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PERS
of MISSISSIPPI

Report on the Annual Valuation of the Mississippi Highway Safety Patrol Retirement System

Prepared as of June 30, 2019

Cavanaugh Macdonald
CONSULTING, LLC
The experience and dedication you deserve

November 12, 2019

Board of Trustees
Public Employees' Retirement System of Mississippi
429 Mississippi Street
Jackson, MS 39201-1005

Ladies and Gentlemen:

Presented in this report are the results of the annual actuarial valuation of the Mississippi Highway Safety Patrol Retirement System (MHSPRS). The purpose of the valuation was to measure the System's funding progress and to determine the unfunded actuarial accrued liability amortization period beginning July 1, 2019. The results may not be applicable for other purposes.

The date of the valuation was June 30, 2019.

The valuation was based upon data, furnished by the Executive Director and the PERS staff, concerning active, inactive and retired members along with pertinent financial information. While not verifying data at the source, the actuary performed tests for consistency and reasonableness. The complete cooperation of the PERS staff in furnishing materials requested is hereby acknowledged with appreciation.

Your attention is directed particularly to the presentation of results on page 1 and the comments on page 9.

Subsequent to the June 30, 2018 valuation, the Board adopted new actuarial assumptions based on the experience investigation for the four-year period ending June 30, 2018. The results of this study were presented to the Board in April, 2019 and the Board adopted the demographic assumption recommendation with regard to the rates of mortality and price and wage inflation assumptions at its August 2019 meeting.

To the best of our knowledge, this report is complete and accurate. The valuation was performed by, and under the supervision of, independent actuaries who are members of the American Academy of Actuaries with experience in performing valuations for public retirement systems. The undersigned meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

The valuation was prepared in accordance with the principles of practice prescribed by the Actuarial Standards Board. We have reviewed the actuarial methods, including the asset valuation method, and continue to believe they are appropriate for the purpose of determining employer contribution levels.

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Future actuarial results may differ significantly from the current results 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 system's funded status); and changes in plan provisions or applicable law. Since the potential impact of such factors is outside the scope of a normal annual actuarial valuation, an analysis of the range of results is not presented herein.

This actuarial valuation was performed to determine the adequacy of statutory contributions to fund the plan. The asset values used to determine unfunded liabilities and funded ratios are not market values but less volatile market related values. A smoothing technique is applied to market values to determine the market related values. The unfunded liability amounts and funded ratios using the market value of assets would be different. The interest rate used for determining liabilities is based on the expected return on assets. Therefore, liability amounts in this report cannot be used to assess a settlement of the obligation.

The actuarial calculations were performed by qualified actuaries according to generally accepted actuarial procedures and methods. The calculations are based on the current provisions of the system, and on actuarial assumptions that are, in the aggregate, internally consistent and reasonably based on the actual experience of the system.

Respectfully submitted,

Edward J. Koebel

Jonathan T. Craven

Edward J. Koebel, EA, FCA, MAAA
Chief Executive Officer

Jonathan T. Craven, ASA, EA, FCA, MAAA
Consulting Actuary

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Section I: Summary of Principal Results

1. This report, prepared as of June 30, 2019, presents the results of the annual actuarial valuation of the System. For convenience of reference, the principal results of the valuation and a comparison with the preceding year's results are summarized below. The current valuation and reported benefits amount reflect any benefit increases granted to retirees as of July 1, 2019. Based on the funding policy adopted by the PERS Board, the PERS Board and the MHSPRS Administrative Board adopted an employer contribution rate of 49.08% of annual compensation effective July 1, 2018 and the amortization period is to be calculated on an open basis.

VALUATION DATE	June 30, 2019	June 30, 2018
Active members included in valuation		
Number	522	511
Annual compensation	$ 31,811,231	$ 29,555,411
Retirees		
Number	734	725
Annual allowances	$ 31,814,897	$ 30,614,457
Assets		
Market related actuarial value	$ 362,591,000	$ 352,415,000
Market value	$ 366,165,000	$ 354,169,000
Unfunded actuarial accrued liability	$ 179,334,453	$ 175,013,349
Funded Ratio	66.9%	66.8%
Employer contribution rate		
Normal Cost*	15.71%	15.18%
Accrued liability	33.37	33.90
Total	49.08%	49.08%
Anticipated accrued liability payment period	17.7 years	18.3 years
Unfunded actuarial accrued liability based on Market value of assets	$ 175,760,453	$ 173,259,349
Funded Ratio	67.6%	67.2%
Payment period	16.9 years	17.9 years

* Includes load for administrative expenses. See Section VI for more contribution rate detail.

Section I: Summary of Principal Results

2. The valuation balance sheet showing the results of the valuation is given in Section III.

3. Comments on the valuation results are given in Section IV, the derivation of the experience gains and losses during the valuation year are given in Section V and the rates of contribution payable by employers are given in Section VI.

4. Due to Senate Bill No. 2659 enacted in 2004 and House Bill No. 1015 enacted April 25, 2013, additional contributions, classified as Motor Vehicle Replacement (MVR) fees are being made to the System and are expected to continue in the future. For the 2019 fiscal year, the total additional fees were $3,770,000. We have increased our expected contributions in perpetuity from these sources to $3,700,000 from $3,500,000 based on actual monies received and the expectation from these sources in the future. The employers are also required to contribute the employer contribution rate as determined based on the funding policy. The funding period of the UAAL of 17.7 years shown on the previous page reflects the additional contributions from Senate Bill No. 2659 and House Bill No. 1015. Without these additional contributions, the funding period would have been 30.6 years on the current employer rate basis. If the funding period was kept at 30 years, without the additional contributions the employer contribution rate would have been 49.39%.

5. Schedule A of this report presents the development of the actuarial value of assets. The estimated investment return for the plan year ending June 30, 2019 on an actuarial value of assets basis was 6.69%, compared to the assumed rate of return for the period of 7.75%.

6. Since the previous valuation, various economic and demographic assumptions have been revised. The changes are summarized below and shown in more detail in Schedule B:
    - The price inflation assumption was reduced from 3.00% to 2.75%,
    - The wage inflation assumption was reduced from 3.25% to 3.00%,
    - The administrative expense load was increased from 0.23% to 0.25%, and
    - Adjustments were made to the Mortality Tables for both healthy and disabled lives.

7. Schedule C gives a summary of the benefit and contribution provision of the System. There have been no changes since the previous valuation.

8. The table on page 4 provides a ten-year history of some pertinent figures.

9. The funding policy for the System was changed in 2012. Under the prior funding policy, the amortization payment for the UAAL was calculated based on a fixed employer contribution rate using a floating amortization period no greater than 30 years. For continuity and informational purposes, we have provided this calculation in Section VII.

10. The funded ratio shown in the Summary of Principal Results, is the ratio of actuarial value of assets to the actuarial accrued liability. The funded status would be different based on the market value of assets. The funded ratio is an indication of progress in funding the promised benefits. Since the ratio is less than 100%, there is a need for additional contributions toward the payment of the unfunded accrued liability. In addition, this funded ratio does not have any relationship to measuring the sufficiency if the plan had to settle its liabilities.

Section I: Summary of Principal Results

Comparative Schedule

	Active Members				Retired Lives				Valuation Results ($ thousands)		
Valuation Date June 30	Number	Payroll ($ thousands)	Average Salary	% increase from previous year	Number	Active/ Retired Ratio	Annual Benefits ($ thousands)	Benefits as % of Payroll	Accrued Liability	Valuation Assets	UAAL
2010	542	$26,353	$48,623	5.0%	696	0.8	$22,899.7	86.9%	$411,277	$281,088	$130,189
2011	515	24,872	48,295	(0.7)	704	0.7	23,975.7	96.4	414,432	278,265	136,167
2012	547	25,670	46,929	(2.8)	713	0.8	25,167.9	98.0	421,415	268,424	152,991
2013	520	25,816	49,646	5.8	713	0.7	25,835.6	100.1	431,575	271,097	160,478
2014	495	25,554	51,624	4.0	720	0.7	26,966.4	105.5	445,822	295,298	150,524
2015	518	25,505	49,237	(4.6)	724	0.7	28,076.5	110.1	477,803	316,149	161,654
2016	484	27,380	56,571	14.9	724	0.7	28,782.0	105.1	494,101	324,894	169,207
2017	470	28,845	61,373	8.5	726	0.6	29,563.8	102.5	497,992	339,114	158,878
2018	511	29,555	57,838	(5.8)	725	0.7	30,614.5	103.6	527,428	352,415	175,013
2019	522	31,811	60,941	5.4	734	0.7	31,814.9	100.0	541,925	362,591	179,334

Section II: Membership Data

Data regarding the membership of the System for use as a basis for the valuation were furnished by the System's office. The following tables summarize the membership of the System as of June 30, 2019 upon which the valuation was based. Detailed tabulations of the data are given in Schedule D.

Active Members

				Group Averages		
Employers	Number of Employers	Number	Payroll	Salary	Age	Benefit Service
State Agencies	1	522	$ 31,811,231	$60,941	42.0	13.1

Of the 522 active members, 374 are vested and 148 are non-vested.

Retired Lives

			Group Averages	
Type of Benefit Payment	No.	Annual Benefits	Benefit	Age
Retirement	544	$27,180,982	$49,965	67.7
Disability	17	442,940	26,055	65.9
Survivor	173	4,190,975	24,225	74.0
Total in HSPRS	734	$31,814,897	$43,345	69.2

Deferred Vested/Inactive Lives

Type of Member	No.	Deferred Benefits	Outstanding Balance
Deferred Vested – Benefit Included	44	$733,171	N/A
Inactive	17	N/A	$161,242
Total in HSPRS	61	$733,171	$161,242

For the liability in this valuation, deferred vested participants with benefits provided are valued assuming a retirement age of 55 and for inactive members, account balances are multiplied by two to estimate liabilities and interest in the future.

Section III: Valuation Balance Sheet

The following valuation balance sheet shows the assets and liabilities of the retirement system as of the current valuation date of June 30, 2019 and, for comparison purposes, as of the immediately preceding valuation date of June 30, 2018. The items shown in the balance sheet are present values actuarially determined as of the relevant valuation date. The development of the actuarial value of assets is presented in Schedule A.

Section III: Valuation Balance Sheet

VALUATION BALANCE SHEET
SHOWING THE ASSETS AND LIABILITIES OF THE
MISSISSIPPI HIGHWAY SAFETY PATROL RETIREMENT SYSTEM

	JUNE 30, 2019	JUNE 30, 2018
ASSETS		
Current actuarial value of assets:		
Annuity Savings Account	$ 27,244,497	$ 27,580,506
Annuity Reserve	40,025,193	37,448,519
Employers' Accumulation Account	295,321,310	287,385,975
Total current assets	$ 362,591,000	$ 352,415,000
Future member contributions to Annuity Savings Account	$ 18,816,713	$ 16,982,967
Prospective contributions to Employer's Accumulation Account		
Normal contributions	$ 40,125,019	$ 35,020,048
Unfunded actuarial accrued liability contributions	179,334,453	175,013,349
Total prospective contributions	$ 219,459,472	$ 210,033,397
Total assets	$ 600,867,185	$ 579,431,364
LIABILITIES		
Present value of benefits payable on account of present retired members and beneficiaries	$ 372,525,568	$ 358,342,339
Present value of benefits payable on account of inactive members for service rendered before the valuation date	6,396,313	6,012,952
Present value of benefits payable on account of active members	$ 221,945,304	$ 215,076,073
Total liabilities	$ 600,867,185	$ 579,431,364

Section III: Valuation Balance Sheet

BREAKDOWN OF TOTAL AND ACCRUED LIABILITIES
AS OF JUNE 30, 2019

	Total Liability	Accrued Liability
Active Members		
Retirement	$ 212,543,267	$ 162,589,319
Death	2,942,671	371,932
Disability	2,484,570	60,953
Termination	3,974,796	(18,632)
Total	$ 221,945,304	$ 163,003,572
Retirees		
Retirement	$ 332,274,178	$ 332,274,178
Survivor	36,012,946	36,012,946
Disability	4,238,444	4,238,444
Total	$ 372,525,568	$ 372,525,568
Deferred Vested Members	6,073,830	6,073,830
Inactive Members	322,483	322,483
Total Actuarial Values	$ 600,867,185	$ 541,925,453
Actuarial Value of Assets		362,591,000
Unfunded Actuarial Accrued Liability		$ 179,334,453

The total liability is the present value of future benefits for all current members as of the valuation date. The accrued liability is the present value of benefits that have been accrued as of the valuation date. Since all inactive members and retirees have accrued their full benefits, the total liability and accrued liability are the same. For actives, the difference between the total liability and the accrued liability is the present value of all future accruals.

Section IV: Comments on Valuation

The valuation balance sheet gives the following information with respect to the funds of the System as of June 30, 2019.

Total Assets

The Annuity Savings Account is the fund to which are credited contributions made by members together with interest thereon. When a member retires, the amount of his or her accumulated contributions is transferred from the Annuity Savings Account to the Annuity Reserve. The Employer's Accumulation Account is the fund to which are credited employer contributions and investment income, and from which are paid all employer-provided benefits under the system. The assets credited to the Annuity Savings Account as of the valuation date, which represent the accumulated contributions of members to that date, amounted to $27,244,497. The assets credited to the Annuity Reserve were $40,025,193 and the assets credited to the Employer's Accumulation Account totaled $295,321,310. Current actuarial assets as of the valuation date equaled the sum of these three funds, $362,591,000. Future member contributions to the Annuity Savings Account were valued to be $18,816,713. Prospective contributions to the Employer's Accumulation Account were calculated to be $219,459,472 of which $40,125,019 is attributable to service rendered after the valuation date (normal contributions) and $179,334,453 is attributable to service rendered before the valuation date (unfunded actuarial accrued liability contributions).

Therefore, the balance sheet shows the present value of current and future assets of the System to be $600,867,185 as of June 30, 2019.

Total Liabilities

The present value of benefits payable on account of presently retired members and beneficiaries totaled $372,525,568 as of the valuation date. The present value of future benefit payments on behalf of active members amounted to $221,945,304. In addition, the present value of benefits for inactive members, due to service rendered before the valuation date, was calculated to be $6,396,313.

Therefore, the balance sheet shows the present value for all prospective benefit payments under the System to be $600,867,185 as of June 30, 2019.

Section 25-11-7 of State law requires that active members contribute the current rate of 7.25% of annual compensation to the System.

Section 25-11-123(c) requires that the State contribute a certain percentage of the annual compensation of members to cover the normal contributions and a certain percentage to cover the accrued liability contributions of the System. These individual contribution percentages are established in accordance with an actuarial valuation. Based on the funding policy adopted by the PERS Board, the PERS Board and the MHSPRS Administrative Board adopted an employer contribution rate of 49.08% of annual compensation effective July 1, 2018 and the amortization period is to be calculated on an open basis. Therefore, the amortization period for the June 30, 2019 valuation is 17.7 years, compared to 18.3 years for the last valuation. See page 12 for a reconciliation of the amortization period.

See Schedule E for a complete analysis of the Financial Experience.

Section V: Derivation of Experience Gains & Losses

Actual experience will never (except by coincidence) coincide exactly with assumed experience. It is assumed that gains and losses will be in balance over a period of years, but sizable year to year fluctuations are common. Detail on the derivation of the experience gain/(loss) for the years ended June 30, 2019 and June 30, 2018 are shown below.

		2019 Valuation $ Thousands	2018 Valuation $ Thousands
(1)	UAAL* as of beginning of year	$ 175,013.3	$ 158,877.5
(2)	Total normal cost from last valuation	6,842.2	6,672.3
(3)	Total contributions	21,715.0	17,399.0
(4)	Interest accrual: [[(1) + (2)] x .0775] - [(3) x .03875]	13,252.4	12,155.9
(5)	Expected UAAL before changes: (1) + (2) – (3) + (4)	$ 173,392.9	$ 160,306.7
(6)	Change due to plan amendments	0.0	0.0
(7)	Change due to actuarial assumptions or methods	3,020.9	0.0
(8)	Expected UAAL after changes: (5) + (6) + (7)	$ 176,413.8	$ 160,306.7
(9)	Actual UAAL as of end of year	$ 179,334.5	$ 175,013.3
(10)	Gain/(loss): (8) – (9)	$ (2,920.7)	$ (14,706.6)
(11)	Gain/(loss) as percent of actuarial accrued liabilities at start of year.	(0.6)%	(2.9)%

*Unfunded actuarial accrued liability.

Valuation Date June 30	Actuarial Gain/(Loss) as a % of Beginning Accrued Liabilities
2014	3.1%
2015	2.3
2016	(1.2)
2017	1.9
2018	(2.9)
2019	(0.6)

Section VI: Required Contribution Rates

The valuation balance sheet gives the basis for determining the percentage rates for contributions to be made by employers to the Retirement System. The following table shows the rates of contribution payable by employers as determined from the present valuation for the 2020/2021 fiscal year and a comparison to the previous valuation results.

Contribution for	2020/2021 Fiscal Year	2019/2020 Fiscal Year
Normal Cost:		
Service retirement benefits	19.78%	19.77%
Disability benefits	0.87	0.85
Survivor benefits	0.93	0.45
Total	21.58%	21.07%
Member Contributions:	7.25%	7.25%
Less future refunds	(1.13)	(1.13)
Available for benefits	6.12%	6.12%
Employer Normal Cost	15.46%	14.95%
Administrative Expense Load	0.25%	0.23%
Unfunded Actuarial Accrued Liabilities (17.7 year level % of payroll amortization*)	33.37%	33.90%
Total Computed Employer Contribution Rate	49.08%	49.08%

*Amortization period a year ago was 18.3 years.

The current funding policy has set the employer contribution rate to 49.08% of payroll and set the amortization period to open-ended. Thirty-year projections are completed after the valuation to determine if an increase or decrease in the employer contribution rate is warranted according to the triggers set forth in the funding policy. Please see Schedule F for the current funding policy.

Section VI: Required Contribution Rates

The components of the change in the computed unfunded actuarial accrued liability amortization period from 18.3 years to 17.7 years are as follows:

Previously Reported Period	18.3 years
Change due to:	
Normal amortization	(1.0)
Actuarial experience	(0.4)
MVR fee assumption change	(0.6)
Assumption changes	1.6
Contribution experience	(0.2)
Computed Period	17.7 years

Section VII: Supplemental Disclosure Information

1. The following supplemental disclosure information is provided for informational purposes only. One such item is a distribution of the number of employees by type of membership, as follows:

NUMBER OF ACTIVE AND RETIRED PARTICIPANTS AS OF JUNE 30, 2019

GROUP	NUMBER
Retired participants and beneficiaries currently receiving benefits	734
Terminated participants and beneficiaries entitled to benefits but not yet receiving benefits	61
Active Participants	522
Total	1,317

Section VII: Supplemental Disclosure Information

2. Another such item is the schedule of funding progress as shown below. As can be seen in the table below, the funded ratio has remained relatively level over the past 9 years, with increases and decreases throughout this period. Since the Highway Safety Patrol fluctuates with its active member counts and annual covered compensation from year to year, the UAAL as a percentage of payroll, shown in column 6, experiences more volatility from year to year than other PERS plans.

SCHEDULE OF FUNDING PROGRESS
($ Thousands)

Plan Year Ended	(1) Actuarial Value of Assets	(2) Actuarial Accrued Liability (AAL) Entry Age	(3) Percent Funded (1)/(2)	(4) Unfunded AAL (2) – (1)	(5) Annual Covered Payroll	(6) Unfunded AAL as a Percentage of Covered Payroll (4)/(5)
06/30/2010	$281,088	$411,277	68.3%	$130,189	$26,353	494.0%
06/30/2011#	278,265	414,432	67.1	136,167	24,872	547.5
06/30/2012	268,424	421,415	63.7	152,991	25,670	596.0
06/30/2013#	271,097	431,575	62.8	160,478	25,816	621.6
06/30/2014	295,298	445,822	66.2	150,524	25,554	589.0
06/30/2015#	316,149	477,803	66.2	161,654	25,505	633.8
06/30/2016	324,894	494,101	65.8	169,207	27,380	618.0
06/30/2017#	339,114	497,992	68.1	158,878	28,845	550.8
06/30/2018	352,415	527,428	66.8	175,013	29,555	592.2
06/30/2019#	362,591	541,925	66.9	179,334	31,811	563.7

After change in actuarial assumptions.

3. Under the prior funding policy, the amortization payment of the unfunded actuarial accrued liability rate was calculated based on a fixed employer contribution rate using a floating amortization period no greater than 30 years. The calculation of this amount for the past two valuations is shown below:

Prior Funding Policy		
Valuation Date June 30	**2019**	**2018**
Employer contribution rate		
Normal Cost*	15.71%	15.18%
Accrued liability	24.71	25.44
Total	40.42%	40.62%
Anticipated accrued liability payment period	30 years	30 years

* Includes load for administrative expenses. See Section VI for more contribution rate detail.

Section VII: Supplemental Disclosure Information

Solvency Tests
($ in Thousands)

	Actuarial Accrued Liabilities for				Portions of Accrued Liabilities Covered by Assets		
Valuation Date	(1) Accumulated Employee Contributions Including Allocated Investment Earnings	(2) Retirees and Beneficiaries Currently Receiving Benefits	(3) Active and Inactive Members Employer Financed Portion	Net Assets Available for Benefits	(1)	(2)	(3)
6/30/2010	$20,658	$284,106	$106,513	$281,088	100%	91.7%	0.0%
6/30/2011	20,621	292,234	101,577	278,265	100	88.2	0.0
6/30/2012	20,760	300,753	99,902	268,424	100	82.3	0.0
6/30/2013	23,706	306,273	101,596	271,097	100	80.8	0.0
6/30/2014	24,411	317,825	103,586	295,298	100	85.2	0.0
6/30/2015	24,827	338,459	114,517	316,149	100	86.1	0.0
6/30/2016	25,791	343,635	124,675	324,894	100	87.0	0.0
6/30/2017	26,922	349,850	121,220	339,114	100	89.2	0.0
6/30/2018	27,581	358,342	141,505	352,415	100	90.6	0.0
6/30/2019	27,244	372,526	142,155	362,591	100	90.0	0.0

As can be seen from the table above, the HSPRS plan assets currently covers 100% of the active member contribution account balances as of the valuation date but only covers about 90.0% of the retiree liability. There remains zero assets to cover any employer financed active liabilities.

Section VII: Supplemental Disclosure Information

Schedule of Active Member Valuation Data

		Active Members			
Valuation Date	Number of Employers	Number	Annual Payroll	Annual Average Pay	% Increase in Average Pay
2010	1	542	$26,353,400	$48,623	5.0%
2011	1	515	24,872,085	48,295	(0.7)
2012	1	547	25,670,030	46,929	(2.8)
2013	1	520	25,815,787	49,646	5.8
2014	1	495	25,553,765	51,624	4.0
2015	1	518	25,504,676	49,237	(4.6)
2016	1	484	27,380,162	56,571	14.9
2017	1	470	28,845,478	61,373	8.5
2018	1	511	29,555,411	57,838	(5.8)
2019	1	522	31,811,231	60,941	5.4

Schedule of Number of Retirants Added To and Removed From Rolls
Last Ten Fiscal Years

	Fiscal Year Ended June 30									
Item	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Beginning of Year	692	696	704	713	713	720	724	724	726	725
Added	22	32	31	23	28	22	26	22	17	28
Removed	(18)	(24)	(22)	(23)	(21)	(18)	(26)	(20)	(18)	(19)
End of Year	696	704	713	713	720	724	724	726	725	734

*See Schedule D for a breakdown by type of retirement.

Schedule of Benefit Payments Added To and Removed From Rolls
Last Seven Fiscal Years

Year Ending	2013	2014	2015	2016	2017	2018	2019
Beginning of Year	$25,167,940	$25,835,619	$26,966,360	$28,076,536	$28,782,015	$29,563,842	$30,614,457
Added	642,344	1,113,236	890,167	833,870	717,225	787,728	1,186,864
Removed	(596,871)	(661,028)	(480,408)	(830,278)	(694,187)	(494,512)	(812,457)
Benefit increase due to annual COLA	622,206	678,533	700,417	701,887	758,789	757,399	826,033
Benefit increase due to plan amendments	0	0	0	0	0	0	0
End of Year	$25,835,619	$26,966,360	$28,076,536	$28,782,015	$29,563,842	$30,614,457	$31,814,897

Section VII: Supplemental Disclosure Information

Schedule of Average Benefit Payments

	Years of Credited Service								
	0-9	10-14	15-19	20-24	25	26-29	30	31+	TOTAL
July 1, 2018 to June 30, 2019									
Average Monthly Benefit		$455.07	$2,111.54	$3,374.59	$3,943.38	$4,902.10	$5,823.91	$5,690.03	$3,532.33
Average Final Salary		$56,573.88	$53,477.12	$77,543.75	$75,695.64	$84,403.44	$93,541.20	$82,712.42	$72,182.33
Number of Active Retirants		3	6	9	1	1	1	7	28
July 1, 2017 to June 30, 2018									
Average Monthly Benefit		$1,307.49	$2,490.53	$3,100.20		$3,562.34	$4,826.30	$5,100.57	$3,976.96
Average Final Salary		$31,379.76	$68,832.18	$60,334.20		$68,125.68	$77,928.36	$75,940.20	$68,584.98
Number of Active Retirants		1	2	4		1	2	7	17
July 1, 2016 to June 30, 2017									
Average Monthly Benefit	$337.90	$996.04	$556.17	$2,927.97	$1,186.14	$2,670.20	$4,606.06	$3,493.16	$2,716.76
Average Final Salary	$19,659.72	$45,533.40	$22,015.92	$67,682.80	$28,912.20	$54,518.06	$72,101.25	$47,949.84	$55,208.79
Number of Active Retirants	1	1	1	6	2	6	4	1	22
July 1, 2015 to June 30, 2016									
Average Monthly Benefit	$314.65			$2,078.23		$3,012.97	$1,729.45	$5,059.27	$2,672.66
Average Final Salary	$53,305.68			$45,947.58		$37,841.45	$50,692.08	$51,223.20	$43,534.73
Number of Active Retirants	3			6		13	1	3	26
July 1, 2014 to June 30, 2015									
Average Monthly Benefit			$1,831.19	$1,719.04	$1,978.03	$4,054.02		$4,758.40	$3,371.84
Average Final Salary			$45,652.04	$30,832.33	$36,844.69	$51,499.73		$67,377.63	$49,438.65
Number of Active Retirants			3	3	2	10		4	22

Section VII: Supplemental Disclosure Information

Schedule of Average Benefit Payments

	Years of Credited Service								
	0-9	10-15	16-20	21-24	25	26-29	30	31+	TOTAL
July 1, 2013 to June 30, 2014									
Average Monthly Benefit			$401.76	$2,013.42		$2,756.37	$3,898.78	$4,528.45	$3,313.21
Average Final Salary			$15,019.06	$54,344.38		$51,232.69	$69,760.18	$68,010.73	$59,196.43
Number of Active Retirants			1	5		8	5	9	28
July 1, 2012 to June 30, 2013									
Average Monthly Benefit	$661.61	$710.09		$1,172.98	$1,696.31	$2,859.71		$3,269.65	$2,327.34
Average Final Salary	$21,843.63	$36,998.42		$31,851.99	$28,672.69	$54,157.79		$54,646.02	$46,220.07
Number of Active Retirants	1	2		3	2	11		4	23
July 1, 2011 to June 30, 2012									
Average Monthly Benefit	$1,648.69		$2,340.93	$982.05	$1,568.62	$2,267.88	$4,335.37	$3,798.92	$3,112.35
Average Final Salary	$39,568.45		$58,021.27	$39,971.01	$28,716.82	$46,824.02	$71,048.35	$62,979.14	$56,306.75
Number of Active Retirants	1		1	1	1	10	5	12	31
July 1, 2010 to June 30, 2011									
Average Monthly Benefit		$716.18	$1,020.55	$2,433.84	$1,896.54	$2,408.76	$3,791.81	$3,296.52	$2,662.01
Average Final Salary		$28,057.78	$26,202.46	$60,342.83	$43,144.33	$50,019.57	$52,042.20	$51,855.68	$49,152.03
Number of Active Retirants		1	2	3	2	11	4	9	32
July 1, 2009 to June 30, 2010									
Average Monthly Benefit			$1,405.04		$3,155.49	$3,024.51	$3,461.46	$2,973.70	$2,760.91
Average Final Salary			$37,962.84		$59,219.21	$47,430.92	$30,160.22	$41,004.34	$42,581.99
Number of Active Retirants			4		2	5	2	9	22

Section VIII: Risk Assessment

Measuring pension obligations and actuarially determined contributions requires the use of assumptions regarding future economic and demographic experience. Whenever assumptions are made about future events, there is risk that actual experience will differ from expected. Actuarial valuations include the risk that actual future measurements will deviate from expected future measurements due to actual experience that is different than the actuarial assumptions. The primary areas of risk in this actuarial valuation are:

- Investment Risk – the potential that investment returns will be different than expected.

- Longevity and Other Demographic Risks – the potential that mortality or other demographic experience will be different than expected.

- Interest Rate Risk – To the extent market rates of interest affect the expected return on assets, there is a risk of change to the discount rate which determines the present value of liabilities and actuarial valuation results.

- Contribution Risk – The potential that actual contributions are different than the actuarially determined contributions.

Annual actuarial valuations are performed for HSPRS which re-measure the assets and liabilities and the adequacy of the contribution rate. Actuarial projections are also performed every year with sensitivity testing of several factors. HSPRS also has experience studies performed every two years to analyze the discrepancies between actuarial assumptions and actual experience and determine if the actuarial assumptions need to be changed. Annual actuarial valuations and projections and periodic experience studies are practical ways to monitor and reassess risk. The annual projection report will assess many of the risks listed above.

Schedule A: Development of Actuarial Value of Assets

($ thousands)

	Valuation Date June 30:	2018	2019	2020	2021	2022	20232
A.	Actuarial Value Beginning of Year	$339,114	$352,415				
B.	Market Value End of Year	354,169	366,165				
C.	Market Value Beginning of Year	341,719	354,169				
D.	Cash Flow						
	D1. Contributions	13,905	17,945				
	D2. Other Revenue	3,494	3,770				
	D3. Benefit Payments	(32,315)	(34,671)				
	D4. Refunds	(103)	(16)				
	D5. Administrative Expenses	(250)	(312)				
	D6. Investment Expenses	(1,207)	(1,527)				
	D7. Net	(16,476)	(14,811)				
E.	Investment Income						
	E1. Market Total: B.-C.-D7.	28,926	26,807				
	E2. Assumed Rate	7.75%	7.75%				
	E3. Amount for Immediate Recognition	27,099	28,460				
	E4. Amount for Phased-In Recognition	1,827	(1,653)				
F.	Phased-In Recognition of Investment Income						
	F1. Current Year: 0.20*E4.	365	(331)				
	F2. First Prior Year	4,181	365	(331)			
	F3. Second Prior Year	(4,566)	4,181	365	(331)		
	F4. Third Prior Year	(3,122)	(4,566)	4,181	365	(331)	
	F5. Fourth Prior Year	5,820	(3,122)	(4,566)	4,181	365	(331)
	F6. Total Recognized Investment Gain	2,678	(3,473)	(351)	4,215	34	(331)
G.	Actuarial Value End of Year: A + D7. + E3. + F6.	$352,415	$362,591				
H.	Difference Between Market & Actuarial Values	$1,754	$3,574	$3,925	$(290)	$(324)	$7

The Actuarial Valuation of Assets recognizes assumed investment income (line E3) fully each year. Differences between actual and assumed investment income (line E4) are phased in over a closed 5 year period. During periods when investment performance exceeds the assumed rate, Actuarial Value of Assets will tend to be less than market value. During periods when investment performance is less than the assumed rate, Actuarial Value of Assets will tend to be greater than market value. If assumed rates are exactly realized for 4 consecutive years, actuarial value will become equal to market value.

Schedule A: Development of Actuarial Value of Assets

	Asset Summary June 30, 2019 ($ in Thousands)		
	Market Value	**Book Value**	**Actuarial Value**
1. Assets at June 30, 2018	$354,169	$285,676	$352,415
2. Contributions and Misc. Revenue	21,715	21,715	21,715
3. Investment Increment	26,807	22,164	24,987
4. Benefit Payments	(34,671)	(34,671)	(34,671)
5. Refunds	(16)	(16)	(16)
6. Expenses	(1,839)	(1,839)	(1,839)
7. Adjustment	0	0	0
8. Assets at June 30, 2019 (1)+(2)+(3)+(4)+(5)+(6)+(7)	$366,165	$293,029	$362,591
9. Investment Return	7.18%	7.28%	6.69%

Schedule B: Statement of Actuarial Assumptions & Methods

INTEREST RATE: 7.75% per annum, compounded annually (net of investment expenses only). The expected return on assets consists of 2.75% price inflation and 5.00% real rate of return.

SEPARATIONS FROM ACTIVE SERVICE: Representative values of the assumed annual rates of separation from active service are as follows:

		Death*		Disability			
Age	Withdrawal and Vesting	Males	Females	Non-Duty	Duty	Service	Service Retirement**
25	5.60%	0.06%	0.02%	0.07%	0.00%	5	5%
30	4.00	0.06	0.03	0.09	0.01	10	5%
35	3.00	0.07	0.04	0.12	0.04	15	5%
40	2.00	0.09	0.05	0.15	0.05	20	5%
45	1.00	0.12	0.07	0.22	0.05	25	10%
50	1.00	0.18	0.09	0.38	0.04	30	25%
55	0.00	0.26	0.13	0.68	0.01	35	25%
60	0.00	0.40	0.18	1.16	0.00	40+	100%

* Base Rates.
** The annual rate of service retirement is 100% at age 61.

It is assumed that a member will be granted 1¾ years of service credit for unused leave at termination of employment. In addition, it is assumed that, on average, ¼ year of service credit for peace-time military service will be granted to each member.

SALARY INCREASES: Representative values of the assumed annual rates of salary increases are as follows:

		Annual Rates of	
Age	Merit & Seniority	Base (Economy)	Increase Next Year
20	5.56%	3.00%	8.56%
25	2.31	3.00	5.31
30	1.49	3.00	4.49
35	1.49	3.00	4.49
40	1.49	3.00	4.49
45	1.00	3.00	4.00
50	0.50	3.00	3.50
55	0.50	3.00	3.50
60	0.00	3.00	3.00

Schedule B: Statement of Actuarial Assumptions & Methods

DEATH AFTER RETIREMENT: The mortality table, for post-retirement mortality, used in evaluating allowances to be paid was the PubS.H-2010(B) Retiree Table with the following adjustments. For males, 112% of male rates from ages 18 to 75 scaled down to 105% for ages 80 to 119. For females, 85% of the female rates from ages 18 to 65 scaled up to 102% for ages 75 to 119. Projection scale MP-2018 is used to project future improvements in life expectancy generationally. The PubT.H-2010 Disabled Retiree Table for disabled retirees with the following adjustments – 137% of male rates at all ages and 115% of female rates at all ages was used for the period after disability retirement. Projection scale MP-2018 is used to project future improvements in life expectancy generationally. This assumption is used to measure the probabilities of each benefit payment being made after retirement.

PAYROLL GROWTH: 3.00% per annum, compounded annually.

ADMINISTRATIVE EXPENSES: 0.25% of payroll.

TIMING OF DECREMENT AND PAY INCREASES: Middle of Year.

ASSUMED INTEREST RATE ON EMPLOYEE CONTRIBUTIONS: 2.00%

MARRIAGE ASSUMPTION: 100% married with the husband three years older than his wife.

SURVIVING CHILD BENEFITS ASSUMPTION: A small load is applied for surviving children.

ASSET VALUATION METHOD: Actuarial value, as developed in Schedule A. The actuarial value of assets recognizes a portion of the difference between the market value of assets and the expected market value of assets, based on the assumed valuation rate of return. The amount recognized each year is 20% of the difference between market value and expected market value.

MAXIMUM COVERED EARNINGS ASSUMPTION GROWTH: 3.00%

MODIFIED CASH REFUND: Benefits were valued with a twelve year certain period for retirees and five year certain for active members to estimate the value of the modified cash refund feature.

Schedule B: Statement of Actuarial Assumptions & Methods

VALUATION METHOD: The valuation is prepared on the projected benefit basis, which is used to determine the present value of each member's expected benefit payable at retirement, disability or death. The calculations are based on the member's age, years of service, sex, compensation, expected future salary increases, and an assumed future interest earnings rate (currently 7.75%). The calculations consider the probability of a member's death or termination of employment prior to becoming eligible for a benefit and the probability of the member terminating with a service, disability, or survivor's benefit. The present value of the expected benefits payable to active members is added to the present value of the expected future payments to current benefit recipients to obtain the present value of all expected benefits payable to the present group of members and survivors.

The employer contributions required to support the benefits of HSPRS are determined following a level funding approach, and consist of a normal contribution and an accrued liability contribution.

The normal contribution is determined using the "entry age normal" method. Under this method, a calculation is made for pension benefits to determine the uniform and constant percentage rate of employer contribution which, if applied to the compensation of the average new member during the entire period of his anticipated covered service, would be required in addition to the contributions of the member to meet the cost of all benefits payable on his behalf.

The unfunded actuarial accrued liability is determined by subtracting the current assets and the present value of prospective employer normal contributions and member contributions from the present value of expected benefits to be paid from the HSPRS. The accrued liability contribution amortizes the balance of the unfunded actuarial accrued liability over a period of years from the valuation date.

Schedule C: Summary of Main Benefit & Contribution Provisions

The following summary presents the main benefit and contribution provisions of the System in effect June 30, 2019, as interpreted in preparing the actuarial valuation.

DEFINITIONS

Average Compensation	Average annual covered earnings of an employee during the four highest consecutive years of service.
Covered Earnings	Gross salary not in excess of the maximum amount on which contributions were required.
Fiscal Year	Year commencing on July 1 and ending June 30.
Credited Service	Service while a contributing member plus additional service as described below.
Unused Sick and Vacation Leave	Service credit is provided at no charge to members for unused sick and vacation time that has accrued at the time of retirement. A payment of up to 240 hours of leave may be used in the Average Compensation definition.
Additional Service	Additional service credit may be granted for service prior to July 1, 1958, active duty military service, and retroactive service

Schedule C: Summary of Main Benefit & Contribution Provisions

The maximum covered earnings for employers and employees over the years are as follows:

EMPLOYER AND EMPLOYEE RATES OF CONTRIBUTION
AND MAXIMUM COVERED EARNINGS

Fiscal Date From	Fiscal Date To	Employer Rate	Employee Rate	Maximum Covered Earnings*
7/1/1958	6/30/1968	13.33%	5.00%	
7/1/1968	6/30/1971	15.33	5.00	
7/1/1971	6/30/1973	18.59	5.00	
7/1/1973	6/30/1975	20.77	5.00	
7/1/1975	6/30/1978	24.65	5.00	
7/1/1978	6/30/1980	26.16	6.00	
7/1/1980	6/30/1989	26.16	6.50	
7/1/1989	6/30/1990	27.97	6.50	
7/1/1990	6/30/2003	26.16	6.50	
7/1/2003	6/30/2006	28.16	6.50	
7/1/2006	6/30/2008	30.30	6.50	
7/1/2008	12/31/2011	30.30	7.25	
1/1/2012	6/30/2012	35.21	7.25	
7/1/2012	6/30/2018	37.00	7.25	
7/1/2018	6/30/2019	49.08	7.25	

*Maximum covered earnings equal wages paid, not to exceed wages paid to the Commissioner of the Department of Public Safety (currently $146,850).

Effective July 1, 2019, additional contributions from SB 2659 and HB 1015 are estimated to be $3,700,000 combined.

Schedule C: Summary of Main Benefit & Contribution Provisions

BENEFITS

Superannuation Retirement

Condition for Retirement

A retirement allowance is payable to any member who retires and has attained age 55 and completed at least five years of membership service, or has attained age 45 and completed at least 20 years of creditable service, or has completed 25 years of creditable service regardless of age.

Any member who has attained age 63 shall be retired forthwith. Effective July 1, 2011, the Commissioner of Public Safety is authorized to allow a member who has attained age 63 to continue in active service. Such continued service may be authorized annually until the member attains age 65.

Amount of Allowance

The annual retirement allowance payable to a retired member is equal to:

1. A member's annuity which is the actuarial equivalent of the member's accumulated contributions at the time of his or her retirement, plus

2. An employer's annuity which, together with the member's annuity, is equal to 2-1/2% of his or her average compensation for each year of membership service, plus

3. A prior service annuity equal to 2-1/2% of average compensation for each year of prior service.

The aggregate amounts of (2) and (3) above shall not exceed 100% of average compensation, regardless of service, for retirements on or after January 1, 2000; 85% for retirements prior to January 1, 2000.

The minimum allowance for both service and disability retirement based on the following table for each year of creditable service, reduced if necessary as indicated below.

Service	Monthly Benefit
Less than 10 years	$250
10-15 years	$300
15 or more years	$500

The annual retirement allowance payable to a member who retires under condition (a) above prior to age 55 is computed in accordance with the above formula except that the employer's annuity and prior service annuity are reduced 3% for each year of age below age 55, or 3% for each year of service below 25 years of creditable service, whichever is less.

Deferred Vested

Condition for Vesting

Any member who withdraws from service prior to his or her attainment of age 55 but after having completed five or more years of creditable service is entitled to receive, in lieu of a refund of his or her accumulated contributions, a retirement allowance commencing at age 55.

Amount of Allowance

The annual retirement allowance payable at age 55 is equal to:

1. A member's annuity which is the actuarial equivalent of the member's accumulated contributions at the time of his or her retirement, plus

2. An employer's annuity which, together with the member's annuity, is equal to 2-1/2% of his or her average compensation for each year of membership service, plus

3. A prior service annuity equal to 2-1/2% of average compensation for each year of prior service.

The aggregate amounts of (2) and (3) above shall not exceed 100% of average compensation, regardless of service, for retirements on or after January 1, 2000; 85% for retirements prior to January 1, 2000.

The minimum allowance for both service and disability retirement based on the following table for each year of creditable service, reduced if necessary as indicated below.

Service	Monthly Benefit
Less than 10 years	$250
10-15 years	$300
15 or more years	$500

Disability Retirement

Non-Duty-Related	Non-duty related disability benefits are available to vested members under the age of 55. Vested members age 55 or older are not eligible for disability benefits but may apply for service retirement benefits. For purposed of disability benefits, average annual compensation is calculated using the last two years of salary before retirement.
Duty-Related	If you become permanently disabled due to sickness or injury caused or sustained as a direct result of duty, you may be eligible for duty-related disability retirement. You are covered for this benefit from the first day of employment if you have not reached age 55, regardless of your years of service. Duty-related disability retirement benefits are calculated at either 50 percent of average compensation of the last two years of salary before retirement (this portion is not taxable) or the non-duty-related disability retirement amount, whichever provides the higher benefit.

Death Benefits

Non-Duty-Related	If you are vested, your spouse and dependent children may be eligible to receive certain statutory benefits. Claims for non-duty-related death benefits are calculated at 2.5 percent of average compensation for each year of service credit, as calculated under Option 9, Maximum Benefit. Under this option, 50 percent of the accrued benefit is payable to your spouse until death, with 25 percent of the accrued benefit payable to one dependent child and 50 percent of the accrued benefit payable for two or more dependent children (under age 19 and never married or under age 23 if a full-time student and never married). Upon application and approval by the Medical Board, benefits to a physically or mentally disabled child may continue as long as the disability exists.
Duty-Related	Coverage for duty-related death benefits begins on the first day of employment and is available to your spouse and dependent children regardless of your vesting status. If you are vested, your spouse and dependent children may be eligible to receive benefits under either non-duty or duty-related death benefit provisions, whichever provided the higher benefit. Claims for duty-related death benefits are calculated at 50 percent of average compensation, payable to your spouse until death, with 25 percent of average compensation payable to one dependent child and 50 percent of average compensation payable for two or more dependent children (under age 19 and never married or under age 23 if a full-time student and never married).

Upon application and approval by the Medical Board, benefits to a physically or mentally disabled child may continue as long as the disability exists.

Death After Retirement

Upon the death of a highway patrolman who has retired for service or disability and who has not elected any other optional form of benefit, his widow or her widower is eligible for a benefit equal to 50% of his or her retirement allowance and each child (but not more than 2) who has not attained age 19 (23 if a full-time student) is eligible for a benefit equal to 25% of his or her retirement allowance. The benefit to the widow is payable for life and to children until they attain age 19 (23 if a full-time student) or for life if they are totally and permanently disabled.

Refund of Contributions

Upon a member's termination of employment for any reason before retirement, his or her accumulated contributions, together with regular interest thereon, are refunded. Upon the death of a member who is not eligible for any other death benefit, his or her accumulated contributions, together with regular interest thereon, are paid to his or her beneficiary.

Effective July 1, 2016, the interest rate on employee contributions shall be calculated based on the money market rate as published by the Wall Street Journal on December 31 of each preceding year with a minimum rate of one percent and a maximum rate of five percent.

Normal Form of Benefit

For single retirees, the normal form of benefit is an allowance payable during the life of the member. For married retirees, the normal form of benefit is an allowance payable as described in Option 9 below. Upon death the benefits described above are payable.

Optional Benefits

A member upon retirement may elect to receive his allowance in one of the following forms which are computed to be actuarially equivalent to the applicable retirement allowance.

Option 1. Reduced allowance with the provision that if the pensioner dies before he receives the value of the member's annuity as it was at the time of retirement, the balance shall be paid to his or her beneficiary.

Option 2. Upon his or her death, his or her reduced retirement allowance shall be continued throughout the life of, and paid to, his or her beneficiary.

Option 3. Upon his or her death, 50% of his or her reduced retirement allowance shall be continued throughout the life of, and paid to, a designated beneficiary and the other 50% of his or her reduced retirement allowance to some other designated beneficiary.

Option 4. Upon his or her death, 75% of his or her reduced retirement allowance shall be continued throughout the life of, and paid to, a designated beneficiary.

Option 4A. Upon his or her death, 50% of his or her reduced retirement allowance shall be continued throughout the life of, and paid to, a designated beneficiary.

Option 4B. A reduced retirement allowance shall be continued throughout the life of the pensioner, but with the further guarantee of payment to the pensioner or his or her beneficiary for a specified number of years certain.

Option 4C. A member may elect any option with the added provision that the member shall receive, so far as possible, the same total amount annually (considering both HSPRS and Social Security benefits) before and after the earliest age at which the member becomes eligible for a Social Security benefit. This option was only available to those who retired prior to July 1, 2004.

Option 9. Upon his or her death, spouse will receive 50% of the benefit member was receiving for life. Each dependent child (under age 19 and never married or under age 23 if a full-time student and never married) will receive 25% of the benefit member was receiving with a maximum of 50% for the support and care of two or more children. Any contribution and interest remaining after member death and after all monthly benefits due to spouse and children have been paid will be refunded to designated beneficiaries. If the member marries after retirement while receiving benefits under this option, they may apply to Pop-Down to Option 2 to provide 100% beneficiary protection to new spouse, or Pop-down to Option 4 or Option 4A for other beneficiary protections for the new spouse. PLSO is available with this option, if eligible.

A member who elects Option 2, Option 4, or Option 4A, at retirement may revert to the normal form of benefit if the designated beneficiary predeceases the retired member or if the retired member divorces the designated beneficiary. A member who elects the normal form of benefit or Option 1 at retirement may select Option 2, Option 4, or Option 4A to provide beneficiary protection to a new spouse if married after retirement.

A member who qualifies for an unreduced retirement allowance may select a partial lump-sum option at retirement. Under this option, the retiree has the option of taking a partial lump-sum distribution equal to either 12, 24, or 36 times the base maximum monthly benefit. With each lump-sum amount, the base maximum monthly benefit will be actuarially reduced. A member selecting this option may also select any of the regular options except Option 1, the prorated single-life annuity, and Option 4-C, the Social Security leveling provision. The benefit is then calculated using the new reduced maximum benefit as a starting point in applying the appropriate option factors for the reduction.

Post-Retirement Adjustments In Allowances

The allowances of retired members are adjusted annually by an amount equal to (a) 3% of the annual retirement allowance for each full fiscal year of retirement prior to the year in which the member reaches age 60*, plus (b) 3% compounded for each year thereafter beginning with the fiscal year in which the member turns age 60*.

A prorated portion of the annual adjustment will be paid to the member, beneficiary, or estate of any member or beneficiary who is receiving the annual adjustment in a lump sum, but whose benefits are terminated between July 1 and December 1.

Those members who retired on or before July 1, 1999 received an ad hoc benefit increase in the amount of $3.50 per month per each full fiscal year of retirement through June 30, 1999 plus $1.00 per month for each year of credited service. The benefits were increased on July 1, 1999.

*this age will be reduced in five phases to age 55 if the actuary certifies that reducing the age will not result in the amortization period of the unfunded actuarial accrued liability exceeding 20 years.

CONTRIBUTIONS

Members contribute 7.25% of compensation and the employer contributes 49.08% of compensation. Funds from SB 2659 and HB 1015 are also provided.

Schedule D: Detailed Tabulations of the Data

RECONCILIATION OF DATA RECEIVED FROM PERS

Reconciliation of Data received from PERS	Active File			Pensioner File			Total
	Active	Inactives	Deferred Vested	Retirees	Disableds	Survivors	
From PERS	531	19	57	557	18	187	1,369
Refunded		(2)	(1)				(3)
Certain Period End							
Deceased			(2)	(13)	(1)	(14)	(30)
Disabled			(1)				(1)
Retired	(9)		(9)				(18)
For Valuation	522	17	44	544	17	173	1,317

STATUS RECONCILIATION FROM 2018 TO 2019

Reconciliation of Data from Last Year to This Year	Actives	Retirees	Disableds	Survivors	Deferred Vested	Inactives	Total
As of June 30, 2018	511	534	17	174	40	15	1,291
Retirement	(19)	23			(4)		
Disabled			1		(1)		
Death with Survivor	(2)	(8)		10			
Terminated Def Vested	(10)				10		
Inactives	(4)					4	
Return to Active Svc	2					(2)	
Refunded	(1)				(1)		(2)
Death No Survivor		(5)	(1)	(13)			(19)
Benefit Ended							
Removed/Cleanup							
New / Pick-up	45			2			47
As of June 30, 2019	522	544	17	173	44	17	1,317

Schedule D: Detailed Tabulations of the Data

Retirants & Beneficiaries as of June 30, 2019

Tabulated by Year of Retirement

Valuation Year of Retirement Ending June 30	No.	Total Annual Benefits, excluding COLA	COLA	Total Annual Benefits	Average Monthly Total Benefit
2019	27	$1,175,742	$0	$1,175,742	$3,629
2018	16	786,061	10,498	796,559	4,149
2017	18	794,711	30,387	825,098	3,820
2016	12	504,074	37,359	541,433	3,760
2015	15	703,343	74,753	778,096	4,323
2014	21	941,868	122,388	1,064,256	4,223
2013	16	644,831	105,943	750,774	3,910
2012	18	793,186	154,170	947,356	4,386
2011	20	883,693	199,420	1,083,113	4,513
2010	45	1,797,873	486,743	2,284,616	4,231
2009	30	1,279,910	372,185	1,652,095	4,589
2008	14	558,501	186,310	744,811	4,433
2007	20	687,798	239,555	927,353	3,864
2006	19	599,553	232,809	832,362	3,651
2005	19	600,369	255,601	855,970	3,754
2004	18	672,565	314,905	987,470	4,572
2003	9	232,883	113,564	346,447	3,208
2002	29	809,852	445,736	1,255,588	3,608
2001	22	646,828	362,119	1,008,947	3,822
2000	14	428,057	261,912	689,969	4,107
1999	14	400,097	264,622	664,719	3,957
1998	29	862,890	605,323	1,468,213	4,219
1997	29	742,992	559,059	1,302,051	3,742
1996	21	514,584	387,995	902,579	3,582
1995	16	411,991	326,186	738,177	3,845
1994	13	298,076	231,213	529,289	3,393
1993	17	342,906	304,511	647,417	3,174
1992	3	64,186	58,800	122,986	3,416
1991	5	69,809	71,061	140,870	2,348
1990	12	166,765	163,342	330,107	2,292
1989	1	20,314	22,351	42,665	3,555
1988	4	45,039	53,934	98,973	2,062
1987	97	1,611,513	1,921,258	3,532,771	3,035
1986	9	157,175	213,099	370,274	3,428
1985	8	115,286	161,598	276,884	2,884
1984	7	76,407	119,505	195,912	2,332
1983 & Prior	47	328,839	574,116	982,955	1,601
TOTAL	734	$21,770,567	$10,044,330	$31,814,897	$3,612

Schedule D: Detailed Tabulations of the Data

Schedule of Retired Members by Type of Retirement

Benefits Payable June 30, 2019

Amount of Monthly Benefit	Number of Rets.	Ret Type 1*	Ret Type 2*	Ret Type 3*
$1 – $500	34	2	2	30
501 – 1,000	90	8	3	79
1,001 – 1,500	68	26	5	37
1,501 – 2,000	102	85	5	12
2,001 – 2,500	103	97	1	5
2,501 – 3,000	98	93	1	4
3,001 – 3,500	96	91		5
3,501 – 4,000	50	50		
4,001 – 4,500	35	34		1
4,501 – 5,000	18	18		
Over 5,000	40	40		
Totals	734	544	17	173

*Type of Retirement
1 – Retirement for Age & Service
2 – Disability Retirement
3 – Survivor Payment

Schedule D: Detailed Tabulations of the Data

Schedule of Retired Members by Type of Option

Benefits Payable June 30, 2019

Amount of Monthly Benefit	Number of Rets.	Life	Option 1	Option 2	Option 3	Option 4	Option 4A	Option 4B	Option 4C*	Option 5	Option 9	PLSO* 1 Year	PLSO* 2 Years	PLSO* 3 Years
$1 – $500	34	30		1							3			
501 – 1,000	90	79		1	1				1		9		1	
1,001 – 1,500	68	40		3				1	3		24	2		4
1,501 – 2,000	102	20		9	2		1	3	3		67	1	1	8
2,001 – 2,500	103	10		8			1	2	1		82	9	3	16
2,501 – 3,000	98	9		9	1		2	5	3		72	5	5	35
3,001 – 3,500	96	14	1	9			0	1			71	9	5	34
3,501 – 4,000	50	3		1	1		1	2			42	7	4	20
4,001 – 4,500	35	1	1	4				1			28	3	3	9
4,501 – 5,000	18										18	3	0	8
Over 5,000	40	1									39	3	7	7
Totals	734	207	2	45	5	0	5	15	11	0	455	42	29	141

<u>Option Selected</u>

Life	-	Return of Contributions
Opt. 1	-	Return of Member's Annuity
Opt. 2	-	100% Survivorship
Opt. 3	-	50%/50% Dual Survivorship
Opt. 4	-	75% Survivorship
Opt. 4A	-	50% Survivorship
Opt. 4B	-	Years Certain & Life
Opt. 4C	-	Social Security Leveling*
Opt. 5	-	Pop-Up
Opt. 9	-	Maximum Benefit with Pop-Down Provision
PLSO	-	Partial Lump Sum* (Reflects reduced monthly benefit)

*Included in other options

Schedule D: Detailed Tabulations of the Data

Retirant and Beneficiary Information June 30, 2019

Attained Age	Service Retirement		Disability Retirement		Survivors and Beneficiaries		Total	
	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits
Under 20					4	$21,416	4	$21,416
20 – 24					4	34,751	4	34,751
25 – 29								
30 – 34					2	25,951	2	25,951
35 – 39					1	22,635	1	22,635
40 – 44			2	$27,283			2	27,283
45 – 49	13	$529,267			6	125,720	19	654,987
50 – 54	17	753,121	2	70,018	2	46,982	21	870,121
55 – 59	75	3,598,309	3	80,962	2	86,378	80	3,765,649
60 – 64	130	6,798,605			3	99,709	133	6,898,314
65 – 69	101	5,044,393	4	121,472	16	423,179	121	5,589,044
70 – 74	92	4,689,115	1	33,236	29	810,787	122	5,533,138
75 – 79	65	3,119,638	2	50,009	39	1,050,955	106	4,220,602
80 – 84	33	1,697,586	2	45,585	23	535,140	58	2,278,311
85 – 89	14	704,601	1	14,375	26	579,968	41	1,298,944
90 – 94	4	246,347			10	227,391	14	473,738
95					2	35,333	2	35,333
96					2	37,660	2	37,660
97					1	10,046	1	10,046
98								
99								
100 & Over					1	16,974	1	16,974
Totals	544	$27,180,982	17	$442,940	173	$4,190,975	734	$31,814,897

Average Age: 69.2 years
Average Age at Retirement: 50.1 years

Schedule D: Detailed Tabulations of the Data

Total Active Member Data as of June 30, 2019
Tabulated by Attained Ages and Years of Service

Attained Age	Completed Years of Service									Total	
	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 & Over	No.	Payroll
Under 25	12	7								19	$ 797,405
25 to 29	17	29	2							48	2,054,494
30 to 34	10	33	15	9						67	3,167,199
35 to 39	5	15	17	47	4					88	4,914,519
40 to 44	2	9	3	35	33	7				89	5,534,184
45 to 49	1	6	3	22	32	35	7			106	7,230,960
50 to 54	1	1		4	14	18	21	2		61	4,458,861
55 to 59				1	2	12	6	7	2	30	2,387,839
60 to 64					1	2		6	5	14	1,265,770
65 to 69											0
70 & Over											0
Total Count	48	100	40	118	86	74	35	14	7	522	$ 31,811,231

While not used in the financial computations, the following group averages are computed and shown because of their general interest.

Age: 42.0 years
Service: 13.1 years
Annual Pay: $60,941

Schedule E: Analysis of Financial Experience

Gains & Losses in Accrued Liabilities
Resulting from Difference Between
Assumed Experience & Actual Experience
($ Thousands)

Type of Activity	$ Gain (or Loss) For Year Ending 6/30/2019	$ Gain (or Loss) For Year Ending 6/30/2018
Age & Service Retirements. If members retire at older ages, there is a gain. If younger ages, a loss.	$ (773.3)	$ 554.8
Disability Retirements. If disability claims are less than assumed, there is a gain. If more claims, a loss.	57.8	(19.6)
Death-in Service Benefits. If survivor claims are less than assumed, there is a gain. If more claims, there is a loss.	266.8	0.6
Withdrawal From Employment. If more liabilities are released by withdrawals than assumed, there is a gain. If smaller releases, a loss.	221.0	(336.8)
Pay Increases. If there are smaller pay increases than assumed, there is a gain. If greater increases, a loss.	800.1	(11,488.1)
New Members / Rehires. Additional unfunded actuarial accrued liability will produce a loss.	(49.5)	(3,306.9)
Investment Income. If there is a greater investment income than assumed, there is a gain. If less income, a loss.	(3,337.4)	2,880.3
Death After Retirement. If retirants live longer than assumed, there is a loss. If not as long, a gain.	1,881.8	131.8
Other. Miscellaneous gains and losses resulting from data adjustments, timing of financial transactions, etc.	(1,988.0)	(3,122.7)
Gain (or Loss) During Year From Financial Experience	$ (2,920.7)	$ (14,706.6)
Non-Recurring Items. Adjustments for plan amendments, software changes, assumption changes, or method changes.	(3,020.9)	0.0
Composite Gain (or Loss) During Year	$ (5,941.6)	$ (14,706.6)

Schedule F: Funding Policy

FUNDING POLICY OF THE MHSPRS BOARD OF TRUSTEES

The purpose of the funding policy is to state the overall funding goals for the System, the benchmarks that will be used to measure progress in achieving those goals, and the methods and assumptions that will be employed to develop the benchmarks.

I. Funding Goals

The objective in requiring employer and member contributions is to accumulate sufficient assets during a member's employment to fully finance the benefits the member receives throughout retirement. In meeting this objective, the System will strive to meet the following funding goals:

- To maintain an increasing ratio of system assets to accrued liabilities and reach an 80 percent minimum funded ratio in 2042;
- To maintain adequate asset levels to finance the benefits promised to members;
- To develop a pattern of stable contribution rates when expressed as a percentage of member payroll as measured by valuations prepared in accordance with the principles of practice prescribed by the Actuarial Standards Board, with a minimum employer contribution equal to the normal cost determined under the Entry Age Normal funding method;
- To provide intergenerational equity for taxpayers with respect to system costs; and
- To fund benefit improvements through increases in contribution rates in accordance with Article 14, § 272A, of the Mississippi Constitution.

II. Benchmarks

To track progress in achieving the previously outlined funding goals, the following benchmarks will be measured annually as of the actuarial valuation date (with due recognition that a single year's results may not be indicative of long-term trends):

- **Funded ratio** – The funded ratio, defined as the actuarial value of system assets divided by the System's actuarial accrued liability, should be increasing over time, before adjustments for changes in benefits, actuarial methods, and/or actuarial assumptions, with a target of at least 80 percent in 2042. If the funded ratio is projected to be less than 60 percent in 2042 or if the funded ratio is projected to be less than 70 percent following three consecutive annual actuarial valuations, a contribution rate increase will be determined that is sufficient to generate a funded ratio of 90 percent in 2042. If a funded ratio of 100 percent or more is attained, and is projected to remain above 100 percent for the ensuing 30 years, a reduced contribution pattern will be established provided the projected funded ratio remains at or above 100 percent in every future year.
- **Contribution rate history** – Employer and member contribution rates should be level from year to year when expressed as a percent of active member payroll unless the projected funded ratio reaches a level that triggers a change in contribution rates. The initial employer contribution rate set under this policy as revised June 19, 2013, was 37.00 percent of active member payroll effective July 1, 2013. This rate was changed effective July 1, 2018 to 49.08 percent.
- **Unfunded Actuarial Accrued Liability (UAAL) amortization period** – The amortization period for the System's UAAL should be declining over time.

Schedule F: Funding Policy

III. Methods and Assumptions

The actuarial funding method used to develop the benchmarks will be entry age normal. The method used to develop the actuarial value of assets will recognize the underlying market value of the assets by spreading each year's unanticipated investment income (gains and losses) over a five-year smoothing period (20 percent per year), as adopted by the Board of Trustees of the Public Employees' Retirement System of Mississippi (PERS).

The actuarial assumptions used will be those last adopted by the PERS Board based upon the advice and recommendation of the System's actuary. The actuary shall conduct an investigation into the System's experience at least every two years on a rolling four year basis, and utilize the results of the investigation to form the basis for those recommendations.

The PERS Board will have an audit of the System's actuarial valuation results conducted by an independent actuary at least every six years. The purpose of such a review is to provide a critique of the reasonableness of the actuarial methods and assumptions in use and the resulting actuarially computed liabilities and contribution rates.

IV. Funding Policy Review

The funding policy components and triggers will be reviewed annually following the annual actuarial valuation and in conjunction with the annual projection report and will be amended as necessary following each experience investigation conducted by the Board.

Schedule G: Glossary

<u>Actuarial Accrued Liability.</u> The difference between (i) the actuarial present value of future plan benefits, and (ii) the actuarial present value of future normal cost. Sometimes referred to as “accrued liability” or “past service liability”.

<u>Accrued Service.</u> The service credited under the plan which was rendered before the date of the actuarial valuation.

<u>Actuarial Assumptions.</u> Estimates of future plan experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and salary increases. Decrement assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.

<u>Actuarial Cost Method.</u> A mathematical budgeting procedure for allocating the dollar amount of the “actuarial present value of future plan benefits” between the actuarial present value of future normal cost and the actuarial accrued liability. Sometimes referred to as the “actuarial funding method”.

<u>Actuarial Equivalent.</u> A series of payments is called on actuarial equivalent of another series of payments if the two series have the same actuarial present value.

<u>Actuarial Present Value.</u> The amount of funds presently required to provide a payment or series of payments in the future. It is determined by discounting the future payments at a predetermined rate of interest, taking into account the probability of payment.

<u>Amortization.</u> Paying off an interest-bearing liability by means of periodic payments of interest and principal, as opposed to paying it off with a lump sum payment.

<u>Experience Gain (Loss).</u> A measure of the difference between actual experience and that expected based upon a set of actuarial assumptions during the period between two actuarial valuation dates, in accordance with the actuarial cost method being used.

<u>Normal Cost.</u> The annual cost assigned, under the actuarial funding method, to current and subsequent plan years. Sometimes referred to as “current service cost”. Any payment toward the unfunded actuarial accrued liability is not part of the normal cost.

<u>Reserve Account.</u> An account used to indicate that funds have been set aside for a specific purpose and are not generally available for other uses.

<u>Unfunded Actuarial Accrued Liability.</u> The difference between the actuarial accrued liability and valuation assets.

<u>Valuation Assets.</u> The value of current plan assets recognized for valuation purposes. Generally based on book value plus a portion of unrealized appreciation or depreciation.