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Actuarial Section

Actuary's Certification Letter



Cavanaugh Macdonald
CONSULTING, LLC
The experience and dedication you deserve

October 18, 2019

The Board of Trustees
Missouri State Employees' Retirement System
907 Wildwood Drive
Jefferson City, Missouri 65109

Dear Members of the Board:

At your request, we have performed an actuarial valuation of the Missouri State Employees' Retirement System (MOSERS) as of June 30, 2019, for the purpose of determining contribution rates for fiscal year 2021. Actuarial valuations are prepared annually for the Missouri State Employees' Plan (MSEP) and the Judicial Plan. The funding policy for both plans includes the Entry Age Normal actuarial cost method and the level percent of payroll methodology for the unfunded actuarial accrued liability (UAAL), which are set statutorily. The Board of Trustees is responsible for selecting the asset valuation method, amortization period and methodology for both plans. The selection of amortization period reflects the Board's desire to reach full funding within thirty years. The major findings of the valuations are contained in this section, which reflects the plan provisions in place on June 30, 2019, as amended by legislation passed by the 2019 legislature.

In July 2018, after extensive analysis, the Board adopted a plan to phase in a change in the full set of economic assumptions over a three year period (2018 through 2020 valuations). The scheduled changes to the economic assumptions were implemented in the 2019 valuation, including decreases in the following: inflation assumption from 2.50% to 2.35%, investment return assumption from 7.25% to 7.10%, cost of living adjustment (COLA) assumption from 2.00% to 1.88%, general wage growth assumption from 2.75% to 2.60% and the payroll growth assumption from 2.50% to 2.35%. For more detail, see the valuation report.

In preparing our report, we relied, without audit, on information (some oral and some in writing) supplied by the System's staff. This information includes, but is not limited to, statutory provisions, member data, and financial information. We found this information to be reasonably consistent and comparable with information used for other purposes. The valuation results depend on the integrity of this information. If any of this information is inaccurate or incomplete, our results may be different and our calculations may need to be revised.

We further certify that all costs, liabilities, and other factors for the plans have been determined on the basis of actuarial assumptions and methods which are individually reasonable (taking into account the experience of the plans and reasonable expectations); meet applicable Actuarial Standards of Practice (ASOPs); and which, in combination, offer our best estimate of anticipated experience affecting the plans. Nevertheless, the emerging costs of the plans will vary from those presented herein to the extent actual experience differs from that projected by the actuarial assumptions. The Board of Trustees has the final decision regarding the appropriateness of the assumptions and adopted them, as indicated in Appendix D of our *MSEP Actuarial Valuation Report* and Appendix C of our *Judges Actuarial Valuation Report*.

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Future actuarial measurements may differ significantly from the current measurements presented in the June 30, 2019 valuation reports 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; and changes in plan provisions or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of future measurements.

Actuarial computations presented in this section are for purposes of determining the recommended and statutory funding amounts for the plans. The calculations have been made on a basis consistent with our understanding of the plans' funding requirements and goals. Determinations for purposes other than meeting these requirements may be significantly different from the results shown in the June 30, 2019 valuation reports. Accordingly, additional determinations may be needed for other purposes.

Based upon the June 30, 2019 valuation results, annual projection forecasting and the presumption that future contributions will be made at the full actuarial contribution rate, it is our opinion that the current funding policy will systematically accumulate assets sufficient to fund all future benefits of both the MSEP and the Judicial Plan, if all actuarial assumptions are met.

We provided the information used by staff to prepare the following schedules in the *Actuarial Section: Schedules of Funding Progress, Active Members by Attained Age and Years of Service, Schedules of Active Member Valuation Data, Short-Term Solvency Test, and Analysis of Financial Experience*. We also provided the information used by staff to prepare the following schedules in the *Financial Section: Schedule of Employers' Net Pension Liability, Sensitivity of Net Pension Liability to Changes in the Discount Rate, Schedule of Changes in Employers' Net Pension Liability* and the *Schedule of Employer Contributions*.

Actuarial computations, based on the actuarial valuations performed as of June 30, 2019, were also prepared as of June 30, 2019, for purposes of fulfilling financial accounting requirements for the plans under Governmental Accounting Standard Number 67 (GASB 67). The Missouri State Employees' Plan (MSEP) is a cost-sharing multiple employer plan and the Judicial Plan is a single employer plan. The assumptions used in the funding valuation were also used for GASB 67 calculations including the 7.10% assumed rate of return used in the funding valuation. In addition, the entry age normal actuarial cost method, which is required to be used under GASB 67, is also used in the funding valuations. The actuarial assumptions and methods meet the parameters set by ASOPs, as issued by the Actuarial Standards Board, and generally accepted accounting principles (GAAP) applicable in the United States of America as promulgated by the Governmental Accounting Standards Board (GASB). Additional information related to GASB 67 can be found in the Financial Section of this report.

The consultants who worked on this assignment are pension actuaries. Cavanaugh Macdonald Consulting, LLC's advice is not intended to be a substitute for qualified legal or accounting counsel.

We certify that, to the best of our knowledge and belief, the June 30, 2019 actuarial valuation reports are complete and accurate and have been prepared in accordance with generally recognized and accepted actuarial principles and practices. We are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein.

A handwritten signature in black ink, appearing to read 'Patrice Beckham', written in a cursive style.

Patrice A. Beckham, FSA, EA, FCA, MAAA
Principal and Consulting Actuary

A handwritten signature in black ink, appearing to read 'Bryan K. Hoge', written in a cursive style.

Bryan K. Hoge, FSA, EA, FCA, MAAA
Senior Actuary

Summary of Actuarial Assumptions

Actuarial Methods

Calculation of normal cost and actuarial accrued liability

The funding method used to determine the normal cost and actuarial accrued liability was the entry age actuarial cost method described below.

- **Entry age actuarial cost method** – Under the entry age normal cost method, the actuarial present value of each member’s projected benefit is allocated on a level basis over the member’s compensation between the entry age of the member and their assumed exit age. The portion of the actuarial present value allocated to the valuation year is called the normal cost. The actuarial present value of benefits allocated to prior years of service is called the actuarial accrued liability. The unfunded actuarial accrued liability represents the difference between the actuarial accrued liability and the actuarial value of assets as of the valuation date. The unfunded actuarial accrued liability is calculated each year and reflects experience gains/losses.
- **Calculation of the actuarial value of assets (AVA)** – The Board adopted a new asset smoothing method effective with the June 30, 2018 valuation. Under the new method, the difference between the actual and assumed investment return on the market value of assets is recognized evenly over a five-year period. No corridor is used with the new method. In addition, the total unrecognized investment experience as of June 30, 2017, will be recognized evenly over a seven-year period beginning June 30, 2018.
- **Amortization of the Unfunded Actuarial Accrued Liability (UAAL)** – Beginning with the June 30, 2018, valuation, the UAAL is amortized using a “layered” approach. Under this method, the “Legacy UAAL”, as determined in the June 30, 2018 valuation, is amortized over a closed 30-year period. Subsequent changes in the UAAL due to actuarial gains/losses or assumption changes are separately financed by establishing amortization bases and payments, as a level percentage of payroll, over closed 30-year periods. Any change in the System's benefit structure shall be amortized over a closed period of 20 years, as set out in state statutes. The total UAAL amortization payment is the sum of the payments for each of the amortization bases.
- **Changes in Methods and Assumptions Since the Prior Year**
An experience study which analyzed the System’s economic assumptions was performed in 2018 and the results were presented to the Board. Below is a summary of the changes to methods and assumptions since the prior year:
 - **Investment return** – The assumption was lowered from 7.25% to 7.10%.
 - **Price inflation** – The assumption was lowered from 2.50% to 2.35%.
 - **General wage growth** – The assumption was lowered from 2.75% to 2.60%.
 - **Payroll growth** – The assumption was lowered from 2.50% to 2.35%.
 - **Cost-of-living adjustment (COLA)** – The assumption was lowered from 2.00% to 1.88%.

Actuarial Assumptions

Economic Assumptions

- **Investment return** – 7.10%, compounded annually, net of investment expenses. (7.25% June 30, 2018 valuation)
 - This assumption will change to 6.95% for the June 30, 2020 valuation and thereafter, absent Board action.
- **Inflation** – 2.35% per year
 - This assumption will change to 2.25% for the June 30, 2020 valuation and thereafter, absent Board action.

Payroll growth – 2.35% per year

- This assumption will change to 2.25% for the June 30, 2020 valuation and thereafter, absent Board action.
- **Cost-of-living adjustment (COLA)** – 4.00% on a compounded basis when a minimum COLA of 4.00% is in effect; 1.88% on a compounded basis when no minimum COLA is in effect
- **Interest on member contributions** – 1.50% per year

Demographic Assumptions

- **Mortality** – The mortality assumption includes an appropriate level of conservatism that reflects expected future mortality improvement

MSEP/MSEP 2000/MSEP 2011

- **Post-retirement** – RP-2014 Healthy Annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 120%
- **Pre-retirement** – RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females
- **Long-term disability** – RP-2014 Disabled mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females

Judicial Plan

- **Post-retirement** – RP-2014 Healthy Annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 98%
- **Pre-retirement** – RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015
- **Long-term disability** – RP-2014 Disabled mortality table, projected from 2006 to 2026 with Scale MP-2015

The actuarial valuation computations were made by or under the supervision of a Member of the American Academy of Actuaries (MAAA). Assumptions were adopted based on the June 30, 2016 experience study and the June 30, 2018 Report on Economic Assumptions.

MSEP

Percent of Eligible Active Members Retiring Within the Next Year

Retirement Age	Normal Retirement			Early Retirement		
	MSEP/MSEP 2000			MSEP 2011	MSEP/MSEP 2000	MSEP 2011
	Percent Retiring			Percent Retiring	Percent Retiring	Percent Retiring
	1st Year	2nd Year	3rd Year			
48	20%					
49	20	10%				
50	20	10	21%			
51	20	10	21			
52	20	10	21			
53	20	10	21			
54	20	10	21			
55	20	10	21	45%		
56	20	10	21	45		
57	20	10	21	35	2.4%	
58	20	10	21	35	3.1	
59	20	10	21	30	3.0	
60	20	10	21	35	5.1	
61	19	10	21	25	6.0	
62	18	22	29	40	6.0	10%
63	16	18	24	30	6.0	10
64	15	17	17	20	6.0	10
65	19	19	27	30		50
66	24	25	28	25		50
67	10	25	23	20		
68	20	25	23	20		
69	20	25	23	20		
70	20	25	23	20		
71	20	25	23	20		
72	20	25	23	20		
73	20	25	23	20		
74	20	25	23	20		
75	50	50	23	50		
76	50	50	23	50		
77	75	75	23	75		
78	100	100	100	100		

Judicial Plan**Percent of Eligible Active Members Retiring Within the Next Year**

Retirement Age	Normal Retirement				Early Retirement	
	Judicial Plan		Judicial Plan 2011		Judicial Plan	
	Percent Retiring		Percent Retiring		Percent Retiring	
	Male	Female	Male	Female	Male	Female
55	20%	3%				
56	16	3				
57	13	3				
58	9	3				
59	5	3				
60	8	8				
61	5	8				
62	8	8	30%	35%	6%	3%
63	10	8	20	20	6	3
64	12	8	15	20	6	3
65	12	15	30	50	6	3
66	20	15	25	25	6	3
67	20	15	20	25	6	3
68	30	15	20	25	6	3
69	30	15	30	50	6	3
70	100	100	100	100	100	100

Elected Officials and Legislators**Percent of Active Members Terminating Within the Next Year**

Years of Service	Percent Terminating	
	Male	Female
0-1	8%	8%
1-2	8	8
2-3	8	8
3-4	8	8
4-5	12	12
5-6	12	12
6-7	12	12
7+	35	35

MSEP

Separations From Active Employment Before Service Retirement Assumptions

Sample Ages	Years of Service	Termination*		Disability		Death**	
		Male	Female	Male	Female	Male	Female
	0	24.0%	27.5%				
	1	19.0	21.5				
	2	15.5	16.3				
	3	13.3	13.5				
	4	11.2	11.3				
25	5+	13.5	14.0	0.10%	0.10%	0.03%	0.01%
30		10.6	11.0	0.10	0.10	0.03	0.02
35		8.2	8.5	0.10	0.10	0.04	0.03
40		5.8	6.0	0.36	0.36	0.05	0.03
45		4.3	4.5	0.41	0.41	0.07	0.05
50		2.9	3.0	0.57	0.57	0.13	0.08
55		2.9	3.0	0.77	0.77	0.22	0.14
60		2.9	3.0	1.02	1.02	0.40	0.20
65		2.9	3.0	1.23	1.23	0.70	0.30
70		2.9	3.0	1.23	1.23	1.17	0.50

* Does not apply to elected officials and legislators.

** 2% of the deaths in active service are assumed to be duty-related.

MSEP

Pay Increase Assumptions

Years of Service	Rates by Service*			
	Inflation	Productivity	Merit	Total
1	2.35%	0.25%	5.75%	8.35%
2	2.35	0.25	2.50	5.10
3	2.35	0.25	1.50	4.10
4	2.35	0.25	1.25	3.85
5	2.35	0.25	1.00	3.60
9	2.35	0.25	0.75	3.35
10	2.35	0.25	0.50	3.10
21+	2.35	0.25	0.25	2.85

* General assembly members have a flat 2.6% assumption.

Judicial Plan**Separations From Active Employment Before Service Retirement
Due to Death and Disability Assumptions**

Sample Ages	Death		Disability	
	Male	Female	Male	Female
25	0.03%	0.01%	0.01%	0.01%
30	0.03	0.02	0.02	0.01
35	0.04	0.03	0.03	0.02
40	0.05	0.04	0.04	0.03
45	0.07	0.05	0.05	0.04
50	0.13	0.09	0.08	0.07
55	0.24	0.16	0.13	0.12
60	0.42	0.23	0.20	0.19
65	0.74	0.33	0.20	0.19
70	1.23	0.55	0.20	0.19

Judicial Plan**Separations From Active Employment Before Service Retirement
Due to Terminations Assumptions**

Service Index	Male	Female
1	0.040%	0.040%
2	0.010	0.023
3	0.013	0.023
4	0.013	0.023
5	0.013	0.023
6-10	0.013	0.023
11-15	0.017	0.023
16+	0.010	0.010

Judicial Plan**Pay Increase Assumptions**

Sample Ages	Merit & Seniority	Inflation	Increase Next Year
25	2.45%	2.35%	4.80%
30	2.45	2.35	4.80
35	1.73	2.35	4.08
40	1.01	2.35	3.36
45	0.85	2.35	3.20
50	0.79	2.35	3.14
55	0.69	2.35	3.04
60	0.25	2.35	2.60
65	0.25	2.35	2.60
70	0.25	2.35	2.60

Other Assumptions | June 30, 2019

- **Form of payment**

MSEP

- 50% joint and survivor

MSEP 2000/MSEP 2011

- Straight life annuity

Judicial Plan

- **Hired before January 1, 2011** – 50% joint and survivor
- **Hired on or after January 1, 2011** – Straight life annuity

- **Marital status**

MSEP/MSEP 2000/MSEP 2011

- **Percent married** – 70% married at retirement, 60% of those dying in active service are married
- **Spouse’s age** – Females assumed to be three years younger than males

Judicial Plan

- **Percent married** – 100% married
- **Spouse’s age** – Females assumed to be four years younger than males

- **Pay increase timing** – Pay increases are assumed to occur at the beginning of the fiscal year.
- **Decrement timing** – Decrements of all types are assumed to occur mid-year.
- **Eligibility testing** – Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
- **Benefit service** – Exact fractional service is used to determine the amount of the benefit payable.
- **Decrement relativity** – Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
- **Decrement operation** – Disability and withdrawal do not operate during normal retirement eligibility.
- **Other liability adjustments**

MSEP/MSEP 2000/MSEP 2011

- Pre-retirement survivor benefits for spouse of an inactive-vested member. These factors are used to estimate the cost of immediate unreduced survivor annuities upon the death of a vested member.

Age	Male	Female
<30	1.57	1.31
30-39	1.24	1.13
40-49	1.09	1.05
>50	1.02	1.01

- **Incidence of contributions** – Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report and the actual payroll payable at the time contributions are made. New entrant normal cost contributions are applied to the funding of new entrant benefits.
 - **Retirement election**
- MSEP 2000*
- All regular state employees hired on or before June 30, 2000, are assumed to elect MSEP 2000 prior to age 62 and MSEP on or after age 62.
 - Elected officials, general assembly, and uniformed water patrol members hired before July 1, 2000, are assumed to elect MSEP at retirement.

- **Service adjustment**

- ***MSEP/MSEP 2000/MSEP 2011***

- It is assumed that each member will be granted eight months of service credit; four months for unused leave upon retirement and four months for military service purchases. For members hired on or after January 1, 2011, it is assumed that each member will be granted five months for unused leave.

- **Forfeitures**

- ***MSEP 2011***

- For those hired on or after January 1, 2011, 50% of state employees terminating at first vesting eligibility are assumed to take a refund and forfeit their deferred pension. This percentage decreases to 0% at first retirement eligibility.

- ***Judicial Plan***

- No vested members are assumed to take a refund of employee contributions.

- **Salary and benefit limits** – For purposes of the valuation, no limits were applied to member compensation or benefits.

- **Commencement age for deferred vested benefit** – normal retirement date

- **Data Adjustments**

- ***MSEP/MSEP 2000/MSEP 2011***

- Active and retired member data was reported as of May 31, 2019. It was brought forward to June 30, 2019, by adding one month of service for all active members, one month of contributions and interest for MSEP 2011 members, and the June COLA for certain retired members. Financial information continues to be reported annually as of June 30. This procedure was instituted to provide sufficient time for the Board of Trustees to certify the appropriate contribution rate prior to the statutory deadline.

- Active members reported with less than a \$100 annualized salary were assumed to receive the average active member pay.

- When the option of choosing plans is available, inactive-vested members are reported with two records, one with benefits under the MSEP and one with benefits under the MSEP 2000. Because it is unknown what the member will elect at retirement, both records are valued and the plan that produces the higher present value of future benefits is used for valuation purposes.

- For any retired member who has elected a joint and survivor benefit, yet has no beneficiary date of birth provided, it was assumed that the beneficiary is three years younger for male retirees and three years older for female retirees.

- For members reported with no gender, the member is assumed to be male.

- Due to limitations in our valuation program, members who are not eligible for normal retirement prior to age 85 had their date of birth adjusted.

- ***Judicial Plan***

- Active and retired member data was reported as of May 31, 2019. It was brought forward to June 30, 2019, by adding one month of service for all active members, one month of contributions and interest for Judicial Plan 2011 members, and the June COLA for certain retired members. Financial information continues to be reported annually as of June 30. This procedure was instituted to provide sufficient time for the Board of Trustees to certify the appropriate contribution rate prior to the statutory deadline.

- Active members reported no annualized salary were assumed to receive the average active member pay.

- **Other Technical Valuation Procedures**

- Salary increases are assumed to apply to annual amounts.

- Decrements are assumed to occur mid-year, except that immediate retirement is assumed for those who are at or older than the age at which retirement rates are 100%. Standard adjustments are made for multiple decrements.

- No actuarial liability is included for participants who terminated without being vested prior to the valuation date, except those due a refund of contributions.

Pension Trust Funds

Employer Schedule of Funding Progress

Last Ten Fiscal Years

MOSERS uses the entry-age normal actuarial cost method which allocates the actuarial present value of each member's projected benefits on a level basis over the member's pensionable compensation between the entry-age of the member and assumed exit ages.

MSEP

Actuarial Valuation Date as of June 30	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) Entry Age (b)	Unfunded AAL (UAAL) (b-a)	Percent Funded (a/b)	Annual Covered Payroll (c)	UAAL Percentage of Covered Payroll [(b-a)/c]
2010	\$ 7,923,377,393	\$ 9,853,155,445	\$ 1,929,778,052	80.4%	\$ 1,945,095,321	99.2%
2011	8,022,481,408	10,123,544,043	2,101,062,635	79.2	1,875,569,816	112.0
2012	7,897,167,203	10,793,651,577	2,896,484,374	73.2	1,864,069,493	155.4
2013	8,096,436,929	11,134,637,484	3,038,200,555	72.7	1,880,212,950	161.6
2014	8,637,758,955	11,494,571,835	2,856,812,880	75.1	1,902,719,928	150.1
2015	8,792,485,658	11,727,618,410	2,935,132,752	75.0	1,918,527,768	153.0
2016	8,878,057,191	12,751,162,753	3,873,105,562	69.6	1,921,528,936	201.6
2017	8,872,381,848	13,152,273,895	4,279,892,047	67.5	1,941,969,786	220.4
2018	8,830,410,210	13,612,763,961	4,782,353,751	64.9	1,915,143,002	249.7
2019	8,782,383,977	13,957,626,309	5,175,242,332	62.9	1,930,764,635	268.0

Judicial Plan

Actuarial Valuation Date as of June 30	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) Entry Age (b)	Unfunded AAL (UAAL) (b-a)	Percent Funded (a/b)	Annual Covered Payroll (c)	UAAL Percentage of Covered Payroll [(b-a)/c]
2010	\$ 88,976,738	\$ 382,012,773	\$ 293,036,035	23.3%	\$ 46,112,730	635.5%
2011	98,398,628	393,484,589	295,085,961	25.0	45,888,020	643.1
2012	102,266,706	413,332,538	311,065,832	24.7	45,835,501	678.7
2013	111,140,339	435,378,358	324,238,019	25.5	48,697,726	665.8
2014	124,269,105	462,336,255	338,067,150	26.9	49,587,936	681.8
2015	134,349,908	482,969,311	348,619,403	27.8	55,656,457	626.4
2016	143,468,860	547,621,617	404,152,757	26.2	57,421,016	703.8
2017	151,828,631	564,417,925	412,589,294	26.9	58,150,935	709.5
2018	162,135,045	593,788,592	431,653,547	27.3	59,551,874	724.8
2019	172,224,529	617,482,705	445,258,176	27.9	60,380,734	737.4

See *Schedule of Employer Contributions* on page 58.

Pension Trust Funds

Summary of Member Data Included in Valuations

June 30, 2019

Active Members

Valuation Group	Number	Annual Covered Payroll	Group Averages		
			Annual Salary	Age (Yrs)	Service (Yrs)
MSEP					
Regular state employees	44,454	\$ 1,793,297,961	\$ 40,341	45.2	10.5
Elected officials	6	654,754	109,126	46.7	2.4
Legislative clerks	8	323,618	40,452	66.4	21.3
Legislators	192	6,902,692	35,952	52.2	4.0
Uniformed water patrol	10	738,934	73,893	43.0	17.2
Conservation department	1,348	61,049,428	45,289	44.5	14.1
School-term salaried employees	829	65,762,962	79,328	58.2	22.3
Administrative law judges	17	2,034,286	119,664	60.8	24.9
Total MSEP group	46,864	\$ 1,930,764,635	41,199	45.5	10.8
Judicial Plan	414	\$ 60,380,734	\$ 145,847	55.6	10.6

Retired Members and Beneficiaries

Type of Benefit Payment	Number	Annual Benefits	Group Averages	
			Benefit	Age (Yrs.)
MSEP				
Retirement	44,158	\$ 711,958,404	\$ 16,123	70.4
Disability	1	2,280	2,280	63.0
Survivor of active member	1,728	19,085,520	11,045	63.1
Survivor of retired member	3,809	48,900,516	12,838	75.8
Total MSEP group	49,696	\$ 779,946,720	15,694	70.5
Judicial Plan	585	\$ 38,600,424	\$ 65,984	76.3

Other Members

Plans	Number Inactive-Vested	Number Inactive-Nonvested	Number Leave of Absence	Number Long-Term Disability
MSEP	16,016	18,852	175	682
Judicial Plan	36	0	0	0

Active Members by Attained Age and Years of Service

June 30, 2019

MSEP

Attained Age	Years of Service to Valuation Date								Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	No.	Valuation Payroll
< 24	2,376	15							2,391	\$ 74,517,568
25-29	3,695	563	11						4,269	147,824,973
30-34	2,774	1,485	468	9					4,736	180,893,664
35-39	2,052	1,228	1,287	463	26				5,056	205,820,334
40-44	1,642	986	1,075	1,156	484	15			5,358	226,049,383
45-49	1,439	939	966	1,083	1,390	407	32		6,256	269,248,069
50-54	1,305	906	883	958	1,138	946	311	17	6,464	281,881,508
55-59	1,215	918	945	1,074	1,079	571	426	134	6,362	276,117,441
60-64	728	636	718	720	663	378	253	158	4,254	187,990,715
65+	265	285	307	261	226	146	104	124	1,718	80,420,980
Totals	17,491	7,961	6,660	5,724	5,006	2,463	1,126	433	46,864	\$ 1,930,764,635

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

Group Averages: Age – 45.5 years • Service – 10.8 years • Annual pay – \$41,199

Judicial Plan

Attained Age	Years of Service to Valuation Date								Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll	
< 39	22	2						24	\$ 3,415,811	
40-44	27	7						34	4,875,490	
45-49	29	10	11	1				51	7,274,271	
50-54	25	15	15	10	4			69	10,023,763	
55-59	29	21	13	14	12	1		90	13,140,228	
60-64	16	15	14	11	23	3	3	85	12,507,139	
65+	3	7	9	9	12	13	8	61	9,144,032	
Totals	151	77	62	45	51	17	11	414	\$ 60,380,734	

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

Group Averages: Age – 55.6 years • Service – 10.6 years • Annual pay – \$145,847

Schedules of Active Member Valuation Data

Last Ten Fiscal Years

MSEP

Schedule of Active Member Valuation Data

Valuation Date as of June 30	Number	Annual Payroll	Average Annual Pay	% Increase in Average Pay
2010	53,478	\$ 1,945,095,321	\$ 36,372	0.01%
2011	51,660	1,875,569,816	36,306	(0.18)
2012	51,332	1,864,069,493	36,314	0.02
2013	50,833	1,880,212,950	36,988	1.86
2014	50,621	1,902,719,928	37,588	1.62
2015	49,980	1,918,527,768	38,386	2.12
2016	49,464	1,921,528,936	38,847	1.20
2017	48,910	1,941,969,786	39,705	2.21
2018	47,806	1,915,143,002	40,061	0.90
2019	46,864	1,930,764,635	41,199	2.84

Judicial Plan

Schedule of Active Member Valuation Data

Valuation Date as of June 30	Number	Annual Payroll	Average Annual Pay	% Increase in Average Pay
2010	402	\$ 46,112,730	\$ 114,708	0.07%
2011	399	45,888,020	115,008	0.26
2012	398	45,835,501	115,165	0.14
2013	400	48,697,726	121,744	5.71
2014	405	49,587,936	122,439	0.57
2015	405	55,656,457	137,423	12.24
2016	408	57,421,016	140,738	2.41
2017	410	58,150,935	141,832	0.78
2018	415	59,551,874	143,498	1.17
2019	414	60,380,734	145,847	1.64

Retirees and Beneficiaries Added and Removed

Last Ten Fiscal Years

MSEP

Fiscal Year Ended June 30	Classification	Benefit Type	Added to Rolls		Removed from Rolls	
			Number	Annual Allowances	Number	Annual Allowances
2010	General employees	Retirement	2,298	\$ 34,755,192	833	\$ 9,979,318
		Survivor of active	83	1,054,292	49	276,401
		Survivor of retired	246	3,080,424	117	1,078,265
		Disability	0	830	1	2,985
	Lincoln University - vested	Retirement	1	5,671	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	12	201,562	12	239,880
		Survivor of active	0	3,975	1	16,709
		Survivor of retired	5	78,765	0	0
	Elected officials	Retirement	0	0	1	66,911
		Survivor of active	0	3,117	0	0
		Survivor of retired	1	34,780	0	0
	ALJs	Retirement	3	113,877	1	46,794
		Survivor of retired	0	7,332	0	0
2011	General employees	Retirement	2,850	41,203,358	892	10,670,476
		Survivor of active	65	914,689	46	261,503
		Survivor of retired	298	3,059,195	176	1,670,990
		Disability	0	79	1	1,732
	Lincoln University - vested	Retirement	1	1,780	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	41	601,171	10	185,635
		Survivor of active	0	2,903	1	19,612
		Survivor of retired	5	73,841	2	16,628
	Elected officials	Retirement	0	0	0	0
		Survivor of active	0	3,242	0	0
		Survivor of retired	0	1,053	0	0
	ALJs	Retirement	4	212,519	0	0
		Survivor of retired	0	2,599	1	27,724

Source of Data: MOSERS benefit payment database as of June 30, 2019.
Other Actuarial Section information reported based on MOSERS data as of May 31, 2019.

Rolls at End of Year					
Number	Annual Allowances	Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances	
29,407	\$ 449,976,272	5.83%	\$ 15,302	0.56%	
1,398	12,873,137	6.43	9,208	3.85	
2,388	24,540,289	8.88	10,277	3.01	
9	30,900	(6.52)	3,433	3.84	
14	61,624	10.14	4,402	0.00	
1	2,624	0.00	2,624	0.00	
262	5,169,635	(0.74)	19,731	(0.74)	
12	133,476	(8.71)	11,123	(1.10)	
61	850,744	10.20	13,947	1.18	
13	553,224	(10.79)	42,556	(3.93)	
1	81,041	4.00	81,041	4.00	
2	67,897	105.02	33,949	2.51	
28	1,244,605	5.70	44,450	(1.85)	
11	283,184	2.66	25,744	2.66	
31,365	480,509,154	6.79	15,320	0.12	
1,417	13,526,322	5.07	9,546	3.67	
2,510	25,928,494	5.66	10,330	0.52	
8	29,247	(5.35)	3,656	6.50	
15	63,404	2.89	4,227	(3.98)	
1	2,624	0.00	2,624	0.00	
293	5,585,171	8.04	19,062	(3.39)	
11	116,767	(12.52)	10,615	(4.57)	
64	907,957	6.73	14,187	1.72	
13	553,224	0.00	42,556	0.00	
1	84,283	4.00	84,283	4.00	
2	68,950	1.55	34,475	1.55	
32	1,457,124	17.08	45,535	2.44	
10	258,059	(8.87)	25,806	0.24	

Retirees and Beneficiaries Added and Removed continued on pages 122-123.

Retirees and Beneficiaries Added and Removed continued from pages 120-121.

MSEP

Fiscal Year Ended June 30	Classification	Benefit Type	Added to Rolls		Removed from Rolls	
			Number	Annual Allowances	Number	Annual Allowances
2012	General employees	Retirement	2,637	\$ 39,423,910	895	\$ 11,116,063
		Survivor of active	82	1,129,634	34	197,452
		Survivor of retired	282	3,665,503	158	1,416,283
		Disability	0	458	0	0
	Lincoln University - vested	Retirement	0	0	2	11,032
		Survivor of active	0	0	0	0
	Legislators	Retirement	13	229,979	8	139,545
		Survivor of active	0	3,531	0	0
		Survivor of retired	4	80,142	3	52,550
	Elected officials	Retirement	2	86,431	0	0
		Survivor of active	0	3,371	0	0
		Survivor of retired	0	1,336	0	0
	ALJs	Retirement	3	124,248	3	158,072
		Survivor of active	1	25,592	0	0
Survivor of retired		2	57,704	0	0	
2013	General employees	Retirement	2,632	40,416,533	983	12,869,826
		Survivor of active	97	1,080,366	64	400,983
		Survivor of retired	323	4,085,887	150	1,363,799
		Disability	0	696	1	3,854
	Lincoln University - vested	Retirement	2	5,980	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	37	442,937	15	320,292
		Survivor of active	0	3,851	0	0
		Survivor of retired	9	176,283	6	88,725
	Elected officials	Retirement	1	53,873	0	0
		Survivor of active	0	3,506	0	0
		Survivor of retired	0	1,458	0	0
	ALJs	Retirement	4	233,124	2	111,466
		Survivor of active	0	1,024	0	0
Survivor of retired		2	65,892	1	22,759	

Source of Data: MOSERS benefit payment database as of June 30, 2019.
Other Actuarial Section information reported based on MOSERS data as of May 31, 2019.

Rolls at End of Year

Number	Annual Allowances	Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances
33,107	\$ 508,817,001	5.89%	\$ 15,369	0.32%
1,465	14,458,505	6.89	9,869	3.38
2,634	28,177,714	8.67	10,698	3.56
8	29,705	1.57	3,713	1.56
13	52,372	(17.40)	4,029	(4.68)
1	2,624	0.00	2,624	0.00
298	5,675,605	1.62	19,046	(0.08)
11	120,298	3.02	10,936	3.02
65	935,549	3.04	14,393	1.45
15	639,655	15.62	42,644	0.21
1	87,654	4.00	87,654	4.00
2	70,286	1.94	35,143	1.94
32	1,423,300	(2.32)	44,478	(2.32)
1	25,592	0.00	25,592	0.00
12	315,763	22.36	26,314	1.97
34,756	536,363,708	5.41	15,432	0.41
1,498	15,137,889	4.70	10,105	2.39
2,807	30,899,802	9.66	11,008	2.90
7	26,546	(10.63)	3,792	2.13
15	58,351	11.42	3,890	(3.45)
1	2,623	(0.04)	2,623	(0.04)
320	5,798,251	2.16	18,120	(4.86)
11	124,149	3.20	11,286	3.20
68	1,023,107	9.36	15,046	4.54
16	693,528	8.42	43,346	1.65
1	91,160	4.00	91,160	4.00
2	71,744	2.07	35,872	2.07
34	1,544,957	8.55	45,440	2.16
1	26,615	4.00	26,615	4.00
13	358,896	13.66	27,607	4.91

Retirees and Beneficiaries Added and Removed continued on pages 124-125.

Retirees and Beneficiaries Added and Removed continued from pages 122-123.

MSEP

Fiscal Year Ended June 30	Classification	Benefit Type	Added to Rolls		Removed from Rolls	
			Number	Annual Allowances	Number	Annual Allowances
2014	General employees	Retirement	2,612	\$ 37,411,991	944	\$ 12,205,892
		Survivor of active	90	1,095,464	34	262,401
		Survivor of retired	324	3,954,360	157	1,504,423
		Disability	0	408	2	7,391
	Lincoln University - vested	Retirement	0	0	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	18	239,904	7	95,748
		Survivor of active	0	3,680	0	0
		Survivor of retired	5	39,520	5	44,445
	Elected officials	Retirement	0	0	1	19,605
		Survivor of active	0	2,788	0	0
		Survivor of retired	1	10,811	0	0
	ALJs	Retirement	1	50,072	2	78,138
		Survivor of active	1	27,358	0	0
Survivor of retired		0	7,404	1	30,930	
2015	General employees	Retirement	2,865	43,527,132	1,061	13,940,436
		Survivor of active	111	1,160,798	56	434,928
		Survivor of retired	350	4,399,848	180	1,673,736
		Disability	0	180	1	5,220
	Lincoln University - vested	Retirement	1	2,340	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	16	236,916	4	130,116
		Survivor of active	0	3,432	1	15,180
		Survivor of retired	3	61,956	9	79,944
	Elected officials	Retirement	0	0	0	0
		Survivor of active	1	15,802	0	0
		Survivor of retired	0	0	0	0
	ALJs	Retirement	3	128,952	0	0
		Survivor of active	0	1,452	0	0
Survivor of retired		0	6,612	0	0	

Source of Data: MOSERS benefit payment database as of June 30, 2019.
Other Actuarial Section information reported based on MOSERS data as of May 31, 2019.

Rolls at End of Year

Number	Annual Allowances	Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances
36,424	\$ 561,569,807	4.70%	\$ 15,418	(0.09)%
1,554	15,970,952	5.50	10,277	1.70
2,974	33,349,739	7.93	11,214	1.87
5	19,563	(26.31)	3,913	3.19
15	58,351	0.00	3,890	0.00
1	2,623	0.00	2,623	0.00
331	5,942,407	2.49	17,953	(0.92)
11	127,829	2.96	11,621	2.97
68	1,018,182	(0.48)	14,973	(0.49)
15	673,923	(2.83)	44,928	3.65
1	93,948	3.06	93,948	3.06
3	82,555	15.07	27,518	(23.29)
33	1,516,891	(1.82)	45,966	1.16
2	53,973	102.79	26,987	1.40
12	335,370	(6.56)	27,948	1.24
38,227	591,156,503	5.27	15,464	0.30
1,608	16,696,822	4.54	10,384	1.04
3,144	36,075,851	8.17	11,475	2.33
4	14,523	(25.76)	3,631	(7.21)
16	60,691	4.01	3,793	(2.49)
1	2,623	0.00	2,623	0.00
339	6,049,207	1.80	17,844	(0.61)
10	116,081	(9.19)	11,608	(0.11)
66	1,000,194	(1.77)	15,154	1.21
15	673,923	0.00	44,928	0.00
2	109,750	16.82	54,875	(41.59)
3	82,555	0.00	27,518	0.00
36	1,645,843	8.50	45,718	(0.54)
2	55,425	2.69	27,713	2.69
12	341,982	1.97	28,499	1.97

Retirees and Beneficiaries Added and Removed continued on pages 126-127.

Retirees and Beneficiaries Added and Removed continued from pages 124-125.

MSEP

Fiscal Year Ended June 30	Classification	Benefit Type	Added to Rolls		Removed from Rolls	
			Number	Annual Allowances	Number	Annual Allowances
2016	General employees	Retirement	2,815	\$ 40,917,948	1,147	\$ 15,381,612
		Survivor of active	101	1,023,096	56	377,484
		Survivor of retired	365	4,493,892	222	2,073,192
		Disability	0	108	0	0
	Lincoln University - vested	Retirement	1	3,444	1	3,936
		Survivor of active	0	0	0	0
	Legislators	Retirement	8	107,412	15	427,428
		Survivor of active	0	3,084	0	0
		Survivor of retired	7	173,760	3	50,448
	Elected officials	Retirement	0	0	0	0
		Survivor of active	0	0	0	0
		Survivor of retired	0	0	0	0
	ALJs	Retirement	5	230,472	2	150,888
		Survivor of active	0	1,176	0	0
Survivor of retired		2	84,588	2	62,220	
2017	General employees	Retirement	2,771	43,468,065	1,265	17,140,831
		Survivor of active	83	1,067,292	52	491,640
		Survivor of retired	381	4,701,360	220	2,029,572
		Disability	0	72	1	3,216
	Lincoln University - vested	Retirement	0	0	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	28	347,844	15	354,564
		Survivor of active	0	1,512	1	5,328
		Survivor of retired	7	103,872	3	73,068
	Elected officials	Retirement	3	135,531	1	53,873
		Survivor of active	0	0	0	0
		Survivor of retired	0	0	0	0
	ALJs	Retirement	8	445,728	0	0
		Survivor of active	1	31,080	0	0
Survivor of retired		1	48,108	0	0	

Source of Data: MOSERS benefit payment database as of June 30, 2019.
Other Actuarial Section information reported based on MOSERS data as of May 31, 2019.

Rolls at End of Year

Number	Annual Allowances	Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances
39,895	\$ 616,692,839	4.32%	\$ 15,458	(0.04)%
1,653	17,342,434	3.87	10,491	1.03
3,287	38,496,551	6.71	11,712	2.07
4	14,631	0.74	3,658	0.74
16	60,199	(0.81)	3,762	(0.82)
1	2,623	0.00	2,623	0.00
332	5,729,191	(5.29)	17,257	(3.29)
10	119,165	2.66	11,917	2.66
70	1,123,506	12.33	16,050	5.91
15	673,923	0.00	44,928	0.00
2	109,750	0.00	54,875	0.00
3	82,555	0.00	27,518	0.00
39	1,725,427	4.84	44,242	(3.23)
2	56,601	2.12	28,301	2.12
12	364,350	6.54	30,363	6.54
41,401	643,020,073	4.27	15,532	0.48
1,684	17,918,086	3.32	10,640	1.42
3,448	41,168,339	6.94	11,940	1.95
3	11,487	(21.49)	3,829	4.67
16	60,199	0.00	3,762	0.00
1	2,623	0.00	2,623	0.00
345	5,722,471	(0.12)	16,587	(3.88)
9	115,349	(3.20)	12,817	7.55
74	1,154,310	2.74	15,599	(2.81)
17	755,582	12.12	44,446	(1.07)
2	112,176	0.08	56,088	0.08
3	84,372	0.50	28,124	0.50
47	2,171,155	25.83	46,195	4.41
3	87,681	54.91	29,227	3.27
13	412,458	13.20	31,728	4.50

Retirees and Beneficiaries Added and Removed continued on pages 128-129.

Retirees and Beneficiaries Added and Removed continued from pages 126-127.

MSEP

Fiscal Year Ended June 30	Classification	Benefit Type	Added to Rolls		Removed from Rolls	
			Number	Annual Allowances	Number	Annual Allowances
2018	General employees	Retirement	2,863	\$ 50,678,574	1,285	\$ 17,257,968
		Survivor of active	85	1,002,108	57	538,308
		Survivor of retired	391	5,294,100	271	2,498,204
		Disability	0	36	2	9,288
	Lincoln University - vested	Retirement	0	0	1	2,340
		Survivor of active	0	0	0	0
	Legislators	Retirement	7	105,972	6	107,556
		Survivor of active	0	1,764	1	3,516
		Survivor of retired	4	68,712	4	45,684
	Elected officials	Retirement	1	17,958	0	0
		Survivor of active	0	0	0	0
		Survivor of retired	0	0	1	38,332
	ALJs	Retirement	4	293,460	1	51,984
		Survivor of active	0	1,704	0	0
Survivor of retired		0	4,692	0	0	
2019	General employees	Retirement	2,470	48,906,540	1,234	19,766,496
		Survivor of active	78	1,117,968	63	603,996
		Survivor of retired	428	6,364,032	254	2,753,988
		Disability	0	48	0	0
	Lincoln University - vested	Retirement	0	0	1	8,592
		Survivor of active	0	0	0	0
	Legislators	Retirement	37	519,660	12	293,568
		Survivor of active	0	1,332	0	0
		Survivor of retired	7	116,340	4	37,980
	Elected officials	Retirement	0	0	0	0
		Survivor of active	0	0	0	0
		Survivor of retired	0	0	0	0
	ALJs	Retirement	3	236,916	0	0
		Survivor of active	0	540	0	0
Survivor of retired		0	6,132	0	0	

Source of Data: MOSERS benefit payment database as of June 30, 2019.
Other Actuarial Section information reported based on MOSERS data as of May 31, 2019.

Rolls at End of Year

Number	Annual Allowances	Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances
42,979	\$ 676,440,679	5.42%	\$ 15,739	1.34%
1,712	18,381,886	2.67	10,737	0.92
3,568	43,964,235	7.26	12,322	3.26
1	2,235	(63.24)	2,235	(43.58)
15	57,859	(3.89)	3,857	2.53
1	2,623	0.00	2,623	0.00
346	5,720,887	(0.03)	16,534	(0.31)
8	113,597	(1.47)	14,200	11.61
74	1,177,338	2.05	15,910	1.94
18	773,540	2.66	42,974	(3.28)
2	112,176	0.00	56,088	0.00
2	46,040	(46.43)	23,020	(18.55)
50	2,412,631	14.00	48,253	4.65
3	89,385	3.01	29,795	2.01
13	417,150	1.29	32,088	1.19
44,215	705,580,723	4.31	15,958	0.01
1,727	18,895,858	2.80	10,941	0.02
3,742	47,574,279	8.21	12,714	0.03
1	2,283	2.15	2,283	0.02
14	49,267	(14.85)	3,519	(0.09)
1	2,623	0.00	2,623	0.00
371	5,946,979	3.95	16,030	(0.03)
8	114,929	1.17	14,366	0.01
77	1,255,698	6.66	16,308	0.03
18	773,540	0.00	42,974	0.00
2	114,808	2.35	57,404	0.02
2	47,030	2.15	23,515	0.02
53	2,649,547	9.82	49,991	0.04
3	89,925	0.60	29,975	0.01
13	423,282	1.47	32,560	0.01

Retirees and Beneficiaries Added and Removed

Last Ten Fiscal Years

Judicial Plan

Fiscal Year Ended June 30	Benefit Type	Added to Rolls		Removed from Rolls	
		Number	Annual Allowances	Number	Annual Allowances
2010	Retirement	12	\$ 1,137,305	13	\$ 750,021
	Survivor of active	0	32,700	2	32,399
	Survivor of retired	11	436,312	5	130,920
2011	Retirement	36	2,501,248	9	563,214
	Survivor of active	0	14,893	1	35,792
	Survivor of retired	4	167,535	9	206,465
2012	Retirement	18	1,490,554	14	1,074,572
	Survivor of active	0	22,717	0	0
	Survivor of retired	8	371,622	6	218,310
2013	Retirement	27	2,233,387	13	851,802
	Survivor of active	0	28,591	1	33,778
	Survivor of retired	8	355,101	10	288,980
2014	Retirement	18	1,671,667	8	443,807
	Survivor of active	2	66,272	0	0
	Survivor of retired	5	254,117	7	216,813
2015	Retirement	39	3,599,880	21	1,395,888
	Survivor of active	0	34,344	0	0
	Survivor of retired	18	705,444	5	198,348
2016	Retirement	16	1,671,084	14	1,078,356
	Survivor of active	0	15,072	1	43,032
	Survivor of retired	8	368,868	10	354,144
2017	Retirement	21	2,128,128	16	1,239,612
	Survivor of active	0	9,852	0	0
	Survivor of retired	12	497,508	2	87,936
2018	Retirement	23	2,642,868	15	1,074,540
	Survivor of active	0	18,660	1	27,540
	Survivor of retired	9	452,040	7	294,660
2019	Retirement	39	3,749,292	17	1,357,068
	Survivor of active	1	59,556	1	40,824
	Survivor of retired	11	583,896	14	514,704

Retirees and Beneficiaries Added and Removed continued from page 130.

Rolls at End of Year					
Number	Annual Allowances	Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances	
325	\$ 20,011,829	1.97%	\$ 61,575	2.29%	
35	1,056,726	0.03	30,192	5.74	
109	3,445,221	9.73	31,608	3.69	
352	21,949,863	9.68	62,358	1.27	
34	1,035,827	(1.98)	30,466	0.91	
104	3,406,291	(1.13)	32,753	3.62	
356	22,365,845	1.90	62,825	0.75	
34	1,058,544	2.19	31,134	2.19	
106	3,559,603	4.50	33,581	2.53	
370	23,747,431	6.18	64,182	2.16	
33	1,053,358	(0.49)	31,920	2.52	
104	3,625,723	1.86	34,863	3.82	
380	24,975,291	5.17	65,724	2.40	
35	1,119,630	6.29	31,989	0.22	
102	3,663,027	1.03	35,912	3.01	
398	25,951,423	9.28	65,205	1.59	
35	1,087,702	3.26	31,077	(2.64)	
115	4,132,819	13.99	35,938	3.08	
400	26,544,151	2.28	66,360	1.77	
34	1,059,742	(2.57)	31,169	0.30	
113	4,147,543	0.36	36,704	2.13	
405	27,432,667	3.35	67,735	2.07	
34	1,069,594	0.93	31,459	0.93	
123	4,557,115	9.88	37,050	0.94	
408	28,112,479	5.91	68,903	3.83	
33	1,050,862	(0.84)	31,844	2.17	
115	4,304,923	3.79	37,434	1.99	
422	28,936,375	2.93	68,570	(0.48)	
34	1,078,474	2.63	31,720	(0.39)	
110	4,216,735	(2.05)	38,334	2.40	

Short-Term Solvency Test

Last Ten Fiscal Years

MSEP

Actuarial Accrued Liabilities for

Fiscal Year	Member Contributions (1)	Current Retirees and Beneficiaries (2)	Active and Inactive Members, Employer Financed Portion (3)	Actuarial Value of Assets Available for Benefits	Percentage of Actuarial Liabilities Covered by Actuarial Value of Assets Available for		
					(1)	(2)	(3)
2010	\$ 0	\$ 5,012,677,769	\$ 4,840,477,676	\$ 7,923,377,393	100.0%	100.0%	60.1%
2011	599,761	5,357,794,617	4,765,149,665	8,022,481,408	100.0	100.0	55.9
2012	5,431,451	5,749,411,068	5,038,809,058	7,897,167,203	100.0	100.0	42.5
2013	14,507,994	6,062,654,441	5,057,475,049	8,096,436,929	100.0	100.0	39.9
2014	27,111,467	6,347,728,717	5,119,731,651	8,637,758,955	100.0	100.0	44.2
2015	42,731,658	6,695,631,737	4,989,255,015	8,792,485,658	100.0	100.0	41.2
2016	60,618,379	7,305,895,284	5,384,649,090	8,878,057,191	100.0	100.0	28.1
2017	78,979,370	7,559,623,100	5,513,671,425	8,872,381,848	100.0	100.0	22.4
2018	103,784,514	8,073,692,664	5,435,286,783	8,830,410,210	100.0	100.0	12.0
2019	128,255,311	8,430,014,973	5,399,356,055	8,782,383,977	100.0	100.0	4.2

Judicial Plan

Actuarial Accrued Liabilities for

Fiscal Year	Member Contributions (1)	Current Retirees and Beneficiaries (2)	Active and Inactive Members, Employer Financed Portion (3)	Actuarial Value of Assets Available for Benefits	Percentage of Actuarial Liabilities Covered by Actuarial Value of Assets Available for		
					(1)	(2)	(3)
2010	\$ 0	\$ 236,113,077	\$ 145,899,696	\$ 88,976,738	100.0%	37.7%	0.0%
2011	59,958	251,532,354	141,892,277	98,398,628	100.0	39.1	0.0
2012	209,817	258,642,149	154,450,572	102,266,706	100.0	39.5	0.0
2013	421,753	274,911,416	160,045,189	111,140,339	100.0	40.3	0.0
2014	716,564	285,124,436	176,469,255	124,269,105	100.0	43.3	0.0
2015	1,204,757	316,042,514	165,722,040	134,349,908	100.0	42.1	0.0
2016	1,855,955	354,715,048	191,050,614	143,468,860	100.0	39.9	0.0
2017	2,232,405	377,099,534	185,085,986	151,828,631	100.0	39.7	0.0
2018	3,124,482	401,725,610	188,938,500	162,135,045	100.0	39.6	0.0
2019	4,421,019	434,204,353	178,857,333	172,224,529	100.0	38.6	0.0

Analysis of Financial Experience

Year Ended June 30, 2019

Actual experience will never coincide exactly with assumed experience (except by coincidence). Gains and losses may offset each other over a period of years, but sizable year-to-year variations from assumed experience are common. Detail on the analysis of the financial experience is shown below.

MSEP		Valuation Date June 30	Actuarial Gain (Loss) as a % of Beginning Accrued Liabilities
Unfunded actuarial accrued liability (UAAL) at beginning of year	\$ 4,782,353,751	2010	4.0%
Normal cost from last valuation	147,497,311	2011	(2.4)
Actual employer and member contributions	(425,436,674)	2012	(4.7)
Administrative expenses	9,200,826	2013	(2.8)
Interest accrual	342,589,646	2014	2.1
Expected UAAL before changes	4,856,204,860	2015	(0.9)
Change from any changes in benefits, assumptions, or methods	74,340,841	2016	(3.2)
Expected UAAL after changes	4,930,545,701	2017	(1.6)
Less: Actual UAAL at end of year	(5,175,242,332)	2018	(0.9)
Gain (loss) during year from experience	<u>\$ (244,696,631)</u>	2019	(1.8)
Gain (loss) as a percent of actuarial accrued liabilities at start of year (\$13,879,745,294)	(1.8)%		

Judicial		Valuation Date June 30	Actuarial Gain (Loss) as a % of Beginning Accrued Liabilities
Unfunded actuarial accrued liability (UAAL) at beginning of year	\$ 431,653,547	2010	(1.1)%
Normal cost from last valuation	12,655,900	2011	(0.4)
Actual employer and member contributions	(39,742,769)	2012	(0.6)
Administrative expenses	72,141	2013	(2.6)
Interest accrual	30,799,536	2014	1.5
Expected UAAL before changes	435,438,355	2015	(1.5)
Change from any changes in benefits, assumptions, or methods	5,024,057	2016	0.1
Expected UAAL after changes	440,462,412	2017	(0.3)
Less: Actual UAAL at end of year	(445,258,176)	2018	(0.3)
Gain (loss) during year from experience	<u>\$ (4,795,764)</u>	2019	(0.8)
Gain (loss) as a percent of actuarial accrued liabilities at start of year (\$611,479,764)	(0.8)%		

Comparison of Plans for General State Employees

June 30, 2019

Benefit Provisions	MSEP (Closed Plan)	MSEP 2000
Membership <i>Eligible members hired in permanent positions which normally requires at least 1,040 hours of work per year</i>	<ul style="list-style-type: none"> Employed prior to July 1, 2000 and vested in the MSEP 	<ul style="list-style-type: none"> Employed for the first time on or after July 1, 2000, but prior to January 1, 2011 Left state employment prior to becoming vested and returned to employment on or after July 1, 2000
Member Contributions	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None
Vesting <i>Eligible for future pension</i>	<ul style="list-style-type: none"> 5 years 	<ul style="list-style-type: none"> 5 years
Service Purchases	<ul style="list-style-type: none"> May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate; may also purchase public sector service at full actuarial cost 	<ul style="list-style-type: none"> May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate; may also purchase public sector service at full actuarial cost
Service Transfers	<ul style="list-style-type: none"> May transfer state service to other positions covered by MOSERS under 104.800 	<ul style="list-style-type: none"> May transfer service under 104.1090 from other systems with written agreements to transfer required funds
Death Prior to Retirement	<ul style="list-style-type: none"> Nonduty-related death (<i>vested members</i>) Survivor benefit paid using joint & 100% survivor option to eligible spouse or 80% of life income annuity paid to eligible children. Duty-related death (<i>no min. service requirement</i>) Survivor benefit to eligible spouse or children no less than 50% of average compensation. <i>Payable the month following the member's death</i> 	<ul style="list-style-type: none"> Nonduty-related death (<i>vested members</i>) Survivor benefit paid using joint & 100% survivor option to eligible spouse or 80% of life income annuity paid to eligible children. Duty-related death (<i>no min. service requirement</i>) Survivor benefit to eligible spouse or children no less than 50% of average compensation. <i>Payable the month following the member's death</i>
Early Retirement <i>Eligible for reduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> Age 55 + 10 years of service <i>Base benefit reduced 1/2 of 1% (.005) for each month age is younger than normal retirement</i> 	<ul style="list-style-type: none"> Age 57 + 5 years of service <i>Base benefit reduced 1/2 of 1% (.005) for each month age is younger than normal retirement</i>
Normal Retirement <i>Eligible for unreduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> Age 65 + 5 years of service Age 60 + 15 years of service Rule of 80 – (at least age 48) Age + years of service = 80 or more <i>Age 50 if first became eligible prior to Aug. 28, 2003</i> 	<ul style="list-style-type: none"> Age 62 + 5 years of service Rule of 80 – (at least age 48) Age + years of service = 80 or more <i>Age 50 if first became eligible prior to Aug. 28, 2003</i> <i>Inactive-vested members ineligible for Rule of 80</i>
Base Benefit <i>Payable for life</i>	<ul style="list-style-type: none"> .016 x FAP x Service <i>Future formula increases, if any, may be passed along to retirees</i> 	<ul style="list-style-type: none"> .017 x FAP x Service <i>Future formula increases, if any, will not be passed along to retirees</i>
Temporary Benefit <i>Stops at age 62</i>	<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> .008 x FAP x Service <i>Available to members retiring under Rule of 80</i>
BackDROP <i>Lump-sum payment at retirement in addition to reduced monthly pension</i>	<ul style="list-style-type: none"> Must work at least 2 years beyond normal retirement eligibility to be eligible; elect BackDROP at retirement (if applicable) 	<ul style="list-style-type: none"> Must work at least 2 year beyond normal retirement eligibility to be eligible; elect BackDROP at retirement (if applicable)
Benefit Payment Options <i>Determines whether or not a benefit will be paid to anyone after member's death</i>	<ul style="list-style-type: none"> Life Income Annuity Unreduced Joint & 50% Survivor Joint & 100% Survivor Life Income with 60 Guaranteed Payments Life Income with 120 Guaranteed Payments 	<ul style="list-style-type: none"> Life Income Annuity Joint & 50% Survivor Joint & 100% Survivor Life Income with 120 Guaranteed Payments Life Income with 180 Guaranteed Payments
Cost-of-Living Adjustment (COLA) <i>Helps offset effects of inflation increasing the cost of goods and services</i>	<ul style="list-style-type: none"> Employed before Aug. 28, 1997 Receive 4-5% each year until reaching 65% COLA cap. After reaching cap, the rate is based on 80% of the percentage increase in the average CPI (0-5%) Employed on/after Aug. 28, 1997 Based on 80% of the percentage increase in the average CPI (0-5%) 	<ul style="list-style-type: none"> Based on 80% of the percentage increase in the average CPI (0-5%)
In-Service COLA <i>Service beyond age 65</i>	<ul style="list-style-type: none"> Applicable COLA rate (if eligible) 	<ul style="list-style-type: none"> Not available

Comparison of Plans for General State Employees continued.

Benefit Provisions	MSEP 2011
Membership <i>Eligible members hired in permanent positions which normally requires at least 1,040 hours of work per year</i>	<ul style="list-style-type: none"> • Employed for the first time on or after January 1, 2011, or • Returned to employment after electing the buyout option in fiscal year 2018
Member Contributions	<ul style="list-style-type: none"> • 4% of pay
Vesting <i>Eligible for future pension</i>	<ul style="list-style-type: none"> • 5 years
Service Purchases	<ul style="list-style-type: none"> • May purchase qualifying public sector service at full actuarial cost
Service Transfers	<ul style="list-style-type: none"> • Not available
Death Prior to Retirement	<ul style="list-style-type: none"> • Nonduty-related death (<i>vested members</i>) Survivor benefit paid using joint & 100% survivor option to eligible spouse or 80% of life income annuity paid to eligible children. <i>Payable the month following the member's death; for inactive-vested, payable when member would have reached normal retirement eligibility</i> • Duty-related death (<i>no min. service requirement</i>) Survivor benefit to eligible spouse or children no less than 50% of average compensation. <i>Payable the month following the member's death</i>
Early Retirement <i>Eligible to receive reduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> • Age 62 + 5 years of service at time of termination <i>Base benefit reduced 1/2 of 1% (.005) for each month age is younger than normal retirement</i> <i>Inactive-vested members ineligible</i>
Normal Retirement <i>Eligible to receive unreduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> • Age 67 + 5 years of service • Rule of 90 – (at least age 55) Age + years of service = 90 or more at time of termination <i>Inactive-vested members ineligible for Rule of 90</i>
Base Benefit <i>Payable for life</i>	<ul style="list-style-type: none"> • .017 x FAP x Service <i>Future formula increases, if any, will not be passed along to retirees</i>
Temporary Benefit <i>Stops at age 62</i>	<ul style="list-style-type: none"> • .008 x FAP x Service <i>Available to members retiring under Rule of 90</i>
BackDROP <i>Lump-sum payment at retirement in addition to reduced monthly pension</i>	<ul style="list-style-type: none"> • Not available
Benefit Payment Options <i>Determines whether or not a benefit will be paid to anyone after member's death</i>	<ul style="list-style-type: none"> • Life Income Annuity • Joint & 50% Survivor • Joint & 100% Survivor • Life Income with 120 Guaranteed Payments • Life Income with 180 Guaranteed Payments
Cost-of-Living Adjustment (COLA) <i>Helps offset effects of inflation increasing the cost of goods and services</i>	<ul style="list-style-type: none"> • Based on 80% of the percentage increase in the average CPI (0-5%)
In-Service COLA <i>Service beyond age 65</i>	<ul style="list-style-type: none"> • Not available

Comparison of Plans for Legislators

June 30, 2019

Benefit Provisions	MSEP (Closed Plan)	MSEP 2000
Membership <i>Elected Members of the General Assembly</i>	<ul style="list-style-type: none"> Employed prior to July 1, 2000 and vested in the MSEP 	<ul style="list-style-type: none"> Employed for the first time on or after July 1, 2000, but prior to January 1, 2011 Left state employment prior to becoming vested and returned to employment on or after July 1, 2000
Member Contributions	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None
Vesting <i>Eligible for future pension</i>	<ul style="list-style-type: none"> 3 biennial assemblies (6 years) 	<ul style="list-style-type: none"> 3 biennial assemblies (6 years)
Service Purchases	<ul style="list-style-type: none"> May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate; may also purchase public sector service at full actuarial cost 	<ul style="list-style-type: none"> May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate; may also purchase public sector service at full actuarial cost
Service Transfers	<ul style="list-style-type: none"> May transfer state service to other positions covered by MOSERS under 104.800 	<ul style="list-style-type: none"> May transfer service under 104.1090 from other systems with written agreements to transfer required funds
Death Prior to Retirement	<ul style="list-style-type: none"> Nonduty-related death (<i>vested members</i>) Survivor benefit paid using joint & 100% survivor option to eligible spouse or 80% of life income annuity paid to eligible children. Duty-related death (<i>no min. service requirement</i>) Survivor benefit to eligible spouse or children no less than 50% of rate of compensation. <i>Payable the month following the member's death</i> 	<ul style="list-style-type: none"> Nonduty-related death (<i>vested members</i>) Survivor benefit paid using joint & 100% survivor option to eligible spouse or 80% of life income annuity paid to eligible children. Duty-related death (<i>no min. service requirement</i>) Survivor benefit to eligible spouse or children no less than 50% of rate of compensation. <i>Payable the month following the member's death</i>
Early Retirement <i>Eligible for reduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Not available
Normal Retirement <i>Eligible for unreduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> Age 55 + 3 full-biennial assemblies or Rule of 80 – (at least age 48) Age + years of service = 80 or more 	<ul style="list-style-type: none"> Age 55 + 3 biennial assemblies or Rule of 80 – (at least age 50) Age + years of service = 80 or more <i>Inactive-vested members ineligible for Rule of 80</i>
Base Benefit <i>Payable for life</i>	<ul style="list-style-type: none"> Biennial Assemblies x \$150 <i>Future formula increases, if any, may be passed along to retirees</i> 	<ul style="list-style-type: none"> (Active Pay ÷ 24) x Service <i>Capped at 100% of pay; future formula increases, if any, will not be passed along to retirees.</i>
Temporary Benefit <i>Stops at age 62</i>	<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Not available
BackDROP <i>Lump-sum payment at retirement in addition to reduced monthly pension</i>	<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Not available
Benefit Payment Options <i>Determines whether or not a benefit will be paid to anyone after member's death</i>	<ul style="list-style-type: none"> Life Income Annuity Unreduced Joint & 50% Survivor Joint & 100% Survivor Life Income with 60 Guaranteed Payments Life Income with 120 Guaranteed Payments 	<ul style="list-style-type: none"> Life Income Annuity Joint & 50% Survivor Joint & 100% Survivor Life Income with 120 Guaranteed Payments Life Income with 180 Guaranteed Payments
Cost-of-Living Adjustment (COLA) <i>Helps offset effects of inflation increasing the cost of goods and services</i>	<ul style="list-style-type: none"> Sworn in before Aug. 28, 1997 Receive 4-5% each year until reaching 65% COLA cap. After reaching cap, the rate is based on 80% of the percentage increase in the average CPI (0-5%) Sworn in on/after Aug. 28, 1997 Based on 80% of the percentage increase in the average CPI (0-5%) 	<ul style="list-style-type: none"> Benefit adjustment based on increase in pay for an active member
In-Service COLA <i>Service beyond age 65</i>	<ul style="list-style-type: none"> Applicable COLA rate (if eligible) 	<ul style="list-style-type: none"> Not available

Comparison of Plans for Legislators continued.

Benefit Provisions	MSEP 2011
Membership <i>Elected Members of the General Assembly</i>	<ul style="list-style-type: none"> • Employed for the first time on or after January 1, 2011, or • Returned to employment after electing the buyout option in fiscal year 2018
Member Contributions	<ul style="list-style-type: none"> • 4% of pay
Vesting <i>Eligible for future pension</i>	<ul style="list-style-type: none"> • 3 biennial assemblies (6 years)
Service Purchases	<ul style="list-style-type: none"> • May purchase qualifying public sector service at full actuarial cost
Service Transfers	<ul style="list-style-type: none"> • Not available
Death Prior to Retirement	<ul style="list-style-type: none"> • Nonduty-related death (<i>vested members</i>) Survivor benefit paid using joint & 100% survivor option to eligible spouse or 80% of life income annuity paid to eligible children. <i>Payable the month following the member's death; for inactive-vested, payable when member would have reached normal retirement eligibility</i> • Duty-related death (<i>no min. service requirement</i>) Survivor benefit to eligible spouse or children no less than 50% of rate of compensation. <i>Payable the month following the member's death</i>
Early Retirement <i>Eligible to receive reduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> • Not available
Normal Retirement <i>Eligible to receive unreduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> • Age 62 + 3 full-biennial assemblies or • Rule of 90 – (at least age 55) Age + years of service = 90 or more at time of termination <i>Inactive-vested members ineligible for Rule of 90</i>
Base Benefit <i>Payable for life</i>	<ul style="list-style-type: none"> • $(\text{Active Pay} \div 24) \times \text{Service}$ <i>Capped at 100% of pay; future formula increases, if any, will not be passed along to retirees</i>
Temporary Benefit <i>Stops at age 62</i>	<ul style="list-style-type: none"> • Not available
BackDROP <i>Lump-sum payment at retirement in addition to reduced monthly pension</i>	<ul style="list-style-type: none"> • Not available
Benefit Payment Options <i>Determines whether or not a benefit will be paid to anyone after member's death</i>	<ul style="list-style-type: none"> • Life Income Annuity • Joint & 50% Survivor • Joint & 100% Survivor • Life Income with 120 Guaranteed Payments • Life Income with 180 Guaranteed Payments
Cost-of-Living Adjustment (COLA) <i>Helps offset effects of inflation increasing the cost of goods and services</i>	<ul style="list-style-type: none"> • Benefit adjustment based on increase in pay for an active member
In-Service COLA Service beyond age 65	<ul style="list-style-type: none"> • Not available

Comparison of Plans for Statewide Elected Officials

June 30, 2019

Benefit Provisions	MSEP (Closed Plan)	MSEP 2000
Membership <i>Members elected to state office</i>	<ul style="list-style-type: none"> Employed prior to July 1, 2000 and vested in the MSEP 	<ul style="list-style-type: none"> Employed for the first time on or after July 1, 2000, but prior to January 1, 2011 Left state employment prior to becoming vested and returned to employment on or after July 1, 2000
Member Contributions	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None
Vesting <i>Eligible for future pension</i>	<ul style="list-style-type: none"> 4 years (1 term) 	<ul style="list-style-type: none"> 4 years (1 term)
Service Purchases	<ul style="list-style-type: none"> May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate; may also purchase public sector service at full actuarial cost 	<ul style="list-style-type: none"> May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate; may also purchase public sector service at full actuarial cost
Service Transfers	<ul style="list-style-type: none"> May transfer state service to other positions covered by MOSERS under 104.800 	<ul style="list-style-type: none"> May transfer service under 104.1090 from other systems with written agreements to transfer required funds
Death Prior to Retirement	<ul style="list-style-type: none"> Nonduty-related death (<i>vested members</i>) Survivor benefit paid using joint & 100% survivor option to eligible spouse or 80% of life income annuity paid to eligible children. Duty-related death (<i>no min. service requirement</i>) Survivor benefit to eligible spouse or children no less than 50% of rate of compensation. <i>Payable the month following the member's death</i> 	<ul style="list-style-type: none"> Nonduty-related death (<i>vested members</i>) Survivor benefit paid using joint & 100% survivor option to eligible spouse or 80% of life income annuity paid to eligible children. Duty-related death (<i>no min. service requirement</i>) Survivor benefit to eligible spouse or children no less than 50% of rate of compensation. <i>Payable the month following the member's death</i>
Early Retirement <i>Eligible for reduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> Age 55 + 10 years of service <i>Base benefit reduced 1/2 of 1% (.005) for each month age is younger than normal retirement</i> 	<ul style="list-style-type: none"> Not available
Normal Retirement <i>Eligible for unreduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> Age 65 with at least one 4-year term or Age 60 + 15 years of service or Rule of 80 – (at least age 50) Age + years of service = 80 or more 	<ul style="list-style-type: none"> Age 55 + 4 years of service or Rule of 80 – (at least age 50) Age + years of service = 80 or more <i>Inactive-vested members ineligible for Rule of 80</i>
Base Benefit <i>Payable for life</i>	<ul style="list-style-type: none"> Less than 12 years of service FAO x .016 x Service 12+ years of service Monthly Statutory Comp. x .50 <i>Future formula increases, if any, may be passed along to retirees</i> 	<ul style="list-style-type: none"> (Active Pay ÷ 24) x Service <i>Capped at 12 years of service or 50% of pay; future formula increases, if any, will not be passed along to retirees.</i>
Temporary Benefit <i>Stops at age 62</i>	<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Not available <i>Available to members retiring under Rule of 80</i>
BackDROP <i>Lump-sum payment at retirement in addition to reduced monthly pension</i>	<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Not available
Benefit Payment Options <i>Determines whether or not a benefit will be paid to anyone after member's death</i>	<ul style="list-style-type: none"> Life Income Annuity Unreduced Joint & 50% Survivor Joint & 100% Survivor Life Income with 60 Guaranteed Payments Life Income with 120 Guaranteed Payments 	<ul style="list-style-type: none"> Life Income Annuity Joint & 50% Survivor Joint & 100% Survivor Life Income with 120 Guaranteed Payments Life Income with 180 Guaranteed Payments
Cost-of-Living Adjustment (COLA) <i>Helps offset effects of inflation increasing the cost of goods and services</i>	<ul style="list-style-type: none"> Sworn in before Aug. 28, 1997 Receive 4-5% each year until reaching 65% COLA cap. After reaching cap, the rate is based on 80% of the percentage increase in the average CPI (0-5%) Sworn in on/after Aug. 28, 1997 Based on 80% of the percentage increase in the average CPI (0-5%) 12+ years of service In addition to applicable COLA above, benefit will be recalculated for increases in statutory compensation for highest position held. 	<ul style="list-style-type: none"> Benefit adjustment based on increase in pay for an active member
In-Service COLA <i>Service beyond age 65</i>	<ul style="list-style-type: none"> Applicable COLA rate (if eligible) 	<ul style="list-style-type: none"> Not available

Comparison of Plans for Statewide Elected Officials continued.

Benefit Provisions	MSEP 2011
Membership <i>Members elected to state office</i>	<ul style="list-style-type: none"> Employed for the first time on or after January 1, 2011, or Returned to employment after electing the buyout option in fiscal year 2018
Member Contributions	<ul style="list-style-type: none"> 4% of pay
Vesting <i>Eligible for future pension</i>	<ul style="list-style-type: none"> 4 years (1 term)
Service Purchases	<ul style="list-style-type: none"> May purchase qualifying public sector service at full actuarial cost
Service Transfers	<ul style="list-style-type: none"> Not available
Death Prior to Retirement	<ul style="list-style-type: none"> Nonduty-related death (<i>vested members</i>) Survivor benefit paid using joint & 100% survivor option to eligible spouse or 80% of life income annuity paid to eligible children. <i>Payable the month following the member's death; for inactive-vested, payable when member would have reached normal retirement eligibility</i> Duty-related death (<i>no min. service requirement</i>) Survivor benefit to eligible spouse or children no less than 50% of current pay. <i>Payable the month following the member's death</i>
Early Retirement <i>Eligible to receive reduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> Not available
Normal Retirement <i>Eligible to receive unreduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> Age 62 + 4 years of service or Rule of 90 – (at least age 55) Age + years of service = 90 or more at time of termination <i>Inactive-vested members ineligible for Rule of 90</i>
Base Benefit <i>Payable for life</i>	<ul style="list-style-type: none"> (Active Pay ÷ 24) x Service <i>Capped at 50% of pay; future formula increases, if any, will not be passed along to retirees</i>
Temporary Benefit <i>Stops at age 62</i>	<ul style="list-style-type: none"> Not available
BackDROP <i>Lump-sum payment at retirement in addition to reduced monthly pension</i>	<ul style="list-style-type: none"> Not available
Benefit Payment Options <i>Determines whether or not a benefit will be paid to anyone after member's death</i>	<ul style="list-style-type: none"> Life Income Annuity Joint & 50% Survivor Joint & 100% Survivor Life Income with 120 Guaranteed Payments Life Income with 180 Guaranteed Payments
Cost-of-Living Adjustment (COLA) <i>Helps offset effects of inflation increasing the cost of goods and services</i>	<ul style="list-style-type: none"> Benefit adjustment based on increase in pay for an active member
In-Service COLA <i>Service beyond age 65</i>	<ul style="list-style-type: none"> Not available

Comparison of Plans for Judges

June 30, 2019

Benefit Provisions	Judicial Plan (Closed Plan)	Judicial Plan 2011
Membership	<ul style="list-style-type: none"> Must be a judge or commissioner of the supreme court or the court of appeals, a judge of any circuit court, probate court, magistrate court, court of common pleas, court of criminal corrections, a justice of the peace, or a commissioner or deputy commissioner of the circuit court appointed after February 29, 1972; a commissioner of the juvenile division of the circuit court appointed pursuant to Section 211.023, RSMo; a commissioner of the drug court; or a commissioner of any family court. 	<ul style="list-style-type: none"> Must be a judge or commissioner of the supreme court or court of appeals, judge of any circuit, probate, or magistrate court, court of common pleas, court of criminal corrections, justice of the peace, or commissioner or deputy commissioner of the circuit court; commissioner of the juvenile division of the circuit court appointed pursuant to Section 211.023, RSMo; a commissioner of the drug court; or commissioner of any family court appointed or elected as a judge and employed in a benefit-eligible position as a judge for the first time on or after January 1, 2011
Member Contributions	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> 4% of pay
Vesting <i>Eligible for future pension</i>	<ul style="list-style-type: none"> Automatic the day you become a member 	<ul style="list-style-type: none"> Automatic the day you become a member
Service Purchases	<ul style="list-style-type: none"> May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate; may also purchase public sector service at full actuarial cost 	<ul style="list-style-type: none"> May purchase qualifying public sector service at full actuarial cost
Service Transfers	<ul style="list-style-type: none"> May transfer state service to other positions covered by MOSERS under 104.800 	<ul style="list-style-type: none"> May transfer state service to other positions covered by MOSERS under 104.800
Death Prior to Retirement	<ul style="list-style-type: none"> Nonduty-related death Survivor benefit paid to eligible spouse equal to 50% of benefit the member would have received based on service to age 70. <i>Payable the month following the member's death</i> 	<ul style="list-style-type: none"> Nonduty-related death Survivor benefit paid to eligible spouse equal to 50% of benefit the member would have received based on service to age 70. <i>Payable the month following the member's death</i>
Early Retirement <i>Eligible for reduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> Less than 15 years of service <i>Age 60</i> Less than 12 years of service <i>Age 62</i> 	<ul style="list-style-type: none"> Less than 1 year of service <i>Age 67</i> Less than 20 years of service <i>Age 62</i>
Normal Retirement <i>Eligible for unreduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> Age 62 + 12 years of service Age 60 + 15 years of service Age 55 + 20 years of service 	<ul style="list-style-type: none"> Age 67 + 12 years of service Age 62 + 20 years of service
Base Benefit <i>Payable for life</i>	<ul style="list-style-type: none"> $\text{Monthly pay} \times .50 = \text{Monthly Base Benefit}$ 	<ul style="list-style-type: none"> $\text{Monthly pay} \times .50 = \text{Monthly Base Benefit}$
Temporary Benefit <i>Stops at age 62</i>	<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Not available
BackDROP <i>Lump-sum payment at retirement in addition to reduced monthly pension</i>	<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Not available
Benefit Payment Options <i>Determines whether or not a benefit will be paid to anyone after member's death</i>	<ul style="list-style-type: none"> Life Income Annuity (if unmarried) Automatic Unreduced Joint & 50% Survivor 	<ul style="list-style-type: none"> Life Income Annuity Joint & 50% Survivor Joint & 100% Survivor Life Income with 120 Guaranteed Payments Life Income with 180 Guaranteed Payments
Cost-of-Living Adjustment (COLA) <i>Helps offset effects of inflation increasing the cost of goods and services</i>	<ul style="list-style-type: none"> Sworn in before Aug. 28, 1997 Receive 4-5% each year until reaching 65% COLA cap. After reaching cap, the rate is based on 80% of the percentage increase in the average CPI (0-5%) Sworn in on/after Aug. 28, 1997 Based on 80% of the percentage increase in the average CPI (0-5%) 	<ul style="list-style-type: none"> Based on 80% of the percentage increase in the CPI (0-5%)
In-Service COLA Service beyond age 60	<ul style="list-style-type: none"> Judges who work beyond normal retirement have increased benefits upon retirement. 	<ul style="list-style-type: none"> Not available

Comparison of Plans for Uniformed Members of the Water Patrol*

June 30, 2019

Benefit Provisions	MSEP (Closed Plan)	MSEP 2000
Membership <i>Eligible members hired in permanent positions which normally requires at least 1,040 hours of work per year</i>	<ul style="list-style-type: none"> Employed prior to July 1, 2000 and vested in the MSEP 	<ul style="list-style-type: none"> Employed for the first time on or after July 1, 2000, but prior to January 1, 2011 Left state employment prior to becoming vested and returned to employment on or after July 1, 2000
Member Contributions	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None
Vesting <i>Eligible for future pension</i>	<ul style="list-style-type: none"> 5 years 	<ul style="list-style-type: none"> 5 years
Service Purchases	<ul style="list-style-type: none"> May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate; may also purchase public sector service at full actuarial cost 	<ul style="list-style-type: none"> May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate; may also purchase public sector service at full actuarial cost
Service Transfers	<ul style="list-style-type: none"> May transfer state service to other positions covered by MOSERS under 104.800 	<ul style="list-style-type: none"> May transfer state service to other positions covered by MOSERS under 104.1090
Death Prior to Retirement	<ul style="list-style-type: none"> Nonduty-related death (<i>vested members</i>) Survivor benefit paid using joint & 100% survivor option to eligible spouse or 80% of life income annuity paid to eligible children. Duty-related death (<i>no min. service requirement</i>) Survivor benefit to eligible spouse or children no less than 50% of average compensation. <i>Payable the month following the member's death</i> 	<ul style="list-style-type: none"> Nonduty-related death (<i>vested members</i>) Survivor benefit paid using joint & 100% survivor option to eligible spouse or 80% of life income annuity paid to eligible children. Duty-related death (<i>no min. service requirement</i>) Survivor benefit to eligible spouse or children no less than 50% of average compensation. <i>Payable the month following the member's death</i>
Early Retirement <i>Eligible for reduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Age 57 + 10 years of service
Normal Retirement <i>Eligible for unreduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> Age 55 + 5 years of service Rule of 80 – (at least age 48) Age + years of service = 80 or more <i>Age 50 if first became eligible prior to Aug. 28, 2003</i> 	<ul style="list-style-type: none"> Age 62 + 5 years of service Rule of 80 – (at least age 48) Age + years of service = 80 or more <i>Age 50 if first became eligible prior to Aug. 28, 2003</i> <i>Inactive-vested members ineligible for Rule of 80</i>
Base Benefit <i>Payable for life</i>	<ul style="list-style-type: none"> .016 x FAP x Service increased by 33% <i>Future formula increases, if any, may be passed along to retirees</i> 	<ul style="list-style-type: none"> .017 x FAP x Service <i>Future formula increases, if any, will not be passed along to retirees</i>
Temporary Benefit <i>Stops at age 62</i>	<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> .008 x FAP x Service <i>Available to members retiring under Rule of 80</i>
BackDROP <i>Lump-sum payment at retirement in addition to reduced monthly pension</i>	<ul style="list-style-type: none"> Must work at least 2 years beyond normal retirement eligibility to be eligible; elect BackDROP at retirement (if applicable) 	<ul style="list-style-type: none"> Must work at least 2 year beyond normal retirement eligibility to be eligible; elect BackDROP at retirement (if applicable)
Benefit Payment Options <i>Determines whether or not a benefit will be paid to anyone after member's death</i>	<ul style="list-style-type: none"> Life Income Annuity Unreduced Joint & 50% Survivor Joint & 100% Survivor Life Income with 60 Guaranteed Payments Life Income with 120 Guaranteed Payments 	<ul style="list-style-type: none"> Life Income Annuity Joint & 50% Survivor Joint & 100% Survivor Life Income with 120 Guaranteed Payments Life Income with 180 Guaranteed Payments
Cost-of-Living Adjustment (COLA) <i>Helps offset effects of inflation increasing the cost of goods and services</i>	<ul style="list-style-type: none"> Employed before Aug. 28, 1997 Receive 4-5% each year until reaching 65% COLA cap. After reaching cap, the rate is based on 80% of the percentage increase in the average CPI (0-5%) Employed on/after Aug. 28, 1997 Based on 80% of the percentage increase in the average CPI (0-5%) 	<ul style="list-style-type: none"> Based on 80% of the percentage increase in the average CPI (0-5%)
In-Service COLA <i>Service beyond age 65</i>	<ul style="list-style-type: none"> COLA given for service beyond age 65 <i>COLA provisions determined by employment date</i> 	<ul style="list-style-type: none"> Not available

* Eligibility for membership in the MSEP and MSEP 2000 is closed for uniformed members of the water patrol. Employees hired on or after January 1, 2011, are members of the Missouri Department of Transportation and Patrol Employees' Retirement System (MPERS).

Life Insurance Plans

June 30, 2019

MOSERS administers basic and optional term life insurance plans for eligible state employees and retirees.

Active Members*

Plan Provision	Requirement
<ul style="list-style-type: none"> • Basic life insurance An amount equal to one times annual salary (with a minimum of \$15,000) while actively employed. 	<ul style="list-style-type: none"> • Actively employed in an eligible state position resulting in membership in MOSERS.
<ul style="list-style-type: none"> • Duty-related death benefit Duty-related death benefit equivalent to two times the annual salary the member was earning at the time of death in addition to the basic life insurance amount of one times annual salary. 	<ul style="list-style-type: none"> • Actively employed in an eligible state position resulting in membership in MOSERS.
<ul style="list-style-type: none"> • Optional life insurance Additional life insurance may be purchased in a flat amount in multiples of \$10,000 not to exceed the maximum (lesser of six times annual salary or \$800,000). Spouse coverage may be purchased in multiples of \$10,000 up to a maximum of \$100,000; however, the amount of spouse coverage cannot exceed the amount of optional life insurance coverage the member has purchased. Coverage for children is available in a flat amount of \$10,000 per child. 	<ul style="list-style-type: none"> • Actively employed in an eligible state position resulting in membership in MOSERS.

* *Terminating employees may convert coverage up to the amount they had as an active employee at individual rates. Not available to employees of the Department of Conservation or colleges and universities except Lincoln University and State Technical College of Missouri.*

Retired Members

Plan Provision	Requirement
<ul style="list-style-type: none"> • Basic life insurance at retirement \$5,000 basic life insurance during retirement. 	<ul style="list-style-type: none"> • Must retire directly from active employment.
<ul style="list-style-type: none"> • Optional life insurance at retirement (MSEP) An employee may retain up to the lesser of \$60,000 or the amount of optional life insurance coverage held at the time of retirement at the group rate and may convert any remaining basic and optional life insurance at individual rates. Coverage for spouse ends at member's retirement and may be converted at individual rates. 	<ul style="list-style-type: none"> • Must retire directly from active employment.
<ul style="list-style-type: none"> • Optional life insurance at retirement (MSEP 2000) Under "Rule of 80", an employee may retain the current amount of coverage prior to retirement until age 62 at which time coverage is reduced to \$60,000, and may convert any remaining basic and optional life insurance at individual rates. Coverage for spouse ends at member's retirement and may be converted at individual rates. 	<ul style="list-style-type: none"> • Must retire directly from active employment.
<ul style="list-style-type: none"> • Optional life insurance at retirement (MSEP 2011) Under "Rule of 90", an employee may retain the current amount of coverage prior to retirement until age 62 at which time coverage is reduced to \$60,000, and may convert any remaining basic and optional life insurance at individual rates. Coverage for spouse ends at member's retirement and may be converted at individual rates. 	<ul style="list-style-type: none"> • Must retire directly from active employment.

Note: Insured employees may port their life insurance and their dependent life insurance when their coverage has been reduced or terminated if they meet certain qualifications.

Long-Term Disability (LTD) Insurance Plans

June 30, 2019

MOSERS administers the LTD Plan for eligible state employees who become disabled during active employment.

Active Members

Classification	Requirement
<ul style="list-style-type: none"> • General state employees, legislators, and elected state officials Members of MOSERS in a position normally requiring 1,040 hours of work a year are covered under the LTD plan, unless they work for a state agency which has its own LTD plan. 	<ul style="list-style-type: none"> • Eligible participants receive 60% of their compensation minus primary social security, workers' compensation, and employer provided income. Benefits commence after 90 days of disability or when sick leave benefits are no longer payable, whichever occurs last. LTD benefits cease upon the earliest of (i) when disability ends, (ii) when the member is first eligible for normal retirement benefits or is receiving early retirement benefits, (iii) upon a member's death, (iv) the date benefits become payable under any other group long-term disability insurance plan, or (v) the date the member fails to provide proof of continued disability and entitlement to LTD benefits.
<ul style="list-style-type: none"> • Water patrol 	<ul style="list-style-type: none"> • Uniformed members who are eligible for statutory occupational disability receive benefits equal to 50% of compensation with no offset for social security at the time of disability. For nonoccupational disabilities, eligible participants receive the same benefit as general employees.
<ul style="list-style-type: none"> • Judges 	<ul style="list-style-type: none"> • In addition to the disability benefits provided to general employees, judges may receive benefits under the state constitution. Participants may receive 50% of salary until the current term expires.

Changes in Plan Provisions

The 2019 legislative session came to an end on May 17, 2019. The bills passed by the Missouri General Assembly and signed by Governor Parson that affect MOSERS include:

House Bill 5 authorizes the appropriation of \$432 million to MOSERS for fiscal year 2020. This appropriation fully funds the employer contribution rate certified by the Board for the majority of our active member payroll. This dollar amount was generated from the employer contribution rates calculated in the annual actuarial valuations, performed by MOSERS' retained actuarial professionals, and certified by the Board of Trustees at its September 2018 meeting.

Senate Bill 185 provides provisions that support the ongoing participation in MOSERS for the Missouri Housing Development Commission and the Environmental Improvement and Energy Resources Authority.

Actuarial Present Values

June 30, 2019

MSEP

Actuarial Present Value June 30, 2019	Actuarial Present Value	Portion Covered by Future Normal Cost Contributions	Actuarial Accrued Liabilities
Active members			
Service retirement benefits based on services rendered before and likely to be rendered after valuation date	\$ 5,315,453,978	\$ 739,698,607	\$ 4,575,755,371
Disability benefits likely to be paid to present active members who become totally and permanently disabled	159,803,629	102,082,080	57,721,549
Survivor benefits likely to be paid to widows and children of present active members who die before retiring	63,470,496	17,501,758	45,968,738
Separation benefits likely to be paid to present active members	227,021,237	158,016,990	69,004,247
Active member totals	\$ 5,765,749,340	\$ 1,017,299,435	4,748,449,905
Members on leave of absence & LTD			
Service retirement benefits based on service rendered before the valuation date			94,581,573
Inactive-vested members			
Service retirement benefits based on service rendered before the valuation date			660,192,743
Retired lives			8,430,014,943
Pending refunds			24,387,145
Total actuarial accrued liability			13,957,626,309
Less: actuarial value of assets			8,782,383,977
Unfunded actuarial accrued liability			\$ 5,175,242,332
Funded ratio			62.9%

Actuarial Present Values

June 30, 2019

Judicial Plan

Actuarial Present Value June 30, 2019	Actuarial Present Value	Portion Covered by Future Normal Cost Contributions	Actuarial Accrued Liabilities
Active members			
Service retirement benefits based on services rendered before and likely to be rendered after valuation date	\$ 239,631,416	\$ 77,555,424	\$ 162,075,992
Disability benefits likely to be paid to present active members who become totally and permanently disabled	1,540,181	1,366,905	173,276
Survivor benefits likely to be paid to widows and children of present active members who die before retiring	5,583,715	3,652,832	1,930,883
Separation benefits likely to be paid to present active members	9,503,811	9,732,708	(228,897)
Active member totals	\$ 256,259,123	\$ 92,307,869	163,951,254
Inactive-vested members			19,327,098
Retired lives			434,204,353
Total actuarial accrued liability			617,482,705
Less: actuarial value of assets			172,224,529
Unfunded actuarial accrued liability			\$ 445,258,176
Funded ratio			27.9%