Missouri Department of Transportation and Highway Patrol Employees' Retirement System (MPERS)

Actuarial Valuation Report

June 30, 2024

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September 11, 2024

Retirement Board
Missouri Department of Transportation
and Highway Patrol Employees' Retirement System
1913 William Street
Jefferson City, Missouri 65102

Ladies and Gentlemen:

The results of the regular annual actuarial valuation as of June 30, 2024 of the Missouri Department of Transportation and Highway Patrol Employees' Retirement System (MPERS), as established by Chapter 104 of the Missouri Revised Statutes, are presented in this report. Reports providing accounting and financial reporting information that are intended to comply with the Governmental Accounting Standards Board (GASB) Statements No. 67 and No. 68 will be provided separately. The purposes of this valuation were:

- To measure the System's funding progress;
- To determine the employer contribution rate for Fiscal Year 2026; and
- To provide certain supplemental schedules for use in the System's Annual Report.

Your attention is directed particularly to the summary of the results and comments on pages 1-12.

This report was prepared at the request of the Board and is intended for use by the Retirement System and those designated or approved by the Board. This report may be provided to parties other than the Retirement System only in its entirety and only with the permission of the Board. This report should not be relied on for any purpose other than the purpose described. GRS is not responsible for unauthorized use of this report.

The member statistical data required for the valuation, together with pertinent data on financial operations, was furnished by your Executive Director and his staff. Member data was reviewed for reasonableness, but was not audited by the actuary. Financial data was received in aggregate and reviewed for reasonableness. Individual investments were not reviewed. Assets are not audited by the actuary. We are not responsible for the accuracy or completeness of the data provided by MPERS.

The cooperation of the Executive Director and the staff in furnishing materials requested for this valuation, and the complete and excellent condition of the records, is acknowledged with appreciation.

The valuation results summarized in this report involve actuarial calculations that require assumptions about future events. The assumptions are established by the Board after consulting with the actuary. We believe that the assumptions and methods used in this report are reasonable and appropriate for the purpose for which they have been used. However, other assumptions and methods could also be reasonable and could result in materially different results. In addition, because it is not possible or practical to consider every possible contingency, we may use summary information, estimates or simplifications of calculations to facilitate the modeling of future events. We may also exclude factors or data that are deemed to be immaterial.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements; and changes in plan provisions or applicable law. This report does not contain an analysis of the potential range of such future measurements.

To the best of our knowledge, this report is complete and accurate and was made in accordance with standards of practice promulgated by the Actuarial Standards Board. The actuarial assumptions used for the valuation produce results which, individually and in the aggregate, are reasonable. The combined effect of the assumptions is expected to have no significant bias (i.e., not significantly optimistic or pessimistic). The actuarial assumptions used in making the valuation are shown in Section E of this report.

The employer contributions determined in this report are based on the Board's funding policy. This policy is discussed on page 4 of this report. We commend the Board for its aggressive monitoring and updating of the funding policy over the recent past. However, continued employer contributions at the current level do not guarantee benefit security. We therefore encourage the Board to continue to routinely monitor and update its funding policy and to continue to consider benefit security when doing so.

This report includes risk measures on pages A-13 and A-14, but does not include a more robust assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment. We recommend that the Board consider performing an analysis to assess risk related to investment and payroll.

This report was prepared using our proprietary valuation model and related software which, in our professional judgment, has the capability to provide results that are consistent with the purposes of the valuation and has no material limitations or known weaknesses. We performed tests to ensure that the model reasonably represents that which is intended to be modeled.

This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. Heidi G. Barry and Jeffrey T. Tebeau are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

The signing actuaries are independent of the plan sponsor.

Respectfully submitted,
Gabriel, Roeder, Smith & Company

Heidi G. Barry, ASA, FCA, MAAA

Jeffrey T. Tebeau, FSA, EA, FCA, MAAA

HGB/JTT:dj

Summary

This report contains the results of the June 30, 2024 valuation. The table below shows a summary of the data used in the valuation as well as the unfunded actuarial accrued liability for the two experience rated groups. This data was the basis for determining valuation results and recommended employer contribution rates.

	Non-Uniformed				
	Patrol Employees	MoDOT Employees	Non-Uniformed Total	Uniformed Patrol	Total
Participants					
Active Members					
Closed Plan	139	737	876	252	1,128
Year 2000 Plan (also closed)	294	1,212	1,506	348	1,854
Year 2011 Tier (open)	615	2,766	3,381	516	3,897
Total Active Members	1,048	4,715	5,763	1,116	6,879
Total Active Members Prior Year	*1,048*	*4,451*	*5,499*	*1,122*	*6,621*
Retiree -- Regular Pensioners					
Closed Plan	472	3,008	3,480	1,168	4,648
Year 2000 Plan (also closed)	718	4,177	4,895	13	4,908
Year 2011 Tier (open)	21	46	67	1	68
Total Regular Pensioners	1,211	7,231	8,442	1,182	9,624
Self-Insured Disability Pensioners	1	29	30	3	33
Fully-Insured Disability Pensioners	9	69	78	5	83
Terminated Vested Members	272	1,759	2,031	174	2,205
Total	**2,541**	**13,803**	**16,344**	**2,480**	**18,824**
Active Member Valuation Payroll	$ 60,191,438	$ 276,011,787	$ 336,203,225	$ 102,100,197	$ 438,303,422
Active Member Valuation Payroll Prior Year	*$ 55,285,348*	*$ 243,470,293*	*$ 298,755,641*	*$ 90,569,104*	*$ 389,324,745*
Unfunded Actuarial Accrued Liability	N/A	N/A	$ 949,721,014	$ 509,472,788	$ 1,459,193,802

The June 30, 2024 valuation results are used to determine the contribution rate for the plan year beginning July 1, 2025. A summary of valuation results and recommended contribution rates follows.

Summary (Continued)

The **total contribution rate** for the plan year beginning July 1, 2025 is shown below:

	FY 2026 Employer Contribution Rates Expressed as % of Active Payroll for Total Benefits			
	Non-Uniformed			
	Civilian Patrol Employees	MoDOT Employees	Total	Uniformed Patrol Total
Benefit Normal Cost	8.020%	8.020%	8.020%	16.560%
Expenses	1.340%	1.340%	1.340%	1.340%
Disability Insurance	0.475%	0.475%	0.475%	0.475%
Total Normal Cost	9.835%	9.835%	9.835%	18.375%
Unfunded Liability	27.178%	27.178%	27.178%	39.630%
Total	37.013%	37.013%	37.013%	58.005%
Projected $	$23,635,427	$108,381,802	$132,017,229	$62,829,913
Prior Year Projected $	*$30,503,850*	*$134,335,433*	*$164,839,283*	*$56,200,938*

The projected dollar amounts are the total employer rate multiplied by the valuation payroll projected to the fiscal year the rate is effective. The projection factor is 1.0609 for Non-Uniformed members and 1.0609 for Uniformed members. Actual contributions will be based on the actual payroll during the 2026 Fiscal Year. The total contribution is based on a 15-year amortization period for all unfunded liabilities from July 1, 2025, in accordance with Board policy. In accordance with Board policy adopted February 16, 2024, a minimum Employer contribution of 45% of payroll for Non-Uniformed and 58% of payroll for Uniformed was included to establish a Contribution Stabilization Reserve Fund subject to a maximum of $250 million and $75 million, respectively.

The contributions above are Employer contributions only. In addition, Employee contributions are estimated to be (on average) 2.090% for Non-Uniformed members and 1.570% for Uniformed members.

The combined contribution rate (42.002% of active payroll) is less than the actual benefit payout rate (68.460% of active payroll). The difference is intended to be made up by investment return. The ability to contribute less than the benefit payout is one of the advantages of a funded retirement plan.

Prior year projected dollars (FY 2025) are based on rates of 52.008% for Non-Uniformed members and 58.491% for Uniform members.

Summary (Continued)

Benefits, Assumptions and Methods for the June 30, 2024 valuation: There were no changes in benefits or assumptions for the June 30, 2024 valuation. The Board adopted a new funding policy. The Unfunded Actuarial Accrued Liability (UAAL) will be amortized over a closed 15-year period beginning July 1, 2025. The Board also lowered the minimum contribution rate for the Non-Uniformed contribution stabilization fund from 58% to 45%, and changed the maximum Contribution Stabilization Reserve Fund from $250 million combined to $250 million for Non-Uniformed Employees and $75 million for Uniformed employees.

Experience: System assets earned a 13.29%# return on a market basis, although the fund recognized a 9.0% rate of return on an actuarial basis after accounting for the smoothing of the 2022 loss and 2023 gain (please see page C-2). In aggregate, there was an experience loss of $116 million (approximately 2.5% of beginning of year liabilities). This loss is primarily due to larger than expected salary and COLA increases and was partially offset by investment gains. Despite this experience loss, the funding status increased from 69.0% to 70.6%. Pages A-11 and A-12 show the derivation of the gain/(loss) in aggregate and by division.

The table below shows a comparison of actual demographic activity versus expected activity (based on the prior year's valuation assumptions).

Demographic Experience

	Non-Uniformed				Uniformed			
	Number Count			General	Number Count			General
	Actual	Expected	A/E%	Direction	Actual	Expected	A/E%	Direction
Retirement	220	239.8	92%	Gain	41	39.1	105%	Loss
Death	1	8.3	12%	Gain	0	0.8	0%	Gain
Disability	16	15.2	105%	Loss	1	1.0	100%	Loss
Vested Terminations	106	140.3	76%	Loss	10	13.7	73%	Loss
Other Terminations	250	211.1	118%	Gain	9	7.1	127%	Gain
Post-Retirement Death	236	288.3	82%	Loss	20	32.1	62%	Loss

Payroll and COLA increases for both Uniform and Non-Uniformed members were larger than expected on an individual basis and resulted in an overall liability loss for both groups. While both groups experienced liability losses, the loss was slightly smaller for the Uniform group. Overall, the groups experienced losses of $65 million (Non-Uniformed) and $51 million (Uniformed) in aggregate.

 # Provided by the System's investment consultant.

Summary (Continued)

Funding Policy:

The total contribution is based on normal cost plus a closed 15-year amortization period for all unfunded liabilities beginning July 1, 2025.

In September 2014, the Board adopted a contribution stabilization reserve fund from experience gains in an effort to keep the employer contribution rate at or near 58%, in the near term. In February 2015, the Board established a maximum of $250 million in the contribution stabilization reserve fund. In February, 2024, the Board lowered the minimum contribution rate for Non-Uniformed members to 45% (keeping the minimum contribution rate for Uniform members at 58%) and established separate maximums of $250 million and $75 million for the Non-Uniformed and Uniform contribution stabilization reserve funds. The contribution stabilization reserve fund is expected to result in the fund becoming more than 100% funded by the end of the amortization period, if experience is exactly as assumed.

An employer contribution rate of less than the minimum contribution rate can occur if the contribution stabilization reserve fund is at its maximum. In this valuation, the Non-Uniformed contribution stabilization reserve fund is at the maximum of $250 million and the resulting employer contribution rate for Non-Uniformed is less than 45%.

Rate Reconciliation: The table below shows the computed rate last year and the approximate effect of the changes that occurred during the year.

	Non-Uniform	Uniform
Prior valuation contribution rate		
Without Contribution Stabilization Reserve Fund	33.375%	58.491%
Additional amount for Contribution Stabilization Reserve Fund (CSR)	18.633%	0.000%
Total computed employer contribution rate	52.008%	58.491%
Prior rate without Contribution Stabilization Reserve Fund	33.375%	58.491%
Effects of:		
Accelerated contributions	(1.960)%	(0.516)%
Change in disability premiums	0.000%	0.000%
Change in administrative expenses	0.000%	0.000%
Phase-in of 2011 Tier members	(0.240)%	(0.520)%
23/24 liability experience loss/(gain)	3.440%	7.010%
23/24 recognized investment loss/(gain)	(1.620)%	(2.250)%
Change due to payroll increase other than expected	(2.403)%	(4.210)%
Change in assumptions and methods	0.000%	0.000%
Change in plan provisions	0.000%	0.000%
Computed employer contribution rate, current valuation without CSR	30.592%	58.005%
Additional amount for Contribution Stabilization Reserve Fund CSR	6.421%	0.000%
Computed employer contribution rate, current valuation	37.013%	58.005%

Summary (Continued)

Funded Status of Retiree Liability: The chart below indicates the funding status of retiree liabilities on an actuarial value of asset basis and a market value of asset basis:

	June 30, 2024			June 30, 2023
Asset Basis	**Non-Uniformed**	**Uniformed**	**Total**	**Total**
Actuarial Value	100.0%	100.0%	100.0%	100.0%
Market Value	100.0%	100.0%	100.0%	100.0%

Total Plan Funded Status: The plan is currently 70.6% funded on an actuarial value of assets basis or 74.1% funded on a market value of assets basis.

Plan Provisions: There were no plan provisions intentionally excluded from the valuation that were in effect on the valuation date. However, certain disability benefits are funded through third party insurance. The premiums for this insurance are included in the normal cost. The liabilities for these disability benefits are not included in the accrued liabilities of the plan, since they are liabilities of the insurance carrier.

Looking Forward: Before recognizing any fiscal year 2025 activity, the fund is positioned to recognize an investment gain of approximately $99.5 million next year (see page C-2). This gain, if not offset by other experience losses, will increase the funded status of the plan.

Despite falling from its peak in 2022, inflation rates remain high when compared to the last few decades. This can have several effects upon the valuation results. For instance, the COLA is directly tied to price inflation. Based on the increase in CPI-U during the 2023 calendar year, we understand that the COLA payable in the 2024 calendar year will exceed the assumed COLA of 1.80%. In addition, based on the partial-2024 inflation data available to date, it appears likely that the COLA payable in calendar year 2025 will also exceed the assumed COLA of 1.80%. Since the valuation census data is created as of May 31, each year, not all of the actual COLA is reflected immediately due to the timing of the valuation. The higher than expected COLAs for the remainder of FY 2024 and FY 2025 will put upward pressure on the contribution rate and downward pressure on the funded status of the Plan.

The higher or lower than assumed inflation will likely affect experience in future valuations (other than just COLAs) including experience related to:

- Rates of Investment return;
- Rates of Pay increases;
- Rates of Retirement; and
- Rates of Terminations.

The effect of higher or lower inflation on these different experience areas may result in gains or losses (depending on the specific area). Our experience study dated February 15, 2023 did not give significant weight to the recent inflation experience. However, if experience begins to change the industry's future expectations, it may result in changes to demographic and economic assumptions in the 2027/28 experience study.

Summary (Concluded)

Recommendations:

1) In accordance with changes in actuarial standards along with more recent changes in forecasts of future economic conditions, we recommend that economic assumptions continue to be reviewed annually each spring/summer before the next valuation cycle begins.

2) The contribution stabilization reserve fund is able to provide a limited buffer against losses in the short term. However, depletion of the contribution stabilization reserve fund would likely result in considerable contribution volatility. The Uniformed division's portion of the stabilization reserve fund was depleted for the June 30, 2023 valuation. While no change in the funding policy is needed at this time, we recommend the Board continue reviewing the funding policy for the Uniformed division with a focus on the hiring aspect to determine if any adjustments should be made in future valuations.

Conclusion: Based upon the results of the June 30, 2024 regular annual actuarial valuation, it is our opinion that the Missouri Department of Transportation and Highway Patrol Employees' Retirement System continues to be financed in accordance with actuarial principles of level percent-of-payroll financing. This statement is based upon the fact that the employer is contributing to the System based upon actuarially determined rates and presumes a continuation of payment of actuarially determined contributions. We believe the contributions determined in this report are reasonable actuarially determined contributions. In addition, we commend the 2009 Board in its decision to more aggressively address the unfunded retiree liability issue, the 2011 Board in its decision to reflect the near-term downsizing of MoDOT, and the 2014 Board for establishing the contribution stabilization reserve fund, which effectively accelerated the funding of the UAAL. In addition, we commend all subsequent Boards for continuing to maintain the contribution stabilization reserve fund. The funded status of the System is higher than it has been in at least a decade.

Other Observations

General Implications of Contribution Allocation Procedure or Funding Policy on Future Expected Plan Contributions and Funded Status

Given the plan's contribution allocation procedure, if all actuarial assumptions are met (including the assumption of the plan earning 6.50% on the actuarial value of assets), it is expected that:

1) The unfunded actuarial accrued liabilities will be fully amortized after 15 years;
2) The funded status of the plan will increase gradually towards a 100% funded ratio and then slightly exceed 100% (due to the contribution stabilization reserve fund); and
3) The unfunded accrued liability will follow the pattern shown on page A-5.

Limitations of Funded Status Measurements

Unless otherwise indicated, a funded status measurement presented in this report is based upon the actuarial accrued liability and the actuarial value of assets. Unless otherwise indicated, with regard to any funded status measurements presented in this report:

1) The measurement is inappropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations; in other words, of transferring the obligations to an unrelated third party in an arm's length market value type transaction.
2) The measurement is dependent upon the actuarial cost method which, in combination with the plan's amortization policy, affects the timing and amounts of future contributions. A funded status measurement in this report of 100% is not synonymous with no required future contributions. If the funded status were 100%, the plan would still require future normal cost contributions (i.e., contributions to cover the cost of the active membership accruing an additional year of service credit).
3) The measurement would produce a different result if the market value of assets were used instead of the actuarial value of assets, unless the market value of assets is used in the measurement.

Limitations of Project Scope

Actuarial standards do not require the actuary to evaluate the ability of the plan sponsor or other contributing entity to make required contributions to the plan when due. Such an evaluation was not within the scope of this project and is not within the actuary's domain of expertise. Consequently, the actuary performed no such evaluation.

Risks to Future Employer Contribution Requirements

There are ongoing risks to future employer contribution requirements to which the Retirement System is exposed, such as:

- Actual and Assumed Investment Rate of Return;
- Actual and Assumed Mortality Rates; and
- Amortization Policy.

Scenario Testing/Sensitivity Testing

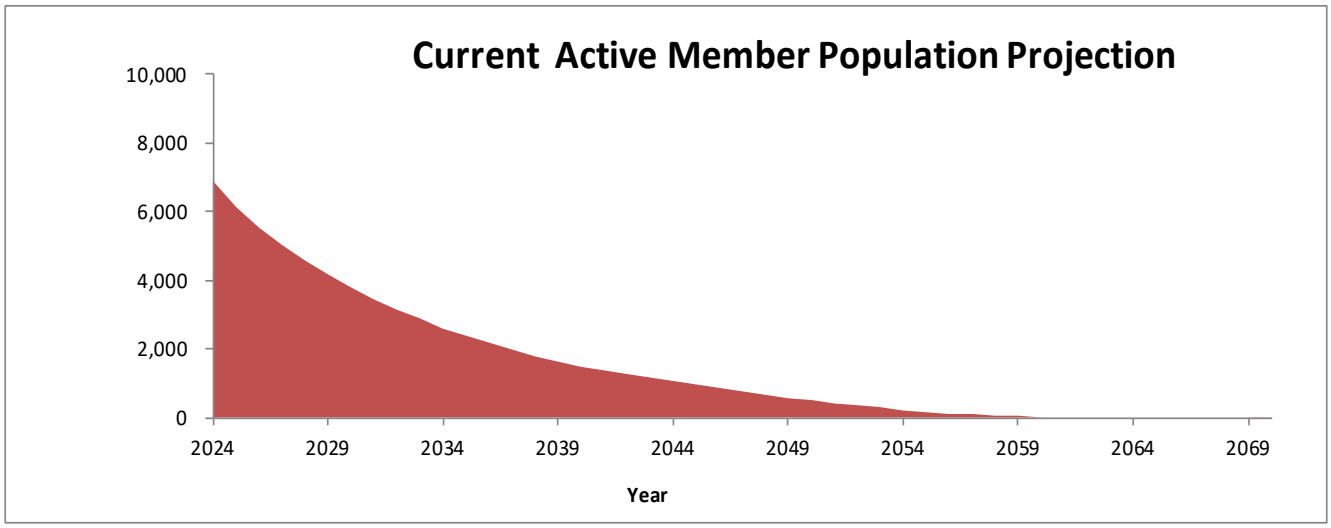
The MPERS staff is provided a 10-year projection tool that allows for various scenario and sensitivity testing. If the Board would like to see additional projections, we would be happy to perform such projections.

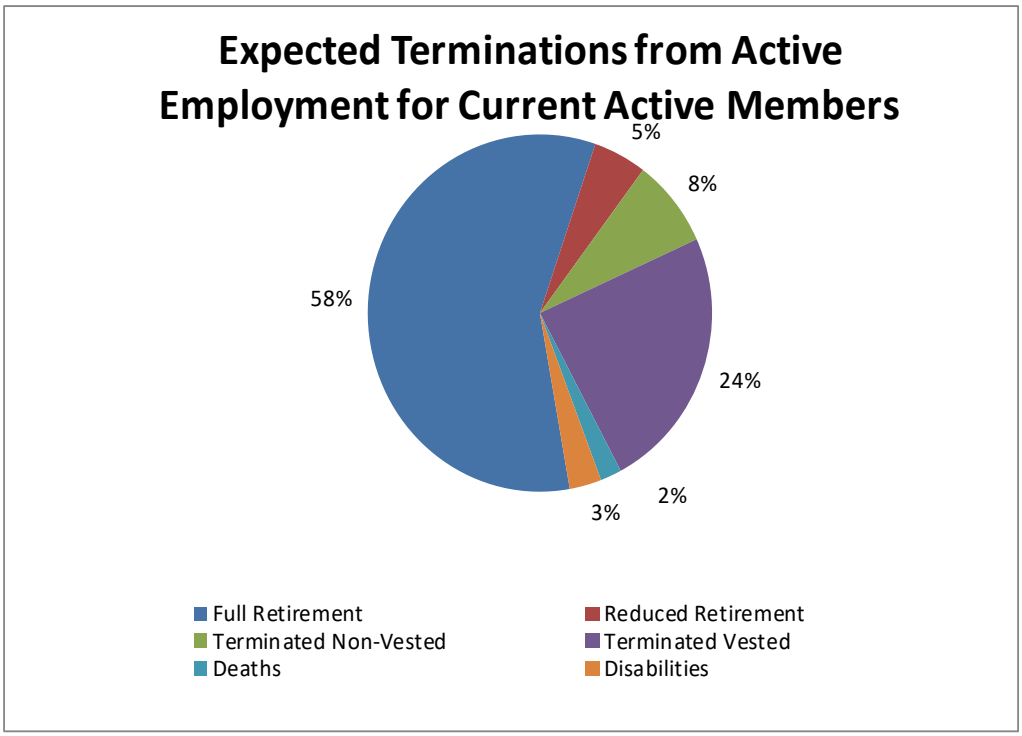
Summary of Key Valuation Results

Actuarial Present Value	June 30, 2024 (1) Actuarial Present Value	June 30, 2024 (2) Portion Covered By Future Normal Cost Contributions	June 30, 2024 (3) Actuarial Accrued Liabilities (1) - (2)	June 30, 2023 Actuarial Accrued Liabilities
Active Members				
Service retirement benefits based on service rendered before and likely to be rendered after valuation date	$ 1,825,573,423	$ 314,531,318	$ 1,511,042,105	$ 1,405,889,643
Disability benefits likely to be paid to present active members who become totally and permanently disabled*	37,675,805	23,616,345	14,059,460	12,495,784
Survivor benefits likely to be paid to widows and children of present active members who die before retiring	29,314,992	10,181,139	19,133,853	17,842,121
Separation benefits likely to be paid to present active members	81,820,702	52,505,422	29,315,280	29,016,821
Active Member Totals	$ 1,974,384,922	$ 400,834,224	$ 1,573,550,698	$ 1,465,244,369
Terminated Vested Members	121,040,885		121,040,885	124,632,780
Retired Lives	3,268,731,877		3,268,731,877	3,119,514,258
Total Actuarial Accrued Liability	$ 5,364,157,684	$ 400,834,224	$ 4,963,323,460	$ 4,709,391,407
Actuarial Value of Assets			3,504,129,658	3,247,983,333
Unfunded Actuarial Accrued Liability			$ 1,459,193,802	$ 1,461,408,074
Contribution Stabilization Reserve Fund			$ 250,000,000	$ 250,000,000
Total Amount Financed			$ 1,709,193,802	$ 1,711,408,074

* *The amounts presented for this category represent liabilities for retirement benefits for active members that may become participants of the long-term disability plan until they reach normal retirement eligibility. These are not liabilities for active members currently on long-term disability.*

Expected Development of Present Populations as of June 30, 2024

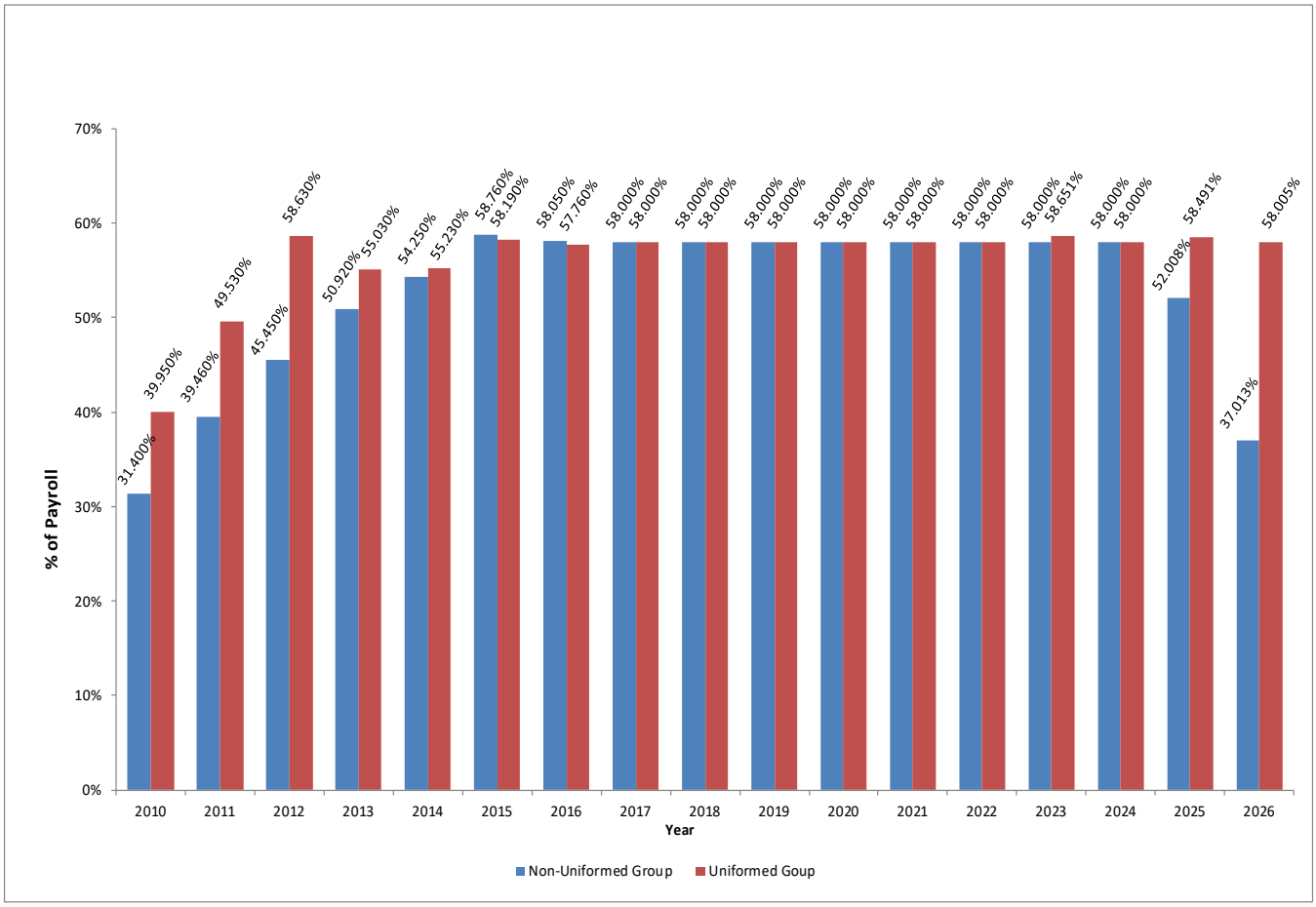




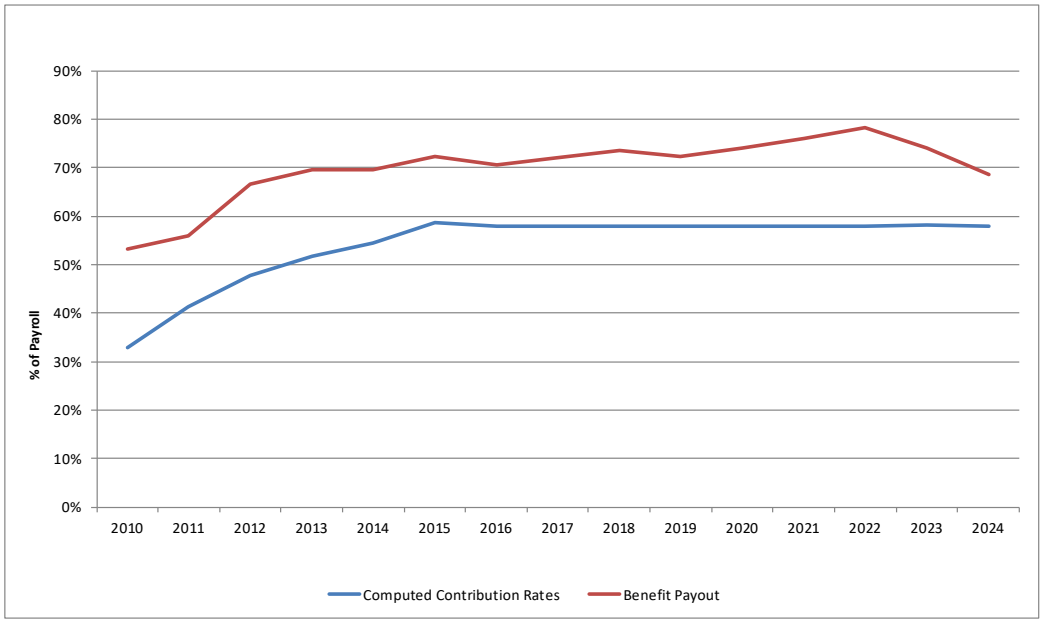
The charts above show the expected future development of the present population in simplified terms. The Retirement System presently covers 6,879 active members. Eventually, 8% of the population is expected to terminate covered employment prior to retirement and forfeit eligibility for an employer provided benefit. Of the present population, 87% is expected to receive monthly retirement benefits either by retiring directly from active service, or by separating from service with a vested benefit, and 5% of the present population is expected to become eligible for death-in-service or disability benefits. Within 8 years, over half of the covered membership is expected to consist of new hires.

Historical Contribution Rates and Benefit Payouts

Computed Contribution Rates

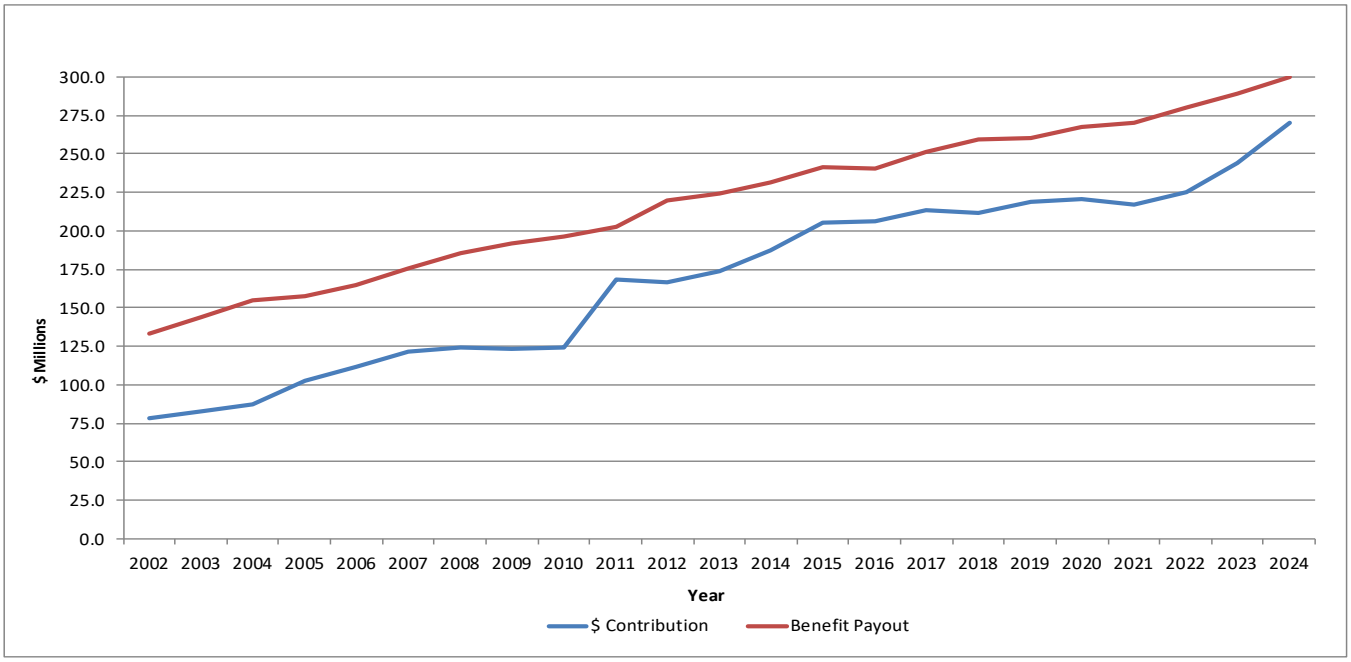


Contribution Rates vs. Benefit Payout



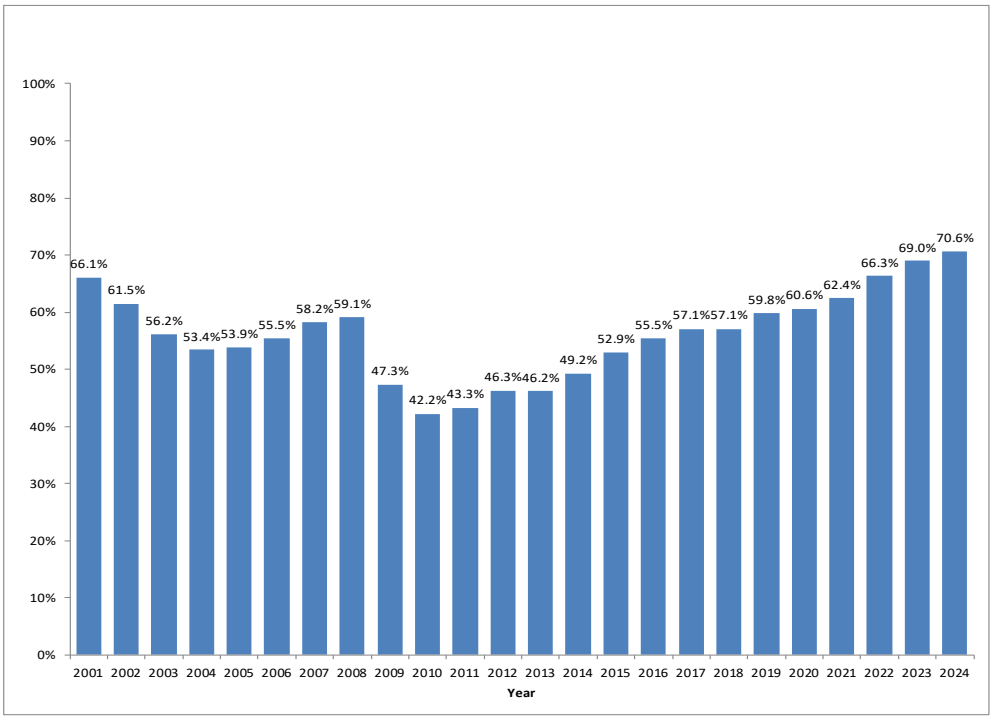
Historical Contribution Rates and Benefit Payouts (Concluded)

Contribution Dollars vs. Benefit Payout Dollars
($ Millions)



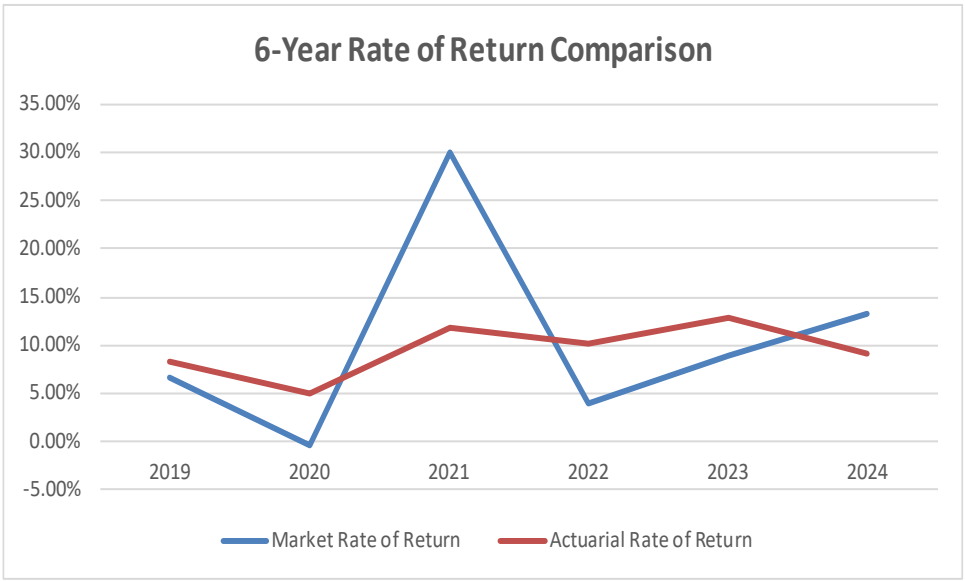
Historical Funded Ratios

Actuarial Value of Assets as Percents of Accrued Liabilities (Funded Ratio)



The funded status shown herein is not appropriate to assess the sufficiency of plan assets to cover the estimated cost of settling the Plan's benefit obligations. A funded status below 100% is an indication that additional contributions will be needed in the future, if experience is exactly as assumed. However, a funded status at or above 100% (by itself) cannot be used to determine the need for future contributions.

Historical Market and Actuarial Rates of Return



SECTION A

VALUATION RESULTS

Computed Contributions to Support Benefits for Fiscal Year 2026 Contributions Computed as of June 30, 2024

Contributions for	Non-Uniformed Employees			Uniformed Patrol		
	Closed & Year 2000	2011 Tier	Total	Closed & Year 2000	2011 Tier	Total
Normal Cost						
Age & service benefits	7.630%	6.810%	7.200%	17.550%	14.390%	16.310%
Disability benefits #	0.570%	0.950%	0.770%	0.460%	0.430%	0.450%
Survivor benefits	0.280%	0.340%	0.310%	0.290%	0.240%	0.270%
Separation benefits	1.950%	1.730%	1.830%	1.400%	0.620%	1.100%
Total Normal Cost	10.430%	9.830%	10.110%	19.700%	15.680%	18.130%
Member Contributions	0.000%	4.000%	2.090%	0.000%	4.000%	1.570%
Employer Normal Cost	10.430%	5.830%	8.020%	19.700%	11.680%	16.560%
Unfunded Actuarial Accrued Liabilities*			27.178%			39.630%
Expense Provision			1.340%			1.340%
Subtotal			36.538%			57.530%
Disability Insurance			0.475%			0.475%
Total Contribution Rate			37.013%			58.005%
Projected Dollar Contribution			$ 132,017,229			$ 62,829,913
Prior Year						
Total Contribution Rate			52.008%			58.491%
Projected Dollar Contribution			$ 164,839,283			$ 56,200,938

\# *Includes costs for benefits payable after conversion to normal retirement and/or benefits payable to survivors. Costs for disability benefits payable prior to conversion are shown under Disability Insurance which is outsourced.*

* *Amortized as a level-percentage of payroll over a 15-year amortization period for all unfunded liabilities from July 1, 2025 and then increased to achieve a minimum of 45% for Non-Uniformed and 58% for Uniformed total employer contribution rate. Growth of stabilization fund was capped at $250 million for Non-Uniformed and $75 million for Uniformed.*

Development of Contribution Stabilization Reserve Fund as of June 30, 2024

	Non-Uniformed Employees	Uniformed Patrol	Total
Beginning of Year Contribution Stabilization Reserve Fund	$ 250,000,000	$ -	$ 250,000,000
Growth (to maintain contribution rate)	-	-	-
Reduction (to match contribution rate)	-	-	-
End of Year Contribution Stabilization Reserve Fund	$ 250,000,000	$ -	$ 250,000,000

At the September 25, 2014 Board meeting, the Board adopted the use of a contribution stabilization reserve fund that would result in a MPERS employer contribution of minimum of 58.00% of pay.

At the February 19, 2015 Board meeting, the Board adopted to cap the contribution stabilization reserve fund at $250 million. Furthermore, the Board adopted a motion that if MPERS experienced a loss, MPERS would deplete the entire reserve fund if a loss of that magnitude were to be realized.

At the February 16, 2024 Board meeting, the Board adopted to lower the Non-Uniformed minimum contribution rate to 45.00%, as well as cap the Non-Uniformed contribution stabilization reserve fund at $250 million and cap the Uniformed contribution stabilization reserve fund at $75 million.

In order to determine the current amount of the contribution stabilization reserve fund for the separate groups, we determined the amount of reduction needed to achieve a 45.00% contribution rate for Non-Uniformed employees and a 58.00% contribution rate for Uniformed employees.

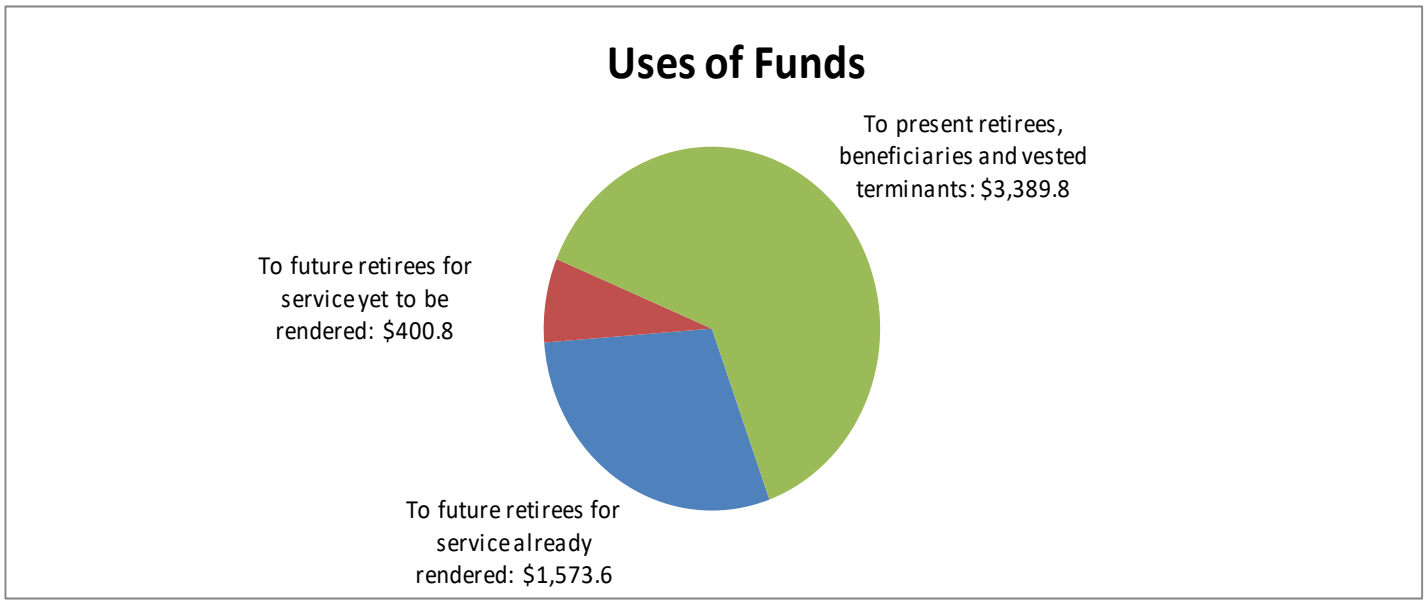
Development of Liabilities
as of June 30, 2024

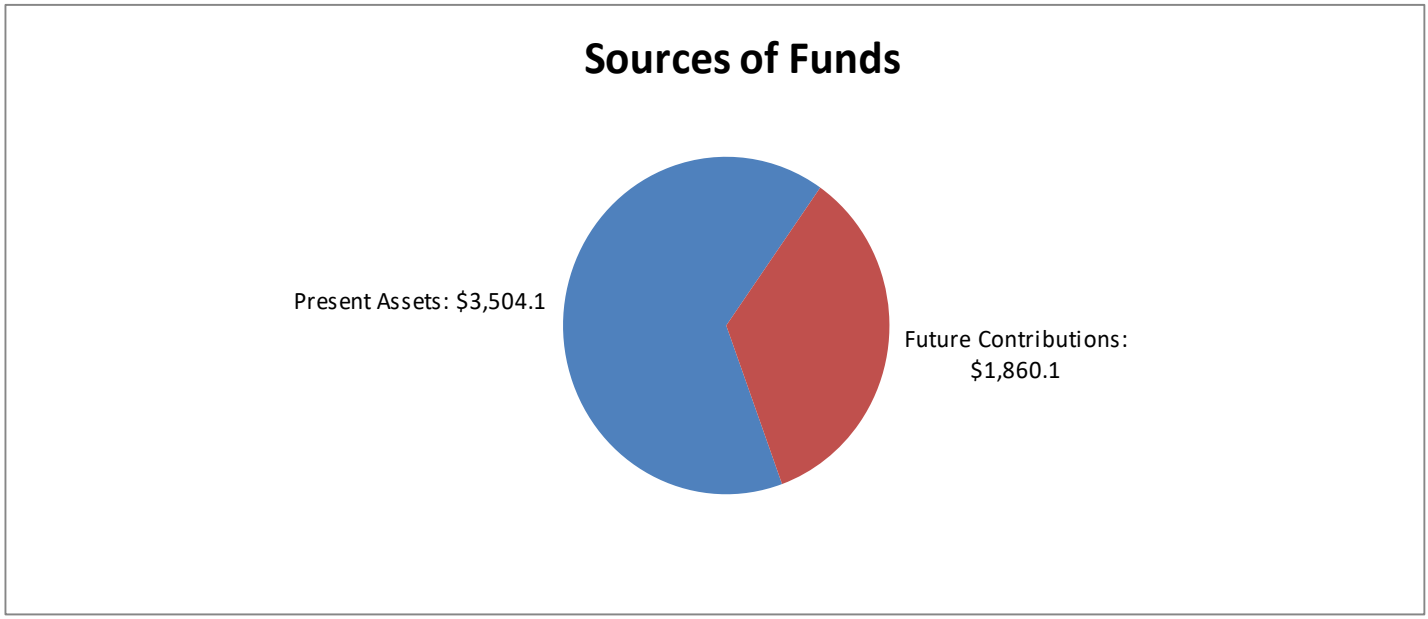
	Non-Uniformed Employees	Uniformed Patrol	Total
Present Value of Future Benefits - Inactives			
Retirees and Survivors	$2,268,957,816	$ 972,899,946	$3,241,857,762
Disability Pensioners	21,884,132	4,989,983	26,874,115
Vested Terminated Employees	105,589,420	15,451,465	121,040,885
Subtotal PVFB - Inactives	2,396,431,368	993,341,394	3,389,772,762
Present Value of Future Benefits - Actives			
Age & Service benefits	1,141,561,866	684,011,557	1,825,573,423
Normal and Work Related Disability benefits	32,708,338	4,967,467	37,675,805
Survivor benefits	23,541,945	5,773,047	29,314,992
Separation benefits	72,781,869	9,038,833	81,820,702
Subtotal PVFB - Actives	1,270,594,018	703,790,904	1,974,384,922
Total Present Value of Future Benefits	3,667,025,386	1,697,132,298	5,364,157,684
Less Present Value of Future Entry Age Normal Costs	234,305,125	166,529,099	400,834,224
Equals Actuarial Accrued Liability	3,432,720,261	1,530,603,199	4,963,323,460
Less Actuarial Value of Assets	2,482,999,247	1,021,130,411	3,504,129,658
Equals Unfunded Actuarial Accrued Liability	949,721,014	509,472,788	1,459,193,802
Plus Contribution Stabilization Reserve Fund	250,000,000	-	250,000,000
Equals Total Amount Financed	1,199,721,014	509,472,788	1,709,193,802
Amortization Payment on UAAL*	$ 96,937,656	$ 42,926,067	$ 139,863,723
as a % of Projected Payroll	27.178%	39.630%	30.157%

* *Amortized as a 15-year amortization period for all unfunded liabilities from July 1, 2025 and then increased to achieve a minimum of a 58% employer contribution rate for Non-Uniformed employees and 45% employer contribution rate for Uniformed employees. Growth of the stabilization fund was capped at $250 million for Non-Uniformed and $75 million for Uniformed.*

System Resources and Obligations
Sources and Uses of $5,364.2 Million
as of June 30, 2024

($ Millions)





Financing Unfunded Actuarial Accrued Liabilities (UAAL) Which Were Calculated Using a Wage Inflation Assumption of 3.00%* and an Investment Return Assumption of 6.50% Compounded Annually 15-Year Amortization*

Fiscal Year Ending June 30	Active Employee Payroll	Unfunded Actuarial Accrued Liability at End of Year	Annual UAAL Contributions During Fiscal Year		UAAL at Year End as % of Payroll
			Dollars	% of Payroll	
2024		$ 1,459,193,802			
2025	$ 451,452,525	1,361,204,065	$ 186,829,113	41.384%	301.5%
2026	464,996,101	1,304,903,246	140,228,874	30.157%	280.6%
2027	478,945,984	1,240,642,394	144,434,700	30.157%	259.0%
2028	493,314,363	1,167,732,201	148,767,741	30.157%	236.7%
2029	508,113,794	1,085,476,286	153,230,773	30.157%	213.6%
2030	523,357,207	993,128,982	157,827,696	30.157%	189.8%
2031	539,057,923	889,892,006	162,562,527	30.157%	165.1%
2032	555,229,661	774,910,915	167,439,403	30.157%	139.6%
2033	571,886,551	647,271,331	172,462,585	30.157%	113.2%
2034	589,043,148	505,994,910	177,636,463	30.157%	85.9%
2035	606,714,443	350,035,050	182,965,557	30.157%	57.7%
2036	624,915,877	178,272,312	188,454,524	30.157%	28.5%
2037	643,663,353	-10,490,453	194,108,159	30.157%	-1.6%
2038	662,973,253	-129,707,889	114,842,351	17.322%	-19.6%
2039	682,862,450	-187,014,592	47,352,874	6.934%	-27.4%
2040	703,348,323	-250,000,000	49,245,771	7.002%	-35.5%

* *Amortized as a level-percentage of payroll over a 15-year amortization period for other unfunded liabilities from July 1, 2025 and then increased to achieve a 45% minimum total employer contribution rate for Non-Uniformed employees and a 58% minimum total employer contribution rate for Uniformed employees. Growth of the stabilization fund was capped at $250 million for Non-Uniformed and $75 million for Uniformed. Payroll was assumed to increase 3.00%.*

Projected Employer Contributions, 30 Years*

Fiscal Year Ending June 30	Active Employee Payroll	Annual Employer Contributions During Fiscal Year	
		Dollars	% of Payroll
2024	$ 438,303,421		
2025	451,452,525	$ 241,748,313	53.549%
2026	464,996,101	195,307,662	42.002%
2027	478,945,984	201,165,852	42.002%
2028	493,314,364	207,200,828	42.002%
2029	508,113,795	213,416,852	42.002%
2030	523,357,209	219,819,358	42.002%
2031	539,057,925	226,413,939	42.002%
2032	555,229,663	233,206,357	42.002%
2033	571,886,553	240,202,548	42.002%
2034	589,043,150	247,408,624	42.002%
2035	606,714,445	254,830,883	42.002%
2036	624,915,878	262,475,810	42.002%
2037	643,663,354	270,350,084	42.002%
2038	662,973,255	193,371,534	29.167%
2039	682,862,453	128,237,931	18.779%
2040	703,348,327	132,557,380	18.847%
2041	724,448,777	136,936,850	18.902%
2042	746,182,240	74,088,701	9.929%
2043	768,567,707	70,570,035	9.182%
2044	791,624,738	73,301,140	9.260%
2045	815,373,480	76,114,179	9.335%
2046	839,834,684	79,011,608	9.408%
2047	865,029,725	81,995,961	9.479%
2048	890,980,617	85,069,844	9.548%
2049	917,710,036	88,235,944	9.615%
2050	945,241,337	91,497,026	9.680%
2051	973,598,577	94,855,942	9.743%
2052	1,002,806,534	98,315,624	9.804%
2053	1,032,890,730	101,879,097	9.863%
2054	1,063,877,452	105,549,474	9.921%

* *Amortized as a level-percentage of payroll over a 15-year amortization period for all unfunded liabilities from July 1, 2025 and then increased to achieve a 45% minimum total employer contribution rate for Non-Uniformed employees and a 58% minimum total employer contribution rate for Uniformed employees. Growth of the stabilization fund was capped at $250 million for Non-Uniformed and $75 million for Uniformed. Payroll was assumed to increase 3.00%.*

Projected Employer Contributions and Benefit Payments, 5 Years

Fiscal Year Ending June 30	Projected Annual Amounts During Fiscal Year	
	Employer Contributions	Benefit Payments *
2024		
2025	$ 241,748,313	$ 307,748,538
2026	195,307,662	315,628,206
2027	201,165,852	323,784,556
2028	207,200,828	331,932,239
2029	213,416,852	339,834,605

* *Projected benefit payments include assumed backdrop elections, but does not include any other optional forms of payment elections (other than straight life).*

Historical Funding Progress
June 30, 2024

Year Ending June 30	Actuarial Asset Value	Entry Age Accrued Liability	Unfunded Accrued Liability (UAAL)	Funded Ratio	Estimated Covered Payroll**	UAAL as a Percentage of Covered Payroll
2015	$ 1,967,001,509	$ 3,715,845,651	$ 1,748,844,142	52.94%	$ 342,264,593	510.96%
2016	2,086,654,348	3,761,733,004	1,675,078,656	55.47%	344,275,147	486.55%
2017	2,172,787,144	3,802,443,730	1,629,656,586	57.14%	356,142,973	457.58%
2018#	2,274,248,122	3,981,838,941	1,707,590,819	57.12%	353,371,000	483.23%
2019	2,415,343,431	4,037,369,708	1,622,026,277	59.82%	362,356,771	447.63%
2020	2,481,329,531	4,092,097,897	1,610,768,366	60.64%	363,572,158	443.04%
2021#	2,711,272,503	4,344,072,912	1,632,800,409	62.41%	358,987,667	454.83%
2022	2,925,561,398	4,410,685,047	1,485,123,649	66.33%	366,743,306	404.95%
2023#	3,247,983,333	4,709,391,407	1,461,408,074	68.97%	400,360,785	365.02%
2024	**3,504,129,658**	**4,963,323,460**	**1,459,193,802**	**70.60%**	**438,548,450**	**332.73%**

** *Values are estimated from contribution rate and amount.*

\# *New assumptions and/or methods adopted.*

Historical Employer Contributions
Non-Uniformed Group
June 30, 2024

Valuation Date	Fiscal Year Ending June 30,	Estimated Covered Payroll**	Actual Employer Contributions	Actual Employer Contribution %	Annually Determined Employer Contribution (ADEC) %	Annually Determined Employer Contribution (ADEC) $	Percentage of ADEC Contributed
June 30, 2013#	2015	$ 258,737,537	$ 152,034,177	58.76%	58.76%	$ 152,034,177	100.00%
June 30, 2014	2016	260,714,141	151,344,559	58.05%	58.05%	151,344,559	100.00%
June 30, 2015	2017	269,522,202	156,322,877	58.00%	58.00%	156,322,877	100.00%
June 30, 2016	2018	269,229,112	156,152,885	58.00%	58.00%	156,152,885	100.00%
June 30, 2017	2019	276,575,119	160,413,569	58.00%	58.00%	160,413,569	100.00%
June 30, 2018#	2020	278,280,036	161,402,421	58.00%	58.00%	161,402,421	100.00%
June 30, 2019	2021	272,509,434	158,055,472	58.00%	58.00%	158,055,472	100.00%
June 30, 2020	2022	278,453,278	161,502,901	58.00%	58.00%	161,502,901	100.00%
June 30, 2021#	2023	307,466,764	178,330,723	58.00%	58.00%	178,330,723	100.00%
June 30, 2022	**2024**	**334,560,257**	**194,044,949**	**58.00%**	**58.00%**	**194,044,949**	**100.00%**

** *Values are estimated from contribution rate and amount.*
\# *New assumptions and/or methods adopted.*
Includes Non-Uniformed employees of MoDOT, Uniformed Patrol, and MPERS.

This information is presented in draft form for review by the System's auditor. Please let us know if there are any items that the auditor changes so that we may maintain consistency with the System's financial statements.

Historical Employer Contributions
Uniformed Patrol Group
June 30, 2024

Valuation Date	Fiscal Year Ending June 30,	Estimated Covered Payroll**	Actual Employer Contributions	Actual Employer Contribution %	Annually Determined Employer Contribution (ADEC) %	Annually Determined Employer Contribution (ADEC) $	Percentage of ADEC Contributed
June 30, 2013#	2015	$ 83,527,056	$ 48,604,394	58.190%	58.190%	$ 48,604,394	100.00%
June 30, 2014	2016	83,561,006	48,264,837	57.760%	57.760%	48,264,837	100.00%
June 30, 2015	2017	86,620,771	50,240,047	58.000%	58.000%	50,240,047	100.00%
June 30, 2016	2018	84,141,888	48,802,295	58.000%	58.000%	48,802,295	100.00%
June 30, 2017	2019	85,781,652	49,753,358	58.000%	58.000%	49,753,358	100.00%
June 30, 2018#	2020	85,292,122	49,469,431	58.000%	58.000%	49,469,431	100.00%
June 30, 2019	2021	86,478,233	50,157,375	58.000%	58.000%	50,157,375	100.00%
June 30, 2020	2022	88,290,028	51,208,216	58.000%	58.000%	51,208,216	100.00%
June 30, 2021#	2023	92,894,021	54,483,272	58.651%	58.651%	54,483,272	100.00%
June 30, 2022	**2024**	**103,988,193**	**60,313,152**	**58.000%**	**58.000%**	**60,313,152**	**100.00%**

*** Values are estimated from contribution rate and amount.*
 # New assumptions and/or methods adopted.

This information is presented in draft form for review by the System's auditor. Please let us know if there are any items that the auditor changes so that we may maintain consistency with the System's financial statements.

Development of Gain/(Loss)
July 1, 2023 to June 30, 2024

	UAAL =	AAL -	Assets
Beginning of Year Values (at July 1)	$ 1,461,408,074	$ 4,709,391,407	$ 3,247,983,333
Normal Cost	55,738,811	55,738,811	0
Transfer In and Service Purchase - Liability	7,632,246	7,632,246	0
Contributions	(270,240,171)	0	270,240,171
Disbursements	0	(306,332,007)	(306,332,007)
Interest	88,268,279	298,214,210	209,945,931
Expected Value Before Any Changes	1,342,807,239	4,764,644,667	3,421,837,428
Effect of Benefit Changes	0	0	0
Effect of Changes in Assumptions & Methods	0	0	0
Effect of Adjustment	0	0	0
Expected Value after Changes	1,342,807,239	4,764,644,667	3,421,837,428
End of Year Values (at June 30)	1,459,193,802	4,963,323,460	3,504,129,658
Gain/(Loss) for Year	$ (116,386,563)	$ (198,678,793)	$ 82,292,230

Development of Gain/(Loss)
July 1, 2023 to June 30, 2024

	Total	Non-Uniformed	Uniformed
Beginning of Year UAAL (at July 1)	$ 1,461,408,074	$ 989,773,506	$ 471,634,568
Normal Cost	55,738,811	36,787,724	18,951,087
Transfer In and Service Purchase - Liability	7,632,246	7,050,377	581,869
Contributions	(270,240,171)	(207,793,575)	(62,446,596)
Interest	88,268,279	59,006,726	29,261,553
Net Change in LTD Assets	0	0	0
Expected Value Before Any Changes	1,342,807,239	884,824,758	457,982,481
Effect of Benefit Changes	0	0	0
Effect of Changes in Assumptions & Methods	0	0	0
Effect of Adjustment	0	0	0
Expected Value After Changes	1,342,807,239	884,824,758	457,982,481
End of Year UAAL (at June 30)	1,459,193,802	949,721,014	509,472,788

Aggregate Gain/(Loss) for Year	$ (116,386,563)	$ (64,896,256)	$ (51,490,307)
Gain/(Loss) as a % of Beginning of Year Liabilities	(2.47)%	(1.98)%	(3.61)%

Asset Gain/(Loss) for Year	$ 82,292,230	$ 58,027,521	$ 24,264,709
Liability Gain/(Loss) for Year	(198,678,793)	(122,923,777)	(75,755,016)
Aggregate Gain/(Loss) for Year	$ (116,386,563)	$ (64,896,256)	$ (51,490,307)

Risk Measures

Plan Maturity Measures: Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Generally accepted plan maturity measures include the following:

	2024	2023	2022	2021	2020
Ratio of the market value of assets to total payroll	8.39	8.43	8.60	8.46	6.54
Ratio of actives to retirees and beneficiaries	1.42	1.45	1.37	1.28	1.26
Duration of the actuarial liability	11.95	11.97	11.64	11.72	11.36

Ratio of Market Value of Assets to Payroll: The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 2.0 times the payroll, a return on assets 5% different than assumed would equal 10% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.

Ratio of Actives to Retirees and Beneficiaries: A young plan with many active members and few retirees will have a high ratio of actives to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

Duration of Actuarial Liability: The duration of the actuarial liability may be used to approximate the sensitivity to a 1% change in the assumed rate of return. For example, a duration of 10 indicates that the liability would increase approximately 10% if the assumed rate of return were lowered 1%.

Additional Risk Assessment: Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability.

A table of additional historical risk measures is shown on the next page.

Risk Measures

($ Thousands)

Valuation Date June 30	(1) Accrued Liabilities (AAL)	(2) Market Value of Assets	(3) Unfunded AAL (1)-(2)	(4) Valuation Payroll	(5) Funded Ratio (2)/(1)	(6) Liability/ Payroll (1)/(4)	(7) Assets/ Payroll (2)/(4)	(8) Unfunded/ Payroll (3)/(4)	(9) Portfolio Rate of Return#	(10) 10-Year Trailing Average	(11) Non-Investment Net Cash Flow	(12) Non-Investment Net Cash Flow Percent of Beginning of Year Assets (11)/(2[Prior Year])
2018*	$ 3,981,839	$ 2,314,530	$ 1,667,309	$ 351,497	58.1%	1,132.8%	658.5%	474.3%	9.2%	N/A	$ (51,928)	(2.4)%
2019	4,037,370	2,423,262	1,614,108	359,296	60.0%	1,123.7%	674.5%	449.2%	6.7%	N/A	(45,595)	(2.0)%
2020	4,092,098	2,361,600	1,730,498	360,852	57.7%	1,134.0%	654.4%	479.6%	-0.4%	N/A	(50,994)	(2.1)%
2021*	4,344,073	3,003,925	1,340,148	355,195	69.1%	1,223.0%	845.7%	377.3%	30.0%	N/A	(57,319)	(2.4)%
2022	4,410,685	3,067,193	1,343,492	356,662	69.5%	1,236.7%	860.0%	376.7%	3.9%	9.8%	(59,500)	(2.0)%
2023*	4,709,391	3,281,628	1,427,763	389,325	69.7%	1,209.6%	842.9%	366.7%	8.9%	9.2%	(50,324)	(1.6)%
2024	4,963,323	3,677,658	1,285,665	438,303	74.1%	1,132.4%	839.1%	293.3%	13.3%	8.7%	(36,092)	(1.1)%

(5) The funded ratio is the most widely known measure of a plan's financial strength, but the trend in the funded ratio is much more important than the absolute ratio. The funded ratio should trend to 100%. As it approaches 100%, it is important to re-evaluate the level of investment risk in the portfolio and potentially to re-evaluate the assumed rate of return.

(6) and (7) The ratio of liabilities and assets to payroll gives an indication of both maturity and volatility. Many systems have values between 500% and 700%. Values significantly above that range may indicate difficulty in supporting the benefit level as a level % of payroll.

(8) The ratio of unfunded liability to payroll gives an indication of the plan's sensitivity to differences between assumed and actual experience related to the employer contributions. A value above approximately 300% or 400% may indicate high volatility relative to small gains and losses.

(9) and (10) Investment return is probably the largest single risk that most systems face. The year-by-year return and the 10-year geometric average give an indicator of the realism of the System's assumed return.

(11) and (12) Non-Divestment Net Cash Flow is a measure of both risk and maturity. For a mature plan the absolute value of (12) should be in the order of the assumed real rate of return over wage inflation (currently assumed to be 4.00%). A more negative number indicates a plan that is more at risk of fund depletion and more sensitive to annual gains and losses.

 # Rates prior to the June 30, 2022 valuation were calculated by GRS. Rates on or after the June 30, 2022 valuation were provided by the System's investment consultant.

** New assumptions and/or methods adopted.*

Low-Default-Risk Obligation Measure

Introduction

In December 2021, the Actuarial Standards Board (ASB) adopted a revision to Actuarial Standard of Practice (ASOP) No. 4, *Measuring Pension Obligations and Determining Pension Plan Costs or Contributions*. The revised ASOP No. 4 requires the calculation and disclosure of a liability referred to by the ASOP as the "Low-Default-Risk Obligation Measure" (LDROM). The rationale that the ASB cited for the calculation and disclosure of the LDROM was included in the Transmittal Memorandum of ASOP No. 4 and is presented below (emphasis added):

> "The ASB believes that the calculation and disclosure of this measure provides **appropriate, useful information for the intended user regarding the funded status of a pension plan**. The calculation and disclosure of this additional measure is **not intended to suggest that this is the "right" liability measure** for a pension plan. However, the ASB does believe that **this additional disclosure provides a more complete assessment of a plan's funded status and provides additional information regarding the security of benefits that members have earned as of the measurement date.**"

Comparing the Accrued Liabilities and the LDROM

One of the fundamental financial objectives of MPERS is to finance each member's retirement benefits over the period from the member's date of hire until the member's projected date of retirement (entry age actuarial cost method) as a level percentage of payroll. To fulfill this objective, the discount rate that is used to value the accrued liabilities of MPERS is set equal to the **expected return** on the System's diversified portfolio of assets (referred to sometimes as the investment return assumption). For MPERS, the investment return assumption is 6.50%.

The LDROM is meant to approximately represent the lump sum cost to a plan to purchase low-default-risk fixed income securities whose resulting cash flows essentially replicate in timing and amount the benefits earned (or the costs accrued) as of the measurement date. The LDROM is very dependent upon market interest rates at the time of the LDROM measurement. The lower the market interest rates, the higher the LDROM, and vice versa. The LDROM results presented in this report are based on the projected unit credit actuarial cost method and discount rates based upon the June 2024 Treasury Yield Curve Spot Rates (end of month). The 1-, 5-, 10- and 30-year rates follow: 5.12%, 4.34%, 4.22% and 4.45%.

Presented below are the actuarial accrued liability and the LDROM as of June 30, 2024 for MPERS.

Type of Member	Valuation AAL	LDROM
Retirees	$ 3,268,731,877	$ 3,986,016,707
Deferreds	121,040,885	182,540,858
Actives	1,573,550,698	2,207,474,861
Totals	**$ 4,963,323,460**	**$ 6,376,032,426**

Low-Default-Risk Obligation Measure

Commentary Regarding the LDROM

Some ways in which the LDROM can assist the MPERS Board of Trustee in a decision-making process include:

(1) It provides information to potentially allow for better risk management for MPERS;
(2) It places the appropriateness of potential employer contribution rate reductions or benefit enhancements in a better context; and
(3) It provides more complete information regarding the benefit security of the membership's benefits earned as of the measurement date.

Potentially Allows for Better Risk Management: A very useful risk metric to exhibit potential contribution rate volatility (or amortization period volatility for fixed rate plans) is the ratio of assets to payroll or AAL to payroll. How could we reduce that potential contribution rate volatility (or amortization period volatility for fixed rate plans)? The LDROM and liability driven investing (LDI) are closely related concepts. Other than reducing benefits, all other things being equal, the only way to reduce that volatility is to immunize (i.e., LDI) a portion of the System's liability. This does not mean that the System needs to immunize all of the liability. For example, if they could immunize half of it, they could reduce the contribution rate volatility in half. This would require the actuary to use a cash flow matching method to value that portion of the liabilities. This means that the actuary would not use the System's investment return assumption for this portion of the liability, but the yield curve resulting from the fixed income portfolio that is being used to immunize the liability. The value of the assets (i.e., fixed income portfolio) and the value of the immunized liability would move in tandem with any changes (up or down) in future interest rates. The result being that the immunized portion of the System's liability would not have the potential of producing new unfunded actuarial accrued liabilities. However, the fixed income portfolio would still have the minor potential for credit default risk.

Places the Appropriateness of Potential Employer Contribution Rate Reductions or Benefit Enhancements in a Better Context: Many PERS have adopted a funding policy. Many funding policies already take into account the System's funded ratio (based upon the AAL) when considering whether to allow for benefit enhancements or contribution rate reductions. For example, a System may not allow for a benefit enhancement if the funded ratio does not exceed a certain threshold. Similarly, a System may not allow for an employer contribution rate reduction in some circumstances. For example, a reduction to the employer normal cost contribution may not be allowed until the System reaches a funded ratio of 120%. Given the fact that most criteria are based upon the expectation of earning the investment return assumption, a System may want to consider extending these criteria to a funded ratio based upon the LDROM in addition to the AAL.

Provides more Complete Information Regarding the Benefit Security of the Membership's Benefits Earned as of the Measurement Date: Too often a high funded ratio (e.g., 100% funded) on an AAL basis is interpreted as benefit security for the participants. The fact that this funded ratio is based upon an expected measure is many times overlooked. If the AAL and LDROM measures are relatively close, then the System at least has the opportunity to make benefits payable in the future more secure.

SECTION B

SUMMARY OF BENEFITS

Missouri Department of Transportation and Highway Patrol Employees' Retirement System
Summary of Benefit Provisions Evaluated as of June 30, 2024

Closed Plan	Year 2000 Plan	2011 Tier

Participation

Participants include:

All MPERS active members, vested terminated members, disability recipients, retirees and survivors who first became members prior to July 1, 2000 and who do not elect to transfer to the Year 2000 Plan at retirement.

Participation

Participants include:

1. All active employees who first became members on or after July 1, 2000 but prior to January 1, 2011.
2. Closed Plan active members and vested former members who elect to transfer to the Year 2000 Plan at retirement.
3. Closed Plan retirees who elected to transfer to the Year 2000 Plan during the election window from July 1, 2000 through July 1, 2001, and their survivors.
4. Closed Plan members who left state employment prior to becoming vested (not eligible for a future retirement benefit) and return to work in a benefit eligible position on or after July 1, 2000.

Participation

Participants include:

1. All employees who first become members on or after January 1, 2011.

Closed Plan	Year 2000 Plan	2011 Tier
Normal Retirement Eligibility (unreduced benefit)	**Normal Retirement Eligibility (unreduced benefit)**	**Normal Retirement Eligibility (unreduced benefit)**
Non-Uniformed Employees: The earlier of attaining: 1. Age 65 with at least 4 years of creditable service. 2. Age 60 with at least 15 years of creditable service. 3. Age 48 with age plus creditable service equal to 80 or more. 4. Age 65 with at least 5 years of service (deferred).*	***Non-Uniformed Employees:*** The earlier of attaining: 1. Age 62 with at least 5 years of creditable service. 2. Age 48 with age plus creditable service equal to 80 or more.	***Non-Uniformed Employees:*** The earlier of attaining: 1. Age 67 with at least 5 years of creditable service. 2. Age 55 with age plus creditable service equal to 90 or more.
Uniformed Patrol Employees Only: The earlier of attaining: 1. Age 55 with at least 4 years of creditable service. 2. Mandatory retirement at age 60. 3. Age 48 with age plus creditable service equal to 80 or more.	***Uniformed Patrol Employees Only:*** The earlier of attaining: 1. Mandatory retirement at age 60. 2. Age 48 with age plus creditable service equal to 80 or more.	***Uniformed Patrol Employees Only:*** The earlier of attaining: 1. Age 55 with at least 5 years of creditable service. 2. Mandatory retirement at age 60.
Final Average Pay Used for Benefit Determination	**Final Average Pay Used for Benefit Determination**	**Final Average Pay Used for Benefit Determination**
Final Average Pay is the average annual pay of a member for the three consecutive years of service during which pay was highest (overtime pay is included for purposes of determining average pay). Employees terminating after reaching retirement eligibility will receive 1/12 of a year of creditable service for every 168 hours of unused sick leave (usable only for benefit computation, not eligibility).	Final Average Pay is the average annual pay of a member for the three consecutive years of service during which pay was highest (overtime pay is included for purposes of determining average pay). All vested members will receive 1/12 of a year of creditable service for every 168 hours of unused sick leave (usable only for benefit computation, not eligibility).	Final Average Pay is the average annual pay of a member for the three consecutive years of service during which pay was highest (overtime pay is included for purposes of determining average pay). Employees terminating after reaching retirement eligibility will receive 1/12 of a year of creditable service for every 168 hours of unused sick leave (usable only for benefit computation, not eligibility).

**See Chapter 104.010.1(32) RSMo.*

Closed Plan	Year 2000 Plan	2011 Tier
Normal Retirement Benefit Amount	**Normal Retirement Benefit Amount**	**Normal Retirement Benefit Amount**
Non-Uniformed Employees: Life Benefit: 1.6% of final average pay times years of creditable service. ***Uniformed Patrol Employees:*** Life Benefit: 2.1333% of final average pay times years of creditable service. Special Benefit: $90 per month payable until age 65. Offset by any amount earned from gainful employment. This benefit does not apply to uniformed members hired on or after January 1, 1995.	***All Employees:*** Life Benefit: 1.7% of final average pay times years of creditable service. Temporary Benefit: If member retires between ages 48 and 62 with age plus creditable service equal to 80 or more, a temporary benefit is payable in the amount of 0.8% of final average pay times years of creditable service until attainment of age 62 or death, whichever occurs first. All Uniformed Patrol members are eligible for the temporary benefit until age 62.	***All Employees:*** Life Benefit: 1.7% of final average pay times years of creditable service. Temporary Benefit: If member retires between ages 55 and 62 with age plus creditable service equal to 90 or more, a temporary benefit is payable in the amount of 0.8% of final average pay times years of creditable service until attainment of age 62 or death, whichever occurs first. All Uniformed Patrol members are eligible for the temporary benefit until age 62.
Early Retirement (reduced benefit)	**Early Retirement (reduced benefit)**	**Early Retirement (reduced benefit)**
Eligibility: Non-Uniformed Employees Age 55 with at least 10 years of creditable service. ***Amount:*** Normal retirement amount reduced by 0.6% for each month that retirement precedes eligibility for normal retirement. ***Uniformed Patrol*** members are not eligible for early retirement.	***Eligibility: All Employees*** Age 57 with at least 5 years of creditable service. ***Amount:*** Normal retirement amount reduced by 0.5% for each month that retirement precedes eligibility for normal retirement.	***Eligibility: All Active Non-Uniformed Employees*** Age 62 with at least 5 years of creditable service. ***Amount:*** Normal retirement amount reduced by 0.5% for each month that retirement precedes eligibility for normal retirement. ***Uniformed Patrol*** members are not eligible for early retirement.

Closed Plan	Year 2000 Plan	2011 Tier
Vested Deferred Benefits	**Vested Deferred Benefits**	**Vested Deferred Benefits**
Eligibility: All Employees Fully vested in accrued pension with 5 years of creditable service. The benefit will commence at the age the individual is eligible for early or normal retirement, considering years of creditable service.	***Eligibility: All Employees*** Fully vested in accrued pension with 5 years of creditable service. The benefit will commence at the age the individual is eligible for early or normal retirement considering years of creditable service. Normal retirement eligibility begins at age 62.	***Eligibility: All Employees*** Fully vested in accrued pension with 5 years of creditable service. The benefit will commence at the age the individual is eligible for normal retirement considering years of creditable service. Normal retirement eligibility begins at age 67.
Minimum Base Benefit	**Minimum Base Benefit**	**Minimum Base Benefit**
Receive a monthly base benefit of no less than $15 for each full year of creditable service. Must be eligible to receive a normal or early retirement benefit the first of the month immediately following the date you leave state employment. Not required to immediately start drawing a benefit.	Same.	Same.
Death Prior to Retirement	**Death Prior to Retirement**	**Death Prior to Retirement**
The spouse of the member who dies after accruing 5 years of creditable service may elect to receive an annuity as if the employee had retired on the date of death and elected a joint and 100% survivor annuity. If no eligible spouse survives or upon the death of the spouse, 80% of the member's accrued annuity will be paid to eligible children until age 21. If the member has 3 or more, but less than 5 years of creditable service, the surviving spouse may elect to receive an annuity equal to 25% of the accrued benefit. If the death is duty-related, there is no service requirement and the minimum annuity is 50% of the final average pay (FAP) to the surviving spouse or eligible children.	The spouse of the member who dies after accruing 5 years of creditable service may elect to receive an annuity as if the employee had retired on the date of death and elected a joint and 100% survivor annuity. If no eligible spouse survives or upon the death of the spouse, 80% of the member's accrued annuity will be paid to eligible children until age 21. If the death is duty related, there is no service requirement and the minimum annuity is 50% of the final average pay (FAP) to the surviving spouse or eligible children.	**Actives:** The spouse of the member who dies after accruing 5 years of creditable service may elect to receive an annuity as if the employee had retired on the date of death and elected a joint and 100% survivor annuity. **Deferred:** The spouse of a vested former member who dies after accruing 5 years of creditable service may elect to receive an annuity on the date the member would have attained normal retirement eligibility based on a joint and 100% survivor annuity election. If no eligible spouse survives or upon the death of the spouse, 80% of the member's accrued annuity will be paid to eligible children until age 21. If the death is duty related, there is no service requirement and the minimum annuity is 50% of the final average pay (FAP) to the surviving spouse or eligible children.

Closed Plan	Year 2000 Plan	2011 Tier
Death After Retirement	**Death After Retirement**	**Death After Retirement**
The benefit payable is 50% of the benefit the retired member was receiving on the date of death (the normal form of payment), or the benefit payable under the joint and survivor or period certain form of payment, if the member elected an optional form of payment at time of retirement. A member who is not married at retirement but marries thereafter may designate a spouse as beneficiary. Additionally, a member may designate a new spouse as beneficiary in the event of the death of the spouse the member was married to at the date of retirement. The election must be completed within one year of the date of marriage. For period certain annuities, beneficiaries may be changed at any time.	The benefit payable under the joint and survivor or period certain form of payment, if the member elected an optional form of payment at time of retirement. A member who is not married at retirement but marries thereafter may designate a spouse as beneficiary. Additionally, a member may designate a new spouse as beneficiary in the event of the death of the spouse the member was married to at the date of retirement. The election must be completed within one year of the date of marriage. For period certain annuities, beneficiaries may be changed at any time.	The benefit payable under the joint and survivor or period certain form of payment, if the member elected an optional form of payment at time of retirement. A member who is not married at retirement but marries thereafter may designate a spouse as beneficiary. Additionally, a member may designate a new spouse as beneficiary in the event of the death of the spouse the member was married to at the date of retirement. The election must be completed within one year of the date of marriage. For period certain annuities, beneficiaries may be changed at any time.
Pop-Up Provision	**Pop-Up Provision**	**Pop-Up Provision**
Benefits to members who choose a reduced survivor form of payment and whose spouse precedes the member in death, will “pop-up” or revert to the amount the member would have received had he/she not elected a reduced survivor option.	Same.	Same.

Closed Plan	Year 2000 Plan	2011 Tier
$5,000 Death Benefit MPERS provides a $5,000 death benefit for a designated beneficiary(ies) of members who retire from service or were approved for normal or work-related disability benefits after September 28, 1985. Members who die while on terminated vested status or long-term disability status do not qualify for this benefit. Long-term disability recipients who retire on or after September 28, 1985 are eligible to receive this benefit.	**$5,000 Death Benefit** MPERS provides a $5,000 death benefit for a designated beneficiary(ies) of members who retire from service or were approved for work-related disability benefits. Members who die while on terminated vested status or long-term disability status do not qualify for this benefit. Long-term disability recipients who retire are eligible to receive this benefit.	**$5,000 Death Benefit** MPERS provides a $5,000 death benefit for a designated beneficiary(ies) of members who retire from service or were approved for work-related disability benefits. Members who die while on terminated vested status or long-term disability status do not qualify for this benefit. Long-term disability recipients who retire are eligible to receive this benefit.
Purchase of Service **Military:** Prior to retirement, qualifying members may purchase up to a maximum of 4 years military service that includes active service, and/or active and inactive duty training from which they were honorably discharged. All months the member is eligible for must be purchased. This service credit ***can*** be used to satisfy the vesting requirement. Periods of military service cannot coincide with employment in a state agency.	**Purchase of Service** **Military:** Prior to retirement, qualifying members may purchase up to a maximum of 4 years military service that includes active service from which they were honorably discharged. All months the member is eligible for must be purchased. This service credit ***cannot*** be used to satisfy the vesting requirement. Periods of military service cannot coincide with employment in a state agency.	**Purchase of Service** **Military:** Not available.
Police Service: Prior to retirement, uniformed patrol members only, may purchase up to a maximum of 4 years police service. Members must purchase all months of service they are eligible for.	**Police Service:** Not available.	**Police Service:** Not available.

Closed Plan	Year 2000 Plan	2011 Tier
Portability: Section 105.691 allows vested members to acquire (purchase/transfer) service credit for any non-federal, full-time public sector employment within Missouri. Service may be purchased/transferred by using the member's own money and/or using the value of the retirement benefit in the prior retirement plan if that plan has an agreement with MPERS. Any non-federal public employment **not covered** by a retirement plan must be purchased.	**Portability:** Same as Closed Plan Section 105.691.	**Portability:** Same as Closed Plan Section 105.691.
Public Employment Prior Service (Subsidized Purchase)	**Public Employment Prior Service (Subsidized Purchase)**	**Public Employment Prior Service (Subsidized Purchase)**
Section 104.040.6 allows, prior to retirement, members may purchase up to a maximum of 4 years full-time "public employment." Public employment refers to employment with a city, county, municipality, public school, or other political subdivision. Federal and out-of-state employment is not eligible. Members must purchase all months of service they are eligible for up to 4 years.	Not available.	Not available.
Disability	**Disability**	**Disability**
Benefits that may be payable during the period of disability (whether Normal, Work-related, or LTD) are administered through a separate program and were not considered for purposes of the valuation. Normal retirement benefits become payable at the time a disabled member becomes eligible for normal retirement, and are computed based on: i) the service that would have accrued to the member if active employment had continued; and ii) the member's rate of pay at the time of disability.	Benefits that may be payable during the period of disability (whether Normal, Work-related, or LTD) are administered through a separate program and were not considered for purposes of the valuation. Normal retirement benefits become payable at the time a disabled member becomes eligible for normal retirement, and are computed based on: i) the service that would have accrued to the member if active employment had continued; and ii) the member's rate of pay at the time of disability increased by 80% of CPI to the retirement date.	Benefits that may be payable during the period of disability (whether Normal, Work-related, or LTD) are administered through a separate program and were not considered for purposes of the valuation. Normal retirement benefits become payable at the time a disabled member becomes eligible for normal retirement, and are computed based on: i) the service that would have accrued to the member if active employment had continued; and ii) the member's rate of pay at the time of disability increased by 80% of CPI to the retirement date.

Closed Plan	Year 2000 Plan	2011 Tier
Post-Retirement Benefit Adjustments For active and inactive employees and current retirees hired prior to August 28, 1997, the benefits of pensioners and their beneficiaries are increased annually by 80% of the increase in the Consumer Price Index (subject to a maximum increase of 5% and a minimum of 4%). These increases are made until the total of the increases reaches 65% of initial benefit at which time the increases will have the minimum removed. For employees hired on or after August 28, 1997 the annual percentage increase is equal to the lesser of: i) 80% of the CPI-U increase, or ii) 5%.	**Post-Retirement Benefit Adjustments** Benefits are increased to retired members (including survivors) annually in accordance with the following: Annual benefit percentage increase equal to the lesser of: i) 80% of the CPI-U increase, or ii) 5%.	**Post-Retirement Benefit Adjustments** Benefits are increased to retired members (including survivors) annually* in accordance with the following: Annual benefit percentage increase equal to the lesser of: i) 80% of the CPI-U increase, or ii) 5%. ** Vested former members and their survivor benefits are increased beginning on the second anniversary of retirement.*
Member Contributions None.	**Member Contributions** None.	**Member Contributions** 4% contributions with interest credited annually at a rate equal to the investment rate published by the US Department of Treasury for 52-week treasury bill, nearest the preceding July 1st. The state of Missouri employer shall pick up and pay the contributions. A deduction shall be made from each member's compensation equal to the amount of the member's contributions picked up by the employer.

The Closed Plan and Year 2000 Plan
BackDROP Option

Legislation effective January 1, 2002 provides a Deferred Retirement Option Provision (BackDROP) to members of MPERS. It is available in both the Closed Plan and the Year 2000 Plan.

To be eligible to participate in the BackDROP, a member must have been eligible to retire under normal age and/or service conditions for at least two years. A retroactive starting date is established for BackDROP purposes which is the later of: 1) the member's normal retirement date; or 2) five years prior to the annuity starting date under the retirement plan selected by the member.

The BackDROP period for the accumulation of the BackDROP amount is from the retroactive starting date to the annuity starting date. This results in a BackDROP period of one to five years depending upon the individual situation.

A theoretical BackDROP account is accumulated that includes 90% of the value of the benefit payments that would have been paid during the BackDROP period had the member retired at the retroactive starting date. These payments include applicable post-retirement benefit increases. These payments do not include any reduction for spouse options during the BackDROP period. The member may choose the BackDROP period in 12-month increments or their maximum period, not to exceed 60 months.

The member is paid the resulting lump sum value of the BackDROP account as of the annuity starting date or as three equal annual installments beginning at the annuity starting date.

The annuity benefit payable from the actual retirement date is computed with years of service and final average pay as of the retroactive starting date for the BackDROP. Post-retirement benefit increases that occurred during the BackDROP period are applied in the calculation of the monthly annuity.

Sample Benefit Computation for Closed Plan Members
Retiring July 1, 2024
Non-Uniformed Employee

	Data	Description
A.	$40,000	Final Average Pay
B.	20	Years of Creditable Service
C.	60	Age of Retiree
D.	50%	Automatic percentage to continue to spouse after retirant's death

Sample Computation Steps

E.	Retirement Benefit Formula:	0.016 x 20 x $40,000 = $12,800

Benefit payable to:

F.	Retiree while spouse is alive (E)	$ 12,800
G.	Spouse after retiree's death (D x E)	$ 6,400
H.	Retiree after spouse's death	$ 12,800

Year Ended June 30	Annual Amount Payable if Price Inflation is 2.25% and Post-Retirement Increases are 1.8%
2024	$12,800
2025	13,030
2026	13,265
2027	13,504
2028	13,747
2029	13,994
2030	14,246
2031	14,503
2032	14,764
2033	15,029

Sample Benefit Computation for Closed Plan Members
Retiring July 1, 2024
Uniformed Patrol

	Data	Description
A.	$40,000	Final Average Pay
B.	20	Years of Creditable Service
C.	60	Age of Retiree
D.	50%	Automatic percentage to continue to spouse after retirant's death

Sample Computation Steps

E.	Retirement Benefit Formula:	0.021333 x 20 x $40,000 = $17,066

Benefit payable to:

F.	Retiree while spouse is alive (E)	$ 17,066
G.	Spouse after retiree's death (D x E)	$ 8,533
H.	Retiree after spouse's death	$ 17,066

Amounts shown below do not include the $1,080 annual supplementary benefit payable to age 65.

Year Ended June 30	Annual Amount Payable if Price Inflation is 2.25% and Post-Retirement Increases are 1.8%
2024	$17,066
2025	17,373
2026	17,686
2027	18,004
2028	18,328
2029	18,658
2030	18,994
2031	19,336
2032	19,684
2033	20,038

Sample Benefit Computation for Year 2000 Plan Members Retiring July 1, 2024

	Data	Description
A.	$40,000	Final Average Pay
B.	20	Years of Creditable Service
C.	60 (67 for 2011 Tier)	Age of Retiree
D.	0%	Automatic percentage to continue to spouse after retirant's death

E1.	Retirement Benefit Formula:	0.017 x 20 x $40,000 = $13,600
E2.	Supplemental Benefit Formula:	.008 x 20 x $40,000 = $6,400

Benefit payable to:

F1.	Retiree prior to age 62 (E1+E2)	$ 20,000
F2.	Retiree after age 62 (E1)	$ 13,600
G.	Spouse after retiree's death (D x E)	$ 0

Year Ended June 30	Annual Amount Payable if Price Inflation is 2.25% and Post-Retirement Increases are 1.8%
2024	$20,000
2025	20,360
2026	14,094
2027	14,348
2028	14,606
2029	14,869
2030	15,137
2031	15,409
2032	15,686
2033	15,969

SECTION C

FINANCIAL INFORMATION

Summary of Fund Operations

	2024	2023
Market Value of Fund Beginning of Fiscal Year	$3,281,627,844	$3,067,193,086
Post Valuation Audit Adjustment	0	0
Contributions		
Employer	254,358,101	232,813,995
Employee	8,249,824	6,838,152
Transfer from MOSERS	6,634,554	4,036,789
Service Purchase (Employee)	997,692	573,233
Total Contributions	$ 270,240,171	$ 244,262,169
Investment Return		
Interest	$ 85,634,889	$ 63,201,787
Dividends	6,703,504	6,915,593
Real Estate	63,478,101	45,117,378
Realized Capital Gains	876,992,645	1,064,856,358
Realized Capital Losses	(626,449,505)	(890,295,828)
Miscellaneous Income	0	0
Securities Lending Income	156,046	196,037
Other	0	0
Total Investment Return	$ 406,515,680	$ 289,991,325
Other Income (Rental Income and Misc.)	178	1,954
Increase (Decrease) in Unrealized Appreciation	70,877,733	7,203,440
Benefit Payments		
Retirement Payments	$ 280,196,969	$ 266,371,260
Retirement Payments - BackDROP	12,241,819	15,605,731
Death Benefits	960,000	1,065,000
Long-Term Disability Payments	20,789	8,884
Insured Disability Program	1,581,734	1,715,791
Employee Contribution Refunds	996,748	972,241
Service Transfer Payments - Employer	4,082,999	3,317,630
Total Benefit Payments	$ 300,081,057	$ 289,056,536
Expenses		
Investment	$ 45,272,091	$ 32,438,336
Other	6,250,951	5,529,258
Total Expenses	$ 51,523,042	$ 37,967,594
Market Value of Fund End of Fiscal Year	$3,677,657,507	$3,281,627,844

Note: Numbers may not add due to rounding.

Missouri MPERS
Development of Actuarial Value of Assets

Valuation Date of June 30	2019	2020	2021	2022	2023	2024	2025	2026
A. Actuarial value at beginning of year	$2,274,248,122	$2,415,343,431	$2,481,329,531	$2,711,272,503	$2,925,561,398	**$3,247,983,333**		
B. Market value at end of year	2,423,261,830	2,361,599,888	3,003,925,228	3,067,193,086	3,281,627,844	**3,677,657,507**		
C. Market value at beginning of year	2,314,530,148	2,423,261,830	2,361,599,888	3,003,925,228	3,067,193,086	**3,281,627,844**		
D. Cash flow								
D1. Contributions	218,595,641	220,902,777	217,389,128	225,366,897	244,262,169	**270,240,171**		
D2. Benefit Payments	(259,817,811)	(267,605,833)	(270,122,850)	(279,637,701)	(289,056,536)	**(300,081,057)**		
D3. Administrative Expenses	(4,372,966)	(4,291,028)	(4,585,473)	(5,229,018)	(5,529,258)	**(6,250,951)**		
D4. Non-Investment Net Cash Flow	(45,595,136)	(50,994,084)	(57,319,195)	(59,499,822)	(50,323,625)	**(36,091,837)**		
E. Investment income								
E1. Market total (B - C - D4)	154,326,818	(10,667,858)	699,644,535	122,767,680	264,758,383	**432,121,500**		
E2. Assumed Rate of Return	7.00%	7.00%	7.00%	6.50%	6.50%	**6.50%**	**6.50%**	
E3. Amount for Immediate Recognition (A+.5xD4)xE2	157,601,539	167,289,247	171,686,895	174,298,968	188,525,973	**209,945,932**		
E4. Amount for Phased-In Recognition	(3,274,721)	(177,957,105)	527,957,640	(51,531,288)	76,232,410	**222,175,568**		
F. Phased in recognition of investment income								
F1. Current Year (33 1/3% of E4)	(1,091,574)	(59,319,035)	175,985,880	(17,177,096)	25,410,803	**74,058,523**		
F2. First Prior Year	10,101,546	(1,091,574)	(59,319,035)	175,985,880	(17,177,096)	25,410,803	$ 74,058,523	
F3. Second Prior Year	20,078,934	10,101,546	(1,091,573)	(59,319,035)	175,985,880	(17,177,096)	25,410,804	$ 74,058,522
F4. Total Recognized Investment Gain (F1 + F2 + F3)	29,088,906	(50,309,063)	115,575,272	99,489,749	184,219,587	**82,292,230**	99,469,327	74,058,522
G. Actuarial value at end of year (A + D4 + E3 + F4)	2,415,343,431	2,481,329,531	2,711,272,503	2,925,561,398	3,247,983,333	**3,504,129,658**		
Less LTD Assets	0	0	0	0	0	**0**		
H. Preliminary Plan AVA	2,415,343,431	2,481,329,531	2,711,272,503	2,925,561,398	3,247,983,333	**3,504,129,658**		
I. Corridor (Maximum of 120% of Market Value)	2,907,914,196	2,833,919,866	3,604,710,274	3,680,631,703	3,937,953,413	**4,413,189,008**		
J. Corridor Minimum of 80% of Market Value)	1,938,609,464	1,889,279,910	2,403,140,182	2,453,754,469	2,625,302,275	**2,942,126,006**		
K. Additional Investment Gain/(Loss) recognized due to corridor	0	0	0	0	0	0		
L. Final Plan AVA after corridor adjustment, if any	2,415,343,431	2,481,329,531	2,711,272,503	2,925,561,398	3,247,983,333	**3,504,129,658**		
Difference between market and actuarial values	7,918,399	(119,729,643)	292,652,725	141,631,688	33,644,511	**173,527,849**		
Market Rate of Return#	6.73%	(0.44)%	29.99%	3.90%	8.90%	**13.29%**		
Ratio of Actuarial Value to Market Value	99.67%	105.07%	90.26%	95.38%	98.97%	**95.28%**		
Recognized actuarial rate of return	8.29%	4.89%	11.71%	10.21%	12.85%	**9.05%**		

 # Rates prior to the June 30, 2022 valuation were calculated by GRS. Rates on or after the June 30, 2022 valuation were provided by the System's investment consultant.

Allocation of Assets between Groups

The allocation of the actuarial value of assets between the Uniformed Patrol and Non-Uniformed Employee groups is in proportion to their market value of assets, as shown below:

Allocation of Actuarial Value of Assets	June 30 2024	June 30 2023
1. Actuarial Value of Assets	$3,504,129,658	$3,247,983,333
2. Reported Market Value of Assets		
a) Uniformed Patrol	1,071,697,765	962,972,186
b) Non-Uniformed Employees	2,605,959,742	2,318,655,658
c) Total	3,677,657,507	3,281,627,844
3. Actuarial Value of Assets Split		
a) Uniformed Patrol		
(2a) / (2c) x (1)	1,021,130,411	953,099,425
b) Non-Uniformed Employees		
(2b) / (2c) x (1)	2,482,999,247	2,294,883,908
4. Total Assets Allocated	3,504,129,658	3,247,983,333

SECTION D

SUMMARY OF MEMBER DATA

Civilian Patrol Closed Active Members
as of June 30, 2024
by Attained Age and Years of Service

Attained Age	Count by Completed Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20									
20-24									
25-29									
30-34									
35-39									
40-44		1			1			2	$ 97,179
45-49					6	15	1	22	1,479,444
50-54		1	1	1	5	32	6	46	2,958,691
55-59			3		6	14	13	36	2,411,545
60					1	3	3	7	522,585
61			1			2	3	6	370,590
62						3		3	191,640
63				1		2	2	5	367,894
64					1	2		3	132,720
65			1				2	3	169,749
66						1		1	34,992
67							1	1	60,432
68							1	1	48,042
69						1	1	2	165,698
70									
Over 70							1	1	44,520
Totals		**2**	**6**	**2**	**20**	**75**	**34**	**139**	**$9,055,721**

Average Age: 54.9 years
Average Service: 27.6 years
Average Pay: $65,149

Civilian Patrol Year 2000 Active Members as of June 30, 2024 by Attained Age and Years of Service

Attained Age	Count by Completed Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20									
20-24									
25-29									
30-34		1						1	$ 58,686
35-39	2	1	14	15	1			33	2,179,311
40-44		1	10	33	20			64	4,634,634
45-49		4	8	25	21			58	4,187,593
50-54	3		8	18	22	1		52	3,221,638
55-59		5	6	30	18			59	3,532,469
60			1	4	3			8	490,956
61			2	1	2			5	328,869
62		1		1	1			3	153,919
63				1	1			2	79,680
64			1	3	1			5	404,595
65				1	1			2	83,596
66				1				1	55,229
67									
68									
69									
70	1							1	16,968
Over 70									
Totals	**6**	**13**	**50**	**133**	**91**	**1**		**294**	**$19,428,143**

Average Age: 49.1 years
Average Service: 17.5 years
Average Pay: $66,082

Civilian Patrol 2011 Tier Active Members
as of June 30, 2024
by Attained Age and Years of Service

Attained Age	Count by Completed Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20									
20-24	29							29	$ 1,191,183
25-29	87	18						105	5,413,347
30-34	56	51	17					124	7,051,144
35-39	19	27	29					75	4,310,371
40-44	25	19	13					57	2,999,905
45-49	20	16	14					50	2,530,931
50-54	22	20	12					54	2,624,456
55-59	35	16	12					63	2,955,558
60	2	4	4					10	495,945
61	5	3	2					10	452,782
62	5	2						7	306,440
63	4	6						10	406,909
64	2	3	1					6	273,920
65	1		1					2	83,699
66	1	4	1					6	259,971
67	1	2	1					4	195,396
68			1					1	62,832
69	1							1	40,249
70									
Over 70			1					1	52,536
Totals	**315**	**191**	**109**					**615**	**$31,707,574**

Average Age: 40.8 years
Average Service: 5.5 years
Average Pay: $51,557

MoDOT Closed Active Members
as of June 30, 2024
by Attained Age and Years of Service

Attained Age	Count by Completed Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20									
20-24									
25-29									
30-34									
35-39									
40-44					6	6		12	$ 808,069
45-49		1	3	2	51	85	2	144	10,578,457
50-54			3	1	35	159	52	250	19,502,262
55-59			4	4	25	66	94	193	15,004,601
60				1	5	12	13	31	2,186,094
61	1	1	2		1	9	13	27	1,843,567
62						5	9	14	1,153,961
63					2	9	5	16	1,203,909
64					4	9	10	23	1,514,774
65	1				1	2	6	10	782,016
66						2	3	5	311,257
67						1		1	71,769
68						1	2	3	250,053
69							1	1	87,155
70						1	1	2	158,962
Over 70					1		4	5	446,876
Totals	**2**	**2**	**12**	**8**	**131**	**367**	**215**	**737**	**$55,903,782**

Average Age: 54.3 years
Average Service: 28.0 years
Average Pay: $75,853

MoDOT Year 2000 Active Members
as of June 30, 2024
by Attained Age and Years of Service

Attained Age	Count by Completed Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20									
20-24									
25-29									
30-34									
35-39	6	6	23	67	2			104	$ 6,438,015
40-44	8	6	27	141	69			251	16,798,148
45-49	8	7	22	105	130	1		273	18,356,958
50-54	5	16	25	89	100	1		236	15,591,411
55-59	12	7	10	76	88	1		194	11,563,773
60			3	10	9	1		23	1,379,719
61		2	5	9	11			27	1,567,592
62		1	1	14	10			26	1,445,711
63		1	4	14	9			28	1,621,065
64	1		1	5	8			15	839,377
65				5	4			9	530,830
66			3	7				10	597,428
67				3	2			5	270,162
68				1	1			2	111,813
69		1	2	1				4	211,113
70				1	1			2	144,918
Over 70					3			3	157,562
Totals	**40**	**47**	**126**	**548**	**447**	**4**		**1,212**	**$77,625,595**

Average Age: 49.7 years
Average Service: 17.9 years
Average Pay: $64,048

MoDOT 2011 Tier Active Members
as of June 30, 2024
by Attained Age and Years of Service

Attained Age	Count by Completed Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20	11							11	$ 430,311
20-24	222	5						227	9,809,110
25-29	315	88						403	20,795,729
30-34	225	210	33					468	25,718,923
35-39	204	167	47					418	22,598,120
40-44	151	115	41					307	15,876,895
45-49	120	89	28					237	12,018,127
50-54	134	84	31					249	12,928,219
55-59	120	85	31					236	11,896,267
60	22	17	6		1			46	2,190,376
61	14	11	6					31	1,518,065
62	14	13	8					35	1,779,365
63	12	9	4					25	1,357,054
64	11	8	5					24	1,141,663
65	9	11	5					25	1,272,046
66	1	5	1					7	330,846
67	1	2	1					4	195,511
68	3	1	1					5	219,237
69		4						4	194,108
70			1					1	70,048
Over 70	1	2						3	142,390
Totals	**1,590**	**926**	**249**		**1**			**2,766**	**$142,482,410**

Average Age: 39.9 years
Average Service: 4.6 years
Average Pay: $51,512

Uniformed Patrol Closed Active Members
as of June 30, 2024
by Attained Age and Years of Service

Attained Age	Count by Completed Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20									
20-24									
25-29									
30-34									
35-39									
40-44			1					1	$ 72,646
45-49					13	33		46	4,996,707
50-54				1	4	102	34	141	15,447,852
55-59	1				1	30	31	63	6,943,231
60							1	1	125,743
61									
62									
63									
64									
65									
66									
67									
68									
69									
70									
Over 70									
Totals	**1**		**1**	**1**	**18**	**165**	**66**	**252**	**$27,586,179**

Average Age: 52.3 years
Average Service: 28.2 years
Average Pay: $109,469

Uniformed Patrol Year 2000 Active Members
as of June 30, 2024
by Attained Age and Years of Service

Attained Age	Count by Completed Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20									
20-24									
25-29									
30-34			1					1	$ 99,172
35-39	1		27	45	1			74	7,239,747
40-44			10	77	26			113	11,512,320
45-49	1		3	31	62	3		100	10,510,495
50-54			3	15	30	1		49	4,992,889
55-59				3	6			9	899,588
60				2				2	208,688
61									
62									
63									
64									
65									
66									
67									
68									
69									
70									
Over 70									
Totals	**2**		**44**	**173**	**125**	**4**		**348**	**$35,462,899**

Average Age: 44.3 years
Average Service: 18.7 years
Average Pay: $101,905

Uniformed Patrol 2011 Tier Active Members as of June 30, 2024 by Attained Age and Years of Service

Attained Age	Count by Completed Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20									
20-24	46							46	$ 3,161,875
25-29	85	58						143	10,203,699
30-34	44	92	34					170	12,899,222
35-39	21	29	69					119	9,752,253
40-44	3	9	9					21	1,618,128
45-49		4	8					12	1,025,524
50-54	1		1					2	147,449
55-59		1	2					3	242,969
60									
61									
62									
63									
64									
65									
66									
67									
68									
69									
70									
Over 70									
Totals	**200**	**193**	**123**					**516**	**$39,051,119**

Average Age: 31.8 years
Average Service: 6.4 years
Average Pay: $75,680

Growth of Active Member Payroll

Growth of Active Member Payroll

Actuarial Valuation for June 30,	Number	Covered Payroll	Average Pay	% Change in Average Pay from Prior Year
1989	8,181	$194,452,400	$23,769	(0.5)%
1990	8,256	211,414,753	25,607	7.7 %
1991	8,308	220,856,988	26,584	3.8 %
1992	8,591	228,503,592	26,598	0.1 %
1993	8,658	236,236,082	27,285	2.6 %
1994	8,849	242,864,780	27,445	0.6 %
1995	8,904	250,529,253	28,137	2.5 %
1996	9,023	264,196,115	29,280	4.1 %
1997	8,997	280,209,116	31,145	6.4 %
1998	8,871	284,889,796	32,115	3.1 %
1999	9,140	298,673,247	32,678	1.8 %
2000	9,171	312,532,009	34,078	4.3 %
2001	9,087	327,049,257	35,991	5.6 %
2002	8,695	312,747,492	35,969	(0.1)%
2003	8,892	318,744,192	35,846	(0.3)%
2004	9,002	328,210,887	36,460	1.7 %
2005	9,193	345,695,867	37,604	3.1 %
2006	9,033	348,614,699	38,593	2.6 %
2007	8,640	360,842,421	41,764	8.2 %
2008	8,599	369,424,653	42,961	2.9 %
2009	8,784	377,652,245	42,993	0.1 %
2010	8,457	369,911,252	43,740	1.7 %
2011	8,231	361,639,001	43,936	0.4 %
2012	7,458	329,293,168	44,153	0.5 %
2013	7,319	323,205,767	44,160	0.0 %
2014	7,390	332,085,689	44,937	1.8 %
2015	7,358	334,400,980	45,447	1.1 %
2016	7,441	339,799,379	45,666	0.5 %
2017	7,456	348,979,212	46,805	2.5 %
2018	7,391	351,496,555	47,557	1.6 %
2019	7,421	359,296,056	48,416	1.8 %
2020	7,355	360,851,545	49,062	1.3 %
2021	7,219	355,194,571	49,203	0.3 %
2022	6,874	356,662,243	51,886	5.5 %
2023	6,621	389,324,744	58,802	13.3 %
2024	6,879	438,303,422	63,716	8.4 %
			Ten-Year Average:	3.6 %

Count and Total Monthly Benefits
Civilian Patrol Closed Retired (Non-Disabled)
Members and Survivors
as of June 30, 2024
by Attained Age

Age	Number	Monthly Benefit Amount
Less than 20		
20-24		
25-29		
30-34		
35-39		
40-44		
45-49		
50-54	2	$ 2,266
55-59	25	49,500
60-64	57	123,458
65-69	76	158,252
70-74	80	156,593
75-79	72	125,345
80-84	57	114,205
85-89	55	126,650
90-94	43	93,117
95-99	5	6,859
100-104		
105 & Over		
TOTAL	**472**	**$ 956,245**

Note: Totals may not add due to rounding.

Count and Total Monthly Benefits of Civilian Patrol Year 2000 Retired (Non-Disabled) Members and Survivors as of June 30, 2024 by Attained Age

Age	Number	Monthly Benefit Amount
Less than 20	2	$ 1,010
20-24		
25-29		
30-34		
35-39		
40-44		
45-49		
50-54	10	35,657
55-59	56	159,263
60-64	135	218,673
65-69	160	241,181
70-74	167	265,036
75-79	127	201,219
80-84	55	89,214
85-89	5	2,706
90-94	1	2,577
95-99		
100-104		
105 & Over		
TOTAL	**718**	**$ 1,216,536**

Note: Totals may not add due to rounding.

Count and Total Monthly Benefits of Civilian Patrol 2011 Tier Retired (Non-Disabled) Members and Survivors as of June 30, 2024 by Attained Age

Age	Number	Monthly Benefit Amount
Less than 20	1	$ 393
20-24		
25-29		
30-34		
35-39	1	313
40-44		
45-49		
50-54		
55-59		
60-64	2	717
65-69	10	3,737
70-74	7	2,183
75-79		
80-84		
85-89		
90-94		
95-99		
100-104		
105 & Over		
TOTAL	**21**	**$ 7,343**

Note: Totals may not add due to rounding.

Count and Total Monthly Benefits of MoDOT Closed Retired (Non-Disabled) Members and Survivors as of June 30, 2024 by Attained Age

Age	Number	Monthly Benefit Amount
Less than 20		
20-24	1	$ 1,317
25-29	1	791
30-34		
35-39	1	217
40-44	2	1,353
45-49	8	8,020
50-54	25	36,725
55-59	139	284,737
60-64	300	577,236
65-69	445	848,583
70-74	376	705,203
75-79	359	689,909
80-84	479	1,230,721
85-89	565	1,666,261
90-94	239	638,626
95-99	61	154,145
100-104	7	8,430
105 & Over		
TOTAL	**3,008**	**$ 6,852,274**

Note: Totals may not add due to rounding.

Count and Total Monthly Benefits of MoDOT Year 2000 Retired (Non-Disabled) Members and Survivors as of June 30, 2024 by Attained Age

Age	Number	Monthly Benefit Amount
Less than 20	6	$ 2,720
20-24	1	214
25-29		
30-34	1	271
35-39	4	3,830
40-44	3	1,727
45-49	8	10,966
50-54	115	386,717
55-59	383	1,125,252
60-64	862	1,735,250
65-69	991	1,617,510
70-74	810	1,406,629
75-79	674	1,361,911
80-84	283	612,833
85-89	29	52,823
90-94	4	8,841
95-99	2	4,964
100-104	1	1,585
105 & Over		
TOTAL	**4,177**	**$ 8,334,043**

Note: Totals may not add due to rounding.

Count and Total Monthly Benefits of MoDOT Year 2011 Tier Retired (Non-Disabled) Members and Survivors as of June 30, 2024 by Attained Age

Age	Number	Monthly Benefit Amount
Less than 20		
20-24		
25-29		
30-34		
35-39	1	$ 244
40-44		
45-49		
50-54	1	481
55-59		
60-64	11	4,710
65-69	22	9,525
70-74	7	2,715
75-79	4	1,258
80-84		
85-89		
90-94		
95-99		
100-104		
105 & Over		
TOTAL	**46**	**$ 18,933**

Note: Totals may not add due to rounding.

Count and Total Monthly Benefits of Uniformed Patrol Closed Retired (Non-Disabled) Members and Survivors as of June 30, 2024 by Attained Age

Age	Number	Monthly Benefit Amount
Less than 20		
20-24		
25-29		
30-34		
35-39		
40-44	1	$ 1,723
45-49	6	17,760
50-54	66	304,919
55-59	196	814,844
60-64	184	969,719
65-69	162	961,825
70-74	161	922,617
75-79	163	885,257
80-84	118	653,055
85-89	83	430,733
90-94	18	85,646
95-99	10	55,675
100-104		
105 & Over		
TOTAL	**1,168**	**$ 6,103,773**

Note: Totals may not add due to rounding.

Count and Total Monthly Benefits of Uniformed Patrol Year 2000 Retired (Non-Disabled) Members and Survivors as of June 30, 2024 by Attained Age

Age	Number	Monthly Benefit Amount
Less than 20	2	$ 466
20-24		
25-29		
30-34		
35-39		
40-44	1	1,894
45-49	2	2,993
50-54	1	5,075
55-59	3	12,686
60-64	2	3,946
65-69	2	3,575
70-74		
75-79		
80-84		
85-89		
90-94		
95-99		
100-104		
105 & Over		
TOTAL	**13**	**$ 30,635**

Note: Totals may not add due to rounding.

Count and Total Monthly Benefits of Uniformed Patrol Year 2011 Tier Retired (Non-Disabled) Members and Survivors as of June 30, 2024 by Attained Age

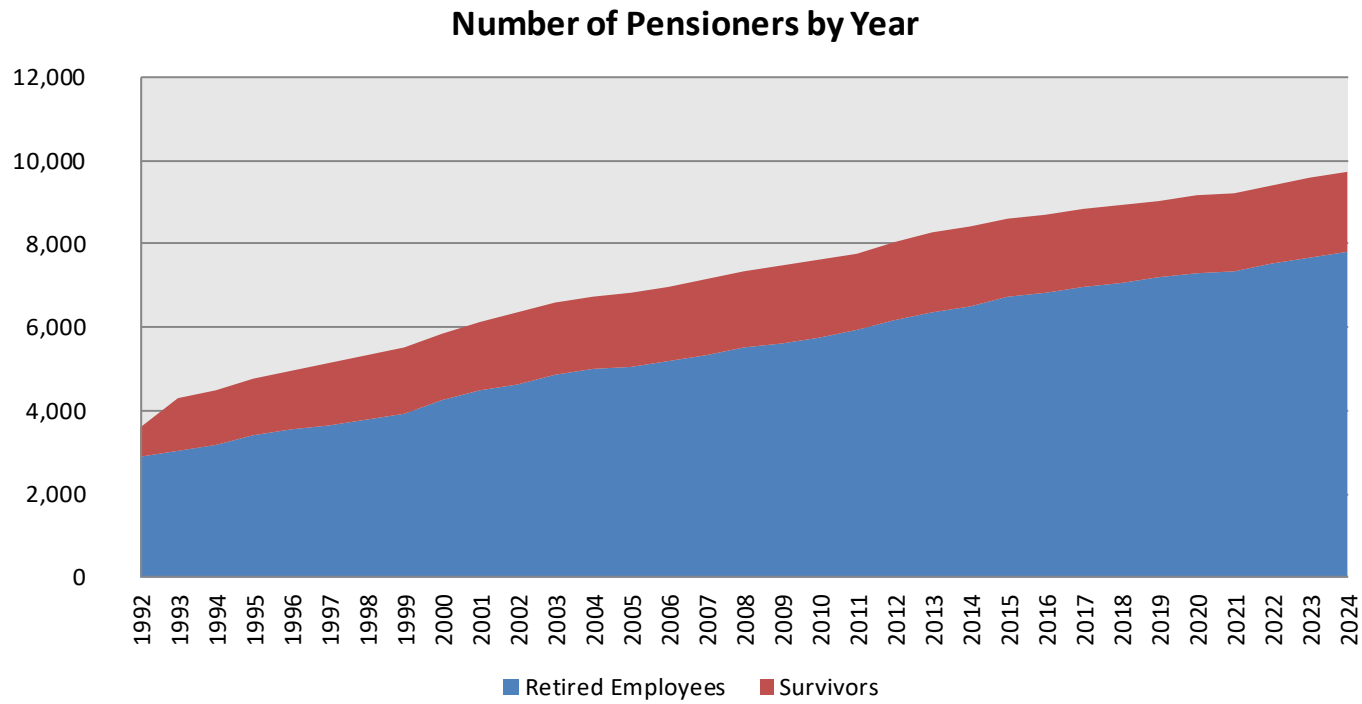
Age	Number	Monthly Benefit Amount
Less than 20		
20-24		
25-29	1	$ 483
30-34		
35-39		
40-44		
45-49		
50-54		
55-59		
60-64		
65-69		
70-74		
75-79		
80-84		
85-89		
90-94		
95-99		
100-104		
105 & Over		
TOTAL	**1**	**$ 483**

Note: Totals may not add due to rounding.

Growth of Pension Population by Year

Year	Retired Employees	Survivors	Total	% Increase	Annual Benefits	Active Payroll	Benefits as a % of Payroll
1992	2,908	699	3,607	4.7%			
1993	3,047	1,269	4,316	19.7%			
1994	3,156	1,307	4,463	3.4%			
1995	3,419	1,365	4,784	7.2%			
1996	3,536	1,405	4,941	3.3%			
1997	3,646	1,486	5,132	3.9%			
1998	3,781	1,549	5,330	3.9%	$ 80,686,152	$284,889,796	28.3%
1999	3,924	1,600	5,524	3.6%	91,512,311	298,673,247	30.6%
2000	4,236	1,621	5,857	6.0%	100,794,676	312,532,009	32.3%
2001	4,482	1,663	6,145	4.9%	115,998,915	327,049,257	35.5%
2002	4,623	1,716	6,339	3.2%	125,623,460	312,747,492	40.2%
2003	4,845	1,751	6,596	4.1%	136,320,125	318,744,192	42.8%
2004	4,996	1,735	6,731	2.0%	142,359,307	328,210,887	43.4%
2005	5,068	1,761	6,829	1.5%	148,340,170	345,695,867	42.9%
2006	5,164	1,790	6,954	1.8%	155,230,301	348,614,699	44.5%
2007	5,336	1,805	7,141	2.7%	164,048,455	360,842,421	45.5%
2008	5,496	1,829	7,325	2.6%	172,112,941	369,424,653	46.6%
2009	5,604	1,866	7,470	2.0%	179,850,466	377,652,245	47.6%
2010	5,739	1,867	7,606	1.8%	187,267,535	369,911,252	50.6%
2011	5,926	1,849	7,775	2.2%	191,892,660	361,639,001	53.1%
2012	6,172	1,883	8,055	3.6%	201,906,768	329,293,168	61.3%
2013	6,382	1,908	8,290	2.9%	210,904,464	323,205,767	65.3%
2014	6,507	1,894	8,401	1.3%	217,149,528	332,085,689	65.4%
2015	6,720	1,868	8,588	2.2%	223,021,512	334,400,980	66.7%
2016	6,814	1,870	8,684	1.1%	227,218,908	339,799,379	66.9%
2017	6,969	1,862	8,831	1.7%	231,168,516	348,979,212	66.2%
2018	7,064	1,852	8,916	1.0%	235,395,456	351,496,555	67.0%
2019	7,180	1,855	9,035	1.3%	241,935,168	359,296,056	67.3%
2020	7,318	1,864	9,182	1.6%	249,197,664	360,851,545	69.1%
2021	7,339	1,896	9,235	0.6%	252,148,236	355,194,571	71.0%
2022	7,518	1,908	9,426	2.1%	257,882,316	356,662,243	72.3%
2023	7,690	1,914	9,604	1.9%	270,729,868	389,324,744	69.5%
2024	7,821	1,919	9,740	1.4%	284,749,594	438,303,422	65.0%

Growth of Pension Population by Year



Self-Insured Disabled Retired Members as of June 30, 2024

Age	Number	Monthly Benefit Amount
Less than 20		
20-24		
25-29		
30-34		
35-39		
40-44		
45-49		
50-54	2	$ 4,087
55-59	2	4,408
60-64	5	5,447
65-69	5	5,749
70-74	11	10,265
75-79	6	6,097
80-84	1	942
85-89		
90-94	1	128
95-99		
100-104		
105 & Over		
TOTAL	**33**	**$ 37,122**

Note: Totals may not add due to rounding.

These members became disabled prior to outsourcing disability claims. Liabilities for these members include benefits payable during and after the period of disability.

Fully Insured Disabled Retired Members as of June 30, 2024

Age	Number	Monthly Benefit Amount
Less than 20		
20-24		
25-29		
30-34		
35-39	5	$ 15,209
40-44	4	11,247
45-49	15	43,964
50-54	22	52,852
55-59	19	29,226
60-64	17	18,520
65-69	1	727
70-74		
75-79		
80-84		
85-89		
90-94		
95-99		
100-104		
105 & Over		
TOTAL	**83**	**$ 171,744**

Note: Totals may not add due to rounding.

These members became disabled after disability claims became outsourced. Liabilities for these members during the period of disability are an obligation of the insurance company and not included in this valuation. Liabilities for these members after the period of disability are included in the valuation.

Vested Terminated Members as of June 30, 2024

Age	Number	Monthly Benefit Amount
Less than 20		
20-24		
25-29	25	$ 8,840
30-34	117	51,273
35-39	223	121,093
40-44	337	214,480
45-49	401	279,207
50-54	516	341,578
55-59	407	247,145
60-64	168	81,276
65-69	10	3,582
70-74	1	253
75-79		
80-84		
85-89		
90-94		
95-99		
100-104		
105 & Over		
TOTAL	**2,205**	**$ 1,348,727**

Note: Totals may not add due to rounding.

Data Reconciliation
as of June 30, 2024

Non-Uniformed	Active Members	Vested Terminated Members	Retired
Number at Start of Year	5,499	2,058	8,456
Increase (Decrease) From			
New Entrants/Rehires	860	(19)	(3)
Service Retirement	(220)	(90)	310
Vested Terminations	(109)	117	(8)
Deaths/Removals	(1)	(35)	(329)
Surviving Beneficiaries			108
Disability Retirement	(16)		16
Non-Vested Terminations	(250)		
Number at End of Year	**5,763**	**2,031**	**8,550**

Uniformed	Active Members	Vested Terminated Members	Retired
Number at Start of Year	1,122	181	1,148
Increase (Decrease) from			
New Entrants/Rehires	55	(2)	
Service Retirement	(41)	(10)	51
Vested Terminations	(10)	10	0
Deaths/Removals		(4)	(27)
Surviving Beneficiaries			16
Disability Retirement	(1)	(1)	2
Non-Vested Terminations	(9)		
Number at End of Year	**1,116**	**174**	**1,190**

SECTION E

ASSUMPTIONS USED IN THE VALUATION AND GLOSSARY

Summary of Valuation Method and Assumptions
June 30, 2024

The actuarial assumptions used in the valuation are shown in this section of the report unless stated otherwise. The assumptions were established for the June 30, 2023 actuarial valuation, following a five-year actuarial investigation covering the period July 1, 2017 through June 30, 2022. Assumptions were adopted by the Board.

An actuarial valuation is based upon an actuarial cost method, an asset valuation method, and actuarial assumptions. These methods and assumptions are chosen by the Board of Trustees after consultation with the Actuary and other advisors.

The actuarial cost method is called the Entry Age Actuarial Cost Method. This method is consistent with the Board's level percent-of-payroll funding objective. With this method, the level percent-of-payroll is determined that will fund a member's retirement benefit over the member's entire working lifetime, from date of hire (Entry Age) to date of exit from the active member population. Differences in the past between assumed and actual experience become part of unfunded actuarial accrued liabilities and are amortized with level percent-of-payroll contributions. This cost method was first used in the ***June 30, 1999*** valuation.

The asset valuation method is a three-year smoothed market value method in which assumed investment return is recognized immediately each year and differences between actual and assumed investment return are phased-in over a closed three-year period. This asset valuation method is intended to give recognition to the long-term accuracy of market values while filtering out and dampening short term market swings. This method was first used in the ***June 30, 1999*** valuation.

Economic Assumptions

The assumed investment return rate used in making the valuations was 6.50% per year, compounded annually (net after investment expenses). The ***wage inflation rate*** was assumed to be 3.00%. The real rate of return over wage growth is defined to be the portion of total investment return, which is more than the rate of wage inflation. The 6.50% investment return rate and 3.00% wage inflation rate translate to an assumed real rate of return over wage growth net of expenses of 3.50%. Based upon other assumptions, the net real rate of return over price inflation is 4.25%.

Pay increase assumptions for merit and seniority for individual active members are shown on page E-7. Part of the total assumed pay increase at each age is for merit and/or seniority, and the other 3.00% recognizes wage inflation. ***The active member payroll*** for all members is assumed to increase 3.00% annually for all years.

The price inflation rate is assumed to be 2.25% annually. This is the inflation rate upon which the post-retirement increases are based. The difference between wage and price inflation of 0.75% is attributable to overall productivity increases and macroeconomic factors.

The total number of active members is assumed to continue at the present total number.

Summary of Valuation Method and Assumptions
June 30, 2024 (Continued)

Reviewing the Investment Return Assumption

The analysis of the investment return assumption in this report is based on forward-looking measures of expected investment return outcomes for the asset classes in the System's current investment policy. For purposes of this analysis, we have analyzed the System's investment policy with the capital market assumptions from twelve nationally recognized investment advisors.

Our analysis is based on the GRS Capital Market Assumption Modeler (CMAM). Because GRS is a benefits consulting firm and does not develop or maintain our own capital market expectations, we request and monitor forward-looking expectations developed by several major investment advisory firms. We update our CMAM on an annual basis. The capital market assumptions in the 2024 CMAM are from the following investment firms (in alphabetical order): Aon Hewitt, Blackrock, BNY Mellon, Callan, Cambridge, JPMorgan, Meketa, Mercer, NEPC, Verus, and Wilshire. We believe that the benefit of performing this analysis using multiple investment advisory firms is to recognize the uncertain nature of the items affecting the selection of the investment return assumption. While there may be differences in asset classes, investment horizons, inflation assumptions, treatment of investment expenses, excess manager performance (i.e., alpha), etc., we have attempted to align the various assumption sets from the different investment advisors to be as consistent as possible.

To the best of our ability, we have adapted the System's investment policy to fit with the advisors' assumptions adjusting for these known differences in assumptions and methodology. In the following charts, to the extent possible all returns are net of passive investment expenses and have no assumption for excess manager performance (alpha) in excess of active management fees.

For purposes of this analysis, we have been provided with the following asset allocation from System staff:

Asset Classes	Current Policy
Cash	0.00%
U.S. Stock - Large Cap	20.30%
U.S. Stock - Small Cap	2.70%
Int'l Equity	12.00%
Emerging Mkts Eq	5.00%
U.S. Corporate Bonds	9.00%
Government Bonds	13.50%
TIPS	0.00%
High Yield	7.50%
Int'l Debt	0.00%
Real Estate	20.00%
Private Equity	10.00%
Hedge Funds	0.00%
Other Alternatives	0.00%
Total	**100.00%**

Summary of Valuation Method and Assumptions
June 30, 2024 (Continued)

Investment Consultant	Investment Consultant Expected Nominal Return	Investment Consultant Inflation Assumption	Expected Real Return (2)–(3)	Actuary Inflation Assumption	Expected Nominal Return (4)+(5)	Investment Expenses	Expected Nominal Return Net of Expenses (6)-(7)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	6.62%	2.70%	3.92%	2.25%	6.17%	0.00%	6.17%
2	6.64%	2.60%	4.04%	2.25%	6.29%	0.00%	6.29%
3	7.05%	2.25%	4.80%	2.25%	7.05%	0.00%	7.05%
4	7.27%	2.21%	5.06%	2.25%	7.31%	0.00%	7.31%
5	7.62%	2.50%	5.12%	2.25%	7.37%	0.00%	7.37%
6	7.35%	2.20%	5.15%	2.25%	7.40%	0.00%	7.40%
7	7.73%	2.44%	5.29%	2.25%	7.54%	0.00%	7.54%
8	7.49%	2.21%	5.28%	2.25%	7.53%	0.00%	7.53%
9	7.81%	2.40%	5.41%	2.25%	7.66%	0.00%	7.66%
10	7.95%	2.51%	5.44%	2.25%	7.69%	0.00%	7.69%
11	7.82%	2.13%	5.69%	2.25%	7.94%	0.00%	7.94%
12	8.22%	2.51%	5.71%	2.25%	7.96%	0.00%	7.96%
Average	**7.46%**	**2.39%**	**5.08%**	**2.25%**	**7.33%**	**0.00%**	**7.33%**
					Average from last 3 CMAMs		**6.82%**

Summary of Valuation Method and Assumptions
June 30, 2024 (Continued)

Investment Consultant	Distribution of 20-Year Average Geometric Net Nominal Return			Probability of Exceeding 6.50%	Probability of Exceeding 6.25%	Probability of Exceeding 6.00%
	40th	50th	60th			
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	4.62%	5.54%	6.46%	39.63%	42.28%	44.97%
2	4.63%	5.59%	6.57%	40.69%	43.22%	45.79%
3	5.35%	6.33%	7.33%	48.31%	50.86%	53.43%
4	5.94%	6.79%	7.64%	53.43%	56.40%	59.35%
5	5.91%	6.79%	7.69%	53.32%	56.15%	58.95%
6	6.02%	6.87%	7.73%	54.37%	57.31%	60.22%
7	5.93%	6.88%	7.83%	54.02%	56.66%	59.29%
8	5.97%	6.90%	7.83%	54.32%	57.03%	59.71%
9	6.02%	6.98%	7.95%	55.04%	57.65%	60.23%
10	6.10%	7.04%	7.99%	55.80%	58.45%	61.07%
11	6.32%	7.27%	8.23%	58.09%	60.67%	63.22%
12	6.64%	7.47%	8.29%	61.70%	64.62%	67.47%
Average	**5.79%**	**6.70%**	**7.63%**	**52.39%**	**55.11%**	**57.81%**
Average from last 3 CMAMs		**6.21%**				
Current CMAM average over 20- to 30-year		**6.88%**				

Based on the current asset allocation policy as well as the current price inflation assumption, the investment return assumption is reasonable. Both the price inflation assumption and the investment return assumption are reviewed on an annual basis. While we have stated that the assumptions are reasonable for this valuation, that may not continue in the future if recent trends in forward looking expectations continue.

	Investment Return with Policy Allocation	
CMAM Year	Mean	Median
2015	6.73%	6.15%
2016	7.13%	6.55%
2017	6.59%	6.03%
2018	6.53%	5.94%
2019	7.02%	6.44%
2020	6.54%	5.96%
2021	6.07%	5.46%
2022	5.85%	5.25%
2023	7.29%	6.67%
2024	7.33%	6.70%

Generally, we recommend an investment return assumption between the arithmetic mean and the geometric median of our most recent capital market assumption modeler. Because the results of the most recent CMAMs are not trending in a single direction, we would broaden our range slightly for a recommendation.

Summary of Valuation Method and Assumptions
June 30, 2024 (Continued)

Non-Economic Assumptions

Post-Retirement Healthy Mortality Rates are used to measure the probabilities of members dying after retirement. The rates currently in use are from the Pub-2010 General, Healthy Retiree, Amount-Weighted, Below-Median Income tables for males and females for Non-Uniformed members and Pub-2010 Public Safety Healthy Retiree, Amount-Weighted, tables for males and females for Uniformed members. Rates are decreased by 4% for Non-Uniformed males and increased by 5% for uniform males. The assumed rates are adjusted for mortality improvement back to the observation period base year of 2010 and then projected generationally from 2010 to 2019 using scale MP-2021 and 90% of scale MP-2021 for years following 2019. Sample rates are shown on pages E-8 and E-9.

Post-Retirement Disabled Mortality Rates. The rates currently in use for disabled lives are the Pub-2010 General Disabled Retiree, Amount-Weighted tables for males and females for Non-Uniformed members and the Pub-2010 Public Safety Disabled Retiree, Amount-Weighted tables for males and females for Uniformed members. The assumed rates are adjusted for mortality improvement back to the observation period base year of 2010 and then projected generationally from 2010 to 2019 using scale MP-2021 and 90% of scale MP-2021 for years following 2019. Sample rates are shown on page E-10 and E-11.

Pre-Retirement Mortality Rates. The rates currently in use for active lives are the Pub-2010 General, Employee, Amount-Weighted, Below-Median Income tables for males and females for Non-Uniformed members and the Pub-2010 Public Safety Employee, Amount-Weighted, tables for males and females for Uniformed members. The assumed rates are adjusted for mortality improvement back to the observation period base year of 2010 and then projected generationally from 2010 to 2019 using scale MP-2021 and 90% of scale MP-2021 for years following 2019. Sample rates are shown on page E-12 and E-13.

The probabilities of age and service retirement are shown on page E-15. Upon retirement, members are assumed to pick the BackDROP period that when combined with the remaining annuity produces the highest liability.

The probabilities of disability are shown on page E-16.

The probabilities of withdrawal from service are shown on page E-17.

Employer contributions were assumed to be ***paid in equal installments*** throughout the employer fiscal year.

Present assets (cash & investments) were used with a market value adjustment. Assets may be used in the valuation prior to the final audit. The exact method is shown on page C-2.

Summary of Valuation Method and Assumptions
June 30, 2024 (Concluded)

The data about persons now covered and about present assets were furnished by the System's administrative staff. Although examined for general reasonableness, the data was not audited by the Actuary. Data was furnished as of May 31 and assumed to be statistically equivalent to June 30.

The actuarial valuation computations were made by or under the supervision of a Member of the American Academy of Actuaries (MAAA) who has experience performing public plan valuations.

Service-Based Salary Scale

% Merit Increases in Salaries Next Year		
Service Index	Uniformed Members	Non-Uniformed Members
1	6.00%	7.50%
2	4.00%	3.80%
3	3.00%	2.80%
4	2.00%	1.50%
5	2.00%	1.00%
6	1.90%	0.80%
7	1.80%	0.00%
8	1.70%	0.00%
9	1.60%	0.00%
10	1.50%	0.00%
11	1.40%	0.00%
12	1.30%	0.00%
13	1.20%	0.00%
14	1.10%	0.00%
15	1.00%	0.00%
16	0.90%	0.00%
17	0.85%	0.00%
18	0.70%	0.00%
19	0.60%	0.00%
20	0.50%	0.00%
21	0.00%	0.00%
22	0.00%	0.00%
23	0.00%	0.00%
24	0.00%	0.00%
25	0.00%	0.00%

Post-Retirement Mortality

Non-Uniformed Retired Lives Mortality Rates

Age in 2024	% Dying Next Year	
	Male	Female
20	0.0405%	0.0141%
21	0.0422%	0.0144%
22	0.0421%	0.0136%
23	0.0433%	0.0140%
24	0.0436%	0.0131%
25	0.0463%	0.0147%
26	0.0504%	0.0163%
27	0.0547%	0.0181%
28	0.0593%	0.0212%
29	0.0653%	0.0231%
30	0.0701%	0.0263%
31	0.0761%	0.0295%
32	0.0822%	0.0313%
33	0.0878%	0.0357%
34	0.0946%	0.0384%
35	0.0992%	0.0422%
36	0.1058%	0.0441%
37	0.1101%	0.0483%
38	0.1161%	0.0506%
39	0.1208%	0.0537%
40	0.1256%	0.0562%
41	0.1293%	0.0583%
42	0.1344%	0.0602%
43	0.1386%	0.0629%
44	0.1445%	0.0665%
45	0.1834%	0.0876%
46	0.2336%	0.1164%
47	0.2992%	0.1547%
48	0.3857%	0.2073%
49	0.5003%	0.2803%
50	0.6531%	0.3811%
51	0.6769%	0.3929%
52	0.7063%	0.4070%
53	0.7406%	0.4233%
54	0.7783%	0.4411%
55	0.8204%	0.4597%
56	0.8661%	0.4771%
57	0.9133%	0.4946%
58	0.9620%	0.5112%
59	1.0100%	0.5292%

Age in 2024	% Dying Next Year	
	Male	Female
60	1.0572%	0.5472%
61	1.1013%	0.5666%
62	1.1422%	0.5874%
63	1.1813%	0.6100%
64	1.2180%	0.6331%
65	1.2559%	0.6582%
66	1.3452%	0.7141%
67	1.4478%	0.7777%
68	1.5628%	0.8515%
69	1.6944%	0.9361%
70	1.8425%	1.0347%
71	2.0101%	1.1489%
72	2.1992%	1.2802%
73	2.4147%	1.4322%
74	2.6604%	1.6065%
75	2.9402%	1.8063%
76	3.2594%	2.0330%
77	3.6209%	2.2908%
78	4.0316%	2.5860%
79	4.4974%	2.9209%
80	5.0243%	3.3041%
81	5.6239%	3.7442%
82	6.2979%	4.2463%
83	7.0481%	4.8203%
84	7.8800%	5.4751%
85	8.7948%	6.2225%
86	9.7888%	7.0723%
87	10.8569%	8.0324%
88	12.0036%	9.1046%
89	13.2280%	10.2807%
90	14.5170%	11.5477%
91	15.8381%	12.8604%
92	17.1632%	14.1854%
93	18.4904%	15.5193%
94	19.8276%	16.8588%
95	21.1774%	18.2347%
96	22.6786%	19.7493%
97	24.2650%	21.3661%
98	25.9489%	23.1070%
99	27.7492%	24.9780%

Age in 2024	% Dying Next Year	
	Male	Female
100	29.6332%	26.9753%
101	31.5717%	29.0605%
102	33.5032%	31.1725%
103	35.4304%	33.2970%
104	37.3153%	35.4112%
105	39.1433%	37.4995%
106	40.9184%	39.5333%
107	42.6348%	41.5131%
108	44.2548%	43.4188%
109	45.8057%	45.2365%
110	47.0724%	46.9622%
111	47.2377%	48.5954%
112	47.4030%	49.5196%
113	47.5817%	49.6640%
114	47.7582%	49.7999%
115	47.9252%	49.9450%
116	47.9563%	49.9725%
117	47.9784%	49.9820%
118	47.9914%	50.0000%
119	48.0000%	50.0000%
120	100.0000%	100.0000%

Post-Retirement Mortality

Uniformed Retired Lives Mortality Rates

Age in 2024	% Dying Next Year	
	Male	Female
20	0.0443%	0.0174%
21	0.0450%	0.0189%
22	0.0449%	0.0193%
23	0.0450%	0.0209%
24	0.0454%	0.0227%
25	0.0457%	0.0245%
26	0.0487%	0.0264%
27	0.0519%	0.0284%
28	0.0552%	0.0318%
29	0.0586%	0.0339%
30	0.0605%	0.0374%
31	0.0636%	0.0394%
32	0.0666%	0.0426%
33	0.0693%	0.0457%
34	0.0716%	0.0483%
35	0.0750%	0.0506%
36	0.0777%	0.0524%
37	0.0782%	0.0550%
38	0.0811%	0.0558%
39	0.0832%	0.0574%
40	0.0916%	0.0610%
41	0.1002%	0.0652%
42	0.1090%	0.0689%
43	0.1191%	0.0734%
44	0.1293%	0.0786%
45	0.1398%	0.0847%
46	0.1465%	0.0918%
47	0.1552%	0.1000%
48	0.1651%	0.1096%
49	0.1773%	0.1216%
50	0.1903%	0.1352%
51	0.2070%	0.1526%
52	0.2256%	0.1720%
53	0.2475%	0.1947%
54	0.2738%	0.2215%
55	0.3047%	0.2523%
56	0.3403%	0.2869%
57	0.3816%	0.3247%
58	0.4292%	0.3660%
59	0.4827%	0.4100%
60	0.5424%	0.4579%
61	0.6082%	0.5065%
62	0.6790%	0.5573%
63	0.7548%	0.6110%
64	0.8367%	0.6680%
65	0.9252%	0.7293%
66	1.0205%	0.7947%
67	1.1252%	0.8684%
68	1.2400%	0.9522%
69	1.3693%	1.0468%
70	1.5148%	1.1565%
71	1.6810%	1.2811%
72	1.8692%	1.4250%
73	2.0845%	1.5900%
74	2.3315%	1.7786%
75	2.6130%	1.9949%
76	2.9355%	2.2394%
77	3.3031%	2.5164%
78	3.7235%	2.8303%
79	4.2024%	3.1825%
80	4.7474%	3.5787%
81	5.3679%	4.0246%
82	6.0699%	4.5224%
83	6.8551%	5.0780%
84	7.7376%	5.6980%
85	8.7235%	6.3897%
86	9.8202%	7.1586%
87	11.0325%	8.0173%
88	12.3757%	8.9751%
89	13.8616%	10.0380%
90	15.4941%	11.2164%
91	17.1661%	12.4763%
92	18.8046%	13.7878%
93	20.3849%	15.1435%
94	21.9105%	16.5349%
95	23.3894%	17.9805%
96	24.9924%	19.5707%
97	26.6670%	21.2585%
98	28.4487%	23.0555%
99	30.3715%	24.9636%
100	32.4113%	26.9753%
101	34.5316%	29.0605%
102	36.6442%	31.1725%
103	38.7520%	33.2970%
104	40.8136%	35.4112%
105	42.8130%	37.4995%
106	44.7545%	39.5333%
107	46.6319%	41.5131%
108	48.4036%	43.4188%
109	50.1000%	45.2365%
110	51.4855%	46.9622%
111	51.6662%	48.5954%
112	51.8470%	49.5196%
113	52.0425%	49.6640%
114	52.2355%	49.7999%
115	52.4182%	49.9450%
116	52.4522%	49.9725%
117	52.4764%	49.9820%
118	52.4906%	50.0000%
119	52.5000%	50.0000%
120	100.0000%	100.0000%

Post-Retirement Mortality (Disability)

Non-Uniformed Disabled Retired Lives Mortality Rates

Age in 2024	% Dying Next Year	
	Male	Female
20	0.4241%	0.2529%
21	0.4042%	0.2384%
22	0.3768%	0.2202%
23	0.3476%	0.2047%
24	0.3283%	0.1956%
25	0.3270%	0.2008%
26	0.3564%	0.2250%
27	0.3877%	0.2529%
28	0.4218%	0.2848%
29	0.4584%	0.3187%
30	0.4970%	0.3557%
31	0.5367%	0.3952%
32	0.5768%	0.4363%
33	0.6165%	0.4794%
34	0.6576%	0.5216%
35	0.6957%	0.5636%
36	0.7340%	0.6036%
37	0.7713%	0.6426%
38	0.8082%	0.6798%
39	0.8439%	0.7166%
40	0.8789%	0.7523%
41	0.9152%	0.7881%
42	0.9539%	0.8250%
43	0.9956%	0.8647%
44	1.0443%	0.9090%
45	1.0988%	0.9592%
46	1.1629%	1.0158%
47	1.2357%	1.0810%
48	1.3183%	1.1572%
49	1.4107%	1.2456%
50	1.5143%	1.3458%
51	1.5989%	1.4026%
52	1.6909%	1.4680%
53	1.7899%	1.5428%
54	1.8954%	1.6224%
55	2.0051%	1.7037%
56	2.1169%	1.7820%
57	2.2270%	1.8539%
58	2.3366%	1.9160%
59	2.4422%	1.9669%

Age in 2024	% Dying Next Year	
	Male	Female
60	2.5452%	2.0081%
61	2.6444%	2.0382%
62	2.7434%	2.0631%
63	2.8440%	2.0860%
64	2.9446%	2.1085%
65	3.0445%	2.1366%
66	3.1442%	2.1730%
67	3.2456%	2.2232%
68	3.3508%	2.2905%
69	3.4645%	2.3784%
70	3.5893%	2.4905%
71	3.7330%	2.6271%
72	3.8979%	2.7922%
73	4.0904%	2.9869%
74	4.3137%	3.2147%
75	4.5721%	3.4796%
76	4.8678%	3.7808%
77	5.2058%	4.1232%
78	5.5893%	4.5099%
79	6.0233%	4.9431%
80	6.5104%	5.4259%
81	7.0582%	5.9641%
82	7.6646%	6.5589%
83	8.3275%	7.2129%
84	9.0520%	7.9293%
85	9.8360%	8.7142%
86	10.6796%	9.5326%
87	11.5831%	10.3727%
88	12.5582%	11.2264%
89	13.7792%	12.0898%
90	15.1219%	12.9727%
91	16.4980%	13.8967%
92	17.8783%	14.8732%
93	19.2608%	15.9245%
94	20.6538%	17.0593%
95	22.0598%	18.3039%
96	23.6235%	19.7503%
97	25.2760%	21.3661%
98	27.0301%	23.1070%
99	28.9054%	24.9780%

Age in 2024	% Dying Next Year	
	Male	Female
100	30.8679%	26.9753%
101	32.8872%	29.0605%
102	34.8992%	31.1725%
103	36.9067%	33.2970%
104	38.8701%	35.4112%
105	40.7743%	37.4995%
106	42.6233%	39.5333%
107	44.4113%	41.5131%
108	46.0987%	43.4188%
109	47.7143%	45.2365%
110	49.0338%	46.9622%
111	49.2059%	48.5954%
112	49.3781%	49.5196%
113	49.5643%	49.6640%
114	49.7481%	49.7999%
115	49.9221%	49.9450%
116	49.9545%	49.9725%
117	49.9775%	49.9820%
118	49.9910%	50.0000%
119	50.0000%	50.0000%
120	100.0000%	100.0000%

Post-Retirement Mortality (Disability)

Uniformed Disabled Retired Lives Mortality Rates

Age in 2024	% Dying Next Year	
	Male	Female
20	0.1245%	0.0575%
21	0.1267%	0.0621%
22	0.1263%	0.0658%
23	0.1254%	0.0698%
24	0.1261%	0.0739%
25	0.1294%	0.0796%
26	0.1379%	0.0880%
27	0.1457%	0.0955%
28	0.1537%	0.1046%
29	0.1632%	0.1139%
30	0.1713%	0.1232%
31	0.1803%	0.1336%
32	0.1888%	0.1435%
33	0.1965%	0.1527%
34	0.2030%	0.1620%
35	0.2096%	0.1701%
36	0.2160%	0.1778%
37	0.2219%	0.1838%
38	0.2272%	0.1881%
39	0.2318%	0.1935%
40	0.2371%	0.1962%
41	0.2406%	0.2002%
42	0.2463%	0.2035%
43	0.2507%	0.2075%
44	0.2565%	0.2116%
45	0.2641%	0.2172%
46	0.2726%	0.2253%
47	0.2834%	0.2344%
48	0.2967%	0.2457%
49	0.3138%	0.2595%
50	0.3331%	0.2759%
51	0.3484%	0.3015%
52	0.3674%	0.3321%
53	0.3913%	0.3669%
54	0.4204%	0.4066%
55	0.4553%	0.4509%
56	0.4972%	0.4990%
57	0.5480%	0.5502%
58	0.6072%	0.6053%
59	0.6739%	0.6608%

Age in 2024	% Dying Next Year	
	Male	Female
60	0.7474%	0.7176%
61	0.8279%	0.7745%
62	0.9121%	0.8309%
63	1.0008%	0.8878%
64	1.0916%	0.9448%
65	1.1862%	1.0049%
66	1.2841%	1.0680%
67	1.3881%	1.1379%
68	1.4985%	1.2153%
69	1.6192%	1.3017%
70	1.7546%	1.4010%
71	1.9087%	1.5128%
72	2.0898%	1.6397%
73	2.3036%	1.7832%
74	2.5573%	1.9437%
75	2.8540%	2.1236%
76	3.1948%	2.3252%
77	3.5801%	2.5525%
78	4.0050%	2.8303%
79	4.4650%	3.1825%
80	4.9599%	3.5787%
81	5.5004%	4.0246%
82	6.0967%	4.5224%
83	6.7599%	5.0780%
84	7.5129%	5.6980%
85	8.3791%	6.3897%
86	9.3526%	7.1586%
87	10.5071%	8.0173%
88	11.7864%	8.9751%
89	13.2015%	10.0380%
90	14.7563%	11.2164%
91	16.3487%	12.4763%
92	17.9091%	13.7878%
93	19.4142%	15.1435%
94	20.8671%	16.5349%
95	22.2756%	17.9805%
96	23.8023%	19.5707%
97	25.3971%	21.2585%
98	27.0940%	23.0555%
99	28.9252%	24.9636%

Age in 2024	% Dying Next Year	
	Male	Female
100	30.8679%	26.9753%
101	32.8872%	29.0605%
102	34.8992%	31.1725%
103	36.9067%	33.2970%
104	38.8701%	35.4112%
105	40.7743%	37.4995%
106	42.6233%	39.5333%
107	44.4113%	41.5131%
108	46.0987%	43.4188%
109	47.7143%	45.2365%
110	49.0338%	46.9622%
111	49.2059%	48.5954%
112	49.3781%	49.5196%
113	49.5643%	49.6640%
114	49.7481%	49.7999%
115	49.9221%	49.9450%
116	49.9545%	49.9725%
117	49.9775%	49.9820%
118	49.9910%	50.0000%
119	50.0000%	50.0000%
120	100.0000%	100.0000%

Pre-Retirement Mortality

Non-Uniformed Death-in-Service Mortality Rates

Age in 2024	% Dying Next Year	
	Male	Female
20	0.0422%	0.0141%
21	0.0440%	0.0144%
22	0.0439%	0.0136%
23	0.0451%	0.0140%
24	0.0454%	0.0131%
25	0.0482%	0.0147%
26	0.0525%	0.0163%
27	0.0570%	0.0181%
28	0.0618%	0.0212%
29	0.0680%	0.0231%
30	0.0730%	0.0263%
31	0.0793%	0.0295%
32	0.0856%	0.0313%
33	0.0915%	0.0357%
34	0.0985%	0.0384%
35	0.1033%	0.0422%
36	0.1102%	0.0441%
37	0.1147%	0.0483%
38	0.1209%	0.0506%
39	0.1258%	0.0537%
40	0.1308%	0.0562%
41	0.1347%	0.0583%
42	0.1400%	0.0602%
43	0.1444%	0.0629%
44	0.1505%	0.0665%
45	0.1560%	0.0701%
46	0.1636%	0.0738%
47	0.1720%	0.0778%
48	0.1817%	0.0831%
49	0.1929%	0.0898%
50	0.2057%	0.0971%
51	0.2204%	0.1051%
52	0.2372%	0.1147%
53	0.2562%	0.1261%
54	0.2787%	0.1390%
55	0.3035%	0.1535%
56	0.3318%	0.1693%
57	0.3624%	0.1871%
58	0.3969%	0.2045%
59	0.4345%	0.2240%
60	0.4739%	0.2443%
61	0.5137%	0.2650%
62	0.5555%	0.2867%
63	0.5974%	0.3094%
64	0.6389%	0.3330%
65	0.6821%	0.3599%
66	0.7257%	0.3881%
67	0.7734%	0.4201%
68	0.8234%	0.4565%
69	0.8806%	0.4984%
70	0.9431%	0.5456%
71	1.0147%	0.5991%
72	1.0956%	0.6612%
73	1.1874%	0.7312%
74	1.2915%	0.8102%
75	1.4081%	0.9005%
76	1.5394%	1.0016%
77	1.6863%	1.1150%
78	1.8502%	1.2414%
79	2.0325%	1.3825%
80	2.2354%	1.5401%
81	2.8770%	1.9886%
82	3.7048%	2.5667%
83	4.7695%	3.3105%
84	6.1429%	4.2666%
85	7.9143%	5.4950%
86	10.1967%	7.0723%
87	11.3093%	8.0324%
88	12.5037%	9.1046%
89	13.7792%	10.2807%
90	15.1219%	11.5477%
91	16.4980%	12.8604%
92	17.8783%	14.1854%
93	19.2608%	15.5193%
94	20.6538%	16.8588%
95	22.0598%	18.2347%
96	23.6235%	19.7493%
97	25.2760%	21.3661%
98	27.0301%	23.1070%
99	28.9054%	24.9780%
100	30.8679%	26.9753%
101	32.8872%	29.0605%
102	34.8992%	31.1725%
103	36.9067%	33.2970%
104	38.8701%	35.4112%
105	40.7743%	37.4995%
106	42.6233%	39.5333%
107	44.4113%	41.5131%
108	46.0987%	43.4188%
109	47.7143%	45.2365%
110	49.0338%	46.9622%
111	49.2059%	48.5954%
112	49.3781%	49.5196%
113	49.5643%	49.6640%
114	49.7481%	49.7999%
115	49.9221%	49.9450%
116	49.9545%	49.9725%
117	49.9775%	49.9820%
118	49.9910%	50.0000%
119	50.0000%	50.0000%
120	100.0000%	100.0000%

Pre-Retirement Mortality

Uniformed Death-in-Service Mortality Rates

Age in 2024	% Dying Next Year	
	Male	Female
20	0.0422%	0.0174%
21	0.0429%	0.0189%
22	0.0428%	0.0193%
23	0.0429%	0.0209%
24	0.0432%	0.0227%
25	0.0435%	0.0245%
26	0.0464%	0.0264%
27	0.0494%	0.0284%
28	0.0526%	0.0318%
29	0.0558%	0.0339%
30	0.0576%	0.0374%
31	0.0606%	0.0394%
32	0.0634%	0.0426%
33	0.0660%	0.0457%
34	0.0682%	0.0483%
35	0.0714%	0.0506%
36	0.0740%	0.0524%
37	0.0745%	0.0550%
38	0.0772%	0.0558%
39	0.0792%	0.0574%
40	0.0804%	0.0586%
41	0.0811%	0.0595%
42	0.0838%	0.0613%
43	0.0848%	0.0618%
44	0.0866%	0.0635%
45	0.0895%	0.0652%
46	0.0923%	0.0672%
47	0.0961%	0.0704%
48	0.1002%	0.0731%
49	0.1065%	0.0771%
50	0.1132%	0.0826%
51	0.1205%	0.0886%
52	0.1302%	0.0953%
53	0.1407%	0.1025%
54	0.1520%	0.1112%
55	0.1660%	0.1203%
56	0.1827%	0.1305%
57	0.2002%	0.1416%
58	0.2213%	0.1513%
59	0.2444%	0.1624%

Age in 2024	% Dying Next Year	
	Male	Female
60	0.2685%	0.1725%
61	0.2947%	0.1814%
62	0.3228%	0.1911%
63	0.3513%	0.1997%
64	0.3797%	0.2081%
65	0.4101%	0.2159%
66	0.4579%	0.2427%
67	0.5092%	0.2722%
68	0.5677%	0.3076%
69	0.6320%	0.3481%
70	0.7048%	0.3951%
71	0.7878%	0.4504%
72	0.8829%	0.5155%
73	0.9917%	0.5915%
74	1.1164%	0.6805%
75	1.2610%	0.7849%
76	1.4260%	0.9063%
77	1.6160%	1.0480%
78	1.8343%	1.2130%
79	2.0846%	1.4031%
80	2.3701%	1.6232%
81	2.9776%	2.0824%
82	3.7432%	2.6694%
83	4.7047%	3.4195%
84	5.9150%	4.3771%
85	7.4387%	5.5996%
86	9.3526%	7.1586%
87	10.5071%	8.0173%
88	11.7864%	8.9751%
89	13.2015%	10.0380%
90	14.7563%	11.2164%
91	16.3487%	12.4763%
92	17.9091%	13.7878%
93	19.4142%	15.1435%
94	20.8671%	16.5349%
95	22.2756%	17.9805%
96	23.8023%	19.5707%
97	25.3971%	21.2585%
98	27.0940%	23.0555%
99	28.9252%	24.9636%

Age in 2024	% Dying Next Year	
	Male	Female
100	30.8679%	26.9753%
101	32.8872%	29.0605%
102	34.8992%	31.1725%
103	36.9067%	33.2970%
104	38.8701%	35.4112%
105	40.7743%	37.4995%
106	42.6233%	39.5333%
107	44.4113%	41.5131%
108	46.0987%	43.4188%
109	47.7143%	45.2365%
110	49.0338%	46.9622%
111	49.2059%	48.5954%
112	49.3781%	49.5196%
113	49.5643%	49.6640%
114	49.7481%	49.7999%
115	49.9221%	49.9450%
116	49.9545%	49.9725%
117	49.9775%	49.9820%
118	49.9910%	50.0000%
119	50.0000%	50.0000%
120	100.0000%	100.0000%

Illustrative Annuity Values
(6.50% Interest)

Non-Uniformed

Sample Attained Ages in 2024	Single Life Retirement Values					
	Present Value of $1 Monthly for Life		Percent Dying Next Year		Future Life Expectancy (years)	
	Male	Female	Male	Female	Male	Female
50	$155.63	$164.70	0.6531%	0.3811%	32.71	37.10
55	147.94	158.14	0.8204%	0.4597%	28.36	32.43
60	138.51	149.60	1.0572%	0.5472%	24.15	27.82
65	126.74	138.34	1.2559%	0.6582%	20.04	23.25
70	111.98	123.93	1.8425%	1.0347%	16.06	18.80
75	95.12	106.82	2.9402%	1.8063%	12.41	14.65
80	77.11	87.77	5.0243%	3.3041%	9.21	10.93

Uniformed

Sample Attained Ages in 2024	Single Life Retirement Values					
	Present Value of $1 Monthly for Life		Percent Dying Next Year		Future Life Expectancy (years)	
	Male	Female	Male	Female	Male	Female
50	$163.19	$166.66	0.1903%	0.1352%	34.99	37.46
55	154.32	158.66	0.3047%	0.2523%	29.99	32.39
60	143.15	148.75	0.5424%	0.4579%	25.15	27.51
65	129.76	136.79	0.9252%	0.7293%	20.59	22.88
70	114.06	122.38	1.5148%	1.1565%	16.35	18.51
75	96.15	105.52	2.6130%	1.9949%	12.49	14.45
80	76.98	87.09	4.7474%	3.5787%	9.12	10.85

The present values shown above are for illustrative purposes only. They are straight life amounts and do not include the value of future post-retirement increases.

Rates of Retirement

	% of Active Participants Retiring								
	Closed and Year 2000 Plans					2011 Tier			
	Non-Uniformed Members				Uniformed	Non-Uniformed Members			Uniformed
	Male		Female			Normal		Early	
Age	Normal	Early	Normal	Early	Normal	Age & Service	Rule of 90		Normal
50	39%		25%		45%				
51	35%		19%		15%				
52	27%		23%		18%				
53	22%		21%		16%				
54	21%		23%		19%				
55	25%	3%	28%	3%	26%		30%		30%
56	27%	3%	29%	3%	30%		30%		30%
57	24%	3%	29%	4%	28%		30%		30%
58	21%	3%	26%	4%	30%		30%		30%
59	22%	3%	29%	5%	40%		30%		30%
60	21%	5%	23%	5%	100%		30%		100%
61	19%	5%	22%	5%	100%		30%		100%
62	32%	28%	33%	20%	100%		30%	10%	100%
63	32%	25%	22%	20%	100%		30%	10%	100%
64	22%	21%	16%	20%	100%		30%	10%	100%
65	30%		39%		100%		30%	10%	100%
66	40%		45%		100%		30%	10%	100%
67	40%		40%		100%	50%	30%		100%
68	30%		40%		100%	50%	30%		100%
69	30%		40%		100%	50%	30%		100%
70	40%		50%		100%	100%	100%		100%
71	50%		50%		100%	100%	100%		100%
72	50%		100%		100%	100%	100%		100%
73	50%		100%		100%	100%	100%		100%
74	100%		100%		100%	100%	100%		100%

Rates of Disability

All Plan Participants

Age	% of Active Participants Becoming Disabled			
	Uniformed Members		Non-Uniformed Members	
	Male	Female	Male	Female
20	0.10%	0.10%	0.06%	0.06%
21	0.10%	0.10%	0.06%	0.06%
22	0.10%	0.10%	0.07%	0.07%
23	0.10%	0.10%	0.07%	0.07%
24	0.10%	0.10%	0.07%	0.07%
25	0.10%	0.10%	0.08%	0.08%
26	0.10%	0.10%	0.08%	0.08%
27	0.10%	0.10%	0.09%	0.09%
28	0.10%	0.10%	0.09%	0.09%
29	0.10%	0.10%	0.09%	0.09%
30	0.10%	0.10%	0.09%	0.09%
31	0.10%	0.10%	0.09%	0.09%
32	0.10%	0.10%	0.10%	0.10%
33	0.10%	0.10%	0.10%	0.10%
34	0.10%	0.10%	0.11%	0.11%
35	0.10%	0.10%	0.12%	0.12%
36	0.10%	0.10%	0.12%	0.12%
37	0.10%	0.10%	0.13%	0.13%
38	0.10%	0.10%	0.14%	0.14%
39	0.10%	0.10%	0.14%	0.14%
40	0.10%	0.10%	0.16%	0.16%
41	0.10%	0.10%	0.18%	0.18%
42	0.10%	0.10%	0.20%	0.20%
43	0.10%	0.10%	0.21%	0.21%
44	0.10%	0.10%	0.23%	0.23%
45	0.10%	0.10%	0.26%	0.26%
46	0.10%	0.10%	0.28%	0.28%
47	0.10%	0.10%	0.31%	0.31%
48	0.10%	0.10%	0.34%	0.34%
49	0.10%	0.10%	0.38%	0.38%
50	0.10%	0.10%	0.43%	0.43%
51	0.10%	0.10%	0.49%	0.49%
52	0.10%	0.10%	0.56%	0.56%
53	0.10%	0.10%	0.64%	0.64%
54	0.10%	0.10%	0.72%	0.72%
55	0.10%	0.10%	0.82%	0.82%
56	0.10%	0.10%	0.92%	0.92%
57	0.10%	0.10%	1.03%	1.03%
58	0.10%	0.10%	1.15%	1.15%
59	0.10%	0.10%	1.28%	1.28%
60	0.10%	0.10%	1.41%	1.41%
61	0.10%	0.10%	1.55%	1.55%
62	0.10%	0.10%	1.70%	1.70%
63	0.10%	0.10%	1.86%	1.86%
64	0.10%	0.10%	2.03%	2.03%
65	0.10%	0.10%	0.00%	0.00%
66	0.10%	0.10%	0.00%	0.00%
67	0.10%	0.10%	0.00%	0.00%
68	0.10%	0.10%	0.00%	0.00%
69	0.10%	0.10%	0.00%	0.00%
70	0.10%	0.10%	0.00%	0.00%
71	0.10%	0.10%	0.00%	0.00%
72	0.10%	0.10%	0.00%	0.00%

Rates of Separation from Active Employment

All Plan Participants

Age	Service	% of Active Participants Withdrawing			
		Uniformed Members		Non-Uniformed Members	
		Male	Female	Male	Female
	0-1	10.00%	10.00%	28.00%	22.00%
	1-2	6.00%	6.00%	18.50%	15.00%
	2-3	3.25%	3.25%	12.50%	14.00%
	3-4	3.00%	3.00%	9.00%	12.00%
	4-5	2.75%	2.75%	8.00%	7.00%
25	5 & Up	3.51%	3.51%	9.04%	10.40%
26		3.51%	3.51%	9.04%	10.40%
27		3.51%	3.51%	9.04%	10.40%
28		3.51%	3.51%	8.71%	10.08%
29		3.51%	3.51%	8.38%	9.75%
30		3.51%	3.51%	8.05%	9.43%
31		3.51%	3.51%	7.73%	9.10%
32		3.39%	3.39%	7.41%	8.78%
33		3.07%	3.07%	7.10%	8.35%
34		2.77%	2.77%	6.79%	7.92%
35		2.49%	2.49%	6.48%	7.49%
36		2.22%	2.22%	6.18%	7.06%
37		1.97%	1.97%	5.89%	6.63%
38		1.76%	1.76%	5.60%	6.33%
39		1.59%	1.59%	5.31%	6.03%
40		1.47%	1.47%	5.04%	5.73%
41		1.37%	1.37%	4.77%	5.43%
42		1.28%	1.28%	4.51%	5.14%
43		1.19%	1.19%	4.26%	4.97%
44		1.11%	1.11%	4.02%	4.80%
45		1.02%	1.02%	3.78%	4.63%
46		0.94%	0.94%	3.55%	4.46%
47		0.85%	0.85%	3.34%	4.29%
48		0.76%	0.76%	3.14%	4.17%
49		0.67%	0.67%	2.95%	4.06%
50		0.59%	0.59%	2.76%	3.94%
51		0.50%	0.50%	2.60%	3.82%
52		0.43%	0.43%	2.43%	3.71%
53		0.38%	0.38%	2.29%	3.71%
54		0.36%	0.36%	2.15%	3.71%
55		0.30%	0.30%	2.02%	3.71%
56		0.32%	0.32%	1.93%	3.71%
57		0.24%	0.24%	1.83%	3.71%
58		0.24%	0.24%	1.75%	3.71%
59		0.23%	0.23%	1.68%	3.71%
60		0.22%	0.22%	1.64%	3.71%

Miscellaneous and Technical Assumptions

Administrative Expenses:	1.340% of payroll, based upon actual results from previous year.
Disability Expenses:	0.475% of payroll included in contribution. Retirement system pays premium directly to an outside insurance company or TPA.
Marriage Assumption:	90% of participants are assumed to be married for purposes of death-in-service benefits. Applies to disabled members entitled to future retirement benefits also. Male spouses are assumed to be 3 years older than females if beneficiary information is not available. For purposes of valuing the 50% death after retirement benefit, 100% of closed active members are assumed to be married.
Pay Increase Timing:	Beginning of (Fiscal) year. This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date.
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 benefit payable.
Decrement Relativity:	Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
Normal Form of Benefit:	The assumed normal form of benefit is a 50% joint & survivor benefit for married members in the Closed plan and a straight life benefit for all other members.
Optional Benefit Factors:	Optional Benefit Factors are in accordance with tables adopted by the Board. We believe these factors are reasonably close to actuarial equivalence based on valuation assumptions. The reduction for the Y2K and 2011 Tier benefits was calculated in accordance with 104.1027 RSMo.
Deferred Joint and Survivor:	It was assumed that all deferred members eligible for the Closed plan would choose Closed plan benefits at retirement.
Other:	Turnover decrements do not operate during retirement eligibility.
Miscellaneous Adjustments:	The calculated normal and early retirement benefits were increased by 3.75% for Uniformed and 2.3% for Non-Uniformed to account for the inclusion of unused sick leave in the calculation of Average Pay. The calculated normal and early retirement benefits were further increased by 2% for the Closed and Year 2000 plan Uniform members for end of career increases in compensation. Post-disability benefit liabilities were increased by 25% for all future disabilities to account for potential survivor benefits payable by the retirement system during the period of disability. Current self-insured disability retirant liabilities are increased by 12% to account for future survivor benefits.

Miscellaneous and Technical Assumptions

Miscellaneous Adjustments:	Liabilities for future deferred members were increased by 3% to account for potential survivor benefits payable if the member dies during the deferred period. We have otherwise not modeled this benefit for future deferred members.
COLA:	The COLA is assumed to be 80% of the price inflation assumption of 2.25%. This results in a 1.80% annual COLA assumption (Closed Plan members hired prior to August 28, 1997 receive a minimum 4% COLA. These increases are made until the total of the increases reaches 65% of initial benefit at which time the increases will have the minimum removed). All COLAs are assumed to be paid on the anniversary of retirement.
Contribution Stabilization Reserve Fund:	The contribution stabilization reserve fund affects the total amount of UAAL financed and is assumed to grow at the investment return rate.
Death Prior to Retirement:	100% of deaths in service are assumed to be non-duty.
Gainful Employment Offset:	30% of the $90 per month special benefit is assumed to be offset by gainful employment.
Minimum Benefit Eligibility:	Death prior to retirement benefits are assumed to be eligible for the minimum base benefit along with normal and early retirement benefits.
Active Plan Choice:	It was assumed that active members eligible for the Closed plan would choose the Closed plan benefits at retirement.
Member Contribution Interest:	Member contributions are assumed to be credited with 3.0% interest.

Data

Active and retired member data was reported as of May 31. It was brought forward to June 30 by adding one month of service for all active members and otherwise making no other adjustments. It was assumed that the population as of May 31 was statistically equivalent to the population as of June 30. Financial information is reported as of June 30.

Active Member Data: No Adjustments.

Salary Adjustments: Salary from data as provided in prior valuations was used for eighteen active members on leave. Salary for new hires was annualized.

Disabled Member Data: Y2K and 2011 Tier data as provided are increased by 80% of CPI from date of disability to the valuation date and projected increases from the valuation date to the retirement date at 2.0% annually. For purposes of valuing these benefits, the 2.0% projected annual increases are backed out and replaced with 1.8% (80% of the current 2.25% CPI assumption) projected annual increases.

Deferred Member Data: Two Terminated Vested members were indicated to have a refund request in progress. As a result, we removed them from the Terminated Vested data file.

Reconciliation and Review: Reported data was reconciled to data reported for the prior year and reviewed for completeness and reasonableness. Any questions arising from this review were discussed with System staff. Upon completion of the review, control totals (see page 1) were shared with the Executive Director and discussed to ensure MPERS also agreed that the data was reasonable.

Method of Financing Future Benefits for Present Active Members

The valuation was prepared in accordance with Section 104.1066 of the Missouri Revised Statutes, which requires the use of the entry-age normal actuarial cost method for determining normal cost and level percent-of-payroll financing of unfunded actuarial accrued liabilities. Details of the application of these methods are described below.

Normal cost and the allocation of present values between service rendered before and after the valuation date were determined using an individual entry-age actuarial cost method having the following characteristics:

(i) The annual normal cost for each individual active member, payable from the date of employment to the date of retirement, is sufficient to accumulate the value of the member's benefit at the time of retirement; and

(ii) Each annual normal cost is a constant percentage of the member's year by year projected covered pay.

The ***Value of Future Benefits*** was calculated using the benefits assumed to be payable in the future to current active, terminated vested and retired members. It was assumed that current active and retired Uniformed Patrol members hired prior to July 1, 2000 would elect to retain the benefits under the current plan. Computed costs were increased in accordance with the adjustments described on pages E-18 and E-19.

The ***Present Value of Future Normal Costs*** was defined as the average normal cost rate multiplied by the present value of future payroll for the group.

The ***Actuarial Accrued Liabilities*** were defined as the difference between the present value of future benefits and the present value of future normal costs.

The ***Contribution Stabilization Reserve Fund (CSR)*** is set by the Board based on deferred recognition of gains in an effort to stabilize employer contributions from year to year. The fund is capped at $250,000,000 for the Non-Uniformed group and $75,000,000 for the Uniformed group.

Actuarial Accrued Liabilities, less pension assets as of June 30, 2024, resulted in ***Unfunded Actuarial Accrued Liabilities (UAAL).*** The UAAL plus the CSR was amortized using the following funding policy.

The total contribution is based on normal cost plus a closed 15-year amortization period for all unfunded liabilities starting July 1, 2025.

Post-Valuation Date Activity: No other adjustments were made to the valuation results to reflect other post-valuation date activity.

Glossary

Actuarial Accrued Liability. 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."

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

Actuarial Assumptions. 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.

Actuarial Cost Method. 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."

Actuarial Equivalent. A series of payments is called an actuarial equivalent of another series of payments if the two series have the same actuarial present value.

Actuarial Present Value. 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.

Actuarial value of Assets. Also referred to as funding value of assets, smoothed market value of assets, or valuation assets.

Valuation assets recognize assumed investment return fully each year. Differences between actual and assumed investment return are phased-in over a closed three-year period. This treatment helps remove the timing of investment activities from the valuation process. During periods when investment performance exceeds the assumed rate, valuation assets will tend to be less than market value. During periods when investment performance is less than the assumed rate, valuation assets will tend to be greater than market value. If assumed rates are exactly realized for three consecutive years, valuation assets will become equal to market value.

Actuary. A person who is trained in the applications of probability and compound interest to problems in business and finance that involve payment of money in the future, contingent upon the occurrence of future events. Most actuaries in the United States are Members of the American Academy of Actuaries. The Society of Actuaries is an international research, education and membership organization for actuaries in the life and health insurance, employee benefits, and pension fields. It administers a series of examinations leading initially to Associateship and the designation ASA and ultimately to Fellowship with the designation FSA.

Glossary (Concluded)

Amortization. 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.

Experience Gain (Loss). 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.

Normal Cost. 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.

Plan Termination Liability. The actuarial present value of future plan benefits based on the assumption that there will be no further accruals for future service and salary. The termination liability will generally be less than the liabilities computed on a "going concern" basis and is not normally determined in a routine actuarial valuation.

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

Unfunded Actuarial Accrued Liability. The difference between the actuarial accrued liability and actuarial value of assets. Sometimes referred to as "unfunded accrued liability."

The existence of unfunded actuarial accrued liabilities is not in itself bad, any more than a mortgage on a house is bad. Unfunded actuarial accrued liabilities do not represent a debt that is payable today. What is important is the ability to amortize the unfunded actuarial accrued liabilities and the trend in their amount (after due allowance for devaluation of the dollar).

Valuation Payroll. Active member payroll that is intended to reflect the annual salary considered as covered compensation for Retirement System benefits.

SECTION F

FINANCIAL PRINCIPLES AND OPERATIONAL TECHNIQUES

Financial Principles and Operational Techniques of the Retirement System

Promises Made, and To Be Paid For. As each year is completed, the Retirement System in effect hands an "IOU" to each member then acquiring a year of service credit -- the "IOU" says: "The Missouri Department of Transportation and Highway Patrol Employees' Retirement System owes you one year's worth of retirement benefits, payments in cash commencing when you qualify for retirement."

The principal related financial question is: When shall the money required to cover the "IOU" be contributed? This year, when the benefit of the member's service is received? Or, some future year when the "IOU" becomes a cash demand?

The objective of level percent-of-payroll financing is that this year's taxpayers contribute the money to cover the IOUs being handed out this year. By following this objective, ***the employer contribution rate will remain approximately level from year to year*** --- and will not have to be increased for future generations of taxpayers. However, "Level percent-of-payroll" does NOT mean "Fixed percent-of-payroll." The level percent-of-payroll is an estimate that may change from one year to the next.

(There are systems which have a design for deferring contributions to future taxpayers, lured by a lower contribution rate now and putting aside the consequence that the contribution rate must then relentlessly grow much greater over decades of time.)

An inevitable by-product of the level-cost design is the accumulation of reserve assets, for decades, and the income produced when the assets are invested. ***Invested assets are a by-product and not the objective.*** Investment income becomes the 3rd contributor for benefits to employees, and is interlocked with the contribution amounts required from employees and employer.

Financial Principles and Operational Techniques of the Retirement System (Concluded)

Translated to actuarial terminology, this level-cost objective means that the contribution rates must total at least the following:

Normal Cost (the value assigned to service being rendered this year)

. . . plus . . .

Interest on Unfunded Actuarial Accrued Liabilities (the difference between liabilities for service already rendered and the accrued assets of the Retirement System).

Computing Contributions to Support System Benefits. From a given schedule of benefits and from the employee data and asset data furnished by the system, the actuary determines the contribution rates to support the benefits, by means of ***an actuarial valuation.***

An actuarial valuation has a number of ingredients such as: the rate of investment return which plan assets will earn; the rates of withdrawal of active members who leave covered employment; the rates of mortality; the rates of disability; the rates of pay increases and the assumed age or ages at actual retirement.

In an actuarial valuation the actuary must assume what the above rates will be, for the next year and for decades in the future. Only the subsequent actual experience of the plan can indicate the degree of accuracy of the assumptions.

Reconciling Differences Between Assumed Experience and Actual Experience. Once actual experience has occurred and has been observed, it will not coincide exactly with assumed experience, regardless of the skill of the actuary and the many calculations made. Most retirement systems cope with such differences by having annual actuarial valuations. Each actuarial valuation is a complete recalculation of assumed future experience, taking into account all past differences between assumed and actual experience. The result is ***continuing adjustments to the financial position.***

Actuarial Valuation Process

The ***actuarial valuation*** is the mathematical process by which the contribution rate is determined, and the flow of activity constituting the valuation may be summarized as follows:

A . ***Covered people data*** furnished by plan administrator, including:

Retired lives now receiving benefits

Former employees with vested benefits not yet payable

Active employees

B . + ***Asset data*** (cash & investments), furnished by the plan administrator

C . + ***Benefit provisions*** which specify eligibility and amounts of pensions

D . + ***Assumptions concerning future experience in various risk areas,*** which are established by the Retirement Board after consulting with the actuary

E . + ***The funding method*** for employer contributions (the long-term, planned pattern for employer contributions)

F . + ***Mathematically combining the assumptions, the funding method, and the data***

G . = Determination of:

Plan Financial Position and/or

New Employer Contribution Rate

Meaning of "Unfunded Actuarial Accrued Liabilities"

"Actuarial accrued liabilities" are the portion of the present value of plan promises to pay benefits in the future that are not covered by future normal cost contributions. A liability has been established ("accrued") because the service has been rendered but the resulting monthly cash benefit may not be payable until years in the future. Actuarial accrued liabilities are the result of complex mathematical calculations, which are made by the plan's actuary.

If "actuarial accrued liabilities" exceed the plan's accrued assets (cash & investments), the difference is ***"unfunded actuarial accrued liabilities."*** This is the usual condition. If the plan's assets equaled the plan's "actuarial accrued liabilities," then the plan would be termed "fully funded." This is an unusual condition.

Each time a plan adds a new benefit, which applies to service already rendered, an "actuarial accrued liability" is created, which is also an "unfunded actuarial accrued liability" because the plan can't print instant cash to cover the value of the new benefit promises. Payment for such unfunded actuarial accrued liabilities is spread over a period of years, commonly in the 20- to 30-year range.

Unfunded actuarial accrued liabilities can occur in another way: if actual plan experience is less favorable than assumed plan experience, the difference is added to unfunded actuarial accrued liabilities. In plans where benefits are directly related to an employee's pay near time of retirement, unfunded actuarial accrued liabilities rose dramatically during the 1970s. Unexpected rates of pay increase created additional actuarial accrued liabilities, which could not be matched by reasonable investment results. More recent experience has generally been more favorable with some reductions in unfunded actuarial accrued liabilities.

The existence of unfunded actuarial accrued liabilities is not bad, but the changes from year to year in the amount of unfunded actuarial accrued liabilities are important, --- "bad" or "good" or somewhere in between.

Even though unfunded actuarial accrued liabilities don't constitute a bill payable immediately, it is important that policy-makers prevent the amount from becoming unreasonably high and ***it is vital for plans to have a sound method for making payments toward them*** so that they are controlled.

SECTION G

SUPPLEMENTAL INFORMATION FOR ANNUAL COMPREHENSIVE FINANCIAL REPORTING

800.521.0498 | P: 248.799.9000 | www.grsconsulting.com

September 11, 2024

Retirement Board
Missouri Department of Transportation
and Highway Patrol Employees' Retirement System
1913 William Street
Jefferson City, Missouri 65102

Ladies and Gentlemen:

This report was prepared at the request of the Board and is intended for use by the Retirement System and those designated or approved by the Board. This report may be provided to parties other than the System only in its entirety and only with the permission of the Board. GRS is not responsible for unauthorized use of this report. This report should not be relied on for any purpose other than the purpose described.

The basic financial objective of the Missouri Department of Transportation and Highway Patrol Employees' Retirement System (MPERS) is to establish and receive contributions which:

(1) When expressed in terms of percents of active member payroll, will remain approximately level from generation to generation of Missouri citizens; and

(2) When combined with present assets and future investment returns, will be sufficient to meet the present and future financial obligations of MPERS.

In order to measure progress toward this fundamental objective, MPERS has annual actuarial valuations performed. The valuations: (i) measure the present financial position; and (ii) establish contribution rates that provide for the current cost and level percent-of-payroll amortization of unfunded actuarial liabilities over a reasonable period. An actuarial valuation was performed based upon benefit conditions, data and assumptions as of June 30, 2024. This valuation indicates that contribution rates for the period beginning July 1, 2025 that are at least equal to the calculated contribution rates will meet the Board's financial objective. The calculated contribution rates are 37.013% of payroll for the 5,763 Non-Uniformed employees and 58.005% of payroll for the 1,116 Uniformed Patrol employees.

The plan administrative staff provides the actuary with data for the actuarial valuation. The actuary relies on the data after reviewing it for internal and year to year consistency. Member data was not audited by the actuary. The actuary summarizes and tabulates population data in order to analyze longer term trends. We are not responsible for the accuracy or completeness of the data provided by MPERS.

Gabriel, Roeder, Smith & Company was responsible for the following schedules found in the Actuarial Section:

- Summary of Actuarial Assumptions and Methods
  - Probabilities of Separation from Active Employment
  - Individual Salary Increases
  - Joint Life Retirement Values
  - Probabilities of Retirement for Members
  - Probabilities of Disability for Members
- Summary of Member Data Included in Valuations
  - Active Members by Attained Age and Years of Service
  - Schedule of Active Member Valuation Data
- Solvency Test
- Derivation of Financial Experience
- Schedule of Retirees and Beneficiaries Added and Removed
- Summary of Plan Provisions
- Legislative Changes

Gabriel, Roeder, Smith & Company was responsible for the following schedules found in the Financial Section:

- Schedule of Changes in the Employer's Net Pension Liability
- Schedule of Employer's Net Pension Liability
- Schedule of Employer Contributions
- Schedule of the Actuarially Determined Contributions

Actuarial valuations are based upon assumptions regarding future activity in specific risk areas including the rates of investment return and payroll growth, eligibility for the various classes of benefits, and longevity among retired lives. These assumptions are adopted by the Board. The assumptions and the methods comply with the requirements of the Governmental Accounting Standards Board (GASB). Each actuarial valuation takes into account all prior differences between actual and assumed experience in each risk area and adjusts the contribution rates as needed. Actuarial methods and assumptions were adopted by the Board pursuant to the June 30, 2022 Experience Study. Gabriel, Roeder, Smith & Company has produced the following reports as of June 30, 2024:

- Annual Actuarial Valuation Report
- GASB Statement Nos. 67 and 68 Valuation Report

In order to gain a full understanding of the condition of this Plan, these reports should be read in their entirety.

To the best of our knowledge, this report is complete and accurate and was made in accordance with standards of practice promulgated by the Actuarial Standards Board. The assumptions and methods used for funding purposes meet the parameters set by Actuarial Standards of Practice. The actuarial assumptions used for this valuation produce results which, individually and in the aggregate, are reasonable. The combined effect of the assumptions is expected to have no significant bias (i.e., not significantly optimistic or pessimistic).

The employer contributions determined in this report are based on the Board funding policy. This policy is discussed on page 4 of the annual actuarial valuation report. We commend the Board for its aggressive monitoring and updating of the funding policy over the recent past. However, continued employer contributions at the current level do not guarantee benefit security. We, therefore, encourage the Board to continue to routinely monitor and update its funding policy and to continue to consider benefit security when doing so.

The annual actuarial valuation report includes risk measures on pages A-13 and A-14, but does not include a more robust assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment. We recommend that the Board consider performing an analysis to assess risk related to investment and payroll.

This report was prepared using our proprietary valuation model and related software which in our professional judgment has the capability to provide results that are consistent with the purposes of the valuation and has no material limitations or known weaknesses. We performed tests to ensure that the model reasonably represents that which is intended to be modeled.

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

This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. Heidi G. Barry and Jeffrey T. Tebeau are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

The signing actuaries are independent of the plan sponsor.

Based upon the valuation results, it is our opinion that the Missouri Department of Transportation and Highway Patrol Employees' Retirement System continues to operate in accordance with actuarial principles of level percent-of-payroll financing. It is important to the well-being of the System that it continues to receive contributions at the actuarially determined levels. It is also important to continue to monitor both the total funded status and the funded status of the retiree liabilities to ensure that the funding policy is consistent with the expected life span of the respective unfunded obligation.

Respectfully submitted,
Gabriel, Roeder, Smith & Company

Heidi G. Barry, ASA, FCA, MAAA

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GRS

Solvency Test

The MPERS funding objective is to meet long-term benefit promises through contributions that remain approximately level from year to year as a percent of member payroll. If the contributions to the System are level in concept and soundly executed, the System will ***pay all promised benefits when due – the ultimate test of financial soundness.***

A solvency test is one means of checking a system's progress under its funding program. In a solvency test for a non-contributory plan, the plan's present assets (cash and investments) are compared with: 1) the liabilities for future benefits to present retired lives, and 2) the liabilities for service already rendered by members. In a system that has been following the discipline of level percent-of-payroll financing, the liabilities for future benefits to present retired lives (liability 1) will be fully covered by present assets (except in rare circumstances). In addition, the liabilities for service already rendered by members (liability 2) will be partially covered by the remainder of present assets. The larger the funded portion of liability 2, the stronger the condition of the system.

The schedule below illustrates the history of liability 2 of the System.

Val. Date June 30	(1) Member Contributions	(2) Retirees and Benef.	(3) Active and Inactive Members	Present Valuation Assets	Portion of Present Values Covered by Present Assets			
					(1)	(2)	(3)	Total
	----------$ Millions----------							
2015	3	2,444	1,269	1,967	100%	80%	0%	53%
2016	5	2,470	1,287	2,087	100%	84%	0%	55%
2017	8	2,488	1,306	2,173	100%	87%	0%	57%
2018#	11	2,598	1,373	2,274	100%	87%	0%	57%
2019	14	2,656	1,367	2,415	100%	90%	0%	60%
2020	18	2,726	1,348	2,481	100%	90%	0%	61%
2021#	21	2,882	1,441	2,711	100%	93%	0%	62%
2022	24	2,952	1,435	2,926	100%	98%	0%	66%
2023#	29	3,120	1,560	3,248	100%	100%	6%	69%
2024	36	3,269	1,658	3,504	100%	100%	12%	71%

 # New assumptions and/or methods adopted.

Derivation of Experience Gain/(Loss)

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 sizeable year-to-year variations from assumed experience are common. Detail on the derivation of the experience gain/(loss) is shown below:

	$ Millions
UAAL Beginning of Year (at July 1)	$ 1,461,408,074
Normal Cost	55,738,811
Transfer In and Service Purchase - Liability	7,632,246
Contributions	(270,240,171)
Interest	88,268,279
Net Change in LTD Assets	-
Expected UAAL Before Any Changes	1,342,807,239
Effect of Benefit Changes	-
Effect of Changes in Assumptions & Methods	-
Effect of Adjustment	-
Expected UAAL After Changes	1,342,807,239
End of Year UAAL (at June 30)	$ 1,459,193,802
Gain/(Loss) for Year	$ (116,386,563)
Gain/(Loss) as a percent of actuarial accrued liabilities at start of year ($4,709.4 million)	(2.5)%

Valuation Date June 30	Experience Gain/(Loss) as % of Beginning Accrued Liability
2015	2.4 %
2016	1.1 %
2017	0.1 %
2018	0.6 %
2019	0.7 %
2020	(1.2)%
2021	3.6 %
2022	1.9 %
2023	(0.6)%
2024	**(2.5)%**

Summary of Actuarial Assumptions and Methods

Valuation Date:	June 30, 2024
Actuarial Cost Method:	Entry Age
Amortized Method:	Closed, level percent-of-payroll
Remaining Amortization Period:	15 years
Asset Valuation Method:	3-year smoothed fair value; 20% Corridor
Actuarial Assumptions:	
Investment Rate of Return:	6.50%
Projected Salary Increase:	3.00% to 10.50%
Cost-of-Living Adjustments:	1.80% Compound
Includes Wage Inflation at:	3.00%

An actuarial valuation is based upon an actuarial cost method, an asset valuation method, and actuarial assumptions. These methods and assumptions are chosen by the Board of Trustees after consultation with the Actuary and other advisors.

The actuarial cost method is called the Entry Age Actuarial Cost Method. This method is consistent with the Board's level percent-of-payroll funding objective. With this method, the level percent-of-payroll is determined that will fund a member's retirement benefit over the member's entire working lifetime, from date of hire (Entry Age) to date of exit from the active member population. Differences in the past between assumed and actual experience become part of unfunded actuarial accrued liabilities and are amortized with level percent-of-payroll contributions. This cost method was first used in the ***June 30, 1999*** valuation.

The asset valuation method is a three-year smoothed fair value method in which assumed investment return is recognized immediately each year and differences between actual and assumed investment return are phased-in over a closed three-year period. This asset valuation method is intended to give recognition to the long-term accuracy of market values while filtering out and dampening short-term market swings. This method was first used in the ***June 30, 1999*** valuation.

The actuarial assumptions used in producing the valuation fall into two broad classes: economic assumptions, and demographic assumptions. Economic assumptions refer to long-term rates of investment return, wage growth, covered population growth, and inflation. Demographic assumptions refer to retirement rates, turnover rates, disability rates, merit and seniority pay increases, and mortality rates. The current assumptions are based upon a 2017-2022 study of experience. The assumptions are reviewed from time to time to keep them reasonably current with expected experience. The next experience study is scheduled to follow the June 30, 2027 valuation.

Economic Assumptions

The investment return rate used in making the valuation was 6.50% per year, compounded annually (net after administrative expenses). This rate of return is not the assumed real rate of return. The real rate of return over wage inflation is defined to be the portion of investment return which is more than the wage inflation rate. Considering wage inflation recognition of 3.00%, the 6.50% rate translates to an assumed real rate of return over wage inflation of 3.50%. This rate was first used for the ***June 30, 2021*** valuation.

Summary of Actuarial Assumptions and Methods (Concluded)

Pay increase assumptions for individual active members are shown on Table I. Part of the assumption for each year of service is for a merit and/or seniority increase, and the other 3.00% recognizes wage inflation. These rates were first used for the **June 30, 2023** valuation.

Price Inflation is assumed to be 2.25%. The COLA is assumed to be 80% of the price inflation assumption. This results in a 1.80% annual COLA assumption (Closed Plan members hired prior to August 28, 1997 receive a minimum 4% COLA. These increases are made until the total of the increases reaches 65% of initial benefit at which time the increases will have the minimum removed). It is assumed that the 1.8% COLA will always be paid. All COLAs are assumed to be paid on the anniversary of retirement.

The Active Member Group size is assumed to remain constant at its present level.

The active member payroll for all members is assumed to increase 3.00% annually.

Non-Economic Assumptions

Post-Retirement Healthy Mortality Rates are used to measure the probabilities of members dying after retirement. The rates currently in use are from the Pub-2010 General, Healthy Retiree, Amount-Weighted, Below-Median Income tables for males and females for Non-Uniformed members and Pub-2010 Public Safety Healthy Retiree, Amount-Weighted, tables for males and females for Uniformed members. Rates are decreased by 4% for Non-Uniformed males and increased by 5% for uniform males. The assumed rates are adjusted for mortality improvement back to the observation period base year of 2010 and then projected generationally from 2010 to 2019 using scale MP-2021 and 90% of scale MP-2021 for years following 2019. Sample rates are shown on Tables II and III. These rates were first used in the **June 30, 2023** valuation.

Post-Retirement Disabled Mortality Rates. The rates currently in use for disabled lives are the Pub-2010 General Disabled Retiree, Amount-Weighted tables for males and females for Non-Uniformed members and the Pub-2010 Public Safety Disabled Retiree, Amount-Weighted tables for males and females for Uniformed members. The assumed rates are adjusted for mortality improvement back to the observation period base year of 2010 and then projected generationally from 2010 to 2019 using scale MP-2021 and 90% of scale MP-2021 for years following 2019. Sample rates are shown on Table IV and V. These rates were first used in the **June 30, 2023** valuation.

Pre-Retirement Mortality Rates. The rates currently in use for active lives are the Pub-2010 General, Employee, Amount-Weighted, Below-Median Income tables for males and females for Non-Uniformed members and the Pub-2010 Public Safety Employee, Amount-Weighted, tables for males and females for Uniformed members. The assumed rates are adjusted for mortality improvement back to the observation period base year of 2010 and then projected generationally from 2010 to 2019 using scale MP-2021 and 90% of scale MP-2021 for years following 2019. Sample rates are shown on Table VI and VII. These rates were first used in the **June 30, 2023** valuation.

The probabilities of retirement for members eligible to retire are shown on Table IX. The rates for full retirement were first used in the **June 30, 2023** valuation. The rates for reduced retirement were first used in the **June 30, 2023** valuation. Upon retirement, members are assumed to pick the BackDROP period that when combined with the remaining annuity produces the highest liability.

The probabilities of disability for members eligible to retire are shown on Table X. The rates for disability were first used in the **June 30, 2023** valuation.

The probabilities of withdrawal from service, death-in-service and disability are shown for sample ages on Table XI. The death-in-service and disability rates were first used in the **June 30, 2023** valuation. The withdrawal rates were first used in the **June 30, 2023** valuation.

The data about persons now covered and about present assets was furnished by the System's administrative staff. Although examined for general reasonableness, the data was not audited by the Actuary. Data was furnished as of May 31 and assumed to be statistically equivalent to June 30.

The actuarial valuation computations were made by or under the supervision of a Member of the American Academy of Actuaries (MAAA).

Table I
Service Based Salary Scale

% Merit Increases in Salaries Next Year		
Service Index	**Uniformed Members**	**Non-Uniformed Members**
1	6.00%	7.50%
2	4.00%	3.80%
3	3.00%	2.80%
4	2.00%	1.50%
5	2.00%	1.00%
6	1.90%	0.80%
7	1.80%	0.00%
8	1.70%	0.00%
9	1.60%	0.00%
10	1.50%	0.00%
11	1.40%	0.00%
12	1.30%	0.00%
13	1.20%	0.00%
14	1.10%	0.00%
15	1.00%	0.00%
16	0.90%	0.00%
17	0.85%	0.00%
18	0.70%	0.00%
19	0.60%	0.00%
20	0.50%	0.00%
21	0.00%	0.00%
22	0.00%	0.00%
23	0.00%	0.00%
24	0.00%	0.00%
25	0.00%	0.00%

Table II
Post-Retirement Mortality

Non-Uniformed Retired Lives Mortality Rates

Age in 2024	% Dying Next Year	
	Male	Female
20	0.0405%	0.0141%
21	0.0422%	0.0144%
22	0.0421%	0.0136%
23	0.0433%	0.0140%
24	0.0436%	0.0131%
25	0.0463%	0.0147%
26	0.0504%	0.0163%
27	0.0547%	0.0181%
28	0.0593%	0.0212%
29	0.0653%	0.0231%
30	0.0701%	0.0263%
31	0.0761%	0.0295%
32	0.0822%	0.0313%
33	0.0878%	0.0357%
34	0.0946%	0.0384%
35	0.0992%	0.0422%
36	0.1058%	0.0441%
37	0.1101%	0.0483%
38	0.1161%	0.0506%
39	0.1208%	0.0537%
40	0.1256%	0.0562%
41	0.1293%	0.0583%
42	0.1344%	0.0602%
43	0.1386%	0.0629%
44	0.1445%	0.0665%
45	0.1834%	0.0876%
46	0.2336%	0.1164%
47	0.2992%	0.1547%
48	0.3857%	0.2073%
49	0.5003%	0.2803%
50	0.6531%	0.3811%
51	0.6769%	0.3929%
52	0.7063%	0.4070%
53	0.7406%	0.4233%
54	0.7783%	0.4411%
55	0.8204%	0.4597%
56	0.8661%	0.4771%
57	0.9133%	0.4946%
58	0.9620%	0.5112%
59	1.0100%	0.5292%

Age in 2024	% Dying Next Year	
	Male	Female
60	1.0572%	0.5472%
61	1.1013%	0.5666%
62	1.1422%	0.5874%
63	1.1813%	0.6100%
64	1.2180%	0.6331%
65	1.2559%	0.6582%
66	1.3452%	0.7141%
67	1.4478%	0.7777%
68	1.5628%	0.8515%
69	1.6944%	0.9361%
70	1.8425%	1.0347%
71	2.0101%	1.1489%
72	2.1992%	1.2802%
73	2.4147%	1.4322%
74	2.6604%	1.6065%
75	2.9402%	1.8063%
76	3.2594%	2.0330%
77	3.6209%	2.2908%
78	4.0316%	2.5860%
79	4.4974%	2.9209%
80	5.0243%	3.3041%
81	5.6239%	3.7442%
82	6.2979%	4.2463%
83	7.0481%	4.8203%
84	7.8800%	5.4751%
85	8.7948%	6.2225%
86	9.7888%	7.0723%
87	10.8569%	8.0324%
88	12.0036%	9.1046%
89	13.2280%	10.2807%
90	14.5170%	11.5477%
91	15.8381%	12.8604%
92	17.1632%	14.1854%
93	18.4904%	15.5193%
94	19.8276%	16.8588%
95	21.1774%	18.2347%
96	22.6786%	19.7493%
97	24.2650%	21.3661%
98	25.9489%	23.1070%
99	27.7492%	24.9780%

Age in 2024	% Dying Next Year	
	Male	Female
100	29.6332%	26.9753%
101	31.5717%	29.0605%
102	33.5032%	31.1725%
103	35.4304%	33.2970%
104	37.3153%	35.4112%
105	39.1433%	37.4995%
106	40.9184%	39.5333%
107	42.6348%	41.5131%
108	44.2548%	43.4188%
109	45.8057%	45.2365%
110	47.0724%	46.9622%
111	47.2377%	48.5954%
112	47.4030%	49.5196%
113	47.5817%	49.6640%
114	47.7582%	49.7999%
115	47.9252%	49.9450%
116	47.9563%	49.9725%
117	47.9784%	49.9820%
118	47.9914%	50.0000%
119	48.0000%	50.0000%
120	100.0000%	100.0000%

Table III
Post-Retirement Mortality

Uniformed Retired Lives Mortality Rates

Age in 2024	% Dying Next Year	
	Male	Female
20	0.0443%	0.0174%
21	0.0450%	0.0189%
22	0.0449%	0.0193%
23	0.0450%	0.0209%
24	0.0454%	0.0227%
25	0.0457%	0.0245%
26	0.0487%	0.0264%
27	0.0519%	0.0284%
28	0.0552%	0.0318%
29	0.0586%	0.0339%
30	0.0605%	0.0374%
31	0.0636%	0.0394%
32	0.0666%	0.0426%
33	0.0693%	0.0457%
34	0.0716%	0.0483%
35	0.0750%	0.0506%
36	0.0777%	0.0524%
37	0.0782%	0.0550%
38	0.0811%	0.0558%
39	0.0832%	0.0574%
40	0.0916%	0.0610%
41	0.1002%	0.0652%
42	0.1090%	0.0689%
43	0.1191%	0.0734%
44	0.1293%	0.0786%
45	0.1398%	0.0847%
46	0.1465%	0.0918%
47	0.1552%	0.1000%
48	0.1651%	0.1096%
49	0.1773%	0.1216%
50	0.1903%	0.1352%
51	0.2070%	0.1526%
52	0.2256%	0.1720%
53	0.2475%	0.1947%
54	0.2738%	0.2215%
55	0.3047%	0.2523%
56	0.3403%	0.2869%
57	0.3816%	0.3247%
58	0.4292%	0.3660%
59	0.4827%	0.4100%
60	0.5424%	0.4579%
61	0.6082%	0.5065%
62	0.6790%	0.5573%
63	0.7548%	0.6110%
64	0.8367%	0.6680%
65	0.9252%	0.7293%
66	1.0205%	0.7947%
67	1.1252%	0.8684%
68	1.2400%	0.9522%
69	1.3693%	1.0468%
70	1.5148%	1.1565%
71	1.6810%	1.2811%
72	1.8692%	1.4250%
73	2.0845%	1.5900%
74	2.3315%	1.7786%
75	2.6130%	1.9949%
76	2.9355%	2.2394%
77	3.3031%	2.5164%
78	3.7235%	2.8303%
79	4.2024%	3.1825%
80	4.7474%	3.5787%
81	5.3679%	4.0246%
82	6.0699%	4.5224%
83	6.8551%	5.0780%
84	7.7376%	5.6980%
85	8.7235%	6.3897%
86	9.8202%	7.1586%
87	11.0325%	8.0173%
88	12.3757%	8.9751%
89	13.8616%	10.0380%
90	15.4941%	11.2164%
91	17.1661%	12.4763%
92	18.8046%	13.7878%
93	20.3849%	15.1435%
94	21.9105%	16.5349%
95	23.3894%	17.9805%
96	24.9924%	19.5707%
97	26.6670%	21.2585%
98	28.4487%	23.0555%
99	30.3715%	24.9636%
100	32.4113%	26.9753%
101	34.5316%	29.0605%
102	36.6442%	31.1725%
103	38.7520%	33.2970%
104	40.8136%	35.4112%
105	42.8130%	37.4995%
106	44.7545%	39.5333%
107	46.6319%	41.5131%
108	48.4036%	43.4188%
109	50.1000%	45.2365%
110	51.4855%	46.9622%
111	51.6662%	48.5954%
112	51.8470%	49.5196%
113	52.0425%	49.6640%
114	52.2355%	49.7999%
115	52.4182%	49.9450%
116	52.4522%	49.9725%
117	52.4764%	49.9820%
118	52.4906%	50.0000%
119	52.5000%	50.0000%
120	100.0000%	100.0000%

Table IV
Post-Retirement Mortality

Non-Uniformed Disabled Retired Lives Mortality Rates

Age in 2024	% Dying Next Year	
	Male	Female
20	0.4241%	0.2529%
21	0.4042%	0.2384%
22	0.3768%	0.2202%
23	0.3476%	0.2047%
24	0.3283%	0.1956%
25	0.3270%	0.2008%
26	0.3564%	0.2250%
27	0.3877%	0.2529%
28	0.4218%	0.2848%
29	0.4584%	0.3187%
30	0.4970%	0.3557%
31	0.5367%	0.3952%
32	0.5768%	0.4363%
33	0.6165%	0.4794%
34	0.6576%	0.5216%
35	0.6957%	0.5636%
36	0.7340%	0.6036%
37	0.7713%	0.6426%
38	0.8082%	0.6798%
39	0.8439%	0.7166%
40	0.8789%	0.7523%
41	0.9152%	0.7881%
42	0.9539%	0.8250%
43	0.9956%	0.8647%
44	1.0443%	0.9090%
45	1.0988%	0.9592%
46	1.1629%	1.0158%
47	1.2357%	1.0810%
48	1.3183%	1.1572%
49	1.4107%	1.2456%
50	1.5143%	1.3458%
51	1.5989%	1.4026%
52	1.6909%	1.4680%
53	1.7899%	1.5428%
54	1.8954%	1.6224%
55	2.0051%	1.7037%
56	2.1169%	1.7820%
57	2.2270%	1.8539%
58	2.3366%	1.9160%
59	2.4422%	1.9669%
60	2.5452%	2.0081%
61	2.6444%	2.0382%
62	2.7434%	2.0631%
63	2.8440%	2.0860%
64	2.9446%	2.1085%
65	3.0445%	2.1366%
66	3.1442%	2.1730%
67	3.2456%	2.2232%
68	3.3508%	2.2905%
69	3.4645%	2.3784%
70	3.5893%	2.4905%
71	3.7330%	2.6271%
72	3.8979%	2.7922%
73	4.0904%	2.9869%
74	4.3137%	3.2147%
75	4.5721%	3.4796%
76	4.8678%	3.7808%
77	5.2058%	4.1232%
78	5.5893%	4.5099%
79	6.0233%	4.9431%
80	6.5104%	5.4259%
81	7.0582%	5.9641%
82	7.6646%	6.5589%
83	8.3275%	7.2129%
84	9.0520%	7.9293%
85	9.8360%	8.7142%
86	10.6796%	9.5326%
87	11.5831%	10.3727%
88	12.5582%	11.2264%
89	13.7792%	12.0898%
90	15.1219%	12.9727%
91	16.4980%	13.8967%
92	17.8783%	14.8732%
93	19.2608%	15.9245%
94	20.6538%	17.0593%
95	22.0598%	18.3039%
96	23.6235%	19.7503%
97	25.2760%	21.3661%
98	27.0301%	23.1070%
99	28.9054%	24.9780%
100	30.8679%	26.9753%
101	32.8872%	29.0605%
102	34.8992%	31.1725%
103	36.9067%	33.2970%
104	38.8701%	35.4112%
105	40.7743%	37.4995%
106	42.6233%	39.5333%
107	44.4113%	41.5131%
108	46.0987%	43.4188%
109	47.7143%	45.2365%
110	49.0338%	46.9622%
111	49.2059%	48.5954%
112	49.3781%	49.5196%
113	49.5643%	49.6640%
114	49.7481%	49.7999%
115	49.9221%	49.9450%
116	49.9545%	49.9725%
117	49.9775%	49.9820%
118	49.9910%	50.0000%
119	50.0000%	50.0000%
120	100.0000%	100.0000%

Table V
Post-Retirement Mortality

Uniformed Disabled Retired Lives Mortality Rates

Age in 2024	% Dying Next Year	
	Male	Female
20	0.1245%	0.0575%
21	0.1267%	0.0621%
22	0.1263%	0.0658%
23	0.1254%	0.0698%
24	0.1261%	0.0739%
25	0.1294%	0.0796%
26	0.1379%	0.0880%
27	0.1457%	0.0955%
28	0.1537%	0.1046%
29	0.1632%	0.1139%
30	0.1713%	0.1232%
31	0.1803%	0.1336%
32	0.1888%	0.1435%
33	0.1965%	0.1527%
34	0.2030%	0.1620%
35	0.2096%	0.1701%
36	0.2160%	0.1778%
37	0.2219%	0.1838%
38	0.2272%	0.1881%
39	0.2318%	0.1935%
40	0.2371%	0.1962%
41	0.2406%	0.2002%
42	0.2463%	0.2035%
43	0.2507%	0.2075%
44	0.2565%	0.2116%
45	0.2641%	0.2172%
46	0.2726%	0.2253%
47	0.2834%	0.2344%
48	0.2967%	0.2457%
49	0.3138%	0.2595%
50	0.3331%	0.2759%
51	0.3484%	0.3015%
52	0.3674%	0.3321%
53	0.3913%	0.3669%
54	0.4204%	0.4066%
55	0.4553%	0.4509%
56	0.4972%	0.4990%
57	0.5480%	0.5502%
58	0.6072%	0.6053%
59	0.6739%	0.6608%

Age in 2024	% Dying Next Year	
	Male	Female
60	0.7474%	0.7176%
61	0.8279%	0.7745%
62	0.9121%	0.8309%
63	1.0008%	0.8878%
64	1.0916%	0.9448%
65	1.1862%	1.0049%
66	1.2841%	1.0680%
67	1.3881%	1.1379%
68	1.4985%	1.2153%
69	1.6192%	1.3017%
70	1.7546%	1.4010%
71	1.9087%	1.5128%
72	2.0898%	1.6397%
73	2.3036%	1.7832%
74	2.5573%	1.9437%
75	2.8540%	2.1236%
76	3.1948%	2.3252%
77	3.5801%	2.5525%
78	4.0050%	2.8303%
79	4.4650%	3.1825%
80	4.9599%	3.5787%
81	5.5004%	4.0246%
82	6.0967%	4.5224%
83	6.7599%	5.0780%
84	7.5129%	5.6980%
85	8.3791%	6.3897%
86	9.3526%	7.1586%
87	10.5071%	8.0173%
88	11.7864%	8.9751%
89	13.2015%	10.0380%
90	14.7563%	11.2164%
91	16.3487%	12.4763%
92	17.9091%	13.7878%
93	19.4142%	15.1435%
94	20.8671%	16.5349%
95	22.2756%	17.9805%
96	23.8023%	19.5707%
97	25.3971%	21.2585%
98	27.0940%	23.0555%
99	28.9252%	24.9636%

Age in 2024	% Dying Next Year	
	Male	Female
100	30.8679%	26.9753%
101	32.8872%	29.0605%
102	34.8992%	31.1725%
103	36.9067%	33.2970%
104	38.8701%	35.4112%
105	40.7743%	37.4995%
106	42.6233%	39.5333%
107	44.4113%	41.5131%
108	46.0987%	43.4188%
109	47.7143%	45.2365%
110	49.0338%	46.9622%
111	49.2059%	48.5954%
112	49.3781%	49.5196%
113	49.5643%	49.6640%
114	49.7481%	49.7999%
115	49.9221%	49.9450%
116	49.9545%	49.9725%
117	49.9775%	49.9820%
118	49.9910%	50.0000%
119	50.0000%	50.0000%
120	100.0000%	100.0000%

Table VI
Pre-Retirement Mortality

Non-Uniformed Death-in-Service Mortality Rates

Age in 2024	% Dying Next Year	
	Male	Female
20	0.0422%	0.0141%
21	0.0440%	0.0144%
22	0.0439%	0.0136%
23	0.0451%	0.0140%
24	0.0454%	0.0131%
25	0.0482%	0.0147%
26	0.0525%	0.0163%
27	0.0570%	0.0181%
28	0.0618%	0.0212%
29	0.0680%	0.0231%
30	0.0730%	0.0263%
31	0.0793%	0.0295%
32	0.0856%	0.0313%
33	0.0915%	0.0357%
34	0.0985%	0.0384%
35	0.1033%	0.0422%
36	0.1102%	0.0441%
37	0.1147%	0.0483%
38	0.1209%	0.0506%
39	0.1258%	0.0537%
40	0.1308%	0.0562%
41	0.1347%	0.0583%
42	0.1400%	0.0602%
43	0.1444%	0.0629%
44	0.1505%	0.0665%
45	0.1560%	0.0701%
46	0.1636%	0.0738%
47	0.1720%	0.0778%
48	0.1817%	0.0831%
49	0.1929%	0.0898%
50	0.2057%	0.0971%
51	0.2204%	0.1051%
52	0.2372%	0.1147%
53	0.2562%	0.1261%
54	0.2787%	0.1390%
55	0.3035%	0.1535%
56	0.3318%	0.1693%
57	0.3624%	0.1871%
58	0.3969%	0.2045%
59	0.4345%	0.2240%

Age in 2024	% Dying Next Year	
	Male	Female
60	0.4739%	0.2443%
61	0.5137%	0.2650%
62	0.5555%	0.2867%
63	0.5974%	0.3094%
64	0.6389%	0.3330%
65	0.6821%	0.3599%
66	0.7257%	0.3881%
67	0.7734%	0.4201%
68	0.8234%	0.4565%
69	0.8806%	0.4984%
70	0.9431%	0.5456%
71	1.0147%	0.5991%
72	1.0956%	0.6612%
73	1.1874%	0.7312%
74	1.2915%	0.8102%
75	1.4081%	0.9005%
76	1.5394%	1.0016%
77	1.6863%	1.1150%
78	1.8502%	1.2414%
79	2.0325%	1.3825%
80	2.2354%	1.5401%
81	2.8770%	1.9886%
82	3.7048%	2.5667%
83	4.7695%	3.3105%
84	6.1429%	4.2666%
85	7.9143%	5.4950%
86	10.1967%	7.0723%
87	11.3093%	8.0324%
88	12.5037%	9.1046%
89	13.7792%	10.2807%
90	15.1219%	11.5477%
91	16.4980%	12.8604%
92	17.8783%	14.1854%
93	19.2608%	15.5193%
94	20.6538%	16.8588%
95	22.0598%	18.2347%
96	23.6235%	19.7493%
97	25.2760%	21.3661%
98	27.0301%	23.1070%
99	28.9054%	24.9780%

Age in 2024	% Dying Next Year	
	Male	Female
100	30.8679%	26.9753%
101	32.8872%	29.0605%
102	34.8992%	31.1725%
103	36.9067%	33.2970%
104	38.8701%	35.4112%
105	40.7743%	37.4995%
106	42.6233%	39.5333%
107	44.4113%	41.5131%
108	46.0987%	43.4188%
109	47.7143%	45.2365%
110	49.0338%	46.9622%
111	49.2059%	48.5954%
112	49.3781%	49.5196%
113	49.5643%	49.6640%
114	49.7481%	49.7999%
115	49.9221%	49.9450%
116	49.9545%	49.9725%
117	49.9775%	49.9820%
118	49.9910%	50.0000%
119	50.0000%	50.0000%
120	100.0000%	100.0000%

Table VII
Pre-Retirement Mortality

Uniformed Death-in-Service Mortality Rates

Age in 2024	% Dying Next Year	
	Male	Female
20	0.0422%	0.0174%
21	0.0429%	0.0189%
22	0.0428%	0.0193%
23	0.0429%	0.0209%
24	0.0432%	0.0227%
25	0.0435%	0.0245%
26	0.0464%	0.0264%
27	0.0494%	0.0284%
28	0.0526%	0.0318%
29	0.0558%	0.0339%
30	0.0576%	0.0374%
31	0.0606%	0.0394%
32	0.0634%	0.0426%
33	0.0660%	0.0457%
34	0.0682%	0.0483%
35	0.0714%	0.0506%
36	0.0740%	0.0524%
37	0.0745%	0.0550%
38	0.0772%	0.0558%
39	0.0792%	0.0574%
40	0.0804%	0.0586%
41	0.0811%	0.0595%
42	0.0838%	0.0613%
43	0.0848%	0.0618%
44	0.0866%	0.0635%
45	0.0895%	0.0652%
46	0.0923%	0.0672%
47	0.0961%	0.0704%
48	0.1002%	0.0731%
49	0.1065%	0.0771%
50	0.1132%	0.0826%
51	0.1205%	0.0886%
52	0.1302%	0.0953%
53	0.1407%	0.1025%
54	0.1520%	0.1112%
55	0.1660%	0.1203%
56	0.1827%	0.1305%
57	0.2002%	0.1416%
58	0.2213%	0.1513%
59	0.2444%	0.1624%

Age in 2024	% Dying Next Year	
	Male	Female
60	0.2685%	0.1725%
61	0.2947%	0.1814%
62	0.3228%	0.1911%
63	0.3513%	0.1997%
64	0.3797%	0.2081%
65	0.4101%	0.2159%
66	0.4579%	0.2427%
67	0.5092%	0.2722%
68	0.5677%	0.3076%
69	0.6320%	0.3481%
70	0.7048%	0.3951%
71	0.7878%	0.4504%
72	0.8829%	0.5155%
73	0.9917%	0.5915%
74	1.1164%	0.6805%
75	1.2610%	0.7849%
76	1.4260%	0.9063%
77	1.6160%	1.0480%
78	1.8343%	1.2130%
79	2.0846%	1.4031%
80	2.3701%	1.6232%
81	2.9776%	2.0824%
82	3.7432%	2.6694%
83	4.7047%	3.4195%
84	5.9150%	4.3771%
85	7.4387%	5.5996%
86	9.3526%	7.1586%
87	10.5071%	8.0173%
88	11.7864%	8.9751%
89	13.2015%	10.0380%
90	14.7563%	11.2164%
91	16.3487%	12.4763%
92	17.9091%	13.7878%
93	19.4142%	15.1435%
94	20.8671%	16.5349%
95	22.2756%	17.9805%
96	23.8023%	19.5707%
97	25.3971%	21.2585%
98	27.0940%	23.0555%
99	28.9252%	24.9636%

Age in 2024	% Dying Next Year	
	Male	Female
100	30.8679%	26.9753%
101	32.8872%	29.0605%
102	34.8992%	31.1725%
103	36.9067%	33.2970%
104	38.8701%	35.4112%
105	40.7743%	37.4995%
106	42.6233%	39.5333%
107	44.4113%	41.5131%
108	46.0987%	43.4188%
109	47.7143%	45.2365%
110	49.0338%	46.9622%
111	49.2059%	48.5954%
112	49.3781%	49.5196%
113	49.5643%	49.6640%
114	49.7481%	49.7999%
115	49.9221%	49.9450%
116	49.9545%	49.9725%
117	49.9775%	49.9820%
118	49.9910%	50.0000%
119	50.0000%	50.0000%
120	100.0000%	100.0000%

Table VIII
Illustrative Annuity Values
(6.50% Interest)

Non-Uniformed

Sample Attained Ages in 2024	Single Life Retirement Values					
	Present Value of $1 Monthly for Life		Percent Dying Next Year		Future Life Expectancy (years)	
	Male	Female	Male	Female	Male	Female
50	$155.63	$164.70	0.6531%	0.3811%	32.71	37.10
55	147.94	158.14	0.8204%	0.4597%	28.36	32.43
60	138.51	149.60	1.0572%	0.5472%	24.15	27.82
65	126.74	138.34	1.2559%	0.6582%	20.04	23.25
70	111.98	123.93	1.8425%	1.0347%	16.06	18.80
75	95.12	106.82	2.9402%	1.8063%	12.41	14.65
80	77.11	87.77	5.0243%	3.3041%	9.21	10.93

Uniformed

Sample Attained Ages in 2024	Single Life Retirement Values					
	Present Value of $1 Monthly for Life		Percent Dying Next Year		Future Life Expectancy (years)	
	Male	Female	Male	Female	Male	Female
50	$163.19	$166.66	0.1903%	0.1352%	34.99	37.46
55	154.32	158.66	0.3047%	0.2523%	29.99	32.39
60	143.15	148.75	0.5424%	0.4579%	25.15	27.51
65	129.76	136.79	0.9252%	0.7293%	20.59	22.88
70	114.06	122.38	1.5148%	1.1565%	16.35	18.51
75	96.15	105.52	2.6130%	1.9949%	12.49	14.45
80	76.98	87.09	4.7474%	3.5787%	9.12	10.85

The present values shown above are for illustrative purposes only. They are straight life amounts and do not include the value of future post-retirement increases.

Table IX
Rates of Retirement

	% of Active Participants Retiring								
	Closed and Year 2000 Plans					2011 Tier			
	Non-Uniformed Members					Non-Uniformed Members			
	Male		Female		Uniformed	Normal			Uniformed
Age	Normal	Early	Normal	Early	Normal	Age & Service	Rule of 90	Early	Normal
50	39%		25%		45%				
51	35%		19%		15%				
52	27%		23%		18%				
53	22%		21%		16%				
54	21%		23%		19%				
55	25%	3%	28%	3%	26%		30%		30%
56	27%	3%	29%	3%	30%		30%		30%
57	24%	3%	29%	4%	28%		30%		30%
58	21%	3%	26%	4%	30%		30%		30%
59	22%	3%	29%	5%	40%		30%		30%
60	21%	5%	23%	5%	100%		30%		100%
61	19%	5%	22%	5%	100%		30%		100%
62	32%	28%	33%	20%	100%		30%	10%	100%
63	32%	25%	22%	20%	100%		30%	10%	100%
64	22%	21%	16%	20%	100%		30%	10%	100%
65	30%		39%		100%		30%	10%	100%
66	40%		45%		100%		30%	10%	100%
67	40%		40%		100%	50%	30%		100%
68	30%		40%		100%	50%	30%		100%
69	30%		40%		100%	50%	30%		100%
70	40%		50%		100%	100%	100%		100%
71	50%		50%		100%	100%	100%		100%
72	50%		100%		100%	100%	100%		100%
73	50%		100%		100%	100%	100%		100%
74	100%		100%		100%	100%	100%		100%

Table X
Rates of Disability

All Plan Participants

Age	% of Active Participants Becoming Disabled			
	Uniformed Members		Non-Uniformed Members	
	Male	Female	Male	Female
20	0.10%	0.10%	0.06%	0.06%
21	0.10%	0.10%	0.06%	0.06%
22	0.10%	0.10%	0.07%	0.07%
23	0.10%	0.10%	0.07%	0.07%
24	0.10%	0.10%	0.07%	0.07%
25	0.10%	0.10%	0.08%	0.08%
26	0.10%	0.10%	0.08%	0.08%
27	0.10%	0.10%	0.09%	0.09%
28	0.10%	0.10%	0.09%	0.09%
29	0.10%	0.10%	0.09%	0.09%
30	0.10%	0.10%	0.09%	0.09%
31	0.10%	0.10%	0.09%	0.09%
32	0.10%	0.10%	0.10%	0.10%
33	0.10%	0.10%	0.10%	0.10%
34	0.10%	0.10%	0.11%	0.11%
35	0.10%	0.10%	0.12%	0.12%
36	0.10%	0.10%	0.12%	0.12%
37	0.10%	0.10%	0.13%	0.13%
38	0.10%	0.10%	0.14%	0.14%
39	0.10%	0.10%	0.14%	0.14%
40	0.10%	0.10%	0.16%	0.16%
41	0.10%	0.10%	0.18%	0.18%
42	0.10%	0.10%	0.20%	0.20%
43	0.10%	0.10%	0.21%	0.21%
44	0.10%	0.10%	0.23%	0.23%
45	0.10%	0.10%	0.26%	0.26%
46	0.10%	0.10%	0.28%	0.28%
47	0.10%	0.10%	0.31%	0.31%
48	0.10%	0.10%	0.34%	0.34%
49	0.10%	0.10%	0.38%	0.38%
50	0.10%	0.10%	0.43%	0.43%
51	0.10%	0.10%	0.49%	0.49%
52	0.10%	0.10%	0.56%	0.56%
53	0.10%	0.10%	0.64%	0.64%
54	0.10%	0.10%	0.72%	0.72%
55	0.10%	0.10%	0.82%	0.82%
56	0.10%	0.10%	0.92%	0.92%
57	0.10%	0.10%	1.03%	1.03%
58	0.10%	0.10%	1.15%	1.15%
59	0.10%	0.10%	1.28%	1.28%
60	0.10%	0.10%	1.41%	1.41%
61	0.10%	0.10%	1.55%	1.55%
62	0.10%	0.10%	1.70%	1.70%
63	0.10%	0.10%	1.86%	1.86%
64	0.10%	0.10%	2.03%	2.03%
65	0.10%	0.10%	0.00%	0.00%
66	0.10%	0.10%	0.00%	0.00%
67	0.10%	0.10%	0.00%	0.00%
68	0.10%	0.10%	0.00%	0.00%
69	0.10%	0.10%	0.00%	0.00%
70	0.10%	0.10%	0.00%	0.00%
71	0.10%	0.10%	0.00%	0.00%
72	0.10%	0.10%	0.00%	0.00%

Table XI
Table Rates of Separation from Active Employment

All Plan Participants

Age	Service	% of Active Participants Withdrawing			
		Uniformed Members		Non-Uniformed Members	
		Male	Female	Male	Female
	0-1	10.00%	10.00%	28.00%	22.00%
	1-2	6.00%	6.00%	18.50%	15.00%
	2-3	3.25%	3.25%	12.50%	14.00%
	3-4	3.00%	3.00%	9.00%	12.00%
	4-5	2.75%	2.75%	8.00%	7.00%
25	5 & Up	3.51%	3.51%	9.04%	10.40%
26		3.51%	3.51%	9.04%	10.40%
27		3.51%	3.51%	9.04%	10.40%
28		3.51%	3.51%	8.71%	10.08%
29		3.51%	3.51%	8.38%	9.75%
30		3.51%	3.51%	8.05%	9.43%
31		3.51%	3.51%	7.73%	9.10%
32		3.39%	3.39%	7.41%	8.78%
33		3.07%	3.07%	7.10%	8.35%
34		2.77%	2.77%	6.79%	7.92%
35		2.49%	2.49%	6.48%	7.49%
36		2.22%	2.22%	6.18%	7.06%
37		1.97%	1.97%	5.89%	6.63%
38		1.76%	1.76%	5.60%	6.33%
39		1.59%	1.59%	5.31%	6.03%
40		1.47%	1.47%	5.04%	5.73%
41		1.37%	1.37%	4.77%	5.43%
42		1.28%	1.28%	4.51%	5.14%
43		1.19%	1.19%	4.26%	4.97%
44		1.11%	1.11%	4.02%	4.80%
45		1.02%	1.02%	3.78%	4.63%
46		0.94%	0.94%	3.55%	4.46%
47		0.85%	0.85%	3.34%	4.29%
48		0.76%	0.76%	3.14%	4.17%
49		0.67%	0.67%	2.95%	4.06%
50		0.59%	0.59%	2.76%	3.94%
51		0.50%	0.50%	2.60%	3.82%
52		0.43%	0.43%	2.43%	3.71%
53		0.38%	0.38%	2.29%	3.71%
54		0.36%	0.36%	2.15%	3.71%
55		0.30%	0.30%	2.02%	3.71%
56		0.32%	0.32%	1.93%	3.71%
57		0.24%	0.24%	1.83%	3.71%
58		0.24%	0.24%	1.75%	3.71%
59		0.23%	0.23%	1.68%	3.71%
60		0.22%	0.22%	1.64%	3.71%