ARKANSAS STATE HIGHWAY EMPLOYEES RETIREMENT SYSTEM (ASHERS)

ACTUARIAL VALUATION
AS OF JUNE 30, 2021

Osborn, Carreiro & Associates, Inc.
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October 18, 2021

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, 2021

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, 2021. This valuation determines the contributions for the 2021-22 Plan Year (July 1, 2021 to June 30, 2022). 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 increased from 82.35% to 88.88% this year (about 96% 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 gain that occurred during the fiscal year. This is detailed in the report. The funding period has been reduced to 12.5 years based on current contributions. The total contribution rate for fiscal 2022 is projected to be well above the 30-year and the 18-year payoff of unfunded actuarial accrued liabilities. These are significant improvements.

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

As previously discussed with the report on assumptions, the Board agreed with us to make several changes to the assumptions as we outlined in that report. These demographic assumptions reduced the unfunded actuarial liability. The reduction in discount rate to 7.5% increased the liabilities by about $82 million.

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:

	6/30/2019	6/30/2020	6/30/2021
Number in Plan			
a) Active Members	3,379	3,358	3,367
b) Members in DROP	366	356	306
c) Members Receiving Benefits	3,579	3,483	3,535
d) Inactive Members	269	271	294
Market Value of Assets	$ 1,386,076,598	$ 1,407,173,769	$ 1,715,093,810
Actuarial Value of Assets	$ 1,410,043,327	$ 1,434,541,444	$ 1,585,450,507
Actuarial Accrued Liability	$ 1,736,380,825	$ 1,742,061,623	$ 1,783,900,358
Unfunded Actuarial Accrued Liability	$ 326,337,498	$ 307,520,179	$ 198,449,851
Funded Percentage (Based on Actuarial Assets)	81.21%	82.35%	88.88%
Funded Percentage (Based on Market Value of Assets)	79.83%	80.78%	96.14%
Contribution Rates for the year beginning On the Valuation Date			
Employee	6.50%	7.00%	7.00%
Employer	14.90%	14.90%	14.90%
Total	21.40%	21.90%	21.90%
Needed to Fund UAAL in 30 years	24.67%	23.59%	16.95%
Needed to Fund UAAL in 18 years		27.54%	19.44%
Years to Fund at Current Contribution	53.2 years	39.5 years	12.5 years

Discussion

Introduction

The results of the June 30, 2021 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 88.88% as of the valuation date compared with 82.35% last year. This increase from last year is mainly due to a gain 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. There are also contributions that arise from Tier II DROP (6% employee, 6.9% employer), increasing for the next year.

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 16.95% 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 19.44% 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 53.2 (2019) to 39.5 (2020) to 12.5 years in the current valuation. In other words, the plan should be well 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 29.24% net of investment expenses, 21.24% above the assumed rate of return. This compares with 8.24% 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 17.36%. As you will see in Exhibit 3, there is about $130 million of net investment gains to be recognized in future years.

Please note that as discussed as part of our change in assumption discussion, we reduced the gains to be smoothed by the amount of the liability change for the change in discount rate.

Actuarial Gains and Losses

The actuarial gains and losses by source are developed on page 10 of the report. Besides the gain on investment return, there is a gain on the development of the liabilities. As previously discussed, there was a gain of about $21.5 million from the legislative changes. The gain from demographic assumption changes was about $15 million and the reduction for the change in discount rate was about $82 million. Together, these resulted in an actuarial gain of about $116 million (6.52% 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 5.8%, a decrease from the past few years due to the new additional contributions, assumption changess 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% 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 amount coming out of the plan. The increased employer contributions on DROP salaries in fiscal 2022 is projected to reduce even more below 5.8% in 2022.

Legislative Changes

We have discussed and shown the benefit of the legislative increases in the preliminary results. It is also shown on page 10. This made significant difference in help get the Unfunded Actuarial Liability under $200 million and a funding period of 12.5 years. This puts the plan in a very good place to withstand future shocks in levels of employment or in investment return.

EXHIBIT 1
COSTS AND LIABILITIES

ACTUARIAL PRESENT VALUE OF FUTURE BENEFITS

			6/30/2020		6/30/2021
A.	Active Members				
	1. Retirement Benefits	$	401,719,039	$	402,420,928
	2. Disability Benefits		50,653,092		51,366,508
	3. Death Benefits		3,148,121		2,616,765
	4. Deferred Termination Benefits		15,083,809		16,031,102
	5. Refunds of Contributions		2,048,275		3,562,194
	6. Total Active Members	$	472,652,336	$	475,997,498
B.	Deferred Retirement Option Plan (DROP)				
	1. Future DROP deposits and retirement benefits	$	175,103,321	$	143,566,255
	2. Expected Payouts of current DROP Deposits		210,008,619		225,377,548
	3. Total DROP Members	$	385,111,940	$	368,943,803
C.	Inactive Members				
	1. Vested terminations	$	6,969,684	$	10,374,446
	2. Non-vested terminations		1,658,093		1,882,604
	3. Total Inactive Members	$	8,627,777	$	12,257,050
D.	Retired Members Receiving Benefits				
	1. Service retirements	$	886,289,903	$	944,126,358
	2. Disability retirements		78,422,389		75,205,695
	3. Beneficiaries		65,097,567		72,716,802
	4 Total Retired Members	$	1,029,809,859	$	1,092,048,855
E.	Total Actuarial Present Value of Future Benefits (A6 + B3 + C3 + D4)	$	1,896,201,912	$	1,949,247,206

EXHIBIT 1 (continued)

ANALYSIS OF NORMAL COST

		6/30/2020	6/30/2021
A.	Normal Cost (to fund current Active Members) (Percentage of Payroll)		
	1. Retirement Benefits	8.08%	7.83%
	2. Disability Benefits	1.86%	1.81%
	3. Death Benefits	0.12%	0.09%
	4. Deferred Termination Benefits	1.15%	1.42%
	5. Refunds of Contributions	0.61%	0.57%
	6. Total Normal Cost	11.82%	11.72%
B.	Present Value of Future Normal Costs		
	1. Annualized salaries (excludes DROPs)	$ 158,254,471	$ 164,696,825
	2. Projected payroll for upcoming fiscal year	159,121,521	165,298,590
	3. Present value of future salaries	1,209,669,365	1,235,964,500
	4. Dollar Value of Normal Cost (A6 X B2)	18,808,164	19,371,421
	5. Present Value of Future Normal Costs (A6 X B3)	142,982,919	144,855,039

EXHIBIT 1 (continued)

DEVELOPMENT OF UNFUNDED ACTUARIAL LIABILITY

			6/30/2020		6/30/2021
A.	Actuarial Accrued Liabilities – Active Members				
	1. Present Value of future benefits	$	472,652,336	$	475,997,498
	2. Less Present Value of future normal costs		142,982,919		144,855,039
	3. Accrued Liability – Actives	$	329,669,417	$	331,142,459
B.	Actuarial Accrued Liabilities – DROP Members				
	1. Present Value of future benefits	$	385,111,940	$	368,943,803
	2. Less present value of future Tier II Contributions		11,157,370		20,491,809
	3. Accrued Liability – DROP	$	373,954,570	$	348,451,994
C.	Actuarial Accrued Liabilities – Inactive Members	$	8,627,777	$	12,257,050
D.	Actuarial Accrued Liabilities – Retired Members	$	1,029,809,859	$	1,092,048,855
E.	Total Actuarial Accrued Liabilities (A3 + B3 +C + D)	$	1,742,061,623	$	1,783,900,358
F.	Actuarial Value of Assets (Developed in Exhibit 3)		1,434,541,444		1,585,450,507
G.	Unfunded Actuarial Accrued Liability (E – F)	$	307,520,179	$	198,449,851

EXHIBIT 1 (continued)

Actual Versus Expected Actuarial Assets

		6/30/2020	6/30/2021
1.	Actuarial assets, beginning of year	$ 1,410,043,327	$ 1,434,541,444
2.	Total contributions during year	33,474,207	35,519,843
3.	Benefits paid during year	(120,815,379)	(123,684,368)
4.	Refunds paid during year	(1,974,259)	(2,052,337)
5.	Assumed net investment income at 8%		
	a. Beginning of year assets	112,803,466	114,763,316
	b. Contributions	1,338,968	1,420,794
	c. Benefits	(4,832,615)	(4,947,375)
	d. Refunds	(78,970)	(82,093)
	e. Total	$ 109,230,849	$ 111,154,642
6.	Expected actuarial assets, end of year (Sum of items 1 through 5)	1,429,958,744	1,455,479,224
7.	Actuarial Value of Assets, end of year	1,434,541,444	1,585,450,507
8.	Asset gain/(loss) for year (7 – 6)	4,582,700	129,971,283
9.	Asset gain/(loss) as a percentage of end of year assets (8 / 7)	0.32%	8.20%

EXHIBIT 1 (continued)

ACTUARIAL GAIN OR LOSS FOR THE YEAR

		6/30/2020	6/30/2021
A.	Calculation of actuarial gain or loss		
1.	Unfunded actuarial liability (UAAL), previous year	$ 326,337,498	$ 307,520,179
2.	Normal cost for the year	18,117,160	18,808,164
3.	Contributions for the year	(33,474,207)	(35,519,843)
4.	Interest at 8.0%		
	a. On UAAL	$ 26,107,000	$ 24,601,614
	b. On normal cost	724,686	752,327
	c. On contributions	(1,338,968)	(1,420,794)
	d. Total	$ 25,492,718	$ 23,933,147
5.	Expected UAAL (sum of items 1 – 4)	336,473,169	314,741,647
6.	Actual UAAL	307,520,179	198,449,851
7.	Gain (loss) for the year (item 5 – item 6)	$ 28,952,990	$ 116,291,796
B.	Source of gains and losses		
8.	a. Asset gain (loss) for the year	$ 4,582,700	$ 129,971,283
	b. Gain (loss) from change in assumption	0	15,094,440
	c. Gain (loss) from change in method/discount	0	(81,820,693)
	d. Gain (loss) from Legislative change	0	21,617,039
	e. Actuarial gain (loss) from liability experience (7 – 8a – 8b – 8c - 8d)	24,370,290	31,429,727
	f. Total Gain (loss) for the year (8a + 8b + 8c + 8d + 8e)	$ 28,952,990	$ 116,291,796
9.	Total Actuarial Accrued Liabilities (end of year)	$ 1,742,061,623	$ 1,783,900,358
10.	Gain (loss) components as a percentage of Actuarial Accrued Liabilities		
	a. Asset gain (loss) for the year	0.26%	7.29%
	b. Gain (loss) from change in assumption	0.00%	0.85%
	c. Gain (loss) from change in method	0.00%	-4.59%
	d. Gain (loss) from Legislative change	0.00%	1.21%
	e. Actuarial gain (loss) from liability experience	1.40%	1.76%
	f. Total Gain (loss) for the year	1.66%	6.52%

EXHIBIT 2

DEVELOPMENT OF CONTRIBUTION RATES

			6/30/2020		6/30/2021
A.	Expected Contributions				
	1. Annualized salaries (excludes DROPs)	$	158,254,471	$	164,696,825
	2. Projected payroll for upcoming fiscal year		159,121,521		165,298,590
	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)		34,847,613		36,200,391
	7. Expected Contribution from DROP Salary		781,122		3,285,657
	8. Total Expected Contributions		35,628,735		39,486,048
B.	Unfunded Actuarial Accrued Liability	$	307,520,179	$	198,449,851
C.	Calculation of 30-year Payoff Rate				
	1. 30-year Amortization of UAAL at mid-year	$	19,513,465	$	11,924,810
	2. Less Expected DROP Contributions		781,122		3,285,657
	3. Contribution Needed to meet goal (C1 – C2)		18,732,343		8,639,153
	4. C3 as percentage of payroll (C3/A2)		11.77%		5.23%
	5. Normal Cost		11.82%		11.72%
	6. Total Contribution Needed to meet goal		23.59%		16.95%
D.	Calculation of 18-year Payoff Rate				
	1. 18-year Amortization of UAAL at mid-year	$	25,796,791	$	16,054,121
	2. Less Expected DROP Contributions		781,122		3,285,657
	3. Contribution Needed to meet goal (D1 – D2)		25,015,669		12,768,464
	4. D3 as percentage of payroll (D3/A2)		15.72%		7.72%
	5. Normal Cost		11.82%		11.72%
	6. Total Contribution Needed to meet goal		27.54%		19.44%
E.	Calculation of Funding Period				
	1. Total Expected Contributions (A8)	$	35,628,735	$	39,486,048
	2. Amount needed to pay Normal Cost		18,808,164		19,372,995
	3. Amount remaining to payoff UAAL (E1 – E2)		16,820,571		20,113,054
	4. Years to fund UAAL using amount in E3 Based on 3% payroll growth		39.5 years		12.5 years

EXHIBIT 3

SUMMARY OF FINANCIAL INFORMATION

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

	Plan Year Ended		
	6/30/2019	6/30/2020	6/30/2021
A. INCOME			
1. Contributions			
Employee	$ 9,249,680	$ 10,265,552	$ 11,428,100
State	19,281,642	23,208,655	24,091,743
Other	4,600	2,137	0
2. Investment Income			
Interest/Dividends	26,213,069	24,791,862	18,641,176
Realized Gain	45,093,676	75,980,389	202,131,149
Unrealized Gain	(58,086,291)	18,374,253	186,131,046
Investment Expense	(8,661,421)	(8,604,886)	(8,660,539)
Net Investment Income	4,559,025	110,541,618	398,242,832
3. Adjustment to Previous Year	1,443	0	0
TOTAL INCOME	$ 33,096,390	$ 144,017,962	$ 433,762,675
B. EXPENSES			
1. Administrative	$ 80,391	$ 131,153	$ 105,929
2. Refunds	1,523,052	1,974,259	2,054,337
3. Benefit Payments	117,889,214	120,815,379	123,682,368
TOTAL EXPENSES	$ 119,492,657	$ 122,920,791	$ 125,842,634

EXHIBIT 3 (Continued)

		6/30/2019	6/30/2020	6/30/2021
C.	ASSETS (Market)			
	1. Short Term			
	Cash	$ 1,507,373	$ 657,842	$ 318,111
	Money Market	91,969,742	184,365,252	244,075,629
	2. Corporate Bonds	134,079,475	126,909,543	105,956,774
	3. Common Stocks	932,042,013	856,753,103	1,118,762,865
	4. U.S. Government agency obligations	168,570,794	235,736,224	244,312,244
	5. Net Securities Lending	94,961	5,954	89,370
	6. Receivables			
	Member contributions	226,133	300,150	376,919
	State contributions	383,543	613,176	857,450
	Interest and dividends	2,486,984	2,358,543	1,295,933
	Miscellaneous	62,702,630	28,687	156,138
	7. Liabilities	(7,987,050)	(554,705)	(1,107,623)
	TOTAL ASSETS	$ 1,386,076,598	$ 1,407,173,769	$ 1,715,093,810
D.	RATIO OF ASSETS TO ANNUAL EXPENSES:	11.60	11.45	13.63
E.	INVESTMENT RETURN:			
	Gross	0.93%	8.91%	29.97%
	Net of Investment Expense	0.32%	8.24%	29.24%
	Return on Actuarial Value of Assets:	5.57%	8.35%	17.36%

EXHIBIT 3 (Continued)

	7/1/2019	7/1/2020	7/1/2021
F. DEVELOPMENT OF ACTUARIAL VALUE OF ASSETS			
1. Investment income for year	$ 4,559,025	$ 110,541,618	$ 398,230,408
1b. Adjustment for change in discount			(81,820,693)
2. Expenses and fees for year	74,348	129,016	93,505
3. Actual net investment income	4,484,677	110,412,602	316,316,210
4. Market Value (beginning of year)	1,472,472,865	1,386,076,598	1,407,173,769
5. Contributions during year	28,531,322	33,474,207	35,519,843
6. Benefits paid during year	119,412,266	122,789,638	125,736,705
7. Expected investment income at 8%			
Market Value	117,797,829	110,886,128	112,573,902
Contributions	1,141,253	1,338,968	1,420,794
Benefits	4,776,491	4,911,586	5,029,468
Total	114,162,591	107,313,510	108,965,228
8. Investment gain for year	(109,677,914)	3,099,092	207,350,982
9. Deferral of investment gain			
Current year (75%)	(82,258,436)	2,324,319	155,513,236
Current year – 1 (50%)	50,293,926	(54,838,957)	1,549,546
Current year – 2 (25%)	7,997,781	25,146,963	(27,419,479)
Total	(23,966,729)	(27,367,675)	129,643,304
10. Market value (end of year)	1,386,076,598	1,407,173,769	1,715,093,810
11. Preliminary AVA (end of year) (10) – (9)	1,410,043,327	1,434,541,444	1,585,450,507
12. Final AVA within 20% corridor	$ 1,410,043,327	$ 1,434,541,444	$ 1,585,450,507

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%)

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	318	7						325
	Salary	10,402,740	254,612						10,657,352
25-29	Count	239	106	6					351
	Salary	9,745,374	4,815,091	267,513					14,827,978
30-34	Count	179	117	53	2				351
	Salary	6,494,729	5,992,775	3,002,255	78,670				15,568,429
35-39	Count	142	102	72	60	9			385
	Salary	5,354,107	5,079,180	4,469,345	3,457,880	523,132			18,883,644
40-44	Count	131	92	68	100	53	2		446
	Salary	5,003,744	4,182,920	3,411,554	6,226,716	3,420,274	84,992		22,330,200
45-49	Count	127	78	57	69	65	37		433
	Salary	4,919,786	3,621,734	2,898,750	4,262,957	4,480,209	2,555,935		22,739,371
50-54	Count	113	94	56	78	40	58	1	440
	Salary	4,177,148	4,282,311	2,856,916	4,301,567	2,449,755	4,369,699	81,978	22,519,374
55-59	Count	110	64	65	65	61	64	1	430
	Salary	4,140,495	2,802,949	3,053,535	3,243,449	3,207,871	3,946,874	79,678	20,474,851
60-64	Count	44	56	45	21	4			170
	Salary	1,707,719	2,313,245	1,859,299	972,784	242,486			7,095,533
65-69	Count	22	5	1	2		1		31
	Salary	769,079	247,409	36,568	95,934		82,718		1,231,708
70 & Over	Count	2	1	2					5
	Salary	69,721	44,695	71,871					186,287
Total	Count	1,427	722	425	397	232	162	2	3,367
	Salary	52,784,642	33,636,921	21,927,606	22,639,957	14,323,727	11,040,218	161,656	156,514,727

Average Attained Age: 42.5 years
Average Actual Service: 8.9 years
Average Salary: $ 46,532

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	1	4	1					6
	Benefit	50,924	152,219	33,070					236,213
50-54	Count	12	4	3	5	1	5		30
	Benefit	552,492	179,666	79,265	159,609	40,913	197,593		1,209,538
55-59	Count	31	23	17	15	15	38	2	141
	Benefit	1,282,150	783,963	565,167	650,080	544,714	1,427,530	33,773	5,287,377
60-64	Count	69	35	43	29	26	137	46	385
	Benefit	1,959,220	1,132,837	1,271,749	924,995	820,309	5,460,350	1,815,676	13,385,136
65-69	Count	40	33	61	69	64	228	166	661
	Benefit	768,600	700,001	1,616,353	1,610,518	1,864,634	8,014,448	6,822,583	21,397,137
70-74	Count	3	4	4	12	13	213	362	611
	Benefit	29,431	38,780	14,690	223,770	233,534	5,648,577	14,769,374	20,958,156
75-79	Count		2		1		16	340	359
	Benefit		16,285		19,934		201,638	12,578,067	12,815,924
80-84	Count						3	227	230
	Benefit						10,276	8,971,368	8,981,644
85 & Over	Count						1	179	180
	Benefit						3,132	6,503,104	6,506,236
Total	Count	156	105	129	131	119	641	1,322	2,603
	Benefit	4,642,817	3,003,751	3,580,294	3,588,906	3,504,104	20,963,544	51,493,945	90,777,361

Average Attained Age:	71.5 years
Average Years since Retirement:	11.7 years
Average Annual Benefit:	$34,874

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	Count	1				2		1	4
45	Benefit	10,155				14,784		5,001	29,940
45-49	Count	1		1	1	1	8	3	15
	Benefit	30,911		13,950	4,569	6,196	113,125	33,025	201,776
50-54	Count	3	3	5	3	5	11	11	41
	Benefit	41,273	26,890	66,433	41,825	52,375	186,032	170,735	585,563
55-59	Count	4	5	2	8	4	25	20	68
	Benefit	44,431	76,961	43,065	119,980	23,428	428,595	350,927	1,087,387
60-64	Count	4	3	1	4	5	22	43	82
	Benefit	43,236	35,316	5,022	32,549	60,378	281,616	701,361	1,159,478
65-69	Count					3	28	51	82
	Benefit					21,361	425,860	1,007,594	1,454,815
70-74	Count						5	64	69
	Benefit						42,161	1,231,789	1,273,950
75-79	Count							32	32
	Benefit							747,890	747,890
80-84	Count							18	18
	Benefit							400,465	400,465
85 &	Count							4	4
Over	Benefit							101,515	101,515
Total	Count	13	11	9	16	20	99	247	415
	Benefit	170,006	139,167	128,470	198,923	178,522	1,477,389	4,750,302	7,042,779

Average Attained Age:	64.9 years
Average Years since Retirement:	13.3 years
Average Annual Benefit:	$16,971

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	7		2	1		8		18
	Benefit	90,069		17,135	15,276		64,356		186,836
45-49	Count	5		2	2		3	3	15
	Benefit	53,708		26,703	28,750		24,023	24,991	158,175
50-54	Count	3		2		1	2	1	9
	Benefit	15,979		80,882		21,837	34,906	2,756	156,360
55-59	Count	2	2	2	1	1	14	9	31
	Benefit	26,818	12,498	22,984	2,575	6,124	222,277	116,216	409,492
60-64	Count	8	5	7	2	4	26	16	68
	Benefit	90,153	69,205	134,643	41,920	77,729	391,086	226,417	1,031,153
65-69	Count	9	5	3	6	3	17	24	67
	Benefit	103,072	83,289	41,341	98,873	23,057	209,164	316,939	875,735
70-74	Count	7	4	6	7	8	24	27	83
	Benefit	107,995	55,785	113,625	109,673	156,078	311,188	437,518	1,291,862
75-79	Count	3	6	3	5	4	21	28	70
	Benefit	18,211	69,515	80,154	81,972	46,080	365,304	474,412	1,135,648
80-84	Count	6	5	3	5	4	19	36	78
	Benefit	118,969	102,549	25,384	96,292	65,883	364,179	692,974	1,466,230
85 & Over	Count	4	5	1	2	2	18	46	78
	Benefit	116,759	142,864	8,585	33,363	78,062	324,600	808,751	1,512,984
Total	Count	54	32	31	31	27	152	190	517
	Benefit	741,733	535,705	551,436	508,694	474,850	2,311,083	3,100,974	8,224,475

Average Attained Age: 72.4 years
Average Years since Retirement: 9.5 years
Average Annual Benefit: $15,908

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	1						5
	Benefit	157,507	31,920						189,427
50-54	Count	14	10	9	9	5	2		49
	Benefit	570,266	423,968	347,801	311,460	198,002	65,598		1,917,095
55-59	Count	10	8	12	26	16	24		96
	Benefit	350,029	294,761	477,497	1,133,155	653,683	861,668		3,770,793
60-64	Count	27	19	19	15	14	18	11	123
	Benefit	512,150	363,964	531,332	542,318	483,420	715,547	420,684	3,569,415
65-69	Count	9	4	8	3	6			30
	Benefit	52,562	28,273	104,643	15,873	95,342			296,693
70-74	Count	1		1					2
	Benefit	12,946		8,145					21,091
75-79	Count								-
	Benefit								-
80-84	Count		1						1
	Benefit		2,173						2,173
85 & Over	Count								-
	Benefit								-
Total	Count	65	43	49	53	41	44	11	306
	Benefit	1,655,460	1,145,059	1,469,418	2,002,806	1,430,447	1,642,813	420,684	9,766,687

Average Attained Age: 59.6 years
Average Years since DROP: 3.3 years
Average Annual Benefit: $31,917

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 also made for salaries of those on DROP participants. Previously, the State did 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 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.

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.

For those hired 7/1/2021 and after, the employee contribution will continue during the DROP period.

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

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.

<u>Appendix 2 (Continued)</u>

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 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)

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 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)

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)

INTEREST 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.

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 11.72% of payroll, which is 10.18% 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 10.18% 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.