

ARKANSAS STATE HIGHWAY EMPLOYEES RETIREMENT SYSTEM
ACTUARIAL VALUATION REPORT
JUNE 30, 2016

October 11, 2016

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

Dear Members of the Board:

Subject: Actuarial Valuation as of June 30, 2016

We certify that the information contained in this report is accurate and fairly presents the actuarial position of the Arkansas State Highway Employees Retirement System (ASHERS) as of June 30, 2016.

All calculations have been made in conformity with generally accepted actuarial principles and practices, and with the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion the results presented also comply with Arkansas statutes, and, where applicable, the Internal Revenue Code, ERISA, and the Statements of the Governmental Accounting Standards Board. The undersigned are independent actuaries and both are experienced in performing valuations for large public retirement systems. Joseph Newton is an Enrolled Actuary and a Member of the American Academy of Actuaries, and meets the Qualification Standards of the American Academy of Actuaries.

Actuarial Valuation

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 ASHERS' condition.

This report no longer provides information related to Governmental Accounting Standards Board (GASB) Statement No. 25. All of the information required by GASB is now provided in a stand-alone report entitled "GASB 67 Reporting and Disclosure Information", dated October 15, 2016 for the plan year ending June 30, 2016.

Valuations are prepared annually, as of June 30 of each year, the last day of ASHERS' plan and fiscal year.

Financing Objectives

The member and employer contribution rates are established by statute. Currently, members contribute 6% of annual compensation, and the State contributes 12.90%. The rates are intended

to be sufficient to pay ASHERS' normal cost and to amortize ASHERS' unfunded actuarial accrued liability (UAAL) in level payments (as a percentage of payroll) over a period not in excess of 30 years from the valuation date. The amortization period for the current contribution rates is more than 30 years and, therefore, the financing objectives are currently not being met. A State contribution rate of 16.57% of payroll (in conjunction with a member rate of 6.00%) for fiscal year 2017 would produce a 30-year funding period.

Progress Toward Realization of Financing Objectives

As of June 30, 2016, the System's UAAL is \$241.9 million, and the current funding period is infinite. The current contribution rate will not be able to amortize the unfunded liabilities of the system in a period that less than 30 years, and therefore the stated funding policy is not being met.

The funded ratio (the ratio of the actuarial value of assets to the actuarial accrued liability) decreased from last year. The funded ratio at June 30, 2015 was 87.8%, while it is 85.7% as of June 30, 2016. This decrease is due to the experiences losses on the actuarial liabilities and actuarial value of assets.

The Board of Trustees is proposing changes to the benefits of ASHERS. Please see Section I for more information about the impact of these proposed changes.

Benefit Provisions

The actuarial valuation reflects the benefit and contribution provisions set forth in the Arkansas statutes. There was no legislation passed since prior valuation.

Section T of Table 17 summarizes the most recent plan changes which were effective in 2013. There are no ancillary benefits (such as cost-of-living increases to retirees) funded by a source independent of ASHERS.

Assumptions and Methods

Actuarial assumptions and methods are set by the Board of Trustees, based upon recommendations made by the plan's actuary. We believe these assumptions are internally consistent and where applicable are reasonably based on the actual experience of ASHERS, and comply with Actuarial Standards of Practice.

The results of the actuarial valuation are dependent on the actuarial assumptions used. Actual results can and almost certainly will differ, as actual experience deviates from the assumptions. Even seemingly minor changes in the assumptions can materially change the liabilities, calculated contribution rates and funding periods. The actuarial calculations are intended to provide information for rational decision making.

This report does not include a more robust assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment.

There have been no changes to the actuarial assumptions and methods since the prior actuarial valuation. Please see Table 18 for a summary of the current actuarial assumptions.

Deferred Retirement Option Program (DROP)

We have reviewed the DROP program to determine its overall impact on the liabilities of the System. Based on the current actuarial assumptions, the overall DROP program does not increase the cost of the benefits for new hires. For active employees, while overall the DROP program provides some additional costs to the System, Tier II of the DROP program does not add any additional costs.

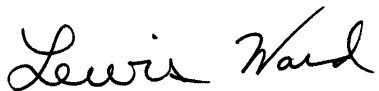
Data

Member data for retired, active, and inactive participants was supplied as of June 30, 2016, by the staff of ASHERS. We have not subjected this data to any auditing procedures, but have examined the data for reasonableness and consistency with the prior year's data. Asset information was also supplied by the ASHERS staff.

Please see the following page for additional disclosures required by our Actuarial Standards of Practice.

We are available to answer any questions you may have and to provide additional details as may be appropriate.

Sincerely,
Gabriel, Roeder, Smith & Company



Lewis Ward
Consultant



Joseph P. Newton, FSA, MAAA, EA
Senior Consultant

Actuarial Standards of Practice Disclosure Statements

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law.

This report should not be relied on for any purpose other than the purpose described above. Determinations of the financial results associated with the benefits described in this report in a manner other than the intended purpose may produce significantly different results.

The valuation was based upon information furnished by the System's staff, concerning Retirement System benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal and year-to-year consistency, but did not otherwise audit the data. We are not responsible for the accuracy or completeness of the information provided by the System's staff.

The developed findings included in this report consider data or other information through June 30, 2016.

This is one of multiple documents comprising the actuarial report. The other document comprising the actuarial report is a PowerPoint presentation presented to the Board of Trustees following the publication of this report.

	<u>PAGE</u>
Section A – Executive Summary	2
Section B – Introduction	4
Section C – Funded Status	5
Section D – Change in Assets During the Year.....	6
Section E – Actuarial Gains and Losses.....	7
Section F – Impact of Changes	8
Section G – History of Cash Flow	9
Section H – Historical Comparisons and Statistical Summaries	10
Section I – Impact of Proposed Changes	11
Section J – Summary and Closing Comments	12
Section K – Tables	14

Executive Summary

The key results of the valuation of the Arkansas State Highway Employees Retirement System as of June 30, 2016, may be summarized as follows:

	<u>June 30, 2016</u>	<u>June 30, 2015</u>
	(1)	(2)
1. Assets		
Market Value	\$ 1,304.9 million	\$ 1,443.5 million
Actuarial Value	\$ 1,447.3 million	\$ 1,430.5 million
2. Members		
a. Actives not in DROP	3,406	3,338
b. Actives in DROP	364	333
c. Inactive, vested	206	217
d. Retirees and beneficiaries	3,301	3,244
3. Annualized salaries (excluding DROP participants)	\$141.9 million	\$140.5 million
4. Normal Cost rate	12.50%	12.44%
5. UAAL	\$241.9 million	\$198.7 million
6. Actuarial assets as % of actuarial accrued liability	85.7%	87.8%
7. Funding period	Infinite	48.4 years
8. Employer contribution rate necessary to produce 30-year funding period	16.57%	14.72%
9. Estimated yield on actuarial assets for prior year	6.82%	11.82%
10. Estimated yield on market value for prior year	(4.31%)	1.74%
11. Member contributions for prior year	\$9.4 million	\$9.1 million
12. Member contribution rate for prior year	6.00%	6.00%
13. State contributions for prior year	\$19.2 million	\$19.1 million
14. State contribution rate for prior year	12.90%	12.90%
15. Benefit, refund, and administrative expense payments for prior year	\$106.9 million	\$102.3 million
16. Net Investment income for prior year	(\$60.3) million	\$25.4 million

Executive Summary
(Continued)

	<u>June 30, 2016</u>	<u>June 30, 2015</u>
	(1)	(2)
17. Actuarial gains (losses)		
Assets	(\$16.4) million	\$32.1 million
Liability experience	(20.9) million	(20.8) million
Legislative changes	0.0 million	0.0 million
Method change	0.0 million	18.1 million
Assumption change	<u>0.0 million</u>	<u>(91.9) million</u>
Total	(\$37.3) million	(\$62.6) million

	<u>UAAL</u>	<u>Funding</u>	<u>Change in</u>
	(\$ Million)	Period	Funding Period
	(1)	(in years)	(in years)
18. Changes in funding period	(1)	(2)	(3)
a. 2015 valuation	\$198.7	48.4	0.0
b. 2016 valuation with all expected experience	\$204.6	57.7	9.3
c. 2016 valuation with actual assets	\$220.9	Infinite	N/A
d. 2016 valuation with actual assets and actual liabilities	\$241.9	Infinite	N/A

Introduction

The results of the June 30, 2016, actuarial valuation of the Arkansas State Highway Employees Retirement System (ASHERS) performed by Gabriel, Roeder, Smith 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.

In preparing this valuation, Gabriel, Roeder, Smith has relied on employee data and asset information provided by the staff of ASHERS. While not verifying the data at their source, Gabriel, Roeder, Smith has performed such tests for consistency and reasonableness as has been deemed necessary to be satisfied with the appropriateness of using the data supplied.

The valuation results are based on benefit provisions of the System as of June 30, 2016, as summarized in Table 17 of Section J. The determination of actuarial accrued liabilities and funded status is based on the actuarial assumptions adopted effective for the June 30, 2015 valuation, and as summarized in Table 18.

The results of the actuarial valuation are summarized in Section C. The period required to amortize the unfunded actuarial accrued liability is also discussed in Section C. Section D discusses the change in assets during the last year. Section E discusses actuarial gains and losses. The impact of changes is discussed in Section F. Cash flow history is shown in Section G, and historical comparisons and statistical summaries are provided by Section H. Section I provides the summary remarks regarding the actuarial valuation. Completing the report is Section J with the various supporting tables.

Section A contains an executive summary of the key valuation results. It is intended to provide one convenient place for those valuation items most often referenced during the year.

Funded Status

Table 3 in Section J details the normal cost of the Retirement System by its various components. This normal cost is developed based on the valuation method known as the Entry Age Normal (EAN) actuarial valuation method. This method gives an equitable allocation of contribution requirements among various generations of taxpayers, complying with the objective of Act 793 of 1977.

Table 3 details the normal cost by its various components. The total normal cost for the Retirement System is 12.50% of pay. Retirement benefits account for 8.91% of the 12.50% total normal cost. Benefits payable upon death, disability, and other terminations account for the remaining 3.59% of the total normal costs.

Table 1 calculates the unfunded actuarial accrued liability (UAAL). As shown in Item 10, the UAAL has increased from \$198.7 million to \$241.9 million. The increase was due to experience losses on both investments and liabilities. Since the UAAL is positive, the System is deemed to be underfunded. As shown in Item 12, the funding period is now infinite, which means the current employer contribution rate is not sufficient to amortize the UAAL over any period.

The funded ratio, the ratio of actuarial value of assets of the System to the actuarial accrued liability of the System, decreased from 87.8%, as of June 30, 2015, to 85.7%, as of June 30, 2016. The ratio of the market value of assets to the actuarial accrued liability decreased year over year from 88.6% to 77.2%.

The actuarial asset method recognizes investment excesses/(shortfalls) over a 4 year period. Therefore, excess/(shortfall) bases will be recognized 25% per year over four valuations (including this one). The shortfall earnings for fiscal years 2015 and 2016 were \$91.1 million and \$172.8 million while the excess earnings for fiscal years 2013 and 2014 were \$63.6 million and \$130.8 million. Therefore, \$(129.6) million (or 75% of the total 2015 shortfall earnings), \$ (45.6) million (or 50% of the total 2015 excess earnings) and \$32.7 million (or 25% of the total 2014 excess earnings) are still being deferred for recognition in future valuations. The remaining excess earnings from 2013 were fully recognized in this valuation.

Change in Assets During the Year

This section of the report provides an analysis of the change in the accounting assets during the year and estimates the yield on mean assets of the total System. Table 6 provides the change in the plan net assets.

Part II of Table 6 details the revenue of the year, distinguished between contributions in Item A and investment income in Item B. The total revenue for the year is shown in Item C.

In Part III of Table 6 the System's expenditures for the year are categorized into refunds (Item III.A), benefit payments (Item III. B), and administrative expenses (Item III.D), with the total for the year shown in Item III.E.

The net increase/(decrease) in market value of the System during the year is shown in Item IV as \$(138.6) million.

Item VI and Item VII of Table 6 use the increases and decreases of the prior sections of the table to produce an estimated yield based on market value and on actuarial value.

The estimated yield is derived by applying the traditional yield formula of $2I/(A + B - D)$. As indicated by Item VII.D. in Table 6, the estimated yield on actuarial assets is 6.82%. The estimated yield on mean market assets is -4.31%.

As shown on Table 4-A, the expected investment income for fiscal year 2016 was \$112.4 million. The actual investment income (net of all expenses) during fiscal year 2016 was \$(60.5) million. Therefore, the shortfall in investment income for the fiscal year was \$172.8 million. 25% of this shortfall will be recognized in this valuation and the remainder will be recognized over the next three valuations.

Actuarial Gains and Losses

Section C noted that the unfunded actuarial accrued liability (UAAL) has increased from \$198.7 million in 2015 to \$241.9 million in 2016. The purpose of this section is to determine the source of the actuarial losses during the year that have caused the UAAL to increase.

Table 8 develops the expected value of actuarial assets for this valuation, based on the investment return assumption that was in effect for the 2015/2016 plan year, namely, 8.0%. It compares the expected value with the actual value of actuarial assets as of the end of the year to determine the asset gain (loss) for the year.

As shown in Item 6 of Table 8, the expected value of actuarial assets as of June 30, 2016, is \$1,463.7 million. As shown in Item 7, the actual value of actuarial assets as of the valuation date is \$1,447.3 million. Thus the asset loss for the year is the difference between the actual value and the expected value, or \$16.4 million (as shown in Item 8).

Table 9 determines that the overall actuarial loss for the 2015/2016 plan year is \$37.3 million. The asset loss for the year is \$16.4 million. This means that the total liability loss for the year is \$20.9 million, which is 1.24% of the actuarial accrued liability.

Impact of Changes

Using the actuarial gains and losses developed in Table 9, it is possible in Table 10 to trace the source of the changes in the funding period between June 30, 2015 and June 30, 2016.

The funding period as of June 30, 2015, was 48.4 years. Item 2 of Table 10 indicates that if experience had been exactly as anticipated (i.e., no actuarial gains or losses on either the asset or the liability side, but using actual payroll) the UAAL would have been \$204.6 million and the funding period would have increased to 57.7 years.

The asset loss of \$16.4 million increased the above expected UAAL to \$220.9 million, and increased the funding period to infinite. The liability experience loss of \$20.9 million decreased the UAAL to \$241.9 million, which resulted in the funding period remaining infinite.

History of Cash Flow

Table 11 provides a history of external cash flow. External cash flow is defined as total contributions during the year, less benefit payments, refunds, window benefits, and expenses.

Note that the calculation of external cash flow specifically excludes investment income since investment income is generated by the System. If external cash flow is positive, all expenditure obligations can be met by external funds, and all income generated by the System's investments is available for re-investment.

On the other hand, when external cash flow becomes negative, some portion of investment income must be used to make benefit payments instead of being re-invested. The more negative this measure, the more emphasis asset allocation must place on the production of current income as opposed to long-term asset growth.

External cash flow became negative for the first time from July 1, 1994 to June 30, 1995 and has slowly grown more negative since that time. This is the expected consequence of a mature pension plan. The reason we pre-fund the pension plans is so that the assets (and income on those assets) can be used to meet benefit payments obligations. Currently, the contributions and investment income have been sufficient to cover external fund needs. As the DROP program matures, its cash flow impact will be an item to watch in this table.

Historical Comparisons and Statistical Summaries

Tables 13 through 17 summarize statistical information for active and retired members of Arkansas State Highway Employees Retirement System as of June 30, 2016. The number of participants in DROP increased from 333 to 364 as of the valuation date (See Table 12). There was an increase in the amount of benefit payments during the fiscal year. This increase in benefit payments contributed to an increase in the negative external cash flow of the System.

Impact of Proposed Changes

As discussed previously, the current funding objectives of ASHERS are not being met. To address this situation the Board of Trustees is proposing legislation to alter the benefits of ASHERS.

Currently, all ASHERS' retirees and active members in DROP receive a fixed 3.0% cost of living adjustment (COLA) in July of each year (following one year of retirement or participation in DROP). The Board of Trustees is proposing to modify the COLA to a variable COLA based on annual changes in the consumer price index (CPI) with a maximum COLA of 3.0%.

The actuarial valuation assumes that inflation will be 2.50% on average. However, while this is expected to be the average of changes in the CPI it is not expected that the change in the CPI will be 2.50% each year. Instead we expect some years above 2.50% and some years below 2.50%. Because of this volatility it is expected that the average COLA granted will be less than the average change in the CPI due to the maximum that applies to the COLA but not to the CPI. The impact of this volatility is approximately a 0.25% reduction in the expected COLAs. Therefore, this proposed benefit change is being valued as a 2.25% COLA going forward.

If the proposed change was in effect as of June 30, 2016 it would have had the following impact:

- A reduction in the normal cost from the current 12.50% to 11.70%
- A reduction in the unfunded actuarial accrued liability from \$242 million to \$172 million
- A reduction in the funding period from infinite to 26.9 years

While the proposed changes would vastly improve the outlook of ASHERS, it should be noted that ASHERS is still deferring \$142 million in investment losses to be recognized in the future. Without offsetting actuarial gains, it is likely that further changes to the benefits or additional contributions will be required to meet the funding objectives of ASHERS.

Summary and Closing Comments

Like most retirement systems with June 30 measurement dates, the System earned less than its assumed rate of return on investments for the 2016 fiscal year, when measured on a market value basis. Arkansas State Highway Employees Retirement System (ASHERS) 2016 fiscal year return of -4.31% was 12.31% below its investment return assumption.

After considering all aspects of the Retirement System, it is our opinion that as of the valuation date the rate of contribution required under the Law will not be sufficient to fund the benefit payments which are specified in the Law. However, as demonstrated by this valuation, the funding period is very volatile due to the ratio of payroll to the assets and liabilities of the system. Because the funding period is more than 30 years, the State law banning benefit enhancements is currently applicable.

The 1998 valuation was the first ASHERS valuation to include members participating in DROP. As of June 30, 2016, there are 364 active employees who are DROP participants with an average balance per participant of \$120,563.

As noted in Section D, general market conditions produced an investment loss on a market value basis when compared with the 8% assumption during the 2015 and 2016 plan years. As shown on Table 8, the System experienced a loss on the actuarial value of assets due to the partial recognition of the investment gains from fiscal year 2013 and 2014 not being sufficient to offset the partial recognition of the shortfalls in 2015 and 2016. As shown on Table 4-B, the actuarial asset valuation method is now deferring \$142.5 million in net investment losses compared with \$12.9 million net investment gains in the prior valuation.

The System remained in an unfunded position this year. The current funding deficit is \$241.9 million. While the funded ratio of the System at 85.7% is still strong, the funding period is has become infinite, which means the current employer contribution is not sufficient to amortize the UAAL over any period.

Given the change in the funding period to infinite and the amount of deferred investment losses to be recognized in the future, we believe it would be appropriate for the Board of Trustees to consider changes to the benefit structures and/or contribution structures of the System. We have worked with many systems in making modifications to their structures. It is always desirable to consider

**Summary and Closing Comments
(Continued)**

not just the impact on the retirement systems but also the impact on the workforce and the employer's workforce needs when making changes to a retirement system. We stand ready to assist you in any deliberations.

Tables

Table Number	Content of Table	Page
1	Summary of Cost Items	15
2	Actuarial Present Value of Future Benefits	16
3	Analysis of Normal Cost by Component	17
4-A	Calculation of Excess Investment Income	18
4-B	Development of Actuarial Value of Assets	19
5	Development of Years to Fund the Unfunded Actuarial Liability	20
6	Change in Plan Net Assets	21
7	Plan Net Assets	22
8	Actual Versus Expected Actuarial Assets	23
9	Actuarial Gain or Loss for the Year	24
10	Analysis of Change in Funding Period	25
11	History of Cash Flow	26
12	Statistical Information	27
13	Distribution of Active Members by Age and Service	28
14	Distribution of Active Members by Service and Current Rate of Compensation	29
15-A through 15-C	Distribution of Retired Members by Years Since Retirement	30-32
16-A through 16-C	Distribution of Retired Members by Age	33-35
17	Summary of the Benefit Provisions of the Retirement System	36-42
18	Summary of Assumptions and Methods	43-48
19	Definition of Actuarial Terms	49-50

Summary of Cost Items

	Valuation as of June 30, 2016 <u>(1)</u>	Valuation as of June 30, 2015 <u>(2)</u>
1. Participants		
a. Active members not in DROP	3,406	3,338
b. Active members in DROP	364	333
c. Inactive members with deferred benefits	206	217
d. Retired members and beneficiaries	3,301	3,244
e. Total	<u>7,277</u>	<u>7,132</u>
2. Annualized salaries (excludes DROP participants)	\$ 141,906,487	\$ 140,544,393
3. Averages for active members (excludes DROP participants)		
a. Age	43.2	43.6
b. Service	9.5	9.9
c. Pay	\$ 41,664	\$ 42,104
4. State normal cost	12.50%	12.44%
5. Present value of future benefits		
a. Retired members	\$ 1,090,063,509	\$ 1,038,576,896
b. Active members	724,464,127	711,917,248
c. Vested terminated members	9,474,088	9,843,578
d. Non-vested terminated members	780,875	690,297
e. Total	<u>\$ 1,824,782,599</u>	<u>\$ 1,761,028,019</u>
6. Present value of future normal costs	\$ 130,037,374	\$ 126,481,471
7. Present value of Tier II DROP contributions	\$ 5,534,603	\$ 5,270,461
8. Actuarial accrued liability (Item 5.e. - Item 6 - Item 7)	\$ 1,689,210,622	\$ 1,629,276,087
9. Actuarial assets	\$ 1,447,342,661	\$ 1,430,527,926
10. Unfunded actuarial accrued liability (Item 8 - Item 9)	\$ 241,867,961	\$ 198,748,161
11. Employer contribution rate	12.90%	12.90%
12. Funding period	Infinite	48.4 years
13. Estimated yield on assets		
a. Based on Market Value	(4.31%)	1.74%
b. Based on Actuarial Value	6.82%	11.82%
14. Relative size of unfunded actuarial accrued liability		
a. As % of actuarial assets	16.7%	13.9%
b. As % of covered payroll	170.4%	141.4%
c. As % of total present value of future benefits	13.3%	11.3%

Actuarial Present Value of Future Benefits

	June 30, 2016 (1)	June 30, 2015 (2)
1. Active members		
a. Retirement benefits	\$ 650,670,428	\$ 639,461,394
b. Deferred termination benefits	21,194,073	20,674,407
c. Refunds	1,299,999	1,186,586
d. Death benefits	7,477,723	7,560,060
e. Disability benefits	43,821,904	43,034,801
f. Total	<u>\$ 724,464,127</u>	<u>\$ 711,917,248</u>
2. Retired members		
a. Service retirements	\$ 947,512,818	\$ 906,812,132
b. Disability retirements	75,920,111	72,366,196
c. Beneficiaries	66,630,580	59,398,568
d. Window health insurance subsidy	-	-
e. Total	<u>\$ 1,090,063,509</u>	<u>\$ 1,038,576,896</u>
3. Inactive members		
a. Vested terminations	\$ 9,474,088	\$9,843,578
b. Non-vested terminations	780,875	690,297
c. Total	<u>\$ 10,254,963</u>	<u>\$10,533,875</u>
4. Total actuarial present value of future benefits	<u>\$ 1,824,782,599</u>	<u>\$ 1,761,028,019</u>

Analysis of Normal Cost by Component

Benefit Component (1)	Cost as % of Pay	
	2016 (2)	2015 (3)
1. Retirement benefit	8.91%	8.87%
2. Disability benefit	1.77%	1.75%
3. Death benefit	0.18%	0.18%
4. Vesting benefit	1.08%	1.08%
5. Refund of contributions	0.56%	0.56%
6. Gross normal cost (State normal cost)	12.50%	12.44%

**Calculation of Excess Investment Income
 For Actuarial Value of Assets**

Item (1)	Plan Year Ending June 30			
	2016 (2)	2015 (3)	2014 (4)	2013 (5)
1. Net investment income for year	(60,344,123)	25,383,457	234,208,606	159,592,223
2. Expenses and fees for year	118,199	91,542	43,282	163,298
3. Actual net investment income based on market value of assets (Item 1 - Item 2)	(60,462,322)	25,291,915	234,165,324	159,428,925
4. Market value of assets (beginning of year)	1,443,476,294	1,492,232,721	1,326,022,360	1,230,012,388
5. Contributions during year				
a. Employee	9,379,784	9,138,451	8,884,829	8,621,381
b. State	19,231,804	19,059,012	18,614,507	18,053,378
c. Other	-	-	-	37,910
d. Total	28,611,588	28,197,463	27,499,336	26,712,669
6. Benefits paid during year	105,056,553	100,328,585	93,712,721	89,037,007
7. Refunds paid during year	1,699,287	1,917,221	1,741,876	1,084,539
8. Expected net investment income at 8.0%				
a. Market value of assets (beginning of year)	115,478,104	119,378,618	106,081,789	98,400,991
b. Contributions	1,144,464	1,127,899	1,099,973	1,068,507
c. Benefits	(4,202,262)	(4,013,143)	(3,748,509)	(3,561,480)
d. Refunds	(67,971)	(76,689)	(69,675)	(43,382)
e. Total	112,352,335	116,416,685	103,363,578	95,864,636
9. Excess investment income for year (Item 3 - Item 8e)	(172,814,657)	(91,124,770)	130,801,746	63,564,289

Development of Actuarial Value of Assets

Item (1)	2016 (2)	2015 (3)
1. Excess/(Shortfall) of invested income for current and previous years		
a. Current year	\$ (172,814,657)	\$ (91,124,770)
b. Current year - 1	(91,124,770)	130,801,746
c. Current year - 2	130,801,746	63,564,289
d. Current year - 3*	63,564,289	N/A
e. Total	\$ (69,573,392)	\$ 103,241,265
2. Deferral of excess/(shortfall) of invested income for current and previous years		
a. Current year (75%)	\$ (129,610,993)	\$ (68,343,578)
b. Current year - 1 (50%)	(45,562,385)	65,400,873
c. Current year - 2 (25%)	32,700,437	15,891,072
d. Current year - 3 (0%)*	-	N/A
e. Total deferred	\$ (142,472,941)	\$ 12,948,367
3. Market value of plan assets (end of year)	\$ 1,304,869,720	\$ 1,443,476,293
4. Preliminary AVA (end of year) (Item 3 - Item 2f)	\$ 1,447,342,661	\$ 1,430,527,926
5. AVA corridor		
a. 80% of MVA, EOY	\$ 1,043,895,776	\$ 1,154,781,034
b. 120% of MVA, EOY	\$ 1,565,843,664	\$ 1,732,171,552
6. Actuarial value of plan net assets	\$ 1,447,342,661	\$ 1,430,527,926
7. Actuaril value of assets prior to method change	\$ 1,447,342,661	\$ 1,412,469,345
8. Increase/(Decrease) in actuarial value of assets due to method change	N/A	\$ 18,058,581

* Actuaial value of assets was marked to market June 30, 2012
Prior years' bases set to zeros

Development of Years to Fund Unfunded Actuarial Liability

	June 30, 2016 (1)	June 30, 2015 (2)
A. Basic Data		
1. Annualized salaries (excludes DROP participants)	\$ 141,906,487	\$ 140,544,393
2. Projected payroll for upcoming fiscal year	\$ 152,220,866	\$ 152,213,166
3. State normal cost	12.50%	12.44%
4. Contribution rate for funding unfunded accrued liability		
a. Total contribution rate	18.90%	18.90%
b. Less normal cost rate	(12.50%)	(12.44%)
c. Total contribution rate available	6.40%	6.46%
5. Actuarial accrued liability for active members		
a. Present value of future benefits for active members	\$ 724,464,127	\$ 711,917,248
b. Less present value future normal cost	(130,037,374)	(126,481,471)
c. Less present value of Tier II DROP contributions	(5,534,603)	(5,270,461)
d. Actuarial accrued liability	\$ 588,892,150	\$ 580,165,316
B. Development of Funding Period		
6. Total actuarial accrued liability		
a. Present value of benefits currently being paid	\$ 1,090,063,509	\$ 1,038,576,896
b. Actuarial accrued liability for active members (Item 5d)	588,892,150	580,165,316
c. Present value of deferred vested benefits	9,474,088	9,843,578
d. Present value of non-vested benefits	780,875	690,297
e. Other liabilities	0	0
f. Total	\$ 1,689,210,622	\$ 1,629,276,087
7. Current assets	\$ 1,447,342,661	\$ 1,430,527,926
8. Unfunded actuarial accrued liability (Item 6f - Item 7)	\$ 241,867,961	\$ 198,748,161
9. Amount of contribution available to fund unfunded actuarial accrued liability*	\$ 10,430,670	\$ 10,632,475
10. Years to fund unfunded actuarial accrued liability based on 3.00% payroll growth	Infinite	48.4 years

*Includes estimated impact of DROP Tier II contributions

Change in Plan Net Assets

	Year Ending as of	
	June 30, 2016 (1)	June 30, 2015 (2)
I. Plan Net Assets, beginning of year		
A. Value reported in prior valuation	\$ 1,443,476,293	\$ 1,492,232,422
B. Prior period adjustments	\$ 1	299
C. Revised value	\$ 1,443,476,294	\$ 1,492,232,721
II. Additions		
A. Contributions		
1. Employee Contributions	\$ 9,379,784	\$ 9,138,451
2. State Contributions	\$ 19,231,804	19,059,012
3. Reinstatements and Other		
a. Principal	\$ -	-
b. Interest	\$ -	-
c. Other	\$ -	-
d. Total	\$ -	-
4. Total Contributions	\$ 28,611,588	\$ 28,197,463
B. Investment Income		
1. Interest	\$ 6,822,301	\$ 7,821,372
2. Dividends	\$ 16,701,557	15,109,023
3. Net Gains	\$ (75,859,083)	10,245,461
4. Subtotal	\$ (52,335,225)	33,175,856
5. less Investment Expenses	\$ (8,008,898)	(7,792,398)
6. Net Investment Income	\$ (60,344,123)	\$ 25,383,457
C. Total Additions	\$ (31,732,535)	\$ 53,580,920
III. Deductions		
A. Refunds	\$ 1,699,287	\$ 1,917,221
B. Benefit Payments	105,056,553	100,328,585
C. Other	-	-
D. Administrative Expenses	118,199	91,542
E. Total Deductions	\$ 106,874,039	\$ 102,337,348
IV. Net Change	\$ (138,606,574)	\$ (48,756,428)
V. Plan Net Assets, end of year	\$ 1,304,869,720	\$ 1,443,476,293
VI. Market value yield		
A. Beginning of year net market assets	\$ 1,443,476,294	\$ 1,492,232,721
B. Investment income net of all expenses	\$ (60,462,322)	\$ 25,291,915
C. End of year market assets	\$ 1,304,869,720	\$ 1,443,476,293
D. Estimated market value yield	-4.31%	1.74%
VII. Actuarial value yield		
A. Beginning of year actuarial assets	\$ 1,430,527,926	\$ 1,349,452,452
B. Investment income net of all expenses	\$ 94,958,987	\$ 155,123,817
C. End of year actuarial assets	\$ 1,447,342,661	\$ 1,430,527,926
D. Estimated actuarial value yield	6.82%	11.82%

Plan Net Assets
(Assets at Fair Value)

ASSET BALANCES	June 30, 2016 (1)	June 30, 2015 (2)
1. Current assets		
a. Cash in State Treasury	\$ 316,612	\$ 306,337
b. Cash in bank	4	\$ 18,228
c. Accounts receivable		
i. Member contributions	498,759	\$ 432,166
ii. State contributions	1,035,876	\$ 863,727
iii. Miscellaneous	1,494,020	\$ 3,702,771
iv. DROP plan	-	\$ -
d. Interest and dividends receivable	1,702,932	\$ 1,576,207
e. Short-term investments	195,884,803	\$ 122,881,838
f. Total current assets	<u>\$ 200,933,006</u>	<u>\$ 129,781,274</u>
2. Long-term investments		
a. U.S. Government agency obligations	\$ 108,017,423	\$ 33,910,333
b. Corporate bonds	139,759,261	163,274,921
c. Common stock	860,324,064	1,117,650,310
d. Total long-term investments	<u>\$ 1,108,100,748</u>	<u>\$ 1,314,835,564</u>
3. Total assets	<u>\$ 1,309,033,754</u>	<u>\$ 1,444,616,838</u>
4. Liabilities	(4,164,034)	(1,140,545)
5. Total market value of net assets available for benefits (item 3 + item 4)	\$ 1,304,869,720	\$ 1,443,476,293
6. Allocation of invested assets, including cash		
a. Invested cash	15.0%	8.6%
b. U.S. Government agency obligations	8.3%	2.4%
c. Corporate bonds	10.7%	11.4%
d. Common stock	66.0%	77.6%
e. Total investments	<u>100.0%</u>	<u>100.0%</u>

Actual Versus Expected Actuarial Assets

Item (1)	Valuation as of	
	June 30, 2016 (2)	June 30, 2015 (3)
1. Actuarial assets, beginning of year	\$ 1,430,527,926	\$ 1,349,452,452
2. Total contributions during year	28,611,588	28,197,463
3. Benefits paid during year	(105,056,553)	(100,328,585)
4. Refunds paid during year	(1,699,287)	(1,917,221)
5. Assumed net investment income at 8.0%		
a. Beginning of year assets	114,442,234	107,956,196
b. Contributions	1,144,464	1,127,899
c. Benefits	(4,202,262)	(4,013,143)
d. Refunds	(67,971)	(76,689)
e. Total	\$ 111,316,465	\$ 104,994,263
6. Expected actuarial assets, end of year (Sum of Items 1 through 5)	\$ 1,463,700,139	\$ 1,380,398,372
7. Actuarial assets, end of year prior to asset method change	\$ 1,447,342,661	\$ 1,412,469,345
8. Asset gain/(loss) for year (Item 7 - Item 6)	\$ (16,357,478)	\$ 32,070,973
9. Asset gain/(loss) as percentage of end of year assets (Item 8 / Item 7)	(1.13%)	2.27%
10. Final actuarial value of assets after method change	\$ 1,447,342,661	\$ 1,430,527,926

Actuarial Gain or Loss for the Year

Item (1)	Valuation as of	
	June 30, 2016 (2)	June 30, 2015 (3)
A. Calculation of total actuarial gain or loss		
1. Unfunded actuarial accrued liability (UAAL), previous year	\$ 198,748,161	\$ 135,483,606
2. Normal cost for the year	18,935,318	18,412,588
3. Contributions for the year	(28,611,588)	(28,197,463)
4. Interest at 8.0%		
a. On UAAL	\$ 15,899,853	\$ 10,838,688
b. On normal cost	757,413	736,504
c. On contributions	(1,144,464)	(1,127,899)
d. Total	\$ 15,512,802	\$ 10,447,293
5. Expected UAAL (sum of Items 1 - 4)	\$ 204,584,693	\$ 136,146,024
6. Actual UAAL	\$ 241,867,961	\$ 198,748,161
7. Gain (loss) for the year (Item 5 - Item 6)	\$ (37,283,268)	\$ (62,602,137)
B. Source of gains and losses		
8. a. Asset gain (loss) for the year (Table 8)	\$ (16,357,478)	\$ 32,070,973
b. Gain (loss) from change in assumptions	0	(91,940,822)
c. Gain (loss) from change in methods	0	18,058,581
d. Gain (loss) from Legislative changes	0	0
9. Asset gain (loss) as percentage of actuarial assets	(1.13%)	2.24%
10. Total actuarial accrued liability gain (loss) for the year (Item 7 - Item 8a - Item 8b - Item 8c)	\$ (20,925,790)	\$ (20,790,869)
11. Analysis of actuarial accrued liability gain (loss)		
a. Assumption changes	0	(91,940,822)
b. Method changes	0	0
c. Legislative changes	0	0
d. Experience liability gain (loss) for the year	(20,925,790)	(20,790,869)
e. Total actuarial accrued liability gain (loss)	\$ (20,925,790)	\$(112,731,691)
12. Experience liability gain (loss) as percentage of total actuarial liability (Item 11d as % of total actuarial accrued liability \$1,629,276,087 as of June 30, 2015, and \$1,689,210,622 as of June 30, 2016)	(1.24%)	(1.28%)

Analysis of Change in Funding Period

Basis (1)	Unfunded Actuarial Accrued Liability (\$ millions) (2)	Normal Cost (3)	Funding Period (in years) (4)	Attributable Change in Funding Period (5)
1. Valuation as of June 30, 2015	\$198.748	12.44%	48.4	0.0
2. Valuation as of June 30, 2016, using expected assets and expected liabilities	\$204.585	12.44%	57.7	9.3
3. Valuation as of June 30, 2016, using actual assets and expected liabilities (asset gain/loss)	\$220.942	12.44%	Infinite	N/A
4. Valuation as of June 30, 2016, using actual assets and actual liabilities	\$241.868	12.50%	Infinite	N/A

Note: Expected assets are based on actual contribution made for 2015/2016 plan year.

History of Cash Flow

Year Ending June 30, (1)	Contributions for the Year ¹ (2)	Expenditures During the Year				External Cash Flow for the Year ³ (7)	Market Value of Assets (8)	External Cash Flow as Percent of Market Value (9)
		Benefit Payments (3)	Refund of Contributions (4)	Expenses ² (5)	Total (6)			
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)	(1,136,396)	(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)	(44,810,937)	(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	(89,037,007)	(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%)

¹ Column (2) includes employee and employer contributions, as well as any account reinstatement receipts during the year

² Column (5) includes both administrative and investment expenses

³ Column (7) = Column (2) + Column (6)

Statistical Information

	June 30, 2016 (1)	June 30, 2015 (2)
A. <u>Number</u>		
1. Active members not in DROP		
a. Male members	2,757	2,682
b. Female members	649	656
c. Total active members	3,406	3,338
2. Inactive vested members	206	217
B. <u>Annualized Salaries For Active Members Not in DROP</u>		
1. Male members	\$ 114,534,894	\$ 113,321,862
2. Female members	27,371,593	27,222,532
3. Total active members	\$ 141,906,487	\$ 140,544,394
4. Average annual salary	\$ 41,664	\$ 42,104
C. <u>Accumulated Member Contributions</u>	\$ 131,837,948	\$ 129,353,920
D. <u>Active Members in DROP</u>		
1. Number	364	333
2. DROP Balance	\$ 43,885,101	\$ 39,805,243
3. Average DROP Balance	\$ 120,563	\$ 119,535
E. <u>Persons Receiving Benefits</u>		
1. Number		
a. Life annuities	2,371	2,340
b. Disability annuities	405	391
c. Survivor annuities	525	513
d. Total persons receiving benefits	3,301	3,244
2. Annual annuities*		
a. Life annuities	\$ 77,756,865	\$ 74,834,667
b. Disability annuities	6,718,265	6,422,307
c. Survivor annuities	7,678,262	7,343,000
d. Total persons receiving benefits	\$ 92,153,392	\$ 88,599,974

* Annual annuities before adding July 1st COLA

Age and Service Distribution

Attained Age	Years of Credited Service												Number of Employees	Total Annual Salary	Average Annual Salary
	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over			
Under 20	8	0	0	0	0	0	0	0	0	0	0	0	8	\$ 183,271	\$ 22,909
20-24	88	71	41	18	5	6	0	0	0	0	0	0	229	6,268,171	27,372
25-29	51	70	50	40	24	58	3	0	0	0	0	0	296	10,254,707	34,644
30-34	47	54	31	35	24	98	58	5	0	0	0	0	352	14,500,407	41,194
35-39	39	46	29	23	17	88	120	61	2	0	0	0	425	18,369,490	43,222
40-44	36	43	24	20	14	77	87	72	39	4	0	0	416	18,681,637	44,908
45-49	29	43	20	24	22	84	85	51	64	55	0	0	477	22,228,033	46,600
50-54	29	33	15	22	19	89	89	69	94	98	1	0	558	25,678,964	46,020
55-59	22	28	20	18	25	75	70	58	53	55	1	0	425	17,449,082	41,057
60-64	5	9	16	6	10	48	62	24	5	6	0	0	191	7,269,161	38,058
65 & Up	2	5	1	1	1	10	8	0	1	0	0	0	29	1,023,564	35,295
Total	356	402	247	207	161	633	582	340	258	218	2	0	3,406	\$ 141,906,487	\$ 41,664

Note: Excludes DROP participants.

**Distribution of Service and
 Current Rate of Compensation**

Completed Years of Service	Number of Employed Participants	Total Annual Plan Compensation	Total Average Plan Compensation
(1)	(2)	(3)	(4)
0	356	\$ 9,937,364	\$ 27,914
1	402	11,453,767	28,492
2	247	8,275,498	33,504
3	207	7,508,222	36,272
4	161	6,241,286	38,766
5-9	633	25,592,305	40,430
10-14	582	27,054,529	46,485
15-19	340	17,325,378	50,957
20-24	258	14,315,935	55,488
25-29	218	14,044,411	64,424
30-34	2	157,792	78,896
35 & up	-	-	-
Total	3,406	\$ 141,906,487	\$ 41,664

Note: Excludes DROP participants.

**Distribution of Retired Members by
 Years Since Retirement as of June 30, 2016**

**SERVICE
 RETIRED**

Years Since Retirement	Member		
	Number	Total Benefit	Average Benefit
(1)	(2)	(3)	(4)
0	98	\$ 2,527,376	\$ 25,790
1	144	4,224,009	29,333
2	137	3,859,140	28,169
3	163	4,571,961	28,049
4	140	4,399,207	31,423
5-9	507	16,113,549	31,782
10-14	505	17,855,937	35,358
15-19	339	11,696,177	34,502
20-24	179	6,538,011	36,525
25-29	119	4,697,311	39,473
30-34	32	1,072,019	33,501
35 & up	8	202,167	25,271
Total	2,371	\$ 77,756,865	\$ 32,795

* Annual annuities before adding COLA

**Distribution of Retired Members by
 Years Since Retirement as of June 30, 2016**

**DISABLED
 RETIRED**

Years Since Retirement	Member		
	Number	Total Benefit	Average Benefit
(1)	(2)	(3)	(4)
0	14	\$ 172,008	\$ 12,286
1	24	285,443	11,893
2	31	478,917	15,449
3	17	211,447	12,438
4	14	183,455	13,104
5-9	88	1,299,623	14,768
10-14	87	1,369,413	15,740
15-19	70	1,437,618	20,537
20-24	36	819,262	22,757
25-29	12	260,868	21,739
30-34	3	74,108	24,703
35 & up	9	126,103	14,011
Total	405	\$ 6,718,265	\$ 16,588

* Annual annuities before adding COLA

**Distribution of Retired Members by
 Years Since Retirement as of June 30, 2016**

BENEFICIARIES

Years Since Retirement	Member		
	Number	Total Benefit	Average Benefit
(1)	(2)	(3)	(4)
0	40	\$ 519,296	\$ 12,982
1	39	575,506	14,757
2	31	566,837	18,285
3	50	720,230	14,405
4	27	365,978	13,555
5-9	120	2,019,803	16,832
10-14	132	1,897,623	14,376
15-19	23	261,090	11,352
20-24	22	261,581	11,890
25-29	19	235,620	12,401
30-34	14	174,569	12,469
35 & up	8	80,129	10,016
Total	525	\$ 7,678,262	\$ 14,625

* Annual annuities before adding COLA

**Distribution of Retired Members by
 Age as of June 30, 2016**

**SERVICE
 RETIRED**

Age	Member		
	Number	Total Benefit	Average Benefit
(1)	(2)	(3)	(4)
Up to 40	-	\$ -	\$ -
40-45	-	-	-
45-49	3	114,476	38,159
50-54	36	1,179,724	32,770
55-59	167	5,995,358	35,900
60-64	389	13,033,384	33,505
65-69	621	19,520,936	31,435
70-74	452	14,299,664	31,636
75-79	326	10,870,160	33,344
80-84	226	7,957,428	35,210
85-89	91	3,241,950	35,626
90-94	46	1,246,055	27,088
95 & up	14	297,731	21,266
Total	2,371	\$ 77,756,865	\$ 32,795

* Annual annuities before adding COLA

**Distribution of Retired Members by
 Age as of June 30, 2016**

**DISABLED
 RETIREES**

Age	Member		
	Number	Total Benefit	Average Benefit
(1)	(2)	(3)	(4)
Up to 40	1	\$ 4,471	\$ 4,471
40-45	12	166,957	13,913
45-49	18	264,437	14,691
50-54	43	609,147	14,166
55-59	74	1,097,554	14,832
60-64	87	1,388,685	15,962
65-69	87	1,494,566	17,179
70-74	44	821,968	18,681
75-79	26	606,227	23,316
80-84	6	126,065	21,011
85-89	4	103,482	25,871
90-94	2	23,158	11,579
95 & up	1	11,548	11,548
Total	405	\$ 6,718,265	\$ 16,588

* Annual annuities before adding COLA

**Distribution of Retired Members by
 Age as of June 30, 2016**

BENEFICIARIES

Age	Number	Member	
		Total Benefit	Average Benefit
(1)	(2)	(3)	(4)
Up to 40	15	\$ 187,619	\$ 12,508
40-45	7	102,984	14,712
45-49	8	137,381	17,173
50-54	20	234,061	11,703
55-59	42	537,738	12,803
60-64	47	580,528	12,352
65-69	60	725,257	12,088
70-74	74	1,121,490	15,155
75-79	78	1,302,015	16,693
80-84	59	929,170	15,749
85-89	63	1,051,068	16,684
90-94	37	551,396	14,903
95 & up	15	217,555	14,504
Total	525	\$ 7,678,262	\$ 14,625

* Annual annuities before adding COLA

**Summary of Benefit Provisions of the Retirement System
(As Most Recently Amended on June 30, 2013)¹**

A. *NORMAL SERVICE RETIREMENT*

1. 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.

2. 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.

3. Final Average Compensation:

Highest 3 year average.

¹ System established July 1, 1949.

4. 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.

5. Optional Forms:

Option A - 10 years certain or life, or

Option B - joint and 50% contingent survivor, with a pop-up to the life only amount if the joint pensioner predeceases the member.

B. *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.

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.

C. *EARLY SERVICE RETIREMENT*

1. Eligibility:

Age 55 with 5 or more years of creditable service.

2. Benefit Formula:

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.

D. *DISABILITY 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. Interest credits are currently 5% 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.

E. *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 5% 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.

F. *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.

G. 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).

H. AUTOMATIC POST-RETIREMENT BENEFIT INCREASES

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.

I. EMPLOYER CONTRIBUTIONS

The State contributes 12.90% of the total payroll earnings of members, excluding DROP participants. The State does not contribute for members in the Tier I portion of DROP and contributes 6.9% of payroll for members in the Tier II portion of DROP.

J. MEMBER CONTRIBUTIONS

1. Each Member must contribute 6% 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.

K. LEGISLATED PLAN CHANGES ENACTED BY THE 1991 LEGISLATURE OF THE STATE OF ARKANSAS

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).

L. LEGISLATED PLAN CHANGES ENACTED BY THE 1993 LEGISLATURE OF THE STATE OF ARKANSAS

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.)

M. LEGISLATED PLAN CHANGES ENACTED BY THE 1995 LEGISLATURE OF THE STATE OF ARKANSAS

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.

N. LEGISLATED 1997 PLAN CHANGES ENACTED BY THE 1997 LEGISLATURE OF THE STATE OF ARKANSAS

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.

O. LEGISLATED 1999 PLAN CHANGES ENACTED BY THE 1999 LEGISLATURE OF THE STATE OF ARKANSAS

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.

P. LEGISLATED 2001 PLAN CHANGES ENACTED BY THE 2001 LEGISLATURE OF THE STATE OF ARKANSAS

1. ACT 482 Provides \$7,500 lump sum death benefit for retirees (not beneficiaries)
2. ACT 539 Increases the multiplier from 2.1% to 2.2%. Grant 4.8% ad hoc to retirees
3. Crediting 8% to the DROP account by taking a Board action.

Q. LEGISLATED 2003 PLAN CHANGES ENACTED BY THE 2003 LEGISLATURE OF THE STATE OF ARKANSAS

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.

R. LEGISLATED 2009 PLAN CHANGES ENACTED BY THE 2009 LEGISLATURE OF THE STATE OF ARKANSAS

1. HB 1177 Changes from 5 years vesting requirement to 10 years vesting requirement on health care coverage. Prorated the \$125 per month health care supplements as follows:
 - a. With less than 10 years of service at retirement: No health care supplements
 - b. With 10 or more years of service but less than 15 years of service at retirement: \$75/month (or 60% of \$125/month)
 - c. With 15 or more years of service but less than 20 years of service at retirement: \$100/month (or 80% of \$125/month)
 - d. With 20 or more years of service at retirement: \$125/month (or 100% of \$125/month)

S. LEGISLATED 2011 PLAN CHANGES ENACTED BY THE 2011 LEGISLATURE OF THE STATE OF ARKANSAS

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

T. LEGISLATED 2013 PLAN CHANGES ENACTED BY THE 2013 LEGISLATURE OF THE STATE OF ARKANSAS

1. HB 1224 Prorates the Health Care Offset paid by the Arkansas State Highway Employees Retirement System (ASHERS), for members who also have service in a reciprocal retirement system.
2. HB 1225 Excludes lump sum termination payments (accrued leave, compensation, etc.) from inclusion in the Average Compensation and credited service used in the determination of retirement benefits paid by the Arkansas State Highway Employees Retirement System (ASHERS).

Summary of Assumptions and Methods

The actuarial assumptions were reviewed as part of an experience investigation performed in 2015 based on data through June 30, 2014. All of the assumptions shown below were affirmed or revised as part of the investigation.

ACTUARIAL ASSUMPTIONS

1. Investment Yield Rate (Effective June 30, 1997) 8.0% per annum, compounded annually.

2. Mortality
 - a. Healthy Post-retirement (Effective June 30, 2015)
..... Male: RP-2000 Combined Healthy for males with Blue Collar adjustments, scaled at 105% with no setback. Generational mortality improvements in accordance with Scale AA from the table's base year of 2000 (both before and after the measurement date)
..... Female: RP-2000 Combined Healthy for females with Blue Collar adjustments, scaled at 100% with no setback. Generational mortality improvements in accordance with Scale AA from the table's base year of 2000 (both before and after the measurement date)

 - b. Disabled Post-retirement... (Effective June 30, 2015)
..... Male: RP-2000 Combined Healthy for males with Blue Collar adjustments, scaled at 105% with three year set-forward. Generational mortality improvements in accordance with Scale AA from the table's base year of 2000 (both before and after the measurement date), minimum 3% rate of mortality at all ages
..... Female: RP-2000 Combined Healthy for females with Blue Collar adjustments, scaled at 100% with three year set-forward. Generational mortality improvements in accordance with Scale AA from the table's base year of 2000 (both before and after the measurement date), minimum 3% rate of mortality at all ages

 - c. Healthy Pre-retirement..... (Effective June 30, 2015)
..... Male: RP-2000 Combined Healthy for males with Blue Collar adjustments, scaled at 70% with no setback. Generational mortality improvements in accordance with Scale AA from the table's base year of 2000 (both before and after the measurement date)

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

3. Retirement Rates (Effective June 30, 2015) The following probabilities of retirement were assumed for members eligible to retire.

Age	Early Retirement Rate	Normal Retirement Rate	
	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%

4. Disability Rates (Effective June 30, 2009) Rates based on the experience of other large public sector retirement systems through age 82; thereafter, Non-Disabled Mortality is assumed.

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

5. Withdrawal Rates
 (for causes other than death, disability, or retirement) (Effective June 30, 2015 Select and ultimate withdrawal rates are used based on age and service. Sample rates are shown below:

Probability of Decrement Due to Withdrawal						
Years of Service						
Male Members						
Age	0	1	2	3	4	5+
20	.3712	.2536	.1697	.1180	.1150	.1043
30	.2925	.1998	.1313	.0862	.0756	.0578
40	.2193	.1538	.1024	.0646	.0477	.0261
50	.1628	.1242	.0894	.0582	.0368	.0159
60	.1342	.1238	.1033	.0748	.0462	.0302
Female Members						
Age	0	1	2	3	4	5+
20	.4028	.3008	.2168	.1509	.1047	.0761
30	.2819	.2118	.1542	.1093	.0765	.0571
40	.1980	.1483	.1073	.0752	.0514	.0366
50	.1715	.1250	.0863	.0550	.0336	.0171
60	.1985	.1391	.0896	.0481	.0230	.0007

6. Salary Scales..... **(Effective June 30, 2015)** Future compensation is assumed to increase by an inflation (growth) increase rate of 2.5% plus a productivity component of 1.00%, and plus a step-rate/promotional component based on service. Rates are illustrated below:

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

7. Future Increase in Total Payroll¹ **(Effective June 30, 2015)** 3.0% per annum.
8. 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.
9. 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.
10. 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.

¹ Used for purposes of funding the Unfunded Actuarial Accrued Liability.

11. Interest Crediting Rate on Drop Accounts(Effective June 30, 2012) 6.0% interest credit on DROP accounts.
12. Drop Accounts Payout Period.....(Effective June 30, 2015) it is assumed that members who participate in DROP will receive their DROPaccounts in equal installments over a 10-year period.

CHANGES IN ASSUMPTIONS SINCE PRIOR VALUATION

There have been no changes to the actuarial assumptions and methods since the prior valuation.

ASSET VALUATION METHOD (Adopted June 30, 2015)

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

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

ACTUARIAL COST METHOD

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

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

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

the normal cost rate. This calculation reflects the plan provisions that apply to each individual member. The employer normal cost rate is equal to (i) the normal cost rate, minus (ii) the member contribution rate.

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

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 12.50% of payroll, which is 6.40% of payroll less than the total contributions required by Law (12.90% from State plus 6% from employees). 12.50% of the State's 12.90% contribution is required to meet the normal cost, and the remaining 0.40% along with the 6.00% from the employee contribution plus any contributions received on behalf of members in Tier II of DROP are assumed to be utilized to fund the unfunded actuarial accrued liability over a period of years in the future, assuming that total payroll is increased by 3.0% per year.

Definition of Actuarial Terms

In our report we have attempted to avoid the use of multitude of complex actuarial terminology, but we realize that different users of our reports may have differing opinions as to what constitutes an "actuarial term". Accordingly, we offer the following definitions of several terms contained in this report which might be considered actuarial in nature. Any qualified user of our report who believes that additional terms should be included is invited to communicate such terms either directly to us or through the Arkansas State Highway Employees Retirement System.

1. Actuarial Accrued Liability - for benefits payable in the future to the present members, it will equal the present value of benefits payable in the future to them less the present value of future normal costs.
2. 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.
3. Actuarial Assumptions - assumptions as to future experience under the System. Current actuarial assumptions are detailed in Table 18 of the current annual valuation report. Assumptions include future fund earnings rates, rates of future salary increases, and rates of death (both before and after retirement), disability, retirement, and withdrawal.
4. 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.
5. Actuarial Gain or Actuarial Loss - a measure of the difference between actual experience and assumed experience of the System. Through 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.
6. 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. The term "reserve" may be used interchangeably with "present value" or "liability". When applied to active members, it takes into account benefits which will be earned through future service and future salary increases.

7. Defined Benefits - in a retirement plan, benefits which are defined by a specific formula applied to a specific member compensation and/or specific years of service. The amount of the benefit is not a function of contributions or actual earnings on those contributions.
8. 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.
9. Future Contributions - contributions to be made by the member or the State in the future, as required by the law.
10. 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.
11. Normal Cost - the average annual actuarial cost of the benefits provided by the System for the current employees.
12. 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).
13. 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.
14. Funded Ratio - the funded ratio is the ratio of the actuarial value of assets to the actuarial accrued liability. The funding ratio is a measure of funded status. While the annual ratio is important as a measure of the System's current funded status, it is probably more valuable to review ratios in time series as a measure of the direction of funding. Consistent substantial increases in this ratio over time can be an indicator of funding progress. However, benefit changes, changes in actuarial assumptions and other external forces may cause the ratio to decrease.