Arkansas State Highway Employees Retirement Systems

Actuarial Valuation Report

As of June 30, 2017

GRS Retirement Consulting

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November 1, 2017

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, 2017

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, 2017.

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 November 1, 2017 for the plan year ending June 30, 2017.

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

FINANCING OBJECTIVES

As of June 30, 2017, the System's UAAL is $229.6 million, and the current funding period is 77.6 years.

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 15.04% of payroll (in conjunction with a member rate of 6.00%) for fiscal year 2018 would produce a 30-year funding period.

The funded ratio (the ratio of the actuarial value of assets to the actuarial accrued liability) increased from last year. The funded ratio at June 30, 2016 was 85.7%, while it is 86.2% as of June 30, 2017. This increase is due to the reduction in liabilities from legislative changes offset by the actuarial losses on the actuarial liabilities and actuarial value of assets. Without the legislative change, the funded ratio would have declined.

Given the current outlook, it is unlikely the current contribution levels will sustain the current benefit package. We strongly urge the Board of Trustees to request increases in the contributions to the System and/or consider further changes to the benefit structures and of the System.

BENEFIT PROVISIONS

The actuarial valuation reflects the benefit and contribution provisions set forth in the Arkansas statutes. There was one piece of legislation impacting the benefits payable from ASHERS effective June 30, 2017.

- 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.

Section U of Appendix 1 summarizes the most recent plan changes which were effective in 2017. 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 Appendix 2 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, 2017, 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 page titled Actuarial Standards of Practice Disclosure Statements for additional disclosures required by our Actuarial Standards of Practice.

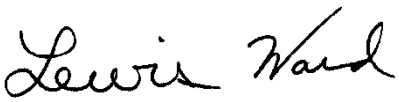
CERTIFICATION

We certify that the information presented herein is accurate and fairly portrays the actuarial position of ASHERS as of June 30, 2017.

All of our work conforms with generally accepted actuarial principles and practices and with the Actuarial Standards of Practice issued by the Actuarial Standards Board.

The undersigned are independent actuaries and consultants. Mr. 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 to render the actuarial opinion contained herein. Both consultants below are experienced in performing valuations for large public retirement systems.

Sincerely,



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

Lewis Ward
Consultant

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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, 2017.

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.

Table of Contents

Executive Summary

The key results of the valuation of the Arkansas State Highway Employees Retirement System as of June 30, 2017, may be summarized as follows:

	June 30, 2017 (1)	June 30, 2016 (2)
1. Assets		
Market Value	$ 1,354.3 million	$ 1,304.9 million
Actuarial Value	$ 1,439.5 million	$ 1,447.3 million
2. Members		
a. Actives not in DROP	3,308	3,406
b. Actives in DROP	355	364
c. Inactive, vested	217	206
d. Retirees and beneficiaries	3,379	3,301
3. Annualized salaries (excluding DROP participants)	$141.2 million	$141.9 million
4. Normal Cost rate	11.78%	12.50%
5. UAAL	$229.6 million	$241.9 million
6. Actuarial assets as % of actuarial accrued liability	86.2%	85.7%
7. Funding period	77.6 years	Infinite
8. Employer contribution rate necessary to produce 30-year funding period	15.04%	16.57%
9. Estimated yield on actuarial assets for prior year	5.39%	6.82%
10. Estimated yield on market value for prior year	10.53%	(4.31%)
11. Member contributions for prior year	$9.1 million	$9.4 million
12. Member contribution rate for prior year	6.00%	6.00%
13. State contributions for prior year	$19.2 million	$19.2 million
14. State contribution rate for prior year	12.90%	12.90%
15. Benefit, refund, and administrative expense payments for prior year	$112.0 million	$106.9 million
16. Net Investment income for prior year	$133.2 million	($60.3) million

Executive Summary (Continued)

	June 30, 2017	June 30, 2016
	(1)	(2)
17. Actuarial gains (losses)		
Assets	($36.7) million	($16.4) million
Liability experience	(12.7) million	(20.9) million
Legistative changes	70.6 million	0.0 million
Method change	0.0 million	0.0 million
Assumption change	0.0 million	0.0 million
Total	$21.2 million	($37.3) million

	UAAL ($ Million)	Funding Period (in years)	Change in Funding Period (in years)
18. Changes in funding period	(1)	(2)	(3)
a. 2016 valuation	$241.9	Infinite	0.0
b. 2017 valuation with all expected experience	$250.8	Infinite	N/A
c. 2017 valuation with actual assets	$287.5	Infinite	N/A
d. 2017 valuation with actual assets and actual liabilities	$300.2	Infinite	N/A
e. 2017 valuation with actual assets and actual liabilities, after assumption changes and before method changes	$300.2	Infinite	N/A
f. 2017 valuation with actual assets and actual liabilities, after assumption changes and assumption changes	$229.6	77.6	N/A

Introduction

The results of the June 30, 2017, 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, 2017, as summarized in Appendix 1. The determination of actuarial accrued liabilities and funded status is based on the actuarial assumptions adopted effective for the June 30, 2017 valuation, and as summarized in Appendix 2.

The discussion section starts with 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. The results of the actuarial valuation are summarized on page 4. Page 5 discusses the change in assets during the last year and page 6 discusses actuarial gains and losses during the year. The impact of the changes is discussed on page 7. Finally, page 10 provides our summary remarks regarding the actuarial valuation. Completing the report is Section B with the various supporting tables.

Funded Status

Table 3 in Section B 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 11.78% of pay. Retirement benefits account for 8.32% of the 11.78% total normal cost. Benefits payable upon death, disability, and other terminations account for the remaining 3.46% of the total normal costs.

Table 1 calculates the unfunded actuarial accrued liability (UAAL). As shown in Item 10, the UAAL has decreased from $241.9 million to $229.6 million. The decrease was due to gain from legislative changes offset by experience losses on liabilities and assets. Since the UAAL is positive, the System is deemed to be underfunded. As shown in Item 12, the funding period became 77.6 years, which means the current employer contribution rate is sufficient to amortize the UAAL over a 77.6 year period.

The funded ratio, the ratio of actuarial value of assets of the System to the actuarial accrued liability of the System, increased from 85.7%, as of June 30, 2016, to 86.2%, as of June 30, 2017. The ratio of the market value of assets to the actuarial accrued liability increased year over year from 77.2% to 81.1%.

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 2014 and 2017 were $130.8 million and $32.0 million. Therefore, $24.0 million (or 75% of the total 2017 excess earnings), $ (86.4) million (or 50% of the total 2016 shortfall earnings) and ($22.8) million (or 25% of the total 2015 shortfall earnings) are still being deferred for recognition in future valuations. The remaining excess earnings from 2014 were fully recognized in this valuation.

Changes 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 $49.4 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 $2I/(A + B – I)$. As indicated by Item VII.D. in Table 6, the estimated yield on actuarial assets is 5.39%. The estimated yield on mean market assets is 10.53%.

As shown on Table 4-A, the expected investment income for fiscal year 2017 was $101.0 million. The actual investment income (net of all expenses) during fiscal year 2017 was $133.0 million. Therefore, the excess in investment income for the fiscal year was $32.0 million. 25% of this excess will be recognized in this valuation and the remainder will be recognized over the next three valuations.

Actuarial Gains and Losses

Previously, it was noted that the unfunded actuarial accrued liability (UAAL) has decreased from $241.9 million in 2016 to $229.6 million in 2017. The purpose of this section is to determine the source of the actuarial gains/losses during the year that have caused the UAAL to decrease.

Table 8 develops the expected value of actuarial assets for this valuation, based on the investment return assumption that was in effect for the 2016/2017 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, 2017, is $1,476.2 million. As shown in Item 7, the actual value of actuarial assets as of the valuation date is $1,439.5 million. Thus the asset loss for the year is the difference between the actual value and the expected value, or $36.7 million (as shown in Item 8).

Table 9 determines that the overall actuarial gain for the 2016/2017 plan year is $21.2 million. The asset loss for the year is $36.7 million. This means that the total liability gain for the year is $57.9 million. This is comprised of a $70.6 million gain due to the legislative changes and a $12.7 million liability experience loss, which is 0.76% 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, 2016 and June 30, 2017.

The funding period as of June 30, 2016, was infinite. 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 $250.8 million and the funding period would have remained infinite.

The asset loss of $36.7 million increased the above expected UAAL to $287.5 million. The liability experience loss of $12.7 million increased the UAAL to $300.2 million. Finally, the liability gain due to the legislated benefit changes decreased the UAAL by 70.6 million to $229.6, which resulted in the funding period of 77.6 years.

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. The negative cash flow has grown to more than 6% of plan assets and the plan is having to hold more cash to meet its cash flow obligations. Holding a significant allocation to cash makes it more difficult to meet the investment return assumption. This item will need to be closely monitored.

Historical Comparisons and Statistical Summaries

Tables 13 through 16 summarize statistical information for active and retired members of Arkansas State Highway Employees Retirement System as of June 30, 2017. The number of participants in DROP decreased from 364 to 355 as of the valuation date (See Table 12). As expected, there was an increase in the amount of benefit payments made during the fiscal year. However, there was a decrease in the amount of contributions received which was unexpected. This increase in benefit payments and decrease in contributions caused an increase in the negative external cash flow of the System.

Summary and Closing Comments

Like most retirement systems with June 30 measurement dates, the System earned more than its assumed rate of return on investments for the 2017 fiscal year, when measured on a market value basis. Arkansas State Highway Employees Retirement System (ASHERS) 2017 fiscal year return of 10.53% was 2.53% above its investment return assumption.

The 1998 valuation was the first ASHERS valuation to include members participating in DROP. As of June 30, 2017, there are 355 active employees who are DROP participants with an average balance per participant of $119,052.

As noted earlier in this section, general market conditions produced an investment gain on a market value basis when compared with the 8% assumption during the 2017 plan year. 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 2014 and 2017 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 $85.2 million in net investment losses compared with $142.5 million net investment losses in the prior valuation.

The System remained in an unfunded position this year. The current funding deficit is $229.6 million. While the funded ratio of the System at 86.2% is still strong, the funding period is still 77.6 years, which means the current employer contribution rate is not sufficient to amortize the UAAL until 2095. It should be noted that on a market value of asset basis the funding period would be infinite, and in fact, instead of having a measurable date at which the UAAL is anticipated to be fully amortized, there is a projected date the plan will become insolvent (2061 based on current assumptions).

Given the current outlook, it is unlikely the current contribution levels will sustain the current benefit package. We strongly urge the Board of Trustees to request increases in the contributions to the System and/or consider further changes to the benefit structures and of the System.

In addition, it has been three years since the most recent experience study and there are material decisions to be made by the Board in the upcoming months. We strongly urge the Board to conduct and experience study to assist them in deciding what the best path is for the System going forward.

Because the funding period is more than 30 years, the State law banning benefit enhancements is currently applicable.

Section B – Tables

Table 1

Summary of Cost Items

	Valuation as of June 30, 2017 (1)	Valuation as of June 30, 2016 (2)
1. Participants		
a. Active members not in DROP	3,308	3,406
b. Active members in DROP	355	364
c Inactive members with deferred benefits	217	206
d. Retired members and beneficiaries	3,379	3,301
e. Total	7,259	7,277
2. Annualized salaries (excludes DROP participants)	$ 141,154,763	$ 141,906,487
3. Averages for active members (excludes DROP participants)		
a. Age	43.2	43.2
b. Service	9.7	9.5
c. Pay	$ 42,671	$ 41,664
4. State normal cost	11.78%	12.50%
5. Present value of future benefits		
a. Retired members	$ 1,106,377,527	$ 1,090,063,509
b. Active members	680,152,759	724,464,127
c. Vested terminated members	9,119,875	9,474,088
d. Non-vested terminated members	863,988	780,875
e. Total	$ 1,796,514,149	$ 1,824,782,599
6. Present value of future normal costs	$ 122,016,636	$ 130,037,374
7. Present value of Tier II DROP contributions	$ 5,389,587	$ 5,534,603
8. Actuarial accrued liability (Item 5.e. - Item 6 - Item 7)	$ 1,669,107,926	$ 1,689,210,622
9. Actuarial assets	$ 1,439,516,380	$ 1,447,342,661
10. Unfunded actuarial accrued liability (Item 8 - Item 9)	$ 229,591,546	$ 241,867,961
11. Employer contribution rate	12.90%	12.90%
12. Funding period	77.6 years	Infinite
13. Estimated yield on assets		
a. Based on Market Value	10.53%	(4.31%)
b. Based on Actuarial Value	5.39%	6.82%
14. Relative size of unfunded actuarial accrued liability		
a. As % of actuarial assets	15.9%	16.7%
b. As % of covered payroll	162.7%	170.4%
c. As % of total present value of future benefits	12.8%	13.3%

Table 2

Actuarial Present Value of Future Benefits

	June 30, 2017 (1)	June 30, 2016 (2)
1. Active members		
a. Retirement benefits	$ 610,087,608	$ 650,670,428
b. Deferred termination benefits	20,379,653	21,194,073
c. Refunds	1,208,309	1,299,999
d. Death benefits	6,969,551	7,477,723
e. Disability benefits	41,507,638	43,821,904
f. Total	$ 680,152,759	$ 724,464,127
2. Retired members		
a. Service retirements	$ 956,319,918	$ 947,512,818
b. Disability retirements	83,349,751	75,920,111
c. Beneficiaries	66,707,858	66,630,580
d. Window health insurance subsidy	-	-
e. Total	$ 1,106,377,527	$ 1,090,063,509
3. Inactive members		
a. Vested terminations	$ 9,119,875	$9,474,088
b. Non-vested terminations	863,988	780,875
c. Total	$ 9,983,863	$10,254,963
4. Total actuarial present value of future benefits	$ 1,796,514,149	$ 1,824,782,599

Table 3

Analysis of Normal Cost by Component

Benefit Component	Cost as % of Pay 2017	Cost as % of Pay 2016
(1)	(2)	(3)
1. Retirement benefit	8.32%	8.91%
2. Disability benefit	1.67%	1.77%
3. Death benefit	0.17%	0.18%
4. Vesting benefit	1.06%	1.08%
5. Refund of contributions	0.56%	0.56%
6. Gross normal cost (State normal cost)	11.78%	12.50%

Table 4-A

Calculation of Excess Investment Income
For Actuarial Value of Assets

Item	Plan Year Ending June 30 2017	2016	2015	2014
(1)	(2)	(3)	(4)	(5)
1. Net investment income for year	133,167,344	(60,344,123)	25,383,457	234,208,606
2. Expenses and fees for year	130,076	118,199	91,542	43,282
3. Actual net investment income based on market value of assets (Item 1 - Item 2)	133,037,268	(60,462,322)	25,291,915	234,165,324
4. Market value of assets (beginning of year)	1,304,869,720	1,443,476,294	1,492,232,721	1,326,022,360
5. Contributions during year				
a. Employee	9,143,408	9,379,784	9,138,451	8,884,829
b. State	19,175,401	19,231,804	19,059,012	18,614,507
c. Other	-	-	-	-
d. Total	28,318,809	28,611,588	28,197,463	27,499,336
6. Benefits paid during year	109,874,806	105,056,553	100,328,585	93,712,721
7. Refunds paid during year	2,029,791	1,699,287	1,917,221	1,741,876
8. Expected net investment income at 8.0%				
a. Market value of assets (beginning of year)	104,389,578	115,478,104	119,378,618	106,081,789
b. Contributions	1,132,752	1,144,464	1,127,899	1,099,973
c. Benefits	(4,394,992)	(4,202,262)	(4,013,143)	(3,748,509)
d. Refunds	(81,192)	(67,971)	(76,689)	(69,675)
e. Total	101,046,146	112,352,335	116,416,685	103,363,578
9. Excess investment income for year (Item 3 - Item 8e)	31,991,122	(172,814,657)	(91,124,770)	130,801,746

Table 4-B

Development of Actuarial Value of Assets

Item	2017	2016
(1)	(2)	(3)
1. Excess/(Shortfall) of invested income for current and previous years		
a. Current year	$ 31,991,122	$ (172,814,657)
b. Current year - 1	(172,814,657)	(91,124,770)
c. Current year - 2	(91,124,770)	130,801,746
d. Current year - 3*	130,801,746	63,564,289
e. Total	$ (101,146,559)	$ (69,573,392)
2. Deferral of excess/(shortfall) of invested income for current and previous years		
a. Current year (75%)	$ 23,993,342	$ (129,610,993)
b. Current year - 1 (50%)	(86,407,329)	(45,562,385)
c. Current year - 2 (25%)	(22,781,193)	32,700,437
d. Current year - 3 (0%)*	-	-
e. Total deferred	$ (85,195,180)	$ (142,472,941)
3. Market value of plan assets (end of year)	$ 1,354,321,200	$ 1,304,869,720
4. Preliminary AVA (end of year) (Item 3 - Item 2f)	$ 1,439,516,380	$ 1,447,342,661
5. AVA corridor		
a. 80% of MVA, EOY	$ 1,083,456,960	$ 1,043,895,776
b. 120% of MVA, EOY	$ 1,625,185,440	$ 1,565,843,664
6. Actuarial value of plan net assets	$ 1,439,516,380	$ 1,447,342,661
7. Actuaril value of assets prior to method change	$ 1,439,516,380	$ 1,447,342,661
8. Increase/(Decrease) in actuarial value of assets due to method change	N/A	N/A

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

Table 5

Development of Years to Fund Unfunded Actuarial Liability

	June 30, 2017 (1)	June 30, 2016 (2)
A. Basic Data		
1. Annualized salaries (excludes DROP participants)	$ 141,154,763	$ 141,906,487
2. Projected payroll for upcoming fiscal year	$ 150,586,955	$ 152,220,866
3. State normal cost	11.78%	12.50%
4. Contribution rate for funding unfunded accrued liability		
a. Total contribution rate	18.90%	18.90%
b. Less normal cost rate	(11.78%)	(12.50%)
c. Total contribution rate available	7.12%	6.40%
5. Actuarial accrued liability for active members		
a. Present value of future benefits for active members	$ 680,152,759	$ 724,464,127
b. Less present value future normal cost	(122,016,636)	(130,037,374)
c. Less present value of Tier II DROP contributions	(5,389,587)	(5,534,603)
d. Actuarial accrued liability	$ 552,746,536	$ 588,892,150
B. Development of Funding Period		
6. Total actuarial accrued liability		
a. Present value of benefits currently being paid	$ 1,106,377,527	$ 1,090,063,509
b. Actuarial accrued liability for active members (Item 5d)	552,746,536	588,892,150
c. Present value of deferred vested benefits	9,119,875	9,474,088
d. Present value of non-vested benefits	863,988	780,875
e. Other liabilities	0	0
f. Total	$ 1,669,107,926	$ 1,689,210,622
7. Current assets	$ 1,439,516,380	$ 1,447,342,661
8. Unfunded actuarial accrued liability (Item 6f - Item 7)	$ 229,591,546	$ 241,867,961
9. Amount of contribution available to fund unfunded actuarial accrued liability*	$ 11,329,298	$ 10,430,670
10. Years to fund unfunded actuarial accrued liability based on 3.00% payroll growth	77.6 years	Infinite

*Includes estimated impact of DROP Tier II contributions

Table 6

Change in Plan Net Assets

	Year Ending as of June 30, 2017 (1)	Year Ending as of June 30, 2016 (2)
I. Plan Net Assets, beginning of year		
A. Value reported in prior valuation	$ 1,304,869,720	$ 1,443,476,293
B. Prior period adjustments	$ -	1
C. Revised value	$ 1,304,869,720	$ 1,443,476,294
II. Additions		
A. Contributions		
1. Employee Contributions	$ 9,143,408	$ 9,379,784
2. State Contributions	$ 19,175,401	19,231,804
3. Reinstatements and Other		
a. Principal	$ -	-
b. Interest	$ -	-
c. Other	$ -	-
d Total	$ -	-
4. Total Contributions	$ 28,318,809	$ 28,611,588
B. Investment Income		
1. Interest	$ 6,728,227	$ 6,822,301
2. Dividends	$ 17,897,271	16,701,557
3. Net Gains	$ 116,623,355	(75,859,083)
4. Subtotal	$ 141,248,853	(52,335,225)
5. less Investment Expenses	$ (8,081,509)	(8,008,898)
6. Net Investment Income	$ 133,167,344	$ (60,344,123)
C. Total Additions	$ 161,486,153	$ (31,732,535)
III. Deductions		
A. Refunds	$ 2,029,791	$ 1,699,287
B. Benefit Payments	109,874,806	105,056,553
C. Other	-	-
D. Administrative Expenses	130,076	118,199
E. Total Deductions	$ 112,034,673	$ 106,874,039
IV. Net Change	$ 49,451,480	$ (138,606,574)
V. Plan Net Assets, end of year	$ 1,354,321,200	$ 1,304,869,720
VI. Market value yield		
A. Beginning of year net market assets	$ 1,304,869,720	$ 1,443,476,294
B. Investment income net of all expenses	$ 133,037,268	$ (60,462,322)
C. End of year market assets	$ 1,354,321,200	$ 1,304,869,720
D. Estimated market value yield	10.53%	-4.31%
VII. Actuarial value yield		
A. Beginning of year actuarial assets	$ 1,447,342,661	$ 1,430,527,926
B. Investment income net of all expenses	$ 75,759,507	$ 94,958,987
C. End of year actuarial assets	$ 1,439,516,380	$ 1,447,342,661
D. Estimated actuarial value yield	5.39%	6.82%

Table 7

Plan Net Assets
(Assets at Fair Value)

ASSET BALANCES	June 30, 2017 (1)	June 30, 2016 (2)
1. Current assets		
a. Cash in State Treasury	$ 278,665	$ 316,612
b. Cash in bank	27	$ 4
c. Accounts receivable		
i. Member contributions	204,201	$ 498,759
ii. State contributions	1,328,447	$ 1,035,876
iii. Miscellaneous	8,493,577	$ 1,494,020
iv. DROP plan	-	$ -
d. Interest and dividends receivable	1,578,058	$ 1,702,932
e. Short-term investments	74,574,787	$ 195,884,803
f. Total current assets	$ 86,457,762	$ 200,933,006
2. Long-term investments		
a. U.S. Government agency obligations	$ 80,821,738	$ 108,017,423
b. Corporate bonds	187,109,301	139,759,261
c. Common stock	1,026,234,099	860,324,064
d. Total long-term investments	$ 1,294,165,138	$ 1,108,100,748
3. Total assets	$ 1,380,622,900	$ 1,309,033,754
4. Liabilities	(26,301,700)	(4,164,034)
5. Total market value of net assets available for benefits (item 3 + item 4)	$ 1,354,321,200	$ 1,304,869,720
6. Allocation of invested assets, including cash		
a. Invested cash	5.5%	15.0%
b. U.S. Government agency obligations	5.9%	8.3%
c. Corporate bonds	13.7%	10.7%
d. Common stock	74.9%	66.0%
e. Total investments	100.0%	100.0%

Table 8

Actual Versus Expected Actuarial Assets

Item	Valuation as of June 30, 2017	Valuation as of June 30, 2016
(1)	(2)	(3)
1. Actuarial assets, beginning of year	$ 1,447,342,661	$ 1,430,527,926
2. Total contributions during year	28,318,809	28,611,588
3. Benefits paid during year	(109,874,806)	(105,056,553)
4. Refunds paid during year	(2,029,791)	(1,699,287)
5. Assumed net investment income at 8.0%		
a. Beginning of year assets	115,787,413	114,442,234
b. Contributions	1,132,752	1,144,464
c. Benefits	(4,394,992)	(4,202,262)
d. Refunds	(81,192)	(67,971)
e. Total	$ 112,443,981	$ 111,316,465
6. Expected actuarial assets, end of year (Sum of Items 1 through 5)	$ 1,476,200,854	$ 1,463,700,139
7. Actuarial assets, end of year prior to asset method change	$ 1,439,516,380	$ 1,447,342,661
8. Asset gain/(loss) for year (Item 7 - Item 6)	$ (36,684,474)	$ (16,357,478)
9. Asset gain/(loss) as percentage of end of year assets (Item 8 / Item 7)	(2.55%)	(1.13%)
10. Final actuarial value of assets after method change	$ 1,439,516,380	$ 1,447,342,661

Table 9

Actuarial Gain or Loss for the Year

Item	Valuation as of June 30, 2017	Valuation as of June 30, 2016
(1)	(2)	(3)
A. Calculation of total actuarial gain or loss		
1. Unfunded actuarial accrued liability (UAAL), previous year	$ 241,867,961	$ 198,748,161
2. Normal cost for the year	18,275,116	18,935,318
3. Contributions for the year	(28,318,809)	(28,611,588)
4. Interest at 8.0%		
a. On UAAL	$ 19,349,437	$ 15,899,853
b. On normal cost	731,005	757,413
c. On contributions	(1,132,752)	(1,144,464)
d. Total	$ 18,947,690	$ 15,512,802
5. Expected UAAL (sum of Items 1 - 4)	$ 250,771,958	$ 204,584,693
6. Actual UAAL	$ 229,591,546	$ 241,867,961
7. Gain (loss) for the year (Item 5 - Item 6)	$ 21,180,412	$ (37,283,268)
B. Source of gains and losses		
8. a. Asset gain (loss) for the year (Table 8)	$ (36,684,474)	$ (16,357,478)
b. Gain (loss) from change in assumptions	0	0
c. Gain (loss) from change in methods	0	0
d. Gain (loss) from Legislative changes	70,591,509	0
9. Asset gain (loss) as percentage of actuarial assets	(2.55%)	(1.13%)
10. Total actuarial accrued liability gain (loss) for the year (Item 7 - Item 8a - Item 8b - Item 8c)	$ (12,726,623)	$ (20,925,790)
11. Analysis of actuarial accrued liability gain (loss)		
a. Assumption changes	0	0
b. Method changes	0	0
c. Legislative changes	70,591,509	0
d. Experience liability gain (loss) for the year	(12,726,623)	(20,925,790)
e. Total actuarial accrued liability gain (loss)	$ 57,864,886	$ (20,925,790)
12. Experience liability gain (loss) as percentage of total actuarial liability (Item 11d as % of total actuarial accrued liability $1,689,210,622 as of June 30, 2016, and $1,669,107,926 as of June 30, 2017)	(0.76%)	(1.24%)

Table 10

Analysis of Change in Funding Period

Basis	Unfunded Actuarial Accrued Liability ($ millions)	Normal Cost	Funding Period (in years)	Attributable Change in Funding Period
(1)	(2)	(3)	(4)	(5)
1. Valuation as of June 30, 2016	$241.868	12.50%	Infinite	0.0
2. Valuation as of June 30, 2017, using expected assets and expected liabilities	$250.772	12.50%	Infinite	N/A
3. Valuation as of June 30, 2017, using actual assets and expected liabilities (asset gain/loss)	$287.456	12.50%	Infinite	N/A
4. Valuation as of June 30, 2017, using actual assets and actual liabilities	$300.183	12.50%	Infinite	N/A
5. Valuation as of June 30, 2017, using actual assets and actual liabilities, after assumption changes but before method changes	$300.183	12.50%	Infinite	N/A
6. Valuation as of June 30, 2017, using actual assets and actual liabilities, after assumption and after legislative changes	$229.592	11.78%	77.6	N/A

Table 11

History of Cash Flow

Year Ending June 30,	Contributions for the Year[1]	Expenditures During the Year: Benefit Payments	Refund of Contributions	Expenses[2]	Total	External Cash Flow for the Year[3]	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)	(1,136,396)	(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%)
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%)

[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)

Table 12

Statistical Information

	June 30, 2017 (1)	June 30, 2016 (2)
A. Number		
1. Active members not in DROP		
a. Male members	2,673	2,757
b. Female members	635	649
c. Total active members	3,308	3,406
2. Inactive vested members	217	206
B. Annualized Salaries For Active Members Not in DROP		
1. Male members	$ 113,875,306	$ 114,534,894
2. Female members	27,279,457	27,371,593
3. Total active members	$ 141,154,763	$ 141,906,487
4. Average annual salary	$ 42,671	$ 41,664
C. Accumulated Member Contributions	$ 131,043,340	$ 131,837,948
D. Active Members in DROP		
1. Number	355	364
2. DROP Balance	$ 42,263,293	$ 43,885,101
3. Average DROP Balance	$ 119,052	$ 120,563
E. Persons Receiving Benefits		
1. Number		
a. Life annuities	2,411	2,371
b. Disability annuities	424	405
c. Survivor annuities	544	525
d. Total persons receiving benefits	3,379	3,301
2. Annual annuities*		
a. Life annuities	$ 81,068,677	$ 77,756,865
b. Disability annuities	7,081,242	6,718,265
c. Survivor annuities	8,091,704	7,678,262
d. Total persons receiving benefits	$ 96,241,623	$ 92,153,392

* Annual annuities before adding July 1st COLA

Table 13

Age and Service Distribution

Attained Age	Years of Credited Service 0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over	Number of Employees	Total Annual Salary	Average Annual Salary
Under 20	3	1	0	0	0	0	0	0	0	0	0	0	4	$ 86,453	$ 21,613
20-24	59	73	43	24	11	4	0	0	0	0	0	0	214	6,056,217	28,300
25-29	34	52	54	49	36	55	0	0	0	0	0	0	280	10,155,378	36,269
30-34	42	43	50	34	26	111	48	1	0	0	0	0	355	14,545,666	40,974
35-39	37	40	34	29	21	78	100	65	4	0	0	0	408	17,909,223	43,895
40-44	23	30	34	23	16	75	91	76	45	4	0	0	417	19,562,712	46,913
45-49	25	25	35	25	22	81	86	66	55	54	1	0	475	22,498,489	47,365
50-54	18	34	31	14	22	73	80	66	75	106	0	0	519	24,394,947	47,004
55-59	17	22	23	12	14	87	61	57	61	51	2	0	407	17,093,698	41,999
60-64	3	10	9	22	7	48	56	28	13	4	0	0	200	7,766,606	38,833
65 & Up	2	0	6	1	3	7	10	0	0	0	0	0	29	1,085,374	37,427
Total	263	330	319	233	178	619	532	359	253	219	3	0	3,308	$ 141,154,763	$ 42,671

Note: Excludes DROP participants.

Table 14

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	263	$ 7,302,180	$ 27,765
1	330	10,173,076	30,828
2	319	10,643,698	33,366
3	233	8,465,927	36,334
4	178	6,809,496	38,256
5-9	619	26,030,998	42,053
10-14	532	24,814,646	46,644
15-19	359	18,666,079	51,995
20-24	253	13,799,481	54,543
25-29	219	14,220,832	64,935
30-34	3	228,348	76,116
35 & up	-	-	-
Total	3,308	$ 141,154,761	$ 42,671

Note: Excludes DROP participants.

Table 15-A

Distribution of Retired Members by Years Since Retirement as of June 30, 2017

SERVICE RETIREDS

Years Since Retirement	Member Number	Total Benefit	Average Benefit
(1)	(2)	(3)	(4)
0	115	$ 3,149,929	$ 27,391
1	103	2,764,791	26,843
2	144	4,351,667	30,220
3	138	4,013,847	29,086
4	161	4,637,486	28,804
5-9	550	18,253,684	33,189
10-14	438	14,297,020	32,642
15-19	399	15,272,385	38,277
20-24	204	8,406,014	41,206
25-29	108	4,059,337	37,586
30-34	41	1,575,934	38,437
35 & up	10	286,583	28,658
Total	2,411	$ 81,068,677	$ 33,625

* Annual annuities before adding COLA

Table 15-B

Distribution of Retired Members by Years Since Retirement as of June 30, 2017

DISABLED RETIREDS

Years Since Retirement	Member		
	Number	Total Benefit	Average Benefit
(1)	(2)	(3)	(4)
0	21	$ 187,609	$ 8,934
1	21	299,747	14,274
2	23	286,939	12,476
3	31	493,284	15,912
4	17	217,790	12,811
5-9	80	1,194,843	14,936
10-14	95	1,566,677	16,491
15-19	70	1,372,097	19,601
20-24	40	948,992	23,725
25-29	15	315,348	21,023
30-34	3	76,331	25,444
35 & up	8	121,582	15,198
Total	424	$ 7,081,239	$ 16,701

* Annual annuities before adding COLA

Table 15-C

Distribution of Retired Members by Years Since Retirement as of June 30, 2017

BENEFICIARIES

Years Since Retirement	Member		
	Number	Total Benefit	Average Benefit
(1)	(2)	(3)	(4)
0	35	$ 571,153	$ 16,319
1	44	567,198	12,891
2	36	502,608	13,961
3	29	514,857	17,754
4	48	722,944	15,061
5-9	113	1,912,278	16,923
10-14	151	2,236,223	14,809
15-19	24	268,837	11,202
20-24	22	269,973	12,272
25-29	16	229,206	14,325
30-34	17	208,606	12,271
35 & up	9	87,822	9,758
Total	544	$ 8,091,705	$ 14,874

* Annual annuities before adding COLA

Table 16-A

Distribution of Retired Members by Age as of June 30, 2017

SERVICE RETIREDS

Age	Member Number	Member Total Benefit	Member Average Benefit
(1)	(2)	(3)	(4)
Up to 40	-	$ -	$ -
40-45	-	-	-
45-49	2	83,959	41,980
50-54	29	969,667	33,437
55-59	154	5,390,047	35,000
60-64	396	13,678,821	34,542
65-69	620	20,309,871	32,758
70-74	479	15,358,117	32,063
75-79	343	11,559,536	33,701
80-84	232	8,856,941	38,176
85-89	96	3,252,810	33,883
90-94	45	1,209,939	26,888
95 & up	15	398,969	26,598
Total	2,411	$ 81,068,677	$ 33,625

* Annual annuities before adding COLA

Table 16-B

Distribution of Retired Members by Age as of June 30, 2017

DISABLED RETIREDS

Age	Member Number	Total Benefit	Average Benefit
(1)	(2)	(3)	(4)
Up to 40	3	$ 18,536	$ 6,179
40-45	11	128,972	11,725
45-49	19	293,480	15,446
50-54	48	711,129	14,815
55-59	71	1,061,125	14,945
60-64	85	1,288,803	15,162
65-69	90	1,525,049	16,945
70-74	54	1,045,606	19,363
75-79	25	611,567	24,463
80-84	10	239,389	23,939
85-89	5	121,838	24,368
90-94	2	23,853	11,927
95 & up	1	11,895	11,895
Total	424	$ 7,081,242	$ 16,701

* Annual annuities before adding COLA

Table 16-C

Distribution of Retired Members by Age as of June 30, 2017

BENEFICIARIES

	Member		
Age	Number	Total Benefit	Average Benefit
(1)	(2)	(3)	(4)
Up to 40	13	$ 165,576	$ 12,737
40-45	5	56,636	11,327
45-49	9	148,012	16,446
50-54	18	226,377	12,577
55-59	34	471,242	13,860
60-64	54	644,721	11,939
65-69	62	804,079	12,969
70-74	81	1,191,411	14,709
75-79	77	1,273,297	16,536
80-84	67	1,104,661	16,487
85-89	59	1,093,143	18,528
90-94	48	702,645	14,638
95 & up	17	209,904	12,347
Total	544	$ 8,091,704	$ 14,874

* Annual annuities before adding COLA

APPENDIX 1

Summary of Benefit Provisions of the Retirement System
(As Most Recently Amended on June 30, 2017; System is established July 1, 1949)

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.

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. 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.

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.)

APPENDIX 1 (Continued)

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 (or100% 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).

U. LEGISLATED 2017 PLAN CHANGES ENACTED BY THE 2017 LEGISLATURE OF THE STATE OF ARKANSAS

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.

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.

APPENDIX 2

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 Rate (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	0.3712	0.2536	0.1697	0.1180	0.1150	0.1043
30	0.2925	0.1998	0.1313	0.0862	0.0756	0.0578
40	0.2193	0.1538	0.1024	0.0646	0.0477	0.0261
50	0.1628	0.1242	0.0894	0.0582	0.0368	0.0159
60	0.1342	0.1238	0.1033	0.0748	0.0462	0.0302
Female Members						
Age	0	1	2	3	4	5+
20	0.4028	0.3008	0.2168	0.1509	0.1047	0.0761
30	0.2819	0.2118	0.1542	0.1093	0.0765	0.0571
40	0.1980	0.1483	0.1073	0.0752	0.0514	0.0366
50	0.1715	0.1250	0.0863	0.0550	0.0336	0.0171
60	0.1985	0.1391	0.0896	0.0481	0.0230	0.0007

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 Payroll (Effective June 30, 2015): 3.0% per annum. Used for purposes of funding the Unfunded Actuarial Accrued Liability.

8. Cost of Living Increase (Effective June 30, 2017): All benefit in pay status are assumed to be increased by 2.25% annually.

9. 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.

10. 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.

11. 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.

12. Interest Crediting Rate on Drop Accounts (Effective June 30, 2012): 6.0% interest credit on DROP accounts.

13. 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.

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

GLOSSARY

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 Appendix 2 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.

Glossary (Continued)

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.