679	57,768		27,068	29,071	3,381	10,179	177,146
50-54	Count		2		1		4	2	9
	Benefit		9,962		51,546		65,637	17,933	145,078
55-59	Count	2	3	1	4	1	9	8	28
	Benefit	26,853	36,254	8,404	58,029	2,612	127,552	105,909	365,613
60-64	Count	4	8	5	6		24	17	64
	Benefit	48,448	67,195	70,165	98,283		383,822	254,077	921,990
65-69	Count	6	8	6	4	7	21	27	79
	Benefit	72,570	126,294	100,449	80,137	141,205	276,857	364,935	1,162,447
70-74	Count	9	10	3	3	6	25	25	81
	Benefit	123,124	149,068	33,017	54,449	76,692	361,059	404,174	1,201,583
75-79	Count	8	3	4	6	3	29	30	83
	Benefit	153,983	11,287	54,574	142,043	74,795	476,136	471,727	1,384,545
80-84	Count	4	2	7	3	4	18	33	71
	Benefit	43,668	29,930	130,984	25,719	88,588	333,108	664,306	1,316,303
85 & Over	Count	1	6	5	2	2	17	49	82
	Benefit	46,519	174,613	101,761	64,662	33,825	368,039	883,072	1,672,491
Total	Count	43	53	32	31	26	152	193	530
	Benefit	654,765	748,522	500,903	601,936	462,272	2,425,337	3,176,312	8,570,047

Average Attained Age:	72.7 years
Average Years since Retirement:	9.4 years
Average Annual Benefit:	$16,170

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	2	1	1					4
	Benefit	87,925	27,126	32,364					147,415
50-54	Count	12	13	5	5	5	3		43
	Benefit	536,262	509,864	206,757	177,010	180,664	99,652		1,710,209
55-59	Count	15	11	11	11	22	23	1	94
	Benefit	572,687	362,057	439,265	453,408	982,887	896,798	40,273	3,747,375
60-64	Count	33	21	11	8	13	18	9	113
	Benefit	739,844	410,139	226,158	293,714	522,706	720,375	315,365	3,228,301
65-69	Count	8	8	3	6	3			28
	Benefit	51,990	70,789	41,566	78,107	48,111			290,563
70-74	Count				1				1
	Benefit				8,251				8,251
75-79	Count		1						1
	Benefit		12,946						12,946
80-84	Count			1					1
	Benefit			2,799					2,799
85 & Over	Count								-
	Benefit								-
Total	Count	70	55	32	31	43	44	10	285
	Benefit	1,988,708	1,392,921	948,909	1,010,490	1,734,368	1,716,825	355,638	9,147,859

Average Attained Age: 59.7 years
Average Years since DROP: 3.2 years
Average Annual Benefit: $32,098

EXHIBIT 4

VESTED TERMINATED MEMBERS

Vested Terminated Member data needed for the valuation was obtained from the records furnished by the administrator. These are the members who have left employment, did not withdraw their employee contributions, and are eligible for a benefit that begins later, typically age 65. The following table shows a detailed breakdown of the included members and beneficiaries by time until benefit commencement. Benefits listed are annual amounts of the benefits payable.

Benefits Commence Within number of years	Number of Members	Annual Benefit
1 year	12	27,741
2 years	6	22,537
3 years	10	44,055
4 years	4	16,645
5 years	10	50,545
5 to 10 years	45	367,998
Over 10 years	245	1,799,805
Total	335	2,329,326

Average Attained Age: 47.5 years
Average Years until Benefit Commencement: 17.5 years
Average Annual Benefit: $ 6,953

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. Beginning 7/1/2021, a contribution is made for salaries of those members on DROP. Previously, the State did not contribute for members in the Tier I portion of DROP and contributed 6.9% of payroll for members in the Tier II portion of DROP.
EMPLOYEE CONTRIBUTIONS:	1. Each Member must contribute 7.0% (for 7/1/2020 and after) 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 60 consecutive months that produces the highest average. This changed beginning 7/1/2021 and the 36 month average is maintained until the 60 month average is greater.
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.

Those who elect DROP after July 1, 2021 will not be paid a health care offset during the DROP period. It will begin upon ultimate retirement.

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%). The member contributions, for those hired before July 1, 2021, cease during DROP until the member enters Tier II. For those hired July 1, 2021 and after, the employee contribution will continue during the entire DROP period. While on DROP, the employer contributes the employer rate, currently 14.90% (beginning July 1, 2021). 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 lump sum 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.

Recent COLA amounts are as follows:

1999-2016	3.00%
2017	2.07%
2018	2.18%
2019	1.77%
2020	2.31%
2021	1.45%
2022	3.00%

APPENDIX 2

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

Session 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).
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.)
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)

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.
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.
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.
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)

2009	1.	ACT 439	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).
	2.		Trustees used provision of Act 1073 of 1997 to reduce the interest credited on DROP accounts to 6%, effective 7/1/2009.
2011	1.	ACT 564	Establishes the cost for purchasing service credit as the actuarial equivalent cost. This applies to all types of service credit including military service, service with another State agency, and reinstatement of forfeited service.
2013	1.	ACT 309	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.	ACT 310	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).
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.
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.
2021	1.	ACT 137	The employer contribution rate will be based on the recommendation of the actuary and then presented for approval to the Commission.
	2.	ACT 138	The employer contribution beginning July 1, 2021 will apply to salaries for Tier 1 and Tier 2 DROP participants. Those hired 7/1/2021 and after will pay employee contributions on DROP salaries.
	3.	ACT 139	The length of time to be married before being eligible for survivor benefits was reduced from 2 years to 1 year.
	4.	ACT 149	The definition of final average compensation went from 3 years to 5 years. There is a provision so that those employed at 7/1/2021 do not see a decrease in final average compensation.
	5.	ACT 150	Those who elect DROP after July 1, 2021 will not be paid a health care offset during the DROP period. It will begin upon ultimate retirement.
	6.	ACT 711	There were various changes in reciprocal service beginning 7/1/2021. ASHERS benefits for those who begin reciprocal service after 7/1/2021 will be based on the ASHERS definition of final average compensation.

APPENDIX 3

ACTUARIAL COST METHODS AND ASSUMPTIONS

INVESTMENT YIELD RATE: 7.5% per annum, compounded annually. (Effective June 30,2021) The expected rate of return on pension plan investments for the purpose of GASB is also 7.50%.

MORTALITY:

a. Healthy Post-retirement (Effective June 30, 2021)

Male: Pub-2010 Public Retirement Plans for males, amount weighted Mortality Table for General employees with below median income, scaled at 105% with no setback. Generational mortality improvements are in accordance with MP-2020 from the table's base year of 2010 (both before and after the measurement date)

Female: Pub-2010 Public Retirement Plans for females, amount weighted Mortality Table for General employees with below median income, scaled at 105% with no setback. Generational mortality improvements are in accordance with MP-2020 from the table's base year of 2010 (both before and after the measurement date)

b. Disabled Post-retirement (Effective June 30, 2021)

Male: Pub-2010 Public Retirement Plans for disabled males, amount weighted Mortality Table for General employees with below median income, with no scale and no setback. Generational mortality improvements are MP-2020 from the table's base year of 2010 (both before and after the measurement date)

Female: Pub-2010 Public Retirement Plans for disabled females, amount weighted Mortality Table for General employees with below median income, with no scale and no setback. Generational mortality improvements are MP-2020 from the table's base year of 2010 (both before and after the measurement date)

c. Healthy Pre-retirement (Effective June 30, 2021)

Male: Pub-2010 Public Retirement Plans for male employees, amount weighted Mortality Table for General employees with below median income, no scale, no setback. Generational mortality improvements are in accordance with MP-2020 from the table's base year of 2010 (both before and after the measurement date)

Female: Pub-2010 Public Retirement Plans for female employees, amount weighted Mortality Table for General employees with below median income, no scale, no setback. Generational mortality improvements are in accordance with MP-2020 from the table's base year of 2010 (both before and after the measurement date)

Appendix 3 (Continued)

RETIREMENT RATES (Continued Effective June 30, 2021):

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 (Continued Effective June 30, 2021):

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, 2021):

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	.4306	.2764	.1850	.1357	.1323	.1095
30	.2984	.2268	.1431	.0991	.0869	.0607
40	.2368	.1815	.0983	.0743	.0549	.0274
50	.1677	.1279	.0983	.0599	.0379	.0164
60	.0138	.1275	.0971	.0770	.0476	.0311

Female Members

Age	0	1	2	3	4	5+
20	.4672	.3279	.2363	.1539	.1099	.0776
30	.2875	.2404	.1681	.1115	.0803	.0582
40	.2138	.1750	.1030	.0767	.0504	.0373
50	.1766	.1288	.0949	.0561	.0353	.0174
60	.2045	.1433	.0842	.0491	.0242	.0007

Appendix 3 (Continued)

SALARY SCALES (Effective June 30, 2021):

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	9.00%	12.00%
1	7.00%	10.00%
2	4.50%	7.50%
3	2.00%	5.00%
4-6	1.50%	4.50%
7-10	1.00%	4.00%
11-13	0.75%	3.75%
14-16	0.50%	3.50%
17-19	0.50%	3.25%
20+	0.00%	3.00%

FUTURE INCREASE IN TOTAL PAYROLL (Effective June 30, 2021):

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

COST OF LIVING INCREASE (Effective June 30, 2021):

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)

INTERCEPT CREDITING 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, 2021):

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.

The return for 2021 was reduced by the amount of the liability change due to change in discount rate. This made a one time additional recognition of market return.

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.

Appendix 3 (Continued)

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.

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 11.75% of payroll, which is 10.15% of payroll less than the total contributions scheduled for the year under current law (14.90% from Employer plus 7.0% from employees). This remaining 10.15% of payroll along with any contributions received on behalf of members on 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.